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Editorial Notes.

A series of reviews on the work of agricultural stations and experimental farms in and outside India will form a special feature of this journal in future and the current number begins with Madras farms. We trust this aspect of agricultural journalism will interest our readers. We request them to help us with their well-considered criticisms and contributions under this head.

During the last twenty years, hundreds of co-operative societies have sprung into existence. Capital which was dubbed very shy before, has freely flowed. Yet the mass of the people in the countryside has hardly moved. The Legislature and Government have not been unmindful. Acts like the Punjab Land Alienation Act, the Deccan Agricultural Relief Act, the Bengal Tenancy Act, the Agricultural Loans Act, the Land Improvement Act which were passed, have given some

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relief and been amended from time to time. The root however has been from the villagers' point of view, the placement, perhaps in a more subtle form, of one kind of oppression by another. The toiling peasant feels that he is never remains the same, the intentions of the Legislature notwithstanding. The root causes of the evils remain untouched. Only certain palliatives are suggested and they fail of their purpose because the methods are unsuited and unsuitable. The uncanny cultivator continues to be the victim of ill-informed politicians, subtle lawyers, helpless judges, angry administrators, the pouncing trader and the haughty doctor. The town and the noisy men therein still claim disproportionately greater attention. The unlettered and cultured and humble villager is left in the cold.

Eminent Indians like Dadabhai Naoroji, and R. C. Dutt, have with excellent intentions, erred we believe in raising wrong issues. It is not the land-tax that is oppressive. It is not the Permanent Settlement that will prove a panacea for all the present ills. The oft-quoted prosperity of Bengal is beside the point and is simply illusory. It is said that Nero was fiddling while Rome was burning. The accumulation of large landed properties in the hands of a small irresponsible and unfeeling section of the population does not add to the vitality of the nation nor conduce to its well-being or progress. Parasitism, whether in the plant or the animal kingdom, saps the vitals of the helpless host which remains a weakling and eventually dies. A very vigorous self-reliant and independent peasantry which was the dream of Sir Thomas Munro, must be built up anew. Greater

attention ought to be paid to rural problems and rural welfare. Questions touching the unobtrusive and nervous villager must be freely, frankly and constantly discussed with him and *with him alone* and not with a self-constituted proxy or an interested middleman.

Statements like "the increasing absorption of gold shows the increasing prosperity of a country" "indebtedness grows with prosperity" are to be taken at their face value. The histories of England and America prove the incorrectness of such views. Superfluous hands must be weaned from the pursuit of agriculture or their dependance on it and their attention, diverted into channels, openings for which must be free and regulated by the individual's capacity for advancement.

An idle brain contrives to do mischief and brings ruin on the possessor and his kinsfolk. To keep the countryside busy, village industries must be encouraged and industrial and landbanks brought into effective operation so that a thriving village population may engage itself on honourable and health-giving pursuits and be free from the baneful effects and undetectable machinations of an outwardly polished, and devitalised urban society.

A central organization known as the Bureau of Mycology has been established in Kew, England for the encouragement and co-ordination of work throughout the Empire on the diseases of plants caused by fungi in relation to agriculture. The Committee of Management consists of some of the foremost biologists in Britain with Viscount Harcourt as their chairman.

Empire
Mycology.

Dr. E. J. Butler, late Imperial Mycologist, Pusa is Director. The Bureau will work broadly on the lines of the existing Imperial Bureau of Entomology at South Kensington. It will be a central agency for the accumulation and distribution of information and for the identification of specimens sent in from all parts of the Empire.

The Mysore Agricultural Calendar for 1921 has been published. It contains very useful articles of a practical nature written by specialists who know the subject. The ground covered is wide and almost all subjects in which the ryot is interested have been ably dealt with. The language is simple and the aim is amply fulfilled. The treatment leaves nothing to be desired and the booklet contains matter which can form food for reflection not only for Mysoreans but also gentlemen engaged in farming in other parts of the country. Monthly notes are a special feature of the publication which adds to its usefulness. Each copy is priced one anna and should be found in every rural home.

Comparative study of the Mulberry silk industry in the different parts of the world.

K. ACHYVA, SERICULTURAL EXPERT.

The Mulberry silk Industry which is the queen of the textile industries and which is an important key industry may be divided into six distinct economic organisations each independent of the other and yet forming a peculiar combination of its own. These are (1) cultivation of mulberry (2) rearing of silk worms—an art

▲ paper read at M. A. S. Union Conference on 22-12-1920.

which has been very highly specialised since the worm is domesticated (3) manufacture of silk-worm eggs known as seed where the use of microscope for moth examination has reduced the silk worm diseases to a minimum in highly developed sericultural countries (4) treatment of cocoons i. e., the reeling of raw silk wastes including pierced cocoons (6) manufacturing of silk fabrics out of raw and spun silks after the processes of twisting, bleaching, dyeing, weaving, finishing and designing. These six functions of the silk industry representing as they do six distinct economic organisations are more or less similar in all the silk producing countries of the world, but the degree of success attained by each is dependent upon many other conditions. Chief amongst them are an abundant supply of mulberry, suitable climate, cheap and willing agricultural or semi-agricultural population in the case of 1 and 2. Skill, knowledge and efficiency of labour forces employed in the case of 3 and 4 and highly complicated devices in the form of machinery and the like used in 5 and 6.

The first two parts may be termed an agricultural pursuit inasmuch as the cultivation of mulberry and the seasonal silk-worm crop of cocoons is concerned. Since the worm is domesticated and this branch of the industry is purely carried on in the cottages of agriculturists, it is termed a 'Cottage Industry' and is known as such all the world over. It is this aspect of the industry where machinery plays absolutely no part that has given the eastern nations where agricultural labour is satisfied with little returns, a decided advantage over the western nations and has highly complicated the international trade in raw silk.

The manufacture of seed has become a highly specialised art after the system expounded by that eminent French scientist Pasteur of microscopically examining every mother moth that lays eggs to find out the quality of the seed. This discovery has been the means of eliminating the worst form of silk worm disease known as pebrine or bringing it down to its lowest minimum.

This has demarcated seed industry from the rearing industry in highly developed sericultural countries and being the controlling factor of diseases is in its turn controlled by the respective Governments under a 'guarantee'.

The reeling industry may be termed the 'border line' between the cottage industry and the manufacturing industry. In some silk producing countries, this branch of the industry is very highly developed by the system of 'Filatures' where the system of steam heating basins and the application of motor power for the purposes of turning the reel have replaced the old 'primitive method of heating basins by the ordinary fire wood and turning the reels by the human agency which are still in vogue in Bengal, Mysore and Kollegal in India and in parts of China. It is to these primitive appliances employed that the poor quality of the Indian raw silk which finds no sale abroad and few competitors in India is due.

Silk wastes are what may be termed the by-products of the silk industry including long and short fibre wastes secured in the process of brushing and cleaning the cocoons to find out the true filament; pierced cocoons—naturally pierced or otherwise in the act of brushing or rough handling in reeling; double cocoons in India (in other countries they are reeled); and the thin wrapper left over after the cocoons are almost used up. In Kashmir in India and in all other countries silk wastes are graded, cleaned, and sold in an unadulterated state, whereas in India the wastes are sold with all the dirt they contain including chrysalids. By not observing the proper system of grading and cleaning, India loses annually an enormous sum of money.

All the wastes are cleaned, carded and spun in spinning mills and sold as spun silk. There are two such mills in Bombay. There is sufficient material for one mill in Mysore and Kollegal.

Chrysalids are another byproduct the oil of which when extracted is used in the manufacture of soaps. In India, it is generally wasted. In China, it is a table delicacy.

Silk weaving: It is this branch of the industry that consumes the total output of raw silk except small quantities used in the manufacture of balloons, parachutes and cartridge bags which found their way to the trenches in the last war. The importance of reserving the silk industry as a great national asset comes in when the high arts of civilization are displayed in the colouring, designing and finishing of silk fabrics. No other fibre presents the same wide scope for this art. The system of state bounties and subsidies given in France for the cocoon producing and raw silk industries is to preserve this high national art in silk weaving.

The chief silk producing countries of the world are:—Japan including Corea; China including Indo-China; Italy, France, Asia-Minor and the Levant including Persia and India including Kashmir. Of these countries Japan and Italy have marched forward rapidly both in the production of cocoons and raw silk. China, France and Persia are more or less stationary; figures for Asia-Minor and Levant are wanting and hence cannot be classified. India except Kashmir is on the decline. The reasons for this state of affairs are not far to seek. A critical survey of each country would, I believe, give the silk Industry in India ample object lessons for remodelling her primitive organisations and overcoming the lethargy, indifference and prejudices of the silk worm rearers, reelers and weavers, to adopt more advanced and rational methods.

Japan and Corea:—Japan with its sturdy peasantry ever alive to the advancement of their country in all spheres of life with a climate pre-eminently suited for sericulture, an abundance of cheap and efficient agricultural labour for rearing and reeling and with a paternal government giving every encouragement to those engaged in the industry in various ways with a lavish expenditure of money, it is no wonder Japan is on the forward move supplying a little less than half the total produce of raw silk of the world. Besides individual efforts the activity of the Government may be summarised thus:—

1. Two higher sericultural institutes in Tokyo and Kyoto for advanced course and research besides eight prefectural institutes and five country institutes.

2. Four prefectural schools and thirteen country schools besides many private schools for educating the rural population.

3. Courses of study in agricultural, and forest colleges, besides agricultural stations, include sericulture.

4. Subsidies are given by the Government for enlarging mulberry plantations.

5. Circuit lecturers are employed by Government, prefectures, counties, towns and sericultural associations to direct those in the industry. Some of them are whole-time lecturers, others are recruited from amongst the graduates of the year for the season.

6. As many as fifty competitive exhibitions are held annually with government help to encourage rearers and reeler.

7. Special laws are enacted whereby individual rearers are not allowed to manufacture seed in order to protect them from disease. There are as many as three thousand employees of the central and prefectural governments who visit seed establishments and certify as to their quality. A sum of 20 lakhs is spent on this work alone by the Government.

8. In addition to the above Government support numerous sericultural guilds. Silk worm seed guilds, raw silk guilds, rearers guilds etc. attached to the central silk association with its head quarters at Tokyo and with a prince of the royal house invariably as its president, are in active existence helping the industry in every way possible besides issuing literature in a cheap and popular form for the guidance of its members.

9. Co-operative societies form another important factor in the wholesale purchase and sale. There are as many as one thousand three hundred societies helping the sericulturists in the country.

10. Conditioning house of Yokohama fulfils a function which is most necessary to improve the quality of raw silk and detect fraud by testing the humidity in silk and by degumming also.

11. Above all, the Empress takes a keen interest in the industry in having a small mulberry garden of her own in the palace grounds and rearing worms.

Corea:— All that has been done for Japan is being done for Corea after it became a protectorate and the result has been that in the course of about ten years the acreage under mulberry and the cocoon production has increased almost fourfold.

Italy:— Italy with an intelligent and thrifty agricultural population; a suitable climate and rich soil for the cultivation of mulberry; a highly developed system of rearing worms evolved after years of patient study by Italian sericultural savants, new breed of crosses withstanding disease and enriching the silk fibre in the cocoons and above all the highly efficient and almost perfect state of the silk filatures, which has given Italy *the premier rank in the classic silks in the raw markets of the world*—these and many other causes have added to the prosperity of the Italian silk industry. The Government of Italy has also thrown itself heart and soul into the industry by opening sericultural institutes and schools for research and education work and by liberal industrial subsidies and bounties to private enterprise. The conditioning house at Milan and the great attraction of Milan as the world's central market for raw silk and surplus cocoons has added in no small measure to the rapid growth of the Italian filatures—and the development of the Italian silk market of the world.

China. Conditions in China are very favourable for the rapid growth of a cottage industry like the silk industry with an industrious and teeming agricultural population accustomed to rearing worms from time immemorial, but the want of a stable government

and the vicissitudes of changing politics and civil strife, want of proper transport communications, have been some of the causes for the stationary nature of the industry. If China had unity of action and the Government of China could give all the facilities for her sericulturists as Japan in the opening of a conditioning house, the manufacture of disease-free seed and subsidies for enlarging mulberry plantation &c., the growth of the Chinese silk industry would have been phenomenal.

The establishment of steam filatures at Canton and its neighbourhood which receive cocoons through the splendid high way of the Yang-tse-kiang river has given a good name to China's silk in the world's market and thus improved the cocoon industry to a good extent by getting better values. Country reelers have also improved their silk by the introduction of re-reels.

It is interesting to note that the climate of Southern China is similar to that of Southern India—particularly Mysore plateau—and the breed of cocoons is the polyvoltine worm just as in Bengal, Mysore and Kollegal, whereas in Northern China as in Northern India (Kashmir), the univoltine worm is reared—the difference of course is largely one of climate.

Indo-China. The French Government has not been slow to take advantage of the good climatic condition of the country and an indigenous breed of the worm to develop the silk industry to its utmost capacity. The sericulturists of France tried first of all to rear univoltine French worms which failed, then tried the method of hybridisation and infusion of new blood which also failed and lastly succeeded in improving the indigenous breed by a *careful system of selection*. There is a lot for India to learn out of this system of careful selection and the great revival accomplished thereby since many of the agricultural conditions of Indo-China resemble that of India. The chief help given by the Government is the supply of disease-free seed *free of cost* from small inexpensive rearing centres scattered all over the country.

France. Favourable conditions prevail in Southern France for a progressive industry, but the agricultural labour engaged in rearing is not satisfied with the returns though it is a purely supplementary industry undertaken just before the agricultural harvest work. The industry is only kept up through the efforts of the French Government by a system of bounties and subsidies paid on a liberal scale both to the cocoon and raw silk producers. The national importance is attached to the high arts of civilization displayed in the manufacturing industry. The system of bounties alone cost the French Government as much as fangs 200,000. With all the bounty system, I am of opinion that the aggressive policy of the Far Eastern silk market and the improving of quality annually which has already complicated the international trade in raw silk will deal a 'knock-out' blow to the French silk industry unless some other means besides bounties is found for eliminating such silks.

Persia. The periodical political changes have affected Persia's silk industry just as that of China. It is well suited to the growth of univoltine worm. This industry is peculiarly suited to Persia where the Zenana system prevails and women can take an active part in the rearing operations.

India. There is no part of the world where the industry is so scattered as in India, though concentration would have given many advantages. The chief silk producing areas are Kashmir, parts of Bengal, Mysore plateau and Kollegal. Other Provinces and Indian states are yet in an experimental stage and so not worth noting down in a narrative like this.

Kashmir. The industry has been in existence for many years on a small scale and it would have died a natural death if the State had not come to its rescue by bringing the industry under a state monopoly. The remarkable growth of the industry under the state control and the large revenue it brings to the state as well as to the agriculturists has often been discussed in the public press as an example of an industry fostered by the state contributing largely to

the prosperity of the agricultural population of the state. Hence a side light into the working of this department would be of some interest.

The sericultural department of Kashmir and Jammu—each independent of the other—is controlled by the Settlement Commissioner with the Revenue Minister responsible to the Durbar. The department controls the mulberry trees of the state by laws enacted making it penal to cut down even a branch thicker than a man's thumb—the penalty for each offence and for cutting down each tree is as much as Rs. 10. The rules are enforced through the Revenue Department. The tree mulberry has been growing wild abundantly in Kashmir valley and sparsely in Jammu province and efforts are being made by the department to extend the plantation by issuing seedlings from the many state nurseries. Rewards are given to village headmen who take interest in the mulberry cultivation and to individual ryots who plant them largely. The leaves are allowed to be used *only for silk worm rearing* by any rearer, no matter on whose land the tree stands.

Rearing. The univoltine seeds largely imported from Italy and France and hibernated in Srinagar and Balote are distributed free to the rearers according to the season and supervised by the assistants and inspectors of the department. Copper sulphate for disinfection and arsenic for killing rats are also distributed free along with seed. The climate being ideal, the cocoons are as good as those produced in France and Italy. Recently efforts are being made to increase the local production of seed which is proving a great success. As much as 45,000 oz. of seed are distributed annually in both the provinces which, I believe, is the limit for the existing number of mulberry trees. The cocoons are bought by the state paying almost Rs. 50/ per dry maund regardless of quality. Those taluks near about the filatures bring in cocoons in green state which is taken by measurement and others bring in a dry state. Almost 6 lakhs of rupees are received by the rearers for cocoons besides cloth rewards given to individual rearers for extra good quality of cocoons.

The village headmen receive a small commission on cocoon production for providing house accommodation and similar other help to those rearers who are without enough accommodation, since rearing is conducted largely on the ground floor and also for giving help to the Sericulture Department in the oversight of mulberry trees in their respective villages. The Sericulture Department is given a voice in the appointment and dismissal of village headmen to make their work effective. The tahsildars also receive rewards from the department for extra good help given.

Reeling. There are two state filatures in the headquarters of the two provinces viz. Srinagar and Jammu. The Srinagar filature is the biggest individual filature in the world employing as many as 7000 workmen and is complete with every modern equipment. The Jammu filature is a small one with 200 basins. The silk reeled is of a very high quality but the Department had to overcome a lot of prejudices against the Indian silks in the European markets, and has succeeded eventually in classifying the Kashmir silk differently as it ought to be, since the silk is from the superior univoltine cocoons unlike the Bengal and Mysore cocoons and reeled in the most modern style. The chief markets for Kashmir silk are France and Italy.

Silk waste. Is all cleaned, graded and sent to France and Italy.

Weaving. It was tried on a pretty big scale by the engagement of an expert from England but was given up as not paying. It is being started again by a private Indian gentleman on a small scale, the state giving him some help.

Income. The net income to the state during the last four years is nearly 30 lakhs of rupees though the income before the war did not exceed 10 lakhs.

Summarising Kashmir efforts, what one could say as regards the other provinces of India is this:—

All along the Himalayas including the Punjab and northern part of United Provinces, the industry can be successfully started

by first importing disease free univoltine seed from France and Italy. It can even be made a state monopoly in the beginning since *gentle pressure* is necessary to induce the ryots to take it up and then handed over to private enterprise if found necessary.

Experience of Kashmir will considerably help towards its success.

Bengal. The multivoltine breed of worms known as 'Nistari and Chotu polu' is reared, feeding them on bush mulberry. The return from the industry is not much owing to the disease amongst worms and the presence of the parasite fly called "Ujji" and hence there was a great decline until the Government stepped in and started seed-distributing nurseries in several places. The chief object of these nurseries is to rear cocoons very carefully and distribute them as seed cocoons. The existing nurseries are not many and so Government can save the industry by multiplying these useful seed nurseries and supplying all the seed necessary and eliminate the disease altogether.

Reeling is done on primitive methods and with no regard to quality. The silk is sold all over Northern India for the use of the Indian hand looms. There were two or three firms notably Messrs. Lorins Payne & Co., of Lyons, Anderson Wright & Co., of Calcutta who put up modern filatures to find a sale for the Bengal raw silk in the European markets but they have given up the business after many years of work owing, I believe, to the increased cost of cocoons, high wages and the deterioration in the quality of the cocoons and not the over-anxious European markets to buy Bengal silk.

Mysore and Kollegal. The variety known as the Mysore variety of polyvoltine worms is reared all over the Mysore plateau including Kollegal, feeding the worms on the bush variety of leaves which grows well. The life of the bush in Kollegal is about ten years when the plantation is removed and some other crop is grown for a year and the land is again brought under mulberry the following year. The bush is propagated by cuttings. The mulberry land is

not irrigated in Kollegal though in many parts of Mysore the land is irrigated and more than 5 crops, which is the general average in Kollegal, are taken. The system followed in all branches of the industry is the same in Mysore and Kollegal.

About 15,000 acres is under mulberry cultivation in Kollegal taluk and about the same number of families engaged in rearing. The mulberry cultivator is not always the rearer and the rearer is not always the silk reeler.

The methods employed both in rearing and reeling may be termed "primitive". The chief defects in rearing are :— *overcrowding* of worms, ill ventilation, defective system of cleaning the litter, heaping the litter in the cattle sheds which are generally very near the rearing rooms; non-disinfection of rearing implements such as stands, trays and chandrakies. These defects may be remedied by patient work by overcoming many of their prejudices but it would require time. But the great loss to the rearer in this taluk is the use of seed cocoons from Mysore rearers which are not always free from disease. The loss thereby is as much as 20% of the entire crop annually. It is only the supply of disease-free seed under a guarantee that will not only bring prosperity to the Kollegal rearer, but also increase the acreage under mulberry. The net income from an acre of mulberry (only poor quality land is brought under mulberry) in dry land is Rs. 150 at present and it will be much more if the disease is eliminated and if such land is utilised. If the mulberry cultivator is a rearer, the income is much more.

The reeling industry is also carried on in the villages off and on at the cocoon season—the methods used are most primitive—no regard is paid for the quality of the silk, its lustre, tenacity, elasticity and least of all size and winding properties. The silk finds an easy sale all over South India in the silk-weaving towns such as Conjeeveram, Kumbakonam, Coimbatore, Dharmavaram, Salem. The prices realised are good, considering the quality of the silk. If the silks are well reeled and the sales extended to French and Italian markets, it ought to find a good sale considering the brilliancy of the Mysore quality silks unsurpassed among raw silks.

Silk waste. Being uncleaned waste just as it comes from the reeling basin, the prices realised are almost nothing. If it is graded and cleaned, it would find a good value and good sale abroad.

Weaving. There are about 400 silk looms in Kollegal using local silk but specialised in weaving high grade saris. The workmanship displayed is excellent but the bad quality of silk mars the quality of the cloth to a great extent.

Mysore is trying its best to supply disease-free seed from state seed nurseries, but the attempt for the last 12 years has only brought the supply to almost ten per cent of the total quantity necessary. In Kollegal, the idea is to supply disease-free seeds to all the rearers and maintain it so that the rearers need not bring in seed cocoons from Mysore. Besides this, the improvement of the worm will be effected by a hill farm at Coonoor which has already been started.

Summary of what other countries are doing which can be copied out in India with advantage.

1. Supply of disease-free seed as in Indo-China and free if necessary.
2. System of bounties and industrial subsidies as in France to preserve the higher arts of civilization displayed in the silk handloom industry of India.
3. Opening of a higher Sericultural Institute etc. as in Japan.
4. Improvement of the indigenous breed by a system of careful selection as in Indo-China.
5. Introduction of other varieties and hybridization should not be attempted.
6. Extension of the industry to all suitable centres if necessary by bounties given to mulberry cultivation as in Japan.
7. Improvement of raw silk by encouraging private individuals to put up modern filatures.

7. System of wholesale purchase and sale of raw silk by co-operative societies as in Japan.

8. Improvement of waste silk.

9. Extraction of oil from chrysalides for the manufacture of soap.

News and Notes.

A London despatch to Washington says that a syndicate of capitalists of the Western States has leased 600,000 square miles of Siberian land from the Russian Government.

The All-India Cow Conference for 1920 was held at Nagpur, Central Provinces during the National Week.

Seed-wheat from the famous Plant-breeding Station, Slavof, Sweden, is being introduced into the Scotch market. One or two small parcels sown in 1919 yielded crops of 60 to 65 bushels an acre. Its merits are great hardiness, high yield and resistance to yellow rust. The variety—Iron wheat—is sold at 120 to 135 shillings per 504 lbs.

At the last July Council meeting of the Royal Agricultural Society of England it was resolved to close the Woburn Farm and experiments which entail a loss of £ 1200 a year and yield results in which only 0.3 per cent of the members take any interest.

Returns relative to the financial position for 1919 of the Scottish Small-holders Organization Ltd., are unsatisfactory and according to the Scottish Farmer, November 13th, show that it is an institution kept alive by the subsidies from the Board of Agriculture.

From a White Paper published it is understood that from 150 farms visited the total yield of milk during the period, October 1,

1919 to April 30, 1920 in England and Wales was 1,22,990 gallons and in Scotland 572,196 gallons. In the former case the average yield of milk per cow per day was 1.476 gallons and in the latter 1.574. In England the average weight of ration purchased and home-grown per day was 62.95 lbs., in Scotland 89.15.

According to Mrs. Hobbs who was the lecturer at the opening meeting for session 1920—21 of the Glasgow and West of Scotland Agricultural Discussion Society, milk is hardly used at all in country districts in the United States of America.

Professor Wallace, observes the Scottish Farmer, said in his opening lecture on Colonial and Indian Agriculture delivered on 14-10-20 that the "great secret of the Garton system of Panti-breeding was due to the introduction of multiple crossing, involving in most cases the blend of wild and weedy but robust and vigorous species and also the regeneration resulting from the use of pollen from different plants within the same species. By these means the tendency to degeneration liable to occur among self-fertilised and the intensely in-bred crop plants was overcome and increased vigour and crop producing power was obtained."

Mr. E. S. Beavan in a paper read to the Farmers' club, London, comes to the conclusion that inherited characteristics alone are useful in breeding. The predominant factor of productivity in cereals is the seed farming energy of the individual plants composing the crop. The ratio of grain to straw is the measure of the factor. This is closely correlated with yield of grain per acre. A consistently higher ratio can be obtained in cross bred races than is present in either of the two parent races.

Madras Farms:—(1) Attur.

This village is situated on the Chingleput—Arkonam line of the South Indian Railway.

At the instance of Mr. (Now Sir) A. Chatterton, Professor of Engineering on special duty, who was investigating the availability of ground water in the sandy bed of the Palar on the eastern bank of which Attur stands, a small area was acquired for pumping experiments, a well was sunk and a pump, fitted up.

The site was however handed over, for an experimental station, to the Agricultural Department in October 1905. The old well proved unsatisfactory. Another was sunk and the whole installation, transferred to the control of the Deputy Director of Agriculture in September 1906.

The soil is poor light sand and part of the site had been lying waste from time immemorial.

The rainfall averages about 46 inches distributed as under:—

April to May	2.0 inches.
June to September	18.4 „
October to December	25.0 „
January to March	0.9 „

The climate is milder than in the inland districts. Hot weather rains are received but are precarious. West winds blow a great part of the year and at times with violence. September is the most important month for sowing when twenty-five per cent of the dry land and thirty-three per cent of the wet lands are sown.

The object with which work was started here was "the thorough trial of perennial and exotic cottons under irrigation, the growth of fodder crops and experiments in fruit cultivation."

The area taken was 69.13 acres of which 64 acres was brought under cultivation and the estate was divided into two blocks by the main road from Chingleput to Conjsevaram.

Soon after possession was given, the land was cleared and cottons, sown in 1905—06 but were however late. The varieties tried were the exotic, Sindh-acclimatized Egyptian cotton, Caravonica, Sea Island and American cottons:—(1) Russel, (2) Truit, (3) Mattis, (4) Christopher, (5) Chiese, (6) Whittle, (7) W. A. Cook, (8) Boyd's Prolific, (9) Koley's Prolific, (10) Harendon, (11) Cameron, (12) Dearing, (13) Mathew's Long Staple, (14) Texas Burr, (15) Braddy, (16) King's Improved, (17) Smith's Improved, (18) Dickens and the indigenous Jadapathi and Pamidipathi varieties and Seemapathi.

Egyptian gave 130 lbs. kappas an acre.

Caravonica which was both sown and transplanted grew luxuriantly but did not fruit before the rains in 1906. Sea Island was fair with 210 lbs. kappas an acre on a plot of 60 cents. Some American varieties did well and they averaged 510 lbs. an acre.

At the end of the season all cottons were pruned. In the second season they started well, became sickly in December following, but recovered later.

A few sorghum varieties were tried for two seasons and Talaivirichan gave the highest straw with 2467 lbs. an acre. Rayachoti cumbu grew well but was caught in the rains in December and the yield was poor.

Cowpeas, horsegram, blackgram, and greengram were sown and the crops ploughed in, sunhemp failed from insect pests and Lucerne from Bangalore was disappointing.

A further trial with cottons did not come up to expectation, it soon became evident that the Farm was quite unsuited for the purpose for which it was intended owing to the extreme poverty of the soil and its porosity. It was accordingly closed in 1908.

Letter.

Crowthorne,
Southbourne, Hants,
December 31st, 1920.

To

The Secretary,
Madras Agricultural Students' Union,
Coimbatore.

Dear Sir,

I am much obliged to you for your letter about the Conference and the kindly wishes which accompanied it. I trust the Conference, which by now is over, was a great success. I shall see an account of it in the paper, no doubt, but at present I am rather out of touch with Madras, as my subscription apparently expired some time ago and though I have sent a fresh one, I have not yet received my paper.

There have been many changes since I left which have left the staff at the College and indeed throughout the Department, very different from what it was at this time last year. There can be little doubt, I think, to any one who knows anything of the working of the Department for the last ten years, that Mr. Sampson's absence even for a short time will be most severely felt.

Conditions in England are of course very different to what they were when I was last here. It is difficult for me, accurately to say just what the differences are, because I have only had six months' experience of my own country since 1905—when I first came to India, but of course the primary and most noticeable difference is the very much higher cost of living. Fortunately for us Indian servants home on leave, this has been largely counterbalanced by the very high rate of exchange which made my saved rupees fetch nearly twice as many pounds sterling as

they would now for instance. Then there is an institution called Income Tax. I wonder how many of you in India realise that all except very small incomes, pay 6 in every 20 direct to the Exchequer, or to the Government, as we should say in India, as Income Tax.

There are however signs that prices are coming down, and in any case, I do not wish to fill this letter with further laments, for in one way and another I am really enjoying my leave most thoroughly. I have joined a local Badminton Club. I can see some of my old students smiling at this, as I expect they remember my expressing my feeling about this game—but they must remember that it is Winter, and that it is dark soon after 4 P. M. It is also wet and windy and any out-door game, except golf, is almost impossible and so twice a week I play Badminton in a large Hall with a shuttle cock, not a ball. This is a cork core with feathers stuck in it and is extremely rapid in its flight for short distances, but drags a good deal and consequently one tends to be late for short shots, and easily for long ones, but it is good fun and provides plenty of exercise. Then I have been attending the Bournemouth School of Art. I took in some of my own designs to the Principal and after discussion with him have taken up 'Design' work and a course on "Lettering"—I shall have some wrinkles to impart to the College Artists if and when I return.

I am also doing a little, rather intermittently I fear to write up my lecture notes on Agriculture, with a view to printing them. Of course, it is quite likely that no publisher will take them, (I wonder if so whether I could persuade the Union to give me anything for them?) but I must produce something, as a start, before one can approach the publishers, and so I have bought a type-writer and sit down at my study table when I get the chance. I have a good bit done already and some of the illustrations, and have resolved, (one of these well known New

Year resolutions, no doubt) to devote February and early March to it. I am going out of England from the month of January to Switzerland and France. When the days begin to get a bit longer and the temperature warmer, I hope to spend more time exploring England by road in my little car.

I have also been assisting in some smaller theatrical performances in aid of various local charities, which have taken up a good deal of time, but have been financially successful, and have afforded me considerable amusement and some experience for the theatrical performances at the College, which I hope still go on.

I had the unusual experience of snow, the other day. It was some time since I had seen that, as you may imagine. I was in London at the time and took the opportunity to see the Houses of Parliament and Westminster Abbey, with their architectural features emphasised by the white covering.

Well—I suppose, Mr. Secretary, that you won't consider I have done my duty unless I impart an agricultural tinge to this letter (this sounds like an extract from a report of a Committee of Rural Education). Well—so far as I have been able to gather, farming or at any rate corn growing is a profitable industry at present, in spite of the very high wages paid to all farm labourers. Wheat and barley still sell very high. Live stock are scarce and expensive, and as British farming depends on the keeping of a large number of animals to consume the straw grown on the land to return it in the shape of manure, it seems likely that modifications of this practice must take place. In Agriculture, as in every thing else, state restrictions have increased and there has recently been much discussion in Parliament on an Agricultural Bill, which aims at giving the Government powers in certain conditions to compel good farming, on the ground that the land is really the nation's, and that it is essential to grow as

much food as possible in the country and minimise the risk of being starved out in case of another war. Locally all dogs have to be muzzled, owing to an outbreak of rabies in the neighbourhood. For many years this country was absolutely free of this dreadful disease but unfortunately in some way—it is said by aeroplane—the germ was introduced and outbreaks from time to time occur. “Efficient muzzling”—every dog of whatever size must wear a wire cage like muzzle over his head, whenever he is loose or outside the house,—will of course stamp it out, since if no dog can bite another, he cannot spread the disease. Well, I must end this letter, or the Editor will be muzzling me. I wish the Union and its members a prosperous and pleasant New Year.

Yours Sincerely,
(Sd.) R. Cecil Wood.

Departmental Notes.

Promotions and appointments :—

1. Mr. P. A. Raghunathaswami Ayyangar, III grade permanent to be I grade S. P. T. on Rs. 200 vice Mr. T. V. Ramanakrishna Ayyar on other duty.
2. Mr. T. Lakshmana Rao, III grade permanent to be II grade S. P. T. on Rs. 175 vice Mr. S. Sundararaman on other duty.
3. Mr. S. R. Venkatakrishna Mudaliar III grade permanent to be II grade S. P. T. on Rs. 175 vice Mr. B. Viswanath on other duty.
4. Mr. K. Ramayya, IV grade permanent to be III grade permanent in an existing vacancy and to be II grade S. P. T. on Rs. 175 vice Mr. Rao Sahib Y. Ramachandra Rao on other duty.
5. Mr. K. Cheriyan Jacob IV grade permanent to be III grade S. P. T. on Rs. 150 vice No. 1.
6. Mr. P. S. Jeevanna Rao, IV grade permanent to be III grade S. P. T. on Rs. 150 vice No. 2.
7. Mr. C. R. Sreenivasa Ayyangar, IV grade permanent to be III grade S. P. T. on Rs. 150 vice No. 3.
8. Mr. V. Ramanatha Ayyar, Farm Manager, V grade on Rs. 50-5-100 to be Assistant to the Cotton Specialist, III grade S. P. T. vice No. 4.

9. Mr. S. N. Chandrasekaran S. P. T. Assistant, Madras Museum to be III grade S. P. T. on Rs. 150 vice Mr. G. N. Rangaswami Ayyangar, on other duty.
10. Mr. K. T. Balaji Rao, Farm Manager, on probation V grade on Rs. 50-5-100 to be Assistant in Economic Botany, IV grade on Rs. 75, 75, 75-5-125 on probation.
11. Mr. M. P. Gowrisankara Ayyar, Farm Manager on probation on Rs. 50-5-100 to be Assistant under the Government Sugarcane Expert on Rs. 75, 75, 75-5-125 on probation.
12. Mr. S. Ramachandra Ayyar, Agricultural Demonstrator, to be Assistant IV grade, Science Section on Rs. 75, 75, 75-5-125 on probation and posted to the Entomological section.
13. Mr. S. Narayana Ayya, transferred to the Koilpatti Agricultural Station in relief of Mr. A. Chinnathambi Pillai.
14. Mr. P. Krishnaswamy, Sub-Assistant to the Marine Biologist, Fisheries Department and S. P. T. Assistant in Entomology to be Assistant in Entomology with effect from 25-8-1920.

Leave:—

1. Mr. M. Mangesha Rao, Agricultural Demonstrator, Mangalore, privilege leave for one month from or after 15-2-1921.
2. Mr. H. Burrows, Assistant Farm Manager, Sim's Park, privilege leave for 6 months from date of relief.
3. Mr. G. L. Narasimha Rao, Assistant Farm Manager, will be considered to have been on one month's furlough from 7th November 1920.
4. Mr. P. Abisheganatham Pillai, Agricultural Demonstrator, VIII Circle privilege leave for 11 days from 3-1-1921 with permission to avail himself of holidays from 31-12-1920 to 2-1-1921.
5. Mr. G. S. Narayanaswamy, Assistant Farm Manager, extension of one month's leave on medical certificate in continuation of the one month's leave already granted.
6. Mr. J. Lakshminah, Assistant Farm Manager, privilege leave for one month from 9-11-1920.

Resignation :—

7. Mr. S. Vedantham Ayyangar, Farm Manager.

February.

Appointments, promotions etc :—

1. Mr. S. Dharmalinga Mudaliar, Farm Manager, to be S. P. T. Assistant in Economic Botany with effect from 1-1-1921 on Rs. 75, 75, 75-5-125.
2. Mr. V. S. Ramaswami Ayyar, Assistant Agricultural Demonstrator, promoted to the Upper division Agricultural section V grade on Rs. 50-5-100 with effect from 1-2-1921.
3. Mr. K. Ramanadha Ayyar. " "
4. Mr. T. S. Venkatrama Ayyar. " "
5. Mr. L. Sankarakumara Pillai. " "
6. Mr. V. Achutharamiah, appointed to the V grade, Agricultural Section upper division on Rs. 50-5-100, on probation and is posted to the I Circle.
7. Mr. N. Subrahmanya Ayyar, " "
and is posted.
8. Mr. A. Chidambaram Pillai, posted to the Paddy Breeding Station.
9. Mr. K. G. Sankappa Bhandary is posted to the Ootacamund gardens as Farm Manager.
10. Mr. C. S. Namasivayam Pillai, Assistant Agricultural Demonstrator, Pollachi, to Central Farm to join on return from leave on 13-2-1921.
11. Mr. D. S. Subrahmanya Ayyar, Assistant Farm Manager, Central Farm to Anamalai Farm on relief by No. 1.
12. Mr. P. S. Jeevanna Rao, Assistant in Botany, privilege leave for two months from or after the 21-2-1921.
13. Mr. K. Avadanayama Pillai, Agricultural Demonstrator, Conjeevaram, privilege leave for one month from or after 15-2-21.
14. Mr. M. Rathnaji Rao, Agricultural Demonstrator, privilege leave for one month on or after 1st March 1921.

Leave :—

1. Mr. C. R. Sreenivasa Ayyangar, Assistant in Economic Botany, privilege leave for 6 weeks from 10-2-1921 with permission to avail of the succeeding Easter holidays from 24th to 29th March 1921.
2. Mr. Kamil Subba Rao Naidu, Assistant Agricultural Demonstrator, privilege leave for 15 days from 11-2-1921.
3. Mr. M. Ramachandra Naidu, Assistant Agricultural Demonstrator, privilege leave for 15 days from 5-3-1921.

March.

Appointments, promotions and transfers :—

1. Mr. K. Thomas, Assistant in Mycology is confirmed in his appointment on Rs. 75-5-125 with retrospective effect from 1-2-1919.
2. Mr. M. Krishnasami Ayyangar, Assistant Farm Manager is posted for duty as Sub-Assistant under the Cotton Specialist.

Leave :—

3. Mr. D. Ananda Rao Garu, Acting Professor of Agriculture and Superintendent of Central Farm, privilege leave for 1½ months from the 1st May to 15th June 1921.
4. Mr. T. V. Rajagopalacharya, Assistant Professor of Agriculture will, during Mr. Ananda Rao's absence be placed in charge of the office of Professor of Agriculture and Superintendent of the Central Farm in addition to his duties.
5. Mr. T. V. Rajagopalacharya, Assistant Professor of Agriculture, privilege leave for 32 days from the 30th March 1921 with permission to prefix the Easter holidays to the leave.
6. Mr. A. Gopalan Nayar, Agricultural Demonstrator, privilege leave for 6 weeks from or after 15-3-1921.
7. Mr. T. G. Anantharama Ayyar, Assistant Agricultural Demonstrator privilege leave for 45 days from or after 15th March 1921.
8. Mr. C. Arulanandam Pillai, Sub-Assistant under the Cotton Specialist, extension of privilege leave for one month.

9. Mr. K. E. Viswam Ayyar, Assistant Farm Manager, Samalkota, privilege leave for 25 days from 5-2-1921.

10. Mr. T. Lakshmipathi Rao, Assistant Agricultural Demonstrator privilege leave for one month from or after 1st April 1921.

11. Mr. P. S. Srinivasa Ayyar, privilege leave for one month from 28th February 1921.

12. Mr. C. S. Namasivayam Pillai, Assistant Farm Manager, Central Farm, extension of leave on loss of pay for one day viz., 13-2-1921.

13. Mr. J. Sundara Rao, Bhatgoswami, Artist, Entomology Section, extension of privilege leave for two weeks from 3-3-21.

Resignation :—

14. Mr. K. Govinda Poi, Agricultural Demonstrator, has resigned.
Leave :—

1. Mr. K. Narayana Ayyangar, Farm Manager, Anakapalli privilege leave for 10 days from date of relief.

2. Mr. V. Muthusami Ayyar, First Teaching Assistant, Agricultural College, Coimbatore, privilege leave from 9-4-1921 to 14-6-21 both days inclusive.

3. Mr. M. P. Kunhikutti, Farm Manager in charge of the Agricultural College Dairy, privilege leave for two months with effect from or after 10-4-21

4. R. Swami Rao will be in charge of the Dairy during the absence of No. 3.

5. Mr. M. Raman, Farm Manager, Central Farm, privilege leave for 2½ months in continuation of the Easter holidays.

6. Mr. T. V. Narayana Rao, Farm Office Manager, Central Farm, privilege leave for six weeks from date of relief.

7. Mr. K. T. Bhandari, Teaching Assistant, Agricultural College, will be in charge of the Farm office during the absence of 6.

8. Mr. P. Vishnu Somayajulu, S. P. T. Assistant in Mycology, privilege leave for six weeks from or after 12-4-21.

April.

Appointments :—

1. Mr. N. Muniappa, Veterinary Assistant of the Veterinary Department, is appointed as Veterinary Assistant, Agricultural College, Coimbatore.

2. Mr. S. Viravaradha Raju, Assistant Agricultural Demonstrator, from VI Circle to VIII Circle to join by 1st May 1921.

3. Mr. K. K. Subrahmanya Ayyar, Agricultural Demonstrator, from IV Circle, to VIII Circle to join at an early date.

4. Mr. L. Narasimha Acharya, Agricultural Demonstrator, from IV Circle to III Circle to be in charge of the Hagari Farm. To join at an early date.

5. Mr. S. P. Fernando, Assistant Farm Manager, from Palur to the Central Farm, Coimbatore to join at an early date.

6. Mr. P. V. Raghavendra Rao, Assistant Farm Manager, Central Farm, to VIII Circle to join on relief by No. 5.

7. Mr. M. U. Vellodi, Farm Manager, Taliparamba, to the Agricultural College, as Teaching Assistant to join by 15th June 1921.

8. Mr. T. V. Srinivasa Charlu from V grade to VI grade with effect from 3-5-1921.

9. Mr. P. S. Venkusami Ayyar, from V grade to IV grade with effect from 23-3-1921.

10. Mr. G. Sitharama Sastri.

11. Mr. S. Viravaradha Raju.

12. Mr. A. K. Ganesh Ayyar.

13. Mr. K. S. Ramana Rao.

14. Mr. V. Chidamparam Pillai.

15. Mr. C. Annamandam Pillai.

16. Mr. P. Vishnu Somayajulu.

17. Mr. C. Krishnan Nair.

18. Mr. S. Ramaswami Raju.

19. Mr. P. Sasunathan.

20. Mr. C. S. Gopabesami Rao.

21. Mr. R. Thomas.

} from V grade to IV grade
with effect from 1-4-1921.

22. Mr. G. N. Rangaswami Ayyangar, Assistant Economic Botanist, privilege leave for 3 weeks from 30-3-1921.

23. Mr. K. Cherian Jacob, Assistant in Systematic Botany, privilege leave for six weeks from 20-3-1921.

24. Mr. V. Achyutham Pantulu, Assistant Agricultural Demonstrator, privilege leave for 25 days and furlough on half pay in continuation thereof for one month and five days from or after 10-4-1921.

25. Mr. P. A. Raghunathaswami Ayyangar, Assistant in Agricultural Chemistry, privilege leave for two months from 1-4-21.

26. Mr. A. Venkobachar, Assistant Agricultural Demonstrator, privilege leave for 20 days from 1-4-1921.

27. Mr. C. V. Seshacharya, Agricultural Demonstrator, V Circle, privilege leave for four months from or after 25-4-1921.

28. Mr. S. Jobitha Raj, Assistant in Economic Botany, privilege leave for one month and 8 days from or after 27-4-1921.

29. Mr. T. Budhavidheya Rao, Teaching Assistant, Agricultural College, privilege leave for one month and a half with effect from or after 1-5-1921.

May.

Appointments:—

1. Mr. K. Kodialbail Timmappa Alwa, Temporary Assistant Director of Agriculture, to be Assistant Director on probation and work in IV Circle, Vellore.

2. Mr. B. Dasappa Malli, is appointed Assistant Farm Manager, V Grade, Lower Division and posted to the Siddapur Coffee Experimental Station for training.

3. The following Lower Subordinates of the Agricultural Station have been admitted to the Diploma Course:—

1. Mr. T. G. Anantharama Ayyar, Asst. Agricultural Demonstrator.

2. Mr. K. S. Ramana Raj, Asst. Farm Manager.

3. Mr. C. Rangayya Nayudu, Asst. Farm Manager.

4. Mr. M. Chinnaswami Nayudu, Agricultural Demonstrator.

5. T. A. Rangaswami Ayyangar, Asst. Farm Manager.

4. Mr. Thomas, Sub Assistant to the Government Sugarcane Expert, to act as Asst. in Botany in that section on Rs. 75, 75-5-125 vice Mr. K. Krishnamurti Rao on other duty or until further orders.

5. Mr. A. Moses, Plant Collector, Govt. Sugarcane Expert's Office to act as Sub-Assistant on Rs. 35-3½-50 vice No. 4.

6. Mr. C. Tadulingam, Assistant Lecturing Botanist, and Assistant Principal, privilege leave for 3 weeks from 16-5-1921.

7. Mr. T. V. Ramakrishna Ayyar Assistant Govt. Entomologist, will act as Assistant Principal in addition to his duties during the absence of No. 6 and will be eligible for a temporary duty allowance of Rs. 50 per mensem so long as he performs the duties of Assistant Principal.

8. Mr. T. S. Ramasubrahmanya Ayyar, Asst. to the Govt. Agricultural Chemist, privilege leave for 6 weeks from or after 23-5-1921.

9. Mr. John A. Muliyl, Assistant to the Govt. Entomologist, privilege leave for two weeks from 29-4-1921.

10. Mr. C. Arulanandam Pillai, Assistant Farm Manager, privilege leave for 19 days and furlough for one month and 11 days in continuation of leave sanctioned already.

11. Mr. K. Raghavacharya, Farm Manager, Palur, privilege leave for one month from date of relief.

12. Mr. C. V. Ramaswami Ayyar, Asst. to the Govt. Agricultural Chemist, privilege leave for four weeks from or after 12-5-1921.

13. Mr. C. Sundararama Ayyar, Lecturer in Agricultural Engineering, privilege leave for 3 weeks from date of relief.

14. Mr. A. S. Nilakanta Ayyar, Assistant Farm Manager, privilege leave for 3 weeks from or after 20-5-21.

15. Mr. T. Lakshmipathi Rao, extension of privilege leave for one month in continuation of the one months' leave already sanctioned.

16. Mr. K. Shiva Rao, Assistant in Chemistry, privilege leave for 26 days from 19-5-21.

17. Mr. M. Ramunni Kidavu, Assistant Farm Manager, Tenmalai Rubber Station, privilege leave for 26 days from or after 2nd May 1921.

18. Mr. Mohammad T. S. Azizuddeen Sahib, Sub Assistant in Economic Botany, privilege leave for 7 weeks from or after 6-5-1921.

19. Mr. A. K. Ganesha Ayyar, Assistant Agricultural Demonstrator, privilege leave for two months from or after 1st June 1921.

20. Mr. K. P. Sankunni Menon, Farm Manager, privilege leave for three months from or after 8th July 1921.

21. Mr. W. Raghava Charya, Farm Manager, Sugarcane Breeding Station, privilege leave for two months from or after 3rd June 1921.

22. Mr. S. Kuppuswami Ayyangar, Farm Manager, Samalkota is appointed vice No. 21.

THE JOURNAL

OF

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Editorial Notes.

The Government of India Act passed in 1919 has secured greater privileges for the rural population. "Privilege" carries with it knowledge, capacity, a willingness to work for the common good and a readiness to shoulder the responsibility on the part of any one who aspires for citizenship. The Montford Reforms, coming as they did in the wake of the cataclysmic war, have, it is true, added to the burdens of the tax-payer but at the same time they have also shown him the sure path, if he is so minded, for solid reconstruction and attainment of his goal. The veil has been partially lifted. The Indian villager who had during several centuries relinquished his status and forgotten his importance in the body politic has now been made alive to his position and his strength. It would be no one else's fault if he is not wakeful and lets slip the opportunities that lie before him. He has a large stake in the country. He should use his brains wisely and well. He must

The ryot and
the Madras
Legislative
Council.

modulate his movements with steadiness and great circumspection. That he will acquit himself well there is not the least shadow of a doubt. The blood of the farmer-poet (Pothanna) who would not leave his plough in order to prostitute his muse for an ephemeral pride in kissing as a courtier, the hands of his mighty sovereign is still surging in his veins.

The Indian villager is sober. That others value his friendship and realise he can no longer be ignored are only matters of recent experience.

No better testimony is needed to show his neglect in the past and the potent influence he is coming to wield under the new order of things than the attention paid to agriculture and kindred subjects in the local Legislative Council, the first business session of which commenced on February 14th last when His Excellency the Governor devoted a large part of his opening address to problems bearing on Agriculture and the agriculturist. His Excellency's references to the introduction of measures defining the "principles of Land Revenue Settlement" "the rights and obligations of landowners and others in respect of irrigation," "the relation of landlord and tenant in estates" and to the extension of the "Malabar Compensation for tenants Improvements Act to the undeveloped areas of Wynaad, and the amendment of the "Cattle Diseases Act" are all reassuring. The development of the ports which are 73 in this presidency to which allusion was made is an equally important matter which would aid the producer and the consumer to come closer and ensure a better understanding between the nations of the earth.

The un-official members' endeavours to elicit information on vital matters affecting the rural interests were strenuous, 35 out of 72 questions put for the first day relating to agricultural points.

The minister for Development, the Hon'ble Rao Bahadur K. Venkata Reddy Naidu Garu, paid his first official visit to the College and Research Institute on 28th and 29th June. The Director of Agriculture Our Ministers took him round the various sections of the college in each of which he spent sometime enquiring into the kind of research work carried on by each member of the staff. On 28th evening he saw the Cane Breeding and Paddy Breeding stations and on 29th morning he went round the Central Farm. The Officers' Club had arranged for a tea party in his honour and he was also present at a dinner got up by the Indian gazetted staff. A very big entertainment was arranged in his honour by the non-Brahmin Association of Coimbatore in the Variety Hall and there—outside our hearing—he paid we are glad to learn a high encomium to the staff of this college and the nature of work carried on here, this being about an answer to the vague criticisms made by some M. L. C's., in the Madras Legislative Council.

As we are writing we happen to come across a note in "Nature" referring to the Parliamentary visit to the Rothamsted station by the Minister of Agriculture, Sir Arthur Griffith-Boscawen. Accompanied by the Agricultural Committee of the House of Commons and some Lords interested in agriculture, the Cabinet Minister

visited the Rothamsted Experiment station on 13th May and the party was shown round by Lord Bledisloe and Dr. E. J. Russell, the Chairman and Director respectively of the Lawes Trust. They saw the field experiments and the laboratories. During the lunch which was arranged in honour of the visitors, the Minister of Agriculture expressed his recognition of the great importance of the work being done at Rothamsted and other Research Institutions and emphasised the fact that in such work lies one of the best hopes for Agriculture. The necessity for economy was insistent in every line of public activity, but he would see to it that, as far as it lay in his power, Agricultural Research should not be called upon to suffer in the name of a false economy. The visit of the Cabinet Minister was the first of its kind and is to be followed by periodical visits to which he will take fresh batches of M. P.s of both Houses each time.

We submit that the two are parallel and suggestive. It will take several years before Coimbatore can reach the level of Rothamsted. If old Rothamsted founded on solid lines 75 years ago is in need of sympathetic consideration at the hands of the British Cabinet Minister, young Coimbatore whose foundation cannot be said to be completely laid which is 12 or 13 years old, is certainly in need of sympathy and encouragement at the hands of the Madras Minister of Development.

We only hope that our Minister will, in the midst of his exacting duties, find time to make a number of visits stay longer each time and bring new batches of M. L. C's with him.

We regret to learn that the Hon'ble Dewan Bahadur A. Subbarayalu Reddier had, on considerations of health, to resign the ministership. We hope his health will improve and he will come back to active duties very soon.

It is our pleasant duty to offer our respectful congratulations to the Hon'ble Rao Bahadur A. P. Patro, one of our patrons, on his assumption of the duties of the minister for self-government. His presence should be a tower of strength to the Rural interests in the council.

We congratulate Messrs. M. R. Ramaswami Sivan, Our members. D. Ananda Rao and T. S. Venkatraman on their promotion to the Indian Agricultural Service.

Obituary.

We record with extreme regret the tragic end through suicide on 7-8-1921 of Mr. G. A. D. Stuart the Director. He came out to India in 1902 and saw service in several districts. A more capable and hardworking officer with due sense of proportion cannot be found for the department.

Improvement of milk supply in Madras, "Milkman."

Those who can answer the following three questions have explained the present status of the Milk Supply Problem in Madras.

- (1) In which hours of the day is milk available in Madras.
- (2) In what quantities.
- (3) and in what form.

From the experience gained during the term of his stay in Madras, the writer has found it difficult to get cow's milk pure in-

dependently after 8 A. M. or 6 P. M. Unless we have engaged a milkman on agreement to bring his cow to our doors every morning and evening and milk her before us and supply us with a definite quantity, we shall have to hunt from street to street and that before 8 A. M. till we come across a milkman who is in the act of milking his cow and even then, that milkman may say that he cannot spare us any quantity. Then we go from door to door to the milkmen's houses asking whether they have got cow's milk. The answer is invariably in the affirmative but when the milk is brought, any one with a slight experience will find out that it is buffalo's milk and water, the latter added just sufficient to give the former an appearance of cow's milk. The same story of want and worry can be repeated without alteration after 6 P. M. Motherless babes or mothers who have for some reason died prematurely, invalids under directions to take only cow's milk unadulterated, suffer untold miseries on account of the bad system of milk supply in Madras. Another vexatious thing is that the milkmen refuse to milk their cows near our houses unless we buy a large quantity every day and all cannot afford to do. It is therefore to be concluded that we must be either rich enough to command direct supply in large quantities or go without it and satisfy ourselves, our infants and our invalids with any sort of milk adulterated with goodness knows what.

Infants and invalids, the sick and the convalescent suffer most (as they mostly depend upon milk for their daily food) if the nutritive value of the milk is unimpaired in any way i. e. either by adulteration with water, by skimming, by contamination with toxins produced by bacteria or by the presence of pathogenetic germs themselves.

Gastro-intestinal disorders arising from the administering of adulterated milk rob the country of millions of infants year after year—enshrining millions of houses in the black pall of death and sorrow, robbing the country of its life. Therefore, proper conditions of care should be enforced upon milkmen in the matter of drawing and the handling of milk. This cannot be done in the absence of State Legislation.

In addition to these nutritive elements furnishing materials for generating heat and imparting energy to the body and for building up and repairing the physical system milk also contains a useful factor which promotes the growth of the young. On account of its highly nutritive value as a producer of heat, energy and body tissue and the quality of its being easily digested and its capacity to induce normal growth, milk is the best of all the articles of artificial foods for the infants and invalids. Nothing is perfect in the world and milk is not an exception to this rule.

It is well known that milk, when improperly handled is often the cause for generating and nursing highly infectious diseases, such as typhoid, scarlet fever, cholera, diphtheria, tuberculosis etc. and here it is that it occupies a unique position among the other food stuffs.

Milk is unfortunately a fit medium for the growth of many varieties of micro-organisms both harmless and harmful (pathogenetic to man and beast). Hence great care should be exercised in producing wholesome milk for the supply of the city.

As it stands, milk supply of Madras is in a deplorable condition and the people are depending upon the milkmen who take their cows from house to house through the dusty and infected streets and milk them mostly on the open roads. The milk drawn in this manner will not only change in composition from day to day as he only milks a portion of the milk from the cow's udder but is also liable to contamination from the dirt of the streets. In addition to this, they adulterate it with water in different proportions while milking very dexterously according to their whims. How can we expect the children to keep good health when such milk is fed to them. This is the chief reason for the infant mortality of Madras. How can this be remedied? The Corporation and Government conjointly can remedy this state of things very easily to some extent.

The work that can be done by the Government and the Corporation of the city.

1. Corporation. Fixing cattle sheds at different centres.
2. Levying tax (license) for keeping animals (cleanliness etc).
3. (a) Insisting upon all milkmen to open shops at different places in place of the present system and to sell milk only after taking license.
 - (b) To separate milk into 'cow's milk and buffalos' milk.
 - (1) Fixing standard of milk and punishing wrongdoers by means of food inspectors as in foreign countries.
 - (2) *Government.*
 - (1) By supplying foods (cattle foods) at cheap rates.
 - (2) By appointing men to educate the milkmen in feeding etc., economically.
 - (3) By making these men to form co-operative societies for joint sale of milk and purchase of cattle food.
 - (4) By treating the milk, at nominal cost before issuing to public.
 - (5) By providing grazing grounds for the dry animals of these societies.
 - (6) By producing good dairy animals by crossing and selection.
 - (7) Periodical inspection of milk shops and their equipments by Government officials to rectify defects if there be any.
 - (8) Establishing model dairies and depots in certain places of the city and organising distribution depots.
 - (9) Prohibition of the export of the best breeds of cattle of the Presidency and getting good milk breeds from foreign countries for crossing.

Fixing Cattle sheds at different places. The cattle in Madras are not properly housed by the milkmen. As many cattle as possible are tied in a corner of the house or are cramped together in an ill-ventilated cattle yard and the dung and urine are allowed to rot in the

yard and hence in the hind quarters some animals appear to be plastered with dung which harbour myriads of microbes which may contaminate the milk at the time of drawing. In addition the rotting dung and urine in the yard provide accommodation for breeding different kinds of flies and mosquitoes which are harmful both for man and beast. However some of the milkmen wash their animals once in a day and that is not quite sufficient as the stalls and their surroundings are dirty. It becomes therefore imperative for the Corporation to take some steps (for future cattle yards at least) in insisting on the milkmen to have better yards with drains etc. or the Corporation themselves may provide some model stalls charging nominal rent from the owner for every animal. If the Corporation is prepared to provide accommodation for the cattle of the poor people it is better to have the stalls in the centre of every division or two or three divisions so that the cattle owners may themselves conveniently attend to the animals in the model stalls.

2. The Corporation will do well to insist on every man who keeps animals to take a license which will compel him to keep the animals and the stalls always clean. Stalls and animals may be inspected periodically to see that conditions of cleanliness are observed. In the case of neglect of either the stalls or animals the owner should be warned or fined in the first instance and should he persist license may be cancelled. This system will have a very good effect on the cow-herds in keeping their animals and stalls clean.

The present system of selling milk from door to door may be stopped. Even the drawing of the milk in the presence of the buyer does not escape adulteration with water by clever milkmen. To remedy this it is suggested that two or three milk depots or shops be opened in every division at convenient distances from one another. The Corporation can allot such places in every division. All the milkmen should keep their milk in the allotted place for sale. They may be permitted to sell their milk either jointly or severally. Each salesman should be made to take a permit or licence for the sale of milk. This system will create an impetus for co-operative sale among themselves. The license for milk sale from any milk depot or sheep may be given on the following conditions.

- (1) That only pure milk should be sold.
- (2) Buffalo's milk should be kept separate from cow's milk.
- (3) That milk should be untouched by hand.
- (4) That all vessels, measures etc. in which milk is dealt out should be kept scrupulously clean.
- (5) Milk for sale should not be exposed but should be covered with a clean lid to prevent flies, dirt etc.
- (6) Persons engaged in the handling or delivery of milk should be free from communicable diseases or from contact with such diseases. Any milk seller should be made to immediately report the presence of any such disease among his employees or in his house and failure to do so should be made criminal.
- (7) The cattle from which the milk is drawn should be free from disease and should be tested by the tuberculine test at least once in a year by some veterinarian.
- (8) The water supply in the premises where milk is produced and sold should be abundant and protected from contamination, i.e. the water should be kept free from any disease producing germs.
- (9) All vessels which come in contact with milk should be thoroughly washed and sterilised with boiling water at least, if not with steam. They should be kept protected from contamination.
- (10) Milk should be sold by weight instead of by measure.

Fixing Standard of Milk. In most of the western countries the milk sold in the market is legally expected to contain the standard milk ingredients. If the seller were to adulterate the food inspectors would detect the same and send him to a court of law for punishment. The procedure adopted is as follows :—

Every food inspector will always carry a number of bottles with him and whenever he suspects a dealer of fraud he will take a sample of the milk and fill three bottles and seal them in the latter's presence.

He will hand over one sealed bottle to the dealer and of the other two he will analyse one himself to find out the ingredients of milk and if he finds it below the standard he prosecutes the seller. The Food Inspector then summons the dealer to appear before a court of law with the sealed bottle the latter has. The Inspector then produces the third sealed bottle for prosecution. The same procedure may be adopted for Madras fixing certain standards of milk separately for cow's and buffalo's milk. This will bring any wrongdoer to book and the crime of adulteration will be minimised.

I have so far made mention only about the work to be taken up by the Corporation and now turn to the work to be undertaken by the Government.

(1) *Supply of Food stuffs for cattle to the milkmen.* The milkmen in Madras find it very difficult to get certain cattle foods like gingelly cake, wheat bran, husks and bhusa, As most of the milkmen are poor they cannot store even a week's supply when the above articles sell cheap. The milkmen of Triplicane insist on having only fresh gingelly cake for feeding their cattle. Dry cakes, they say, are not relished by cattle and interfere with the milk yield. This is a common belief among milkmen and this is a point to be decided by the Agricultural Department after experiment. But in my humble opinion whenever a change of diet is made milk yield is interfered with only temporarily, until the animal becomes accustomed to the diet, when the milk yield generally rises to the normal. But as most of the Madras milkmen solely depend upon the milk of their animals for their daily bread they cannot afford to lose the income they usually get. Therefore they cannot venture on experiments of this kind, as decrease of customers results. In some seasons (especially during the rainy season) the supply of cake is very precarious and often the milkmen go without it, for two or three days when there are constant showers and drizzles. To remedy the above state of things the Government who have already statistics of gingelly yield may purchase the seed in the harvest season and sell them to the oil-mongers of the city for being crushed with an agreement to sell the resultant cakes to the Government at certain favourable and fixed rates. Similarly they

can arrange for bhusa and dhollhusk with the mill owners of the Madras city. Wheat bran can be got from Calcutta at wholesale rates. Straw can be purchased in large quantities at the time of harvest and stocked in different localities of the city for convenient distribution. The feeding materials may be stored in a central store and distributed daily to the subdepots according to the needs of each cowowner. Thus milkmen's daily outlay of cattle food can be very appreciably reduced, whereas now the poor milkman has to pay something like a rupee for two twists of paddy straw which will be not more than 50 to 60 lbs. during the rainy season.

Another peculiarity of the milkman in Madras is that he purchases cattle foods in so many annas per day without caring for the quantity he gets. I have had experience of this for the last six months and any amount of advice does not mend his way. He says that when the cattlefoods are cheap his cattle are fortunate as they get more food and when the price goes high he will say that the animals are unfortunate. Therefore somebody should take up demonstration work to show those people that by feeding a certain ration according to the size and milk yield of an animal he can maintain the condition of the animal very well and at the same time save some money in feeding-charges. Most of the people here are under the false impression that by feeding a large quantity of gingelly cake they can increase enormously the milk yield. Some sort of demonstration by the Agricultural Department is therefore necessary in Madras city until these men understood the real state of things.

Co-operation among milkmen:—There is no co-operation at all at present among milkmen as they belong to several castes. In addition to this, on account of competition in milk trade they suspect each other. A splendid thing it will be if all joined and conducted the purchase of cattle and cattle foods, sale of milk, etc. like the western countries. With the aid of co-operation, the westerners are able to maintain pure breeds of live-stock which fetch very high prices and also manage large creamery and export large quantities of eggs and other dairy products at a considerable

profit. The prospects of improving the cattle of India by formation of co-operative societies will be much more promising than with the European nations. They can sell their milk and ghee and curds in a purer state at a cheaper rate and at the same time getting a better profit than at present. An Indian cowherd should therefore be drilled in the principles of the advantages of co-operation until it is imbibed by his poor brain. Some one should be constantly preaching these principles in time and out of time and at his very doors.

Treating milk at a nominal cost:— Before milk is distributed for consumption it should be filtered and pasteurised and cooled. But the poor milkmen cannot afford to have such a large plant to pasteurise or the patience to pass through such tedious processes. They have little or no education and cannot understand the different processes of fermentation in milk nor have they the required skill and intellect to manage the delicate and cumbersome machinery.

In addition to these on account of the non-co-operation of these milkmen it is impossible, for the supply of large quantities of milk by one or two persons. As treating small quantities of milk is neither profitable nor economical, it is imperative that the Government considering the importance of the health of the city undertake the pasteurisation of pure milk for the supply to the public. In addition to this it will also save the Corporation funds which are now spent on diseases like cholera, tuberculosis, diphtheria and enteric etc. For this purpose the Government should maintain an institution with modern equipments at least to supply pure milk and its product to Government hospitals, colleges and schools, if it is not possible to find a market from the public.

Providing grazing grounds for dry animals:— In a city like Madras the milkmen are unable to maintain at least one or two dry cows in addition to the milch cows. Because, firstly the space is insufficient in his limited house, secondly, he is unable to feed the animals with his daily earnings, thirdly, he has to pay a

tax if he keeps more than a fixed number, fourthly, he is unable to give any exercise to any of his cattle. Therefore, many of the dry cows without reaching their full productive period are mostly sent to the butcher, and thus the valuable assets of the country are lost. It may not be out of place to mention here that a cow of this type was purchased by Mr. Robertson, the late Principal of the Agricultural College, Suidapet and afterwards it proved to be one of the best milkers of the College herd. From this it is evident that the provision of grazing grounds outside the city at a nominal rental will relieve the burden to the poor milkmen. The pasture grounds may be handed over to a body of milkmen on condition that they should keep it in proper order and when it is out of order it should be taken over by the Government who should try to rectify the defects and manage the whole affair. For the admission of dry cows a nominal low rate may be fixed by the body of milkmen or by the Government themselves. This will save the lives of a lot of valuable animals every year.

Producing Good Dairy Animals by crossing & Selection:—

The Madras milkmen are not aware of any methods of breeding except by crossing by foreign animals and they realise that the cross between the country and the foreign blood will increase the milk production and they will not care for the evil effects on the male progeny resulting from such a process. As a rule, there are no breeders in Madras, and very few people keep good stud bulls and charge high fees for their services. A few milkmen only resort to the good breeding bulls for getting their cows covered. On account of the indiscriminate covering the offspring naturally acquire the bad qualities of both the parents and in most cases they are useless for the purpose which they are intended for. As such the Government may take early steps by demonstrating the advantages of pure bred stock from good pedigree bulls and also to help them in grading and selecting the best from their stock. In addition to this, a number of stud animals of high quality may also

be maintained at different centres of the city for the use of these poor milkmen and at the same time animals of the undesirable breed in the city may be castrated and if private persons were to keep their own bulls they may be permitted to have them on production of a certificate from the Officers of the Department concerned, as to their soundness and fitness.

Periodical Inspection of Milk Shops:— The formation of milk shops alone as proposed in a previous para will not improve matters much. These places should be first constantly and then occasionally visited by experts to rectify defects if any and suggest necessary improvements, since illiterate milkmen are not expected to run their depots regularly if left alone.

Establishment of Model Dairies:— In order to instruct the illiterate milkmen and also to provide better stuff to the public small model dairies may be kept at some centres of the city to demonstrate the working and management of sanitary dairies. Milk dealers may be allowed to train themselves for a certain period as paid probationers before they start the opening of their milkshops and the like.

Export of Cattle:— The export of cattle from this Presidency is a drain on the milch cattle of the country. Year after year the Java Government is taking Ongole animals by special trains in large numbers both young and old from the rearing tracts in the country till it has now become very difficult to procure animals of good milking strain. The Government may even now restrict the export of cattle for at least six or seven years to come. This prohibition of export may revive the progeny of existing pure Ongole cows if any exist at all in the nooks and corners of the district.

Grape vine cultivation in Michaelpatti.

P. PONNUSWAMY NAIDU.

Asst. Agricultural Demonstrator, Dindigul

In this village there are about 60 gardens (under well irrigation) in which vines are grown. Most gardens grow from 5 to 30 vines. Only a few have 40 to 80 and only one garden can boast of 400 vines. Though the vine growing is considered as a very paying crop no one depends entirely upon this crop for his living as his principal.

Vine is reported to have been introduced into this place about 40 years ago by a French missionary Reverend Father Larmey and until recently its cultivation was practically confined to the Roman Catholic community of Indian Christians.

Soil and mode of cultivation.

Red loamy soil with a slight admixture of lime stone or gravel is considered best suited for grape vine cultivation. Experienced ryots say that vine grown in gravelly soil tastes sweet, but in colour is not so nice as when grown in other soils (i.e.) grapes from Krishnagiri are nice to look at but not so luscious and sweet.

Planting.

Pits 3' x 3' x 3' are dug at distances of 15 feet and filled with cattle manure and loose soil which are left to decompose for some months. Then young plants (i.e.,) fresh cuttings about 10 inches long from the healthy and vigorous plants 5 to 7 years old or young plants which have been previously cut and propagated in mud pots with soil mixed with some manure are planted.

During the first two years the intervening spaces are generally cultivated with crops like chillies, onions which require moisture and which give the tender plants necessary shade. The

young plants are placed in the pits in cool months of December and January a little after the heavy rains have ceased.

Growth.

The plants attain to a height of 4 or 5 feet when about a year old; until then sticks about 1 inch are placed by the side of the plants to support them. In the beginning of the second year the plants begin to spread when light temporary pandals are put up on which the branches creep.

Pandals.

Pandals are put up in the third year. They are of green mullukiluvai poles (*Balsamodendron berryi*) and are 12 feet apart. Slender agathi or pekkarumbu poles (*Saccharum arudinaceum*) are thrown across and fastened by aloe fibre. The mullukiluvai is chosen as it costs little, strikes root quickly, as its roots do not spread and above all as it affords nice shade to the tender creeping branches. Once in two years the agathi poles (laid across for the support of branches) are removed at the time of pruning. The pandal is about 5 feet raised from the ground level.

After cultivation.

This consists in weeding and hoeing. Hand hoeing is done at all times whenever necessary. But hoeing with mamooty is done only once in three months.

Pruning.

This is done generally twice a year. From the third year vine branches are pruned just when old leaves fall making room for new shoots to come. The first pruning is done during winter season (i.e.,) last week of December. In the third week after pruning new shoots come and by the 5th week the flowers make their full appearance. For about 10 days after pruning vines are not watered, but from the time the new shoots make their appearance vines are regularly watered on every alternate day. The vine comes to yield during the month of March and by the end of March

it is ready for harvest i. e., gathering. Then a complete rest is given from April to May. It is during this season the vine crop is being manured.

The second pruning takes place during summer season from the middle of June. Then the crop would be ready for harvest by the beginning of October. Then as usual there is a resting season from the middle of October to the middle of December.

Yield.

The summer yield is generally heavy and ryots get 5 to 6 Rs. per maund. The winter yield is poor and is about less than half the summer yield and fetches 3 to 4 Rupees per maund in normal conditions. An average-sized healthy vine yields 3 maunds under best conditions in one season.

The vine falls an easy prey to attacks of mildew and other diseases. Thus the crop is lost completely. It is for this reason the ryots cultivating the grape vine are never free from great anxiety, even in spite of its otherwise very paying nature.

An ancient thief in the black-soil.

M CHINNASANI NAIDU, ASSISTANT MANAGER, HAGARI.

The thief that I now drag to the notice of the public is 'Dagadiballi in Kanarese, or DAGADITHICA' (in Telegu) in the Bellary District. This plant though not a common troublesome weed will one day become a noxious pest and is sure to invade the whole of black soil. More than this, beware! it is preparing itself perhaps a world war against the several colonies of the black-soil.

Its existence here is traced as far back as 1903. The plant is identified by the botanist as 'Cocculus Leaba.' It is a twiner or a creeper and an underground invader. It is hardy and is found

growing wild everywhere—fields, fences and bushes— not infrequently twining round shrubs and trees. It is a perennial, gyrophytic in habit, harmless in appearance and small in size. The plant which looks so insignificant is found to send its roots as deep as to 8 to 10 feet straight down as if it were connected with the water strata below which is a belief among the ryots. The root of the plant is not like that of the hariali or nutgrass, but is long and stout: often stouter than the stem itself. The plant has got a few thin lateral roots, tiny little flowers and edible berries of the size and colour of lead shot. Birds seem to be natural agencies for its spread. In short, the plant is for all appearance a harmless little thing. Its wonderful weapons viz., its hardy nature and its inherent determination to baffle all human attempt at extirpation, justify its existence and reveal to the public the wisdom of its Creator.

Attempts were made on the farm this year for the eradication of this weed by digging out the plant. Soil to the depth of 8 feet was dug and yet its root tip could not be seen. As such the complete removal of its root from the ground was given up as hopeless. Further it cost nearly Rs. 15/- to dig out a dozen plants. However, according to the proverb that 'Prevention is better than cure' the weed is kept under check by not being allowed to flower or fruit, but by cutting away the shoots whenever they appear above ground. In place of one shoot cut, several spring from the root which has strong reproductive vigour and which sends root-suckers from any depth below ground. Hence its complete eradication is considered an impossibility at present. It may however be possible to kill it by inoculating some poison or fungus into the plant. If it is left as it is, who knows that the weed may not spread and turn out another 'Lantana' or 'Water Hyacinth' in this country.

The leaves of the plant are used as vegetable and its wiry branches as brooms for sweeping the thrashing floor.

News and Notes.

Journal of Agricultural Research, Washington, March 1921.—

Messrs. C. O. Appleman and S. V. Eaton have recorded the results of experiments on the "Evaluation of climatic Temperature Efficiency for the ripening processes in sweet corn." Green sweet corn is picked while the ripening processes are actively in progress. The corn is considered ripe when the growth of the kernel ceases and the chemical changes have attained equilibrium position and the maturing consists essentially in the loss of water and therefore the rate at which corn matures depends largely upon the climatic conditions which control evaporation. A late crop of corn required 15 days for the same period of ripening that required only 6 days for an early crop, a time ratio of 2.5.

Mr. Carl Heinrich in his article on "Some Lepidoptera likely to be confused with the "Pink Bollworm," defines the characters which distinguish the larva and pupa of the pink bollworm from those of other Lepidoptera attacking cotton and related plants or feeding on plants frequently found near cotton fields and concludes that in no instance was the pink bollworm found on any plant other than cotton.

Water supply.

The question of irrigation is of perennial interest to farmers.

Amongst the methods adopted for husbanding rainfall which is the primary source of all water, large irrigation works play an important part, but their possibilities are limited and in tracts where anicuts and reservoirs are out of the question, water that sinks into the ground is tapped and utilised to produce crops, supplementing the quantities received as rain. In this Presidency

the larger utilisation of well water in crop production attracted the attention of Mr. (now Sir) A. Chatterton about 20 years ago and his strenuous efforts were crowned with success in the increasing demand for oil engines. Wells were dug in large numbers in South Arcot and Chingleput and oil engines installed. This question has received an impetus since the Department of Industries was reorganised last year. Well irrigation is now pressed forward as a factor for mitigating famine in the oft-suffering Ganjam district. The note from the Publicity Bureau on Well Irrigation in Ganjam is, therefore, opportune and is well worth perusal. We should like however to point out that the peculiar land tenure systems in the district have been the cause of the low vitality of the Uriya and Telugu tenants, which they are gradually shaking off, and it would indeed need propaganda work of an extraordinary kind to show any appreciable progress. We suppose that the Assistant Director of Industries, Bezwada, who is responsible for the note is in full possession of information regarding the quality of underground waters in the Ganjam District and gives an authoritative opinion on their suitability to crops and their adequate supply.

Agricultural Instruction.

In an interesting note on Agricultural courses in its issue of February 12, 1921, the American Agriculturist, comments on the crowded conditions in the colleges and suggests "better less practical agriculture and more of the fundamentals" and sums up its suggestions as follows.

One thing is certain, granting students from an agricultural college would be able to express their ideas, they should have ideas to express and should have developed the capacity to interpret and understand what the farm problems are and how to solve them. This thing of having a smattering of every kind of agricultural subject defeats the object of the college and leaves the agricultural student an agricultural invalid for life.

We hold that if really educated in an agricultural college, the student by means of books and bulletins might in a week's time know as much about most practical subjects as is now acquired in a term or year occupied in the average class room. There is a great waste of time now being spent on many subjects. The student is losing because he ought to be at work on subjects that can be learned only in a laboratory and with the guidance of an expert teacher. His time however is occupied usually with work of no scholastic grade when he ought to expend his time in essential and fundamental courses.

Our now very complicated courses of agriculture do not give the results of the simple courses of the olden days. They are not turning out agricultural students of big mental equipment but tending to serve on a plane no higher than mere trade information. In reform processes now going on in agriculture, reforming our college agricultural courses should have immediate consideration.

Journal of the Ministry of Agriculture March 1921.

Lieut-Col The Right Honble Sir Arthur Griffith-Boscawen M. P. has been appointed Minister of Agriculture and Fisheries U. K.

In England, Scotland and Wales nearly two and a half million beasts are slaughtered every year.

Two varieties of wheat have been raised by the Plant Breeding Institute at Cambridge which have carried crops of twelve quarters and over per acre without becoming lodged. The importance of this work is patent even to the dullest imagination when we consider that the average of production in England is not more than four quarters to the acre.

Soil Science:—

Willard Gardner and John A. Widstro in their article on "The Movement of Soil Moisture" observe tentatively that two assumptions have been made in the development and integration of a general equation for the movement of moisture through an ideal soil viz.,

(a) The inherent moisture conductivity in such a soil is independent of the moisture contact.

(b) The capillary potential is a lineal function of the reciprocal of the moisture contact.

M. M. McCool and L. C. Wheeting summarise in the following terms the results of some studies on the rates of formation of soluble substances in several organic soils:—

1. At any given moisture contact, the effect of a higher temperature is to increase the rate of formation of soluble material and conversely lower temperatures decrease the rate of formation.
 2. For higher temperatures, optimum moisture conditions tend to bring greater amounts of material into solution than are found under saturated water condition.
 3. With lower temperatures the opposite effect is observed.
 4. Generally moist soils upon standing increase in concentration to a certain point after which a decline occurs, probably due to (a) reabsorption (b) chemical change to less soluble compounds or (c) biological activity.
 5. Organic soils vary at different depths in the amount of soluble substances present.
 6. Different depths also vary in the rate and amount of materials made soluble upon standing.
 7. Below a depth of 2 feet, most soils are very inactive.
 8. The surface layers usually produce the bulk of the soluble plant foods.
 9. The ability to yield soluble materials decreases regularly from the surface to the water table.
 10. The zone of weathering and the region of greatest activity closely coincide.
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Soil Science : April 1921.

George Bouyoucos of the Michigan Agricultural Experimental Station concludes as the result of experiments made, that the amount of water which the soils are able to render unfree (for crop production) does not vary with the different moisture contents but that it appears to remain constant.

W. Rudolfs' experiments to investigate the "effect of salt solutions on absorption by seeds" show that

(a) there is a marked difference in the absorbing power of salt by different seeds. Seeds of the leguminous type show higher rates of absorption than seeds of other types. The highest absorption rates are indicated for alfalfa, the lowest for corn.

(b) the rates of absorption are progressively retarded with an increase in the osmotic concentration values of solution.

(c) the retardation of the absorption rate is accomplished through osmotic resistance offered to the water entrance into the seeds.

(d) low osmotic concentrations appear to have a stimulating influence upon absorption of seed of some species.

(e) Increasing the length of time during which the seeds are in contact with solutions has the effect of increasing the differences between the quantities absorbed.

The seeds tested were wheat, corn, watermelon, buck-wheat, Canada field peas, lupine, soybeans, rape and alfalfa.

The administration report of the Madras P. W. D. (Irrigation, for 1919—20 shows that a concession for the utilization of the water power from the Periyar lake in the Madura district was granted to Mr. A. H. Garrett in November 1919. A concession to Messrs. Tata and Sons, Limited, Bombay, for the

generation of power from the Kundah river in the Nilgiris for the supply of electrical energy to Coonoor, Ootacamund, Coimbatore and Wellington was under consideration. A special officer was employed to investigate the possible water-power sources in the Presidency. The most promising sites were reported to be Bagra in the Korapet agency and Dunduma in the Jeypore agency.

A meeting of the Indian Economic Association (Madras branch) was held on 28-4-1921 at which Mr. E. V. Sundara Reddi opened a discussion on the consolidation of agricultural holdings. All that the Government had been able to do, was, he said, to suggest that under recent settlement operations, the settlement officer might make experiments to redistribute land with the consent of the parties but that this intention had not been fulfilled. A few speakers advocated a change in the law of inheritance but Mr. Chidambaranatha Mudaliar of Tanjore who presided observed that what was really wanted was the consolidation of *landowners* rather than of landholdings. He preferred to leave things as they were at present and could not think that the division of holdings was such as to require any radical changes even by means of a permissive measure of legislation.

The Masulipatam Correspondent writes to the Hindu of the 29th April that the Government have declared the old Rajah of Chellapalli disqualified under the Court of Wards Act and have appointed his son the Kumar Rajah, a graduate and a member of the Madras Legislative Council, as the manager of the estate.

The South African Sugar Journal, Durban :—

A deputation of the Sugar planters of Natal waited on the Government at Cape Town to press the two questions of control in the future and the relationship with

Mozambique. The industry asks to be guaranteed "such a degree of stability as will enable it to carry on and to expand without fear of cutthroat competition from foreign countries which have natural advantages such as cheap labour and an annual crop as against the local biennial crop."

The next season's crop is in Natal expected to reach between 130,000 and 145,000 tons as against 142,851 tons the estimates of the past season's crop up to the end of February.

Sugar stood second among all products of the Philippine islands in 1920, rice coming first.

Sugar crop in Java is estimated for the current year at 1,420,000 to 1,550,000 long tons as compared with 1,352,000 tons in 1920.

The Italians will have to import 70 thousand tons of sugar this year as the production of beet sugar locally has been reduced one-third.

The world's sugar output this year is nearly 3 million tons short.

The Journal of Biological Chemistry, March 1921; E. W. Schulty and L. R. Chandler record the conclusions of their test on the acidity of goat's milk, cow's milk and human milk. Fresh goat's milk is more acid than fresh cow's milk, and appreciably more acid than human breast milk. Soured goat's milk is more acid than soured cow's milk. Goat's milk is usually recommended for infants and invalids in preference to cow's milk and this is due to the smaller size of the fat globules in it than in cow's or human milk thus affording a longer surface area for the action of the juices in the stomach.

The Analyst for April notes that mustard oil may be added to milk in the proportion of 20 drops per litre as a preserving agent.

The Board of Trade Journal, April 28, 1921 states that in America, a practical substitute for the Sea Island Cotton which is said to be dying out has been found in Meade Cotton a variety developed by the Department of Agriculture.

Ramasastrulu Nayudu Memorial Fund.

I beg to acknowledge with many thanks the receipt of subscriptions from the undermentioned gentlemen towards the above fund, collected up to 31st December 1920.

I shall be grateful if those that have promised subscriptions will kindly send in the same to me at an early date.

I further request those that have not yet subscribed to the above fund to kindly subscribe liberally and thus help in making the undertaking a success.

(Sd.) K. Krishnamurti Rao,
Provisional Secretary.

Ramasastrulu Nayudu Memorial Fund Collection.

Messrs.	Rs.	A.	P.
Ananda Rao, D.	25	0	0
Avadinayagam Pillai K.	1	0	0
Alwa K. T.	5	0	0
Anka Raju P.	3	0	0
Arulanandam Pillai C.	0	8	0
Butchi Raju.	3	0	0
Balakrishnamurti D.	7	0	0 part payment.
Cecil Wood R.	10	0	0
Cherian Jacob K.	1	0	0
Chinnathambi Pillai	2	0	0
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Gopalakrishnayya	5	0	0
Gopalarathnam.	1	0	0 part payment
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Jogi Raju G.	10	0	0
Krishnamurti Rao K.	5	0	0
Kanaka Raju.	1	0	0 part payment
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Lakshmipathi Rao T.	5	0	0
Lakshminarayana P.	3	0	0
Muthuswami Ayyar V.	6	0	0 part payment
Narayana Rao T. V.	1	0	0
Narayana Ayyar C.	1	0	0
Narayanamurti Pantulu J.	15	0	0
Panakala Rao D.	5	0	0
Peri Sastri.	3	0	0
Raghavalu Nayudu.	15	0	0
Raman M.	2	0	0
Ramaswami Ayyar C. V.	1	0	0
Rangachari K. Rai Bahadur.	3	0	0 part payment.

Ramanujachari K.	2	0	0
Ranga Reddi C.	2	0	0 part payment
Rangaswami Ayyangar G. N.	1	0	0
Rangayya G.	5	0	0
Ratnaji Rao,	5	0	0
Raghavachari K.	5	0	0
Ramachandra Rao Y. Rao Sahib.	10	0	0
Rama Reddi P. H.	10	0	0
Rama Rao A. Rao Sahib	5	0	0
Sarma A. K.	3	0	0
Sithapathy Rao.	1	0	0 part payment.
Sudarsana Raju.	3	0	0
Subrahmanya Ayyar S.	3	0	0
Swami Rao R.	5	0	0
Thirumotuganatham Pillai A V.	3	0	0
Veera Raghava Rao.	5	0	0
Venkaswami Rao.	2	0	0
Vencobachar	3	0	0
Venkatrathanam P.	1	0	0
Venkatraman T. S. Rao Sahib.	20	0	0
Viswanath H.	10	0	0
Venkatskrishna Mudaliar S. R.	5	0	0
Venkata Rama Rao Bahadur (Rajah of Munagala).	100	0	0
Total collections up to 31st Decem- ber 1920	Rs.	374	0 0
Expenses		9	0 0
Balance		365	0 0

K. Krishnamurti Rao.

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Superphosphate, Ordinary.	Kainit.
Superphosphate, Concentrated.	Nitrate of Potash.
Basic Slag.	Nitrate of Soda.
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THE JOURNAL
OF
**The Madras Agricultural Students'
Union.**

Vol. IX.

September 1921.

No. 3.

Editorial Notes.

His Majesty, our beloved King-Emperor George V has, we understand, been graciously pleased to accede to the proposals of his responsible ministers that his dear son and heir, H. R. H. The Prince of Wales—
The Prince's Visit. should visit India—the jewel of the British Empire,—and acquaint himself with the Indian peoples and their conditions, as he himself did some years ago. That sovereigns should know the peoples over whom it pleases Providence to place them is necessary for the steady progress of humanity and this has an added significance when they happen to be constitutional monarchs. In the present constitution of world-society it is an idle dream to expect a very exalted personage to so comport himself as to intimately know the inner side of the submerged masses. Truth, however, is not the sole monopoly of a single individual or a group of individuals. It is certainly a preposterous claim that some men make that they are the custodians of truth. They ought to know that this has been possible owing to their being placed under a particular set of circumstances which is a mere matter of accident. Complaints have been made that at a time when

the country is passing through a period of scarcity, strain and depression several lacs have been expended on the visit of H. R. H. The Duke of Connaught and many more will be needed on the occasion of the Prince's visit. Nothing great has been accomplished without a big sacrifice. If the visit is worth having, the expenditure is equally worth incurring. The recent war has laid low the arrogance of 'might' and he would be a bold seer who can tell that nothing good can come to India as the result of the Prince's visit. We are sure that good sense will prevail and our countrymen, who still believe in the work of the Divine Hand, will behave themselves in a way which posterity and the conscience of collective humanity will unhesitatingly endorse.

Complaints have been persistent, during the past two decades, that large numbers of students have been devoting their energies to unproductive literary studies and that their attention has not been turned to science. Recently however the venue has changed and the rage has been to impart education with a distinct rural bias, thus fixing the rural boys and girls to their native homes. That this is all for the better is patent, but time is needed to bring about a wholesome change in the mental outlook of the student population and, still more so, of the parents and guardians, who honestly believe in the educational systems in which they themselves have been nurtured. It is therefore a relief to come across instances of institutions in which the new idea has been put to the test and has been found fruitful

We learn that in England which has served us as model up to the present, four such schools for secondary education have been working for some years now. The report of one school viz., Sexeys' in Somerest, is cheerful reading. The head, the Revd. Edward Smith, we are told, conceived the idea of making a derelict farm of 20 acres, within a stone's throw, serve the purpose. He put his head, energy and zeal into the work. The actual labour on the farm is not done by the scholars, but by a paid staff of 3 men, while the farm provides the school with its 150 pupils and resident staff of nearly dozen persons with all the fresh vegetables, eggs, milk, and butter. Pupils come from all parts and fitting occupation is provided for boys and girls upon whom a purely academic training would be wasted, while opportunities are afforded to those who wish to prepare for an agricultural college. We have in this presidency scores of places where, with very little extra expense, some energy and a radical outlook in the management, several schools of the above kind may be in working order in the course of a few years. May we appeal to the landed classes and their children?

It has been established beyond doubt that mere theorising on the part of a teacher and his appeal to the imagination of a child's mind to discern objects so as to enable it to retain their images should have no place in a school curriculum. Agricultural Colleges stand in need therefore of models for teaching as much as schools of other kinds. In this country the subjects which offer a peculiar attraction for agricultural students at the present day are those which deal with

Agricultural
Models.

insect pests and diseases of plants. These require for a correct understanding of their causes, their growth and remedial measures, vivid pen-pictures as well as good models, solid, descriptive and true. This aspect of work has a fascination for an eager, enquiring mind and models are bound to play an increasing part in agricultural teaching. Experts in model-making with the true instinct of an artist are getting rare, chiefly owing to the absence of facilities. The earlier stalwarts of the Botanical Survey of India could not have finished their monumental work without the work, willingly given, of the poor-paid artists who loved their art more than the pittance of wages they fetched. It is hence pleasing to find the following opinion recorded in the proceedings of the second Mycological Conference held at Pusa, "This meeting is greatly interested in an exhibit of models of plant-diseases which were used in the courses at Coimbatore. These which are superior to anything imported from Europe were made locally and there was a general desire that arrangements might be made so that such models could be purchased by other Colleges." We are proud to note that the models were made in our own college and by the artist Mr. Jagannatha Mudaliar. We have no doubt that he would prepare collections of these models for use in other schools if authorities permitted.

Indian students and their equipment have during the past ten years been the subject of strong adverse criticism at the hands of even responsible persons who have characterised them as lacking in intelligent inquisitiveness.

In good
company.

Others have been echoing the same sentiments and been using words of similar import. We begin to think that the accusations were not well-merited and the causes lie elsewhere. In a recent issue we referred to the opinion of the American Agriculturist that the syllabuses of American Colleges were overcrowded which tended to make students agricultural bankrupts for life. Now comes confirmation from another authoritative quarter—Says the Scottish Farmer of May 1921.

"The Scottish Education Act 1918 put into statutory form and made compulsory and costly a system of education which the Education department has been foisting upon Scotland to the manifest detriment of the efficiency of the youth of the country. We have been engaging young persons for office work for a period of at least 30 years. We have no hesitation in asserting that the youth offering themselves during the second decade of the 20th century have been less efficient, less blessed with general intelligence, less resolute in adherence to high ethical standards than were the youth offering themselves during the last two decades of the nineteenth century. Apart from the debased ethical standard which is most marked, the most notable defect is lack of general intelligence. That reason is to be found in the policy of the department—a policy which has overloaded the syllabus which compelled dissipation rather than the concentration of the energies of teachers and taught and deliberately set itself to destroy local interest in educational affairs."

Write the examiners to the National Examination Board, England.

"Practical agriculture"—The written work was on the whole well done. The oral examinations however revealed a serious lack of practical knowledge on the part of many of the candidates. Comparatively few farmers' sons attended the examination.

A considerable proportion of the candidates had acquired no practical experience before entering an agricultural college and as a rule had attempted to make good the deficiency by working on college or other farms during vacations. We are however strongly of opinion that intermittent spells of farm work are not sufficient preparation for an examination of this character.

In several cases there was distinct evidence of "cramming" and students appear to have neglected such opportunities as exist at colleges for improving their practical knowledge. Judging by the answers to some of the questions, it would seem that more attention might with advantage be paid to modifications of farming practice necessitated by changes due to the war." J. R. A. S. E. 1921.

The international Bureau of labour which is a body created by the Governments of the entire world has arranged for a conference to meet at Geneva in October next. One of the items on the programme is the subject of agricultural labour in its international relations. This provoked an interesting discussion at the last meeting of the General Assembly of the International Institute of Rome and the proposal to circulate the report of the discussion to the several Governments and the International Labour Bureau was finally carried. This was with a view to call attention to the danger to agricultural production of any endeavour to apply international regulation to farm work especially by a body dominantly concerned with urban and factory labour. We are therefore unable to know what is intended in the cable of Mr. Waddington to the Secretary U. P. A. S. I. that the Mill-owners' Association, Bombay, have been asked to urge Government to select Advisers to the Employers' Delegate at the Conference sufficiently early

International
Labour
Conference.

for them to gather information in respect of conditions of Indian Agricultural labour. How far employers of labour, if they are meant to represent, labour can represent agricultural labour, which is at present unorganised in this country, is more than we can say. Constitutional methods, not of a spurious kind but based on ideas of love for humanity, full knowledge of the conditions and abundant faith in justice are the only means of securing decisions of an enduring character. Labour boards, Wages Boards, Arbitration courts and such like legal fibs will not avail if the "inner man" is not satisfied.

We understand that H. C. Sampson Esq., c. i. n. assumed—the duties of the Director of Agriculture, Madras, on the forenoon of 13-9-21. Our Director. We offer him our hearty congratulations and welcome him back for work amongst the ryots of this province.

Ryots' remedies for Fungus diseases of plants and their efficacy.

C. S. GOPALASWAMI RAO, ASSISTANT IN MYCOLOGY, COIMBATORE.

It is familiar to those who have been touring in the rural parts of this Presidency that the Indian ryot has got his own method of dealing with the insect pests and fungus diseases on crops. In spite of his inability to differentiate clearly an insect from a fungus attack, he applies his own cure for the affected plants. The ryot has little knowledge of what a fungus is and how it attacks plants. He attributes therefore every abnormality or weakness in plants to some insect or other. Whenever a diseased crop is visited, the common complaint is that

some "purugu" or "puzha" has wrought the whole mischief. In certain cases, however, where he cannot definitely link any insect with the cause of the ill-health of the plant, the ryot gives it out that it is due to something other than insects. These other causes are pointed out to be winds from certain directions, rains and the heavy dew. Sometimes the much-dreaded evil eye and God's curse are also not left out.

2. The Agricultural Journal of India, Vol. XVI, Part 1, contains an interesting article on the local practices current against insect pests in Southern India. Mention is made of the various means which ryots adopt against crop pests. But the following are some methods which were seen adopted against fungus diseases. These methods can be divided under two main heads.

- i. Preventive.
- ii. Curative.

I. Preventive measures.

(a) Weeding is one important factor in sound cultivation. There is no ryot who does not attend to it. This operation goes a long way to induce a healthy growth of the crop and the plants are consequently in a better condition to withstand or even resist the attacks of fungi. It has also got the additional advantage of eradicating the alternate hosts of fungi which would thereby be starved to death.

(b) The removal of excessive vegetation is not neglected as a precaution against plant diseases. The ryots' plea is that the greater the vegetative growth of a plant, the poorer the yield it gives. Though this is generally true, the removal of excessive leaves brings about freer circulation of air and more light to all parts of the plants. The Krishnagiri gardeners remove all superfluous growth of leaves and shoots from the vines.

(c) Removal of diseased twigs.

In some villages round Krishnagiri, the gardeners remove all shoots and leaves as soon as they find that they are diseased. During the usual process of watering the cholum crop (in which the ryot removes any smutted ear-heads he comes across) it is also common for the ryots to remove all weak and diseased seedlings from this crop. It must be conceded that these steps are really good at preventing the spread of the disease, but when we look at the kind of the disposal of the diseased material the whole process may be said to be one of sheer waste of labour. The diseased twigs and seedlings are thrown in all corners in the garden, even close to the margin of the field, where they are left exposed for days. In some cases they are thrown into the manure pit where the fungus obtains a favourable period of incubation and prepares itself for a fresh campaign.

(d) Proper irrigation. In Krishnagiri grape-vines are not watered on cloudy days. When asked for the reason, the ryots say that the disease—mildew—breaks out if watering is not regulated during cloudy weather. It is also likely that the ryot may expect some rain and thus wish to economise his labour. The same is also the case with tobacco in the Madura district.

(e) Application of Manure. In the Karur Taluk, tomatoes are subject to the leafspot disease caused by a fungus *Vermicularia curcumae* Syd. While enquiries were proceeding about the disease it was learnt that the ryots apply castor cake in a greater quantity than usual as a precaution. No definite statement could however be made about its supposed effects as some of the manured plots which were inspected were also victims to this disease.

* II. Curative measures.

(a) Coming now to the curative measures it may be stated before hand that the Indian ryot aims both at checking and curing the disease. The vegetable grower is almost an expert in this

art. He is ever watchful about his plants and whenever any disease makes its appearance he loses no time in taking some measures to eradicate it. Most of us have observed his sprinkling ashes over 'Bendi' plants against mildew. In almost all cases of mildew attack, ash is being invariably used. In Michaelpatti, a village 4 miles from Kodaikanal Road Railway Station, one intelligent ryot mixed ashes with water and splashed this mixture on mildewed bunches, which in all cases had this coating only on one side whereas the other side was not covered with this mixture.

(b) Sprinkling lime-water over vegetable plants particularly gourds, is also done against mildew. No definite proportion is observed in its preparation, but lime—slaked or unslaked—is mixed in water until the resulting milk of lime assumes a fairly thick consistency.

(c) Soil treatment is also one of the ways adopted in tackling the plant diseases. The Birds' eye disease of grapes or anthracnose is attributed by the Salem ryot to the nature of the soil. The treatment adopted consists in making a solution of asafoetida in water and then pouring the solution into the soil around the stem. The same method is also adopted by a few ryots in Godavari against fungus diseases of coconuts and oranges. Salt is also mixed sometimes with the solution. The effects of this treatment are doubtful.

(d) Asafoetida appears to be the most favourite fungicide with the South Indian ryot. It is a well-known fact that in the Ceded districts ryots make a mixture of asafoetida, garlic, cattle urine and in some cases frankincense and then steep cholum seeds against smut. The same treatment is also done in the case of Tenai (Korra) and Cumbu (Sajja).

3. Let us examine how far these methods of combating fungus diseases of crops are likely to be effective. Taking the

operations noted under preventive measures it is clear at the very outset that the Indian ryot proceeds on certain principles to fight against fungus attack. He knows that he should not allow weeds to grow and understands that sufficient light and air is necessary for all parts of the plants and he should therefore prevent superfluous vegetative growth of plants. The infectious nature of the fungus diseases though not clearly understood by the ryot seems to influence him in taking certain precautions. Why is he otherwise so careful to remove infected shoots as soon as he sees any. His knowledge of the contagious nature of the disease is limited. He imagines that when once the disease begins it will spread gradually; but he does not know how. This is evident from the way he disposes of infected seedlings either in the garden itself or on its border. He never troubles himself to go a step further—to burn them. The proper regulation of water and the application of manure result in invigorating the crop, which does not fall an easy prey to the fungus. Thus it is patent that the ryot's preventive measures are based on sound principles, but what vitiates their beneficial effect is the haphazard manner in which the whole operation is done. If only certain precautions are adopted with some amount of thoroughness, it is likely that his labour may not go unrewarded.

4. With regard to the curative measures, we find certain materials used for all cases of fungus attack—asafoetida, garlic, cattle urine and frankincense. There is one property common to all of them—a strong smell—more repulsive than pleasing. What is it which makes the South Indian ryot prefer such strong smelling materials and prepare this mixture? His idea is perhaps that as in cases of 'roul-lie' for human disease "the worse the drug smells or tastes the more good it is supposed to do." One can very well think of the smell of a mixture of asafoetida and garlic. But the idea of such a curious combination of materials for use against plant diseases is not peculiar to the Indian ryots alone.

For, it is mentioned by Lodeman that in England, William Forsyth even as late as 1791 gave directions for the preparation of what is generally known as "Forsyth's composition." The constituents were one bushel of fresh cowdung, one bushel of lime rubbish and a bushel best wood ash, and 1/16 bushel river sand. These were to be mixed and made into a paste for which urine (presumably of cattle) was used. "This mixture was intended 'to cure disease, defects and injuries of plants.'" How far this strong smell affects the growth of fungi remains an unsolved problem.

5. It is intended, however, to test the fungicidal properties of the materials referred to above and the results of the tests will form the subject of another article.

The New Farming Landowner.

THE EARL OF SELBORNE, K. G., G. C. M. G.

The agricultural landowner who let his land to a tenant farmer but did not farm any of it himself, and the tenant farmer who rented land from a landowner and farmed it but farmed no land of which he was himself the owner, have played a very important part in the history of agriculture and in the economic life of the nation during the past 200 years; but it is my belief that both classes are slowly passing away.

The partnership has been an odd one and much to the advantage of the tenant farmer. In good times he has been able to secure a fair commercial return for the capital he has invested in the industry, and, since annual tenancies replaced leases, he has been able to quit the business quickly when times have been bad. The landowner, on the other hand, in good and bad times alike has received a wholly uncommercial interest for the capital he has invested in the industry. In bad times he has been liable to have the cultivation of the land thrown on his hands without the experience or the equipment with which to cultivate it successfully, and,

latterly at any rate, in good times he has been very chary about raising the rent. This comparison is the more remarkable when it is remembered that at least two-thirds of the capital employed in agriculture have been supplied by the landowner.

The cultivated land of England is not, as Socialists are fond of saying, the free gift of God any more than the coat that the Socialist wears is the free gift of God. The cultivated land, like the coat, has been manufactured by the use of the brains and the physical strength given by God. Any amount of land can be had in the centre of Africa for nothing to-day, because it is in its natural state and unmanufactured, or (to use the term which is applied to the manufacture of cultivable land) unreclaimed. Exactly the same process has taken place in England during the centuries since the Romans came here. With the exception of tracks of down or heath land England was one mass of forest, thicket, swamp, or bog, and, when a landowner to-day acquires an agricultural property either by inheritance or purchase, what he acquires is not the land in its natural state but the product of reclamation and the industrial equipment of the land. This equipment is also an essential part of the process of manufacturing cultivable land because, even if the trees had been felled, and the roots and the underwood and the briars and brambles rooted up, and the swamps drained, the land would be of no use to the farmer unless it had been supplied with farm buildings, houses, cottages, fences, roads, and a proper supply of water. All this equipment as well as the reclamation itself has been supplied by the capital of the landowner. The capital the tenant farmer has supplied is that necessary for the wage fund and for the purchase of live and dead stock.

If any one doubts the accuracy of my statement about the manufacture of English land, he should pay a visit to the famous Experimental Station at Rothamsted. There he will find that 60 years ago a corner of a wheat field was enclosed and left alone, and it has never been touched by the hand of man since. That plot of ground has reverted to the natural state of England, brambles,

briars, underwood and young forest trees, and Dr. Russell, the Director of the Experimental Station, has informed me that to clear that piece of land and make it once again fit for cultivation would cost more than the capital value of the land itself.

It may be well asked why the landowners were prepared to invest their money so unremuneratively in agricultural land. The only possible answer is, that the habit must date from the days when the possession of land brought a social status nothing else could bring, and real political power. It could not have been the mere desire to live in the country, or the wish for sport, because men have always been able to enjoy the amenities of country life and sport by the process of hire. Purchase was not essential for the purpose. Nowadays the possession of land brings with it no political power, and social status can be acquired by other means, and the custom of land ownership, which was dying hardly, has been shattered by the crushing weight of war taxation. Land owners who are not farming their own land have found that by selling that land they can double their income, partly by the increased yield of their new investment, and partly because they become released from those charges and outgoings which make the net return from the rent of agricultural land so much less to the owner than the gross return. This is the simple explanation of the reason why there have been such great sales in the last few years. The new, and hitherto unknown, feeling of insecurity thereby produced to the tenant farmer has been the justification for what is called "the compensation for disturbance" section of the Agriculture Act just passed. These provisions, however, will certainly not tend to arrest the process of selling land. For the reasons I have given very few agricultural landowners will henceforth be able to afford or, if they can afford, will care any longer to own land which they do not farm themselves.

The future of English agriculture, I believe, rests with the men who, whether on a small, moderate, or large scale, farm the land which they themselves own, and I believe that in the long run that

is a surer economic basis for agriculture than the unbusinesslike partnership which I have endeavoured to describe. The returns from good farming will enable the owner-occupier to do justice to his land both as owner and as occupier, and to receive reasonable commercial return for his capital; but to do this the farming must be good farming. The whole standard of farming throughout England must be lifted on to a higher plane than that on which it stands to-day. Not only bad, but indifferent farming must disappear. The owner-occupier must educate his son so that he will know how to manage and farm his land properly and get the most out of it. His life's work will bring him into closer contact than ever with agricultural labourer, and he will more appreciate the fact that that labourer, always really a skilled man, must necessarily become more skilled owing to the increasing use of machinery, and he will understand that low wages are an economic blunder as well as a social misfortune. He must however, as firmly as courteously exact a full, honest day's labour for those wages, or he will not be able to live or give employment to any one. The existence of occupying ownerships of every size throughout the length and breadth of England alongside the corresponding tenancies, which will necessarily long persist, will provide the most capable of those labourers with exactly that ladder of possible advancement which they have so much needed.

But there will always be owner-occupiers who are not able to devote the whole of their own time to their land, and those men will require the assistance of managers or bailiffs. It was one of the tragedies of the bad times in the eighties and nineties of the last century that, when landowners had land thrown on their hands which they had themselves to farm, they did not know where to look for a competent man when they had found him. It is absurd to expect a man who has never had a proper agricultural education successfully to farm 1,000 acres of land and be responsible for the return of £10,000 to £15,000 of capital, and still more absurd to expect a man who has had such an education, and is competent, to be satisfied only with a salary of £150 or £200 a year and a house. Our Agricultural

Colleges have always been turning out competent men of this class, but they could not find employment in England and they had to go to the Dominions or elsewhere to find employment. Henceforth there will be an increasing demand for this class, and the demand will create the supply, and our universities and agricultural colleges are now better equipped than they ever were to create the supply. How should such a man when found be paid? He may quite properly be guaranteed a minimum salary of £150 or £200 a year and a house to commence with, or in the case of large farming operations a larger sum, but the real way to reward him and to get the best out of him, is to give him a good percentage on the profits as proved by properly and independently audited annual accounts. The most satisfactory relationship can be established on this basis between the owner-occupier and his manager.

It will be seen from what I have written that I at any rate am full of hope for the future of agriculture for that class which I have called the owner-occupier and which includes within itself the small free holder and intensive cultivator of 50 acres living in a cottage and the owner of 5,000 acres living in a country house.

But for a long time yet there will still be landowners who do not farm all their land who still let land to tenant farmers. Their duty seems to me to be clear; as long as they retain their land they must make every effort to fulfil their part even in these times of crushing taxation, and keep the land so equipped industrially that they can reasonably insist on the tenant farmer doing his part. They must regard it as a national duty as well as a proper precaution for the interest of their family not to tolerate bad or indifferent farming. They will be entitled to use the Agriculture Act to assist them in carrying out this duty, and they will be entitled to claim a full economic rent for their land. To the good farmers they are bound to continue to show that cordial and intimate consideration which it is universally admitted the old type of landowner always showed to his tenants. And those who have struggled so manfully to preserve their family home and who would regard it so

bitter an experience to be obliged to leave it, must continue to realise as their fathers did, that the process of quitting home may be just as disagreeable to the old-established tenant farmer as to the owner. When the land has to be sold every effort should be made to sell it as at its face value, whether by private treaty or by auction, to the sitting tenant; but, if the land is sold by valuation and private treaty and not by auction, then the owner will be entitled to protect himself by inserting a clause in the conveyance reserving to himself for a term of years the option of repurchase at the price for which he has sold the farm in case the purchaser decides to part with the farm within the period.

“The Journal of the Ministry of Agriculture.”

News and Notes.

The Experiment Station Record for December 1920 in its editorial observes that the people of the cities as well as those in the rural districts should make themselves aware of the importance of agricultural research and improvements, for the funds devoted to this item of expenditure benefit not only the villager who is the producer, but the consumer in the town, who is solely dependent upon the former for his food supply.

“Sugar” for February, 1921, makes suggestive remarks in the course of an illuminating article on “The British Guiana Sugar Industry.” The progress of the industry, it would appear, was for several generations closely interwoven with the development of the colony as a South American outpost of the British Empire. During the closing decades of the last and the first few years of the present century, the sugar crop has shown a reduction and is now less than it was thirty or forty years ago in spite of increased quantity of sugar extracted from the cane and the breeding of seedlings with increased percentages of sucrose. Chief amongst the reasons are the abolition of slavery with the concurrent disturbance in the labour conditions and

the importation of cheap bounty-fed sugar of the eighties, accelerated by the indifference of the British Government. War opened the eyes of the Empire-citizens and proof is afforded in the recent inauguration of a Sugar Planters' Experiment station, where fundamental agricultural principles underlying field practice would be studied, principles which have been left untouched in an undue glamour for laboratory results. This would certainly show "doubters" what modern agriculture has to teach them.

The South African Dairyman, April, 1921, notes that meetings are being held now in the Transvaal, similar to those in the Free State, by farmers who are finding themselves in financial difficulties. It was stated that at a recent meeting in Lichtemberg 300 civil summonses had been issued there and that it was resolved to appoint a committee whose duties would be to ask Government for advances until after harvest. The idea is every farmer shall pay an entrance fee of £ 5 and 2½ percent monthly to clear off his debt.

To relieve the shortage of cows and provide fresh Milk for the small children in Vienna, many of whom have never tasted milk, the American Friends service committee, Philadelphia, purchased 450 cows from Switzerland and Holland and sent them to Vienna.

Great Britain's production in milk, Butter and Cheese.		
Consumed fresh	897,551,000 gallons or	72.7%
Converted into butter	229,635,000 "	or 18.6%
" into cheese	74,076,000 "	or 6.0%
" into cream	33,334,000 "	or 2.7%
Total number of tons of cheese 33,070 tons.		

The annual imports are:—

Butter in tons 200,258 of which 44,981 tons are from British possessions, cheese in tons 115,439 of which 94,895 are from British possessions.

'Something about sugar':—

In his book with this unpretentious title, George M. Ralph tells in simple language for the information of the layman and the pupil in school the various steps by which sugar is prepared. The book also gives a brief history of the commodity and its production in different parts of the world.

The world production was 18,409,016 long tons in 1914—15. This shows its importance as a human food and the place it should occupy in the food crops of the world. The two chief sources of sugar are sugarcane and sugarbeet—sugarcane yields more than 10 millions tons sugar and beet, 8 millions. Sugarcane grows almost exclusively in the tropical belt, extending from 22 degrees north to 22 degrees south, the three essentials for its culture being fertile soil, hot sunshine and plenty of moisture. It flourishes in Hawaii, Cuba, Mexico, Central America, the East and the West Indies, Australia, China, India. In Hawaii it takes 18 months to ripen and tasselling occurs 30 days before it is cut. In Louisiana and Texas cane is harvested from 9 to 10 months from the time of sprouting and consequently before it is mature. In Cuba it is cut in 12 months whether ripe or not. As a rule in Hawaii, plantations are located close to the coast. The lands slope gently towards the sea and are less than 500 feet above sea level. Plantations on the leeward side depend entirely on irrigation, water being brought by ditches or pumped from wells. In the windward side the rainfall is abundant and irrigation unnecessary except during very dry periods. The land is ploughed and tops from untasselled canes planted in furrows which are irrigated once a week. Planting begins in March and extends to September and the crop ripens one year from the following December and harvesting continues until the end of July or August. The field is set fire to before cutting. Recent experience shows that burning will be discontinued in the future, Canes are ratooned from 3 to 4 times and the lands also replanted. In Cuba cane is ratooned for many years. Commercial fertilizers are used in Hawaii in large quantities at times as much as 2000 lbs. an acre.

Rainfall efficiency.—Horton has shown that the average observed interception during the summer of 1918 was 40% of precipitation. This loss ranges from 25% for rains of long duration to 100% for light showers and seems the same for most broad-leaved trees. These losses are greater for needle-leaved trees. The interception by full grown field crops is comparable in value with that from trees.

(Bot. Gazette, October 20.)

Teaching and Research.—We learn from "School Life" for August 15 last that Mr. August Heckscher, of New York city, has given 5,000,000 dollars to Cornell University to maintain professorships of research and to provide facilities for scientific work. *The persons selected for such positions will be relieved of routine teaching and administrative details in order that they may be free to develop themselves to scientific investigation and conduct the training of future investigators.*

The italics are ours. How we wish for a somewhat similar bequest coming to the rescue of the scientists of our research institutes and freeing from them something of the effects often palpably dominant—of routine teaching and "administrative" details.

(G. N. R.)

Invitations to visit the Rothamsted Experiment Station were issued to the members of Parliament in June and to the representatives of county Agricultural Committees and to the Director and Principals of the Agricultural Colleges in July. It is said that this visit was the most representative since 1913. The scope of the work has expanded during and after the war and now includes the soil and the growing plants in health and disease. There is a correlation between the experiments carried on in the laboratories and the fields, with the pot culture as a connecting link. There is now a permanent scientific staff of 26 experts in addition to the staff for out-door work, library records and statistics. Lord Bledisloe welcomed the visitors and explained the scope and usefulness of the work. Sir Daniel Hall, the former

Director described the relationships between Research stations and College and Farm Institutes on the one hand and the county advisers on the other. He impressed the fact that much of the work of an experimental station could have no immediate practical application, but all the same it was absolutely essential for the development of Agricultural science and further advances in agricultural practice. He also drew attention to the great changes which had taken place in recent years in the attitude of Government and the enlightened public toward research work. Dr. Russell, the present Director, going into the details of the present programme of work in the section emphasised the facts that its purpose was first to obtain trustworthy information about soils and growing plants and then to put the information in such a form that teachers and experts could use it. Elaboration of data according to modern statistical methods and greater application of Physics to farm conditions are some of the directions in which work has recently been taken up.

If Rothamsted workers have, after 80 years, to study sciences in their application to agriculture, how much more remains yet to be done in India? There is no end to Research and we, in India, have just begun. We would welcome enlightened public and cultivators to come and see if the staff at the agricultural college at Coimbatore and in district agricultural stations are going on right lines.

M. R. R.

(From Nature 28th July 1921).

Cotton in America.—The area planted in 1921 is 27,875,750 acres against 37,043,000 acres the previous year. This is the smallest acreage planted since 1912—13. This season has seen a noteworthy decrease in the use of commercial fertilisers. The commercial crop actual growth—was 11,920,625 bales in 19—20 when 36,166,600 acres were planted. (Journal of the Society of Arts).

We learn that the Sugar Corporation of India Ltd. have definitely decided to make *gur* until the prices of the machinery which are abnormal at present come down to render sugar-making profitable.

Careful experiments in Java have shown that plants do not recover from 'sereh' on being taken to higher altitudes but that canes from countries where the disease is unknown such as Hawaii and Mauritius may show symptoms of the disease when imported into Java.

In the United States House of Representatives the New Tariff Bill was introduced and passed on 21-7-21 according to the Indian Trade Journal, September 1st, 1921. The chief object is to protect American Industries by raising the rates of the existing tariff and the effect is an increase of about 30 per cent of the rates now in force. The revenue yield under the new tariff is estimated at 500-600 million dollars.

The President is empowered to grant reductions to secure reciprocal trade with any foreign country.

The following are items which affect the Indian agriculturist—extracts of dividivi, myrobolans, castor oil, cottonseed oil, coconut oil, linseed oil, groundnut oil, paddy, brown rice, milled rice, rice products, coconuts and coconut meat, castor seeds, aniseed, cassia buds, coriander seeds, ginger, mustard, chillies, turmeric.

Jute yarns or roving, fabrics composed wholly of Jute bags made from Jute, Indian straw matting, matting made of coco fibre or rattan. The following are exempt from duty. Bones, cotton, coir and coir yarn, dyeing or tanning materials, jute fibre, hides of cattle, skins, leather, oilcake, oilcake meal, sesame oil.

At the Empire Agricultural Conference held in London on 13th July, an unanimous resolution was passed in favour of the formation of the Provincial Committee to frame the outlines of the policy for the consideration of agricultural associations throughout the Empire and to deal with any crisis that may arise.

The Rangoon rice market is reported (30-7-1921) to be stiffening as the result of unfavourable monsoon conditions in India.

The Behar Legislative Council passed a resolution that a committee be appointed to consider the advisability of retaining the Sabour Agricultural College and the whole system of agricultural administration. In the course of the debate it was openly declared that the I. C. S. official was not fitted to control the destinies of the department which is, we are inclined to think, a remark based on insufficient knowledge. Amongst the Britishers there is not another class of officials which exhibits in so marvellous a degree a right sense of proportion, quicker adaptability to change of environment and obedience to authority.

Irrigation Boards composed of officials and non-officials have been instituted in Travancore to regulate the distribution of water.

Mr. Robert Angus writing in the Madras Mail of July 22 observes that farmers are greatly concerned with the lack of rain which has told upon grazing. The withdrawal of Government guarantee of wheat and oat prices and its commutation this year at the rate of £ 4 an acre for oats, and £ 3 an acre for wheat is taxing their brains though they find consolation in the fact that the wages Boards which have forced up rates will be abolished.

The Indian Central Cotton Committee which has been recently appointed to advise the Government of India on the development of cotton trade and industry in India met for the first time at Bombay on the 19th July last, considered the recommendations which the Sub-committee made on (1) restriction on transport of kappas, cotton and waster to prevent fraudulent mixing of cotton and (2) technological and agricultural research on cotton, and forwarded its conclusions to Government. We may point out that this Committee's activities cover a very wide field with the absorption of the functions of the Imperial Cotton Specialist which post was abolished when that kindly Scotsman—Professor Gammie—retired.

Scarcity is reported to prevail in parts of Afghanistan and the frontier.

A Japanese Commercial mission will visit this country next month with the object of studying Indian commercial affairs and promoting mutual commercial relations between the two countries.

A Reuter's telegram dated London, July 22, stated that 2,000,000 registered themselves as unemployed in the United Kingdom on 15th July.

The Beggar problem has forced itself on the attention of the Bengal and Bombay Legislative Councils. With 80 lacs of beggars, the question of its solution is daily becoming insistent.

Jute and Food crops.—In Bengal the total area sown with jute is 1,343,202 acres showing a decrease of 862,121 acres or about 39% as compared with the final figures of 1921.

Sir Ronald Maclean M. P., is reported by Mr. Angus to have said that during the last ten years the small holdings have diminished by 1,500 in spite of the fact that there are 8,000—15,000 approved applicants.

Satisfactory disposal of Town sewage has been a vexatious problem for sanitary experts over the whole world. Mr. Duncan Watson who investigated this question for the Bombay Corporation has submitted a scheme which the corporation has recommended, that will ensure the whole of the sewage from the island being discharged into the sea, a pumping station at Antop Hill in Trombay being instituted for this purpose. He impresses the necessity of increasing the water supply to 50 gallons per head per day.

Disquieting reports appear in the Daily Press that Kanri crop generally reaped in September—October has disappointed the

Travancore ryot and that the succeeding Kumbam crop February—March is also seriously affected and there is fear of water famine next hot weather owing to the present water conditions which have not been witnessed during the last 60 years. Rains on the West Coast have been in defect and Malabar is not free from anxiety. With the spectre of famine stalking through parts of the Ceded districts the prospects for the rains crop are not considered bright.

Students' Corner.

Students' Hostel.—The College opened early in June. The climate is very favourable and there is no report of any sickness in the Hostel. The Hostel management is still in the hands of the Warden and his assistants and the Management deserves the thanks of the members of the Hostel for the appreciable decrease in the mess rates. The non-vegetarian mess was started and the management is trying to keep the mess rates in bounds. It is unfortunate to note that the Sub-Assistant Surgeon who was making regular visits to the Hostel has to discontinue owing to various reasons and arrangements are being made to secure proper medical help.

Students' Club. The College played 3 hockey matches one with the Stanes' High School ending in a draw, either teams scoring two, and the other two with the Forest College being defeated at the one by four to nil and winning the other by three to two. There was a cricket match played with the C. A. C., the College winning by 128 runs. The Hockey this year is not as good as last year's. Our forward line though remaining unchanged requires much understanding between themselves. Mr. Parnell plays in the centre and gives his usual intelligent suggestions to the players. The defence line has been completely reinforced and much change is needed there still.

With more practice and little change, the team may be improved much and have better success this year than last year's. The cricket team is stronger than ever. We are glad to note that we have got back to one midst Mr. Anstead. The team will be much benefited by his advice. We might point out in this connection the extreme desirability of electing a team captain for our various teams.

Departmental Notes.

Appointments etc.,

1. Mr. B. V. Seshaya, M. A., Assistant in Entomology, on probation.
2. „ C. V. Sundaram Ayyar, (Sub Asst) Assistant in Entomology on probation.
3. „ M. L. Narayana Reddi, Assistant Farm Manager, Chintaldevi Farm, on probation, V grade.
4. „ G. K. Valeswaran, (a lower subordinate of the College of Engineering) Draftsman to the Government Agricultural Engineer, on probation on Rs. 50-2½-100.
5. Mr. C. V. Sankaranarayanayyar, Sub Assistant in Economic Botany.
6. „ T. K. Sambamurti, „ Mycology.
7. „ Pushpanatham B. Thomas, Asst. Farm Manager, Sugarcane Breeding Station.
8. „ B. Venkataramana, to III Circle.
9. „ S. Rama Rao, to IV Circle.
10. „ S. Bhima Raju, }
11. „ T. V. Ayyasami Ayyar, } to VI Circle.
12. „ E. R. Subbramanya Ayyar, }
13. „ S. Venkatarama Ayyar, }
14. „ R. Subrahmanya Ayyar, } to V. Circle.
15. „ H. Narahari Rao, }
16. „ G. K. Subrahmanya Ayyar } to VII. Circle.
17. „ A. S. Nityakalyani Reddi. to IV Circle.
18. „ S. Sithaspathi Rao, Assistant Agricultural Demonstrator, II Circle.

19. Mr. A. Ramalingayyar, Assistant Agricultural Demonstrator, V grade to IV grade, lower division, with effect from 1-4-1921.
 20. Mr. N. Sadagopacharya, Farm Manager on probation, deputation for work in the Borsal Institution, Tanjore.
 21. Mr. S. Kashinatha Ayyar, confirmation as Assistant in Chemistry, IV grade
 22. „ M. Ananthan, „ „ Economic „ Rotany,
 23. „ V. Ramachandra Ayyas, confirmation, Agricultural Section, Upper Division, V grade.
 24. „ K. Avadinayakam Pillai, „ „ „
 25. „ T. G. Muthusami Ayyar, „ „ „
 26. „ L. Sankarakumara Pillai, „ „ „
 27. „ V. N. Subbannachar, „ „ „
 28. „ P. S. Venkusuwami Ayyar, „ Agricultural Section, Lower Division, IV grade.
 29. „ S. P. Fernando, „ „ V grade.
 30. „ S. Suryanarayana, „ „ „
 31. „ M. Krishnaswami Ayyangar, „ Science Section, „
 32. „ G. L. Narasimha Rao, „ in the Agricultural Section, Lower Division, V grade.
 33. „ V. Achyutham, „ „ „
 34. „ S. Kuppuswami Ayyangar, Farm Manager, transfer to III Circle.
 35. „ S. Sitharama Pathradu, Farm Manager, transfer to I Circle.
 36. „ M. Raman, in charge of Central Farm vice Mr. Dhanakoti Raju on leave.
- Leave :-
37. Mr. C. Talliagum, Assistant Lecturing Botanist and Assistant Principal, privilege leave extension by three weeks.
 38. Mr. T. Lakshmana Rao, Assistant in Chemistry, privilege leave for 2 weeks from 14-6-21.
 39. Mr. T. S. Ramasubrahmanyam, „ „ extension by 2 weeks.
 40. Mr. S. Kasinathan, „ „ one month from 8-8-21.
 41. Mr. U. Vittal Rao, Botanical Assistant to Sugarcane Expert, privilege leave for 1½ months from or after 1-9-21.
 42. Mr. V. Ramanadhaayyar, Assistant to Cotton Specialist, privilege leave for 2 months from or after 5-10-21.
 43. Mr. T. V. Subrahmanyam, Assistant in Entomology, privilege leave for 15 days from or after 9-6-21 and 2 months from or after 10-8-21.
 44. Mr. C. S. Gopalswami Rao, Assistant in Mycology, privilege leave for 3 months from 6-6-1921.
 45. Mr. C. Krishnan Nair „ „ for 10 days from 7th September 1921.

46. Mr. J. Srinivasan, .. combined privilege leave and furlough for two months from 7-5-1921.
47. Mr. N. Annuthanarayana Ayyar, Assistant in Chemistry, extraordinary leave without allowances for 15 days from 26-7-1921.
48. Mr. K. Baghavacharya, Farm Manager, extension of privilege leave for 2 weeks.
49. Mr. C. V. Seshacharya, Agricultural Demonstrator, extension of privilege leave for 1 month and 4 days.
50. Mr. K. Narayanayyengar, Farm Manager, privilege leave for 3 months from 15-7-1921.
51. Mr. V. Dhannkoti Raja, Farm Manager, privilege leave for 1 month from 8-7-1921.
52. Mr. M. K. Nambiyar, Agricultural Demonstrator, privilege leave for 6 weeks from or after 15-7-1921.
53. Mr. M. K. Nambiyar, Agricultural Demonstrator, privilege leave extension by 2 months.
54. Mr. M. A. Balakrishna Ayyar, Farm Manager, privilege leave for 2 months from 15-8-1921.
55. Mr. M. U. Vellodi, Teaching Assistant, privilege leave for 5 weeks from 11-9-1921.
56. Mr. K. T. Bhandary, Teaching Assistant, privilege leave for 15 days from 14-9-1921.
57. Mr. N. Sadagopacharya, Farm Manager, privilege leave for 27 days from 16-5-1921.
58. Mr. T. S. Azizuldeen Sahib, Sub Assistant, extension of privilege leave by one week.
59. Mr. M. Ramaswami Pillai, Fieldman, privilege leave for 3 weeks from 11th July 1921.
60. Mr. C. K. Subrahmanya Ayyar, Sub Assistant, privilege leave for five months from or after 1-9-1921.
61. Mr. P. S. Suryanarayanayyar, Sub Assistant, privilege leave for 15 days from or after 10-8-1921.
62. Mr. V. B. Ramaswami Ayyar, Agricultural Demonstrator, privilege leave for 6 weeks from or after 15th October 1921.
63. Mr. Viawam Ayyar, Assistant Agricultural Demonstrator, II Circle, for lough on half pay for one month from 10-8-1921.

64. Mr. H. Narahari Rao, Assistant Agricultural Demonstrator, leave without allowances from 27-8-1921 to 25-9-1921.
56. Mr. A. S. Nilakanta Ayyar Assistant Farm Manager, extension of privilege leave by one month.
66. Mr. J. Lakshmayya, Assistant Farm Manager, combined leave for 8 months from 9-12-20.
67. Mr. R. Sitharamayya, Assistant Agricultural Demonstrator, privilege leave for 11 days from 21-6-1921.
68. Mr. V. Narasinha Murthi, Farm Manager, privilege leave for 19 days from 25-5-1921.
69. Mr. S. P. Fernando, Assistant Farm Manager, privilege leave for one month from 15-8-1921.

Subburatnam Memorial Fund.

At a meeting held for the purpose, the members of the students' club unanimously expressed their sympathy for the death of Mr. Subbaratnam of class I last year and desired a memorial to be started in his name. A committee was elected to collect voluntary donations and decide as to the form the memorial is to take. There is already on paper a promise of about two hundred rupees and we may be able to collect more. The general opinion regarding the memorial seems to be to institute a Tennis-cup for doubles. The idea is really a good one, but would it not be better if a prize in the form of books be awarded annually to the best essay and extempore lecture delivered at a competition held by the students' club. There are a member of cups and medals for the athletics of the club, while there are a few for the literary side of the club. Further this prize will induce students to take greater part in the activities of the club. We are sure that the committee will consider well in this matter.

**Ramasastrulu Nayudu Memorial Fund,
Collections.**

Balance on hand (vide pages 61 and 62 of 1921).
(August issue of the M. A. S. U. Journal).

	Rs.
Messrs. Anantham	1
" Balakrishnamurthy	18
" Budhavidhaya Rao	5
" Govinda Gidavu	2
" Lakshmana Rao	3
" Rajagopalachari, T. V.	3
" Madiah	3
" Ramakrishna Iyer, T. V.	1
" Ramayyar, K.	1
" Ramanathan	2
" Ramasubramaniam	1
" Ramaswami Sivan (Rao Sahib)	5
" Rangachari, K. (Rao Bahadur)	3
" Seshachalam	5
" Sundararaman	1
" Tadulingam, C.	10
" Varada Rajan	3
" Vittal Rao	2
Total Rs.	69
Expenses Rs.	1
	Rs. 68

68

Balance on hand Rs. 433

Rupees Four hundred and Thirty three only.

K. Krishnamurthi Rao,

Secretary.

THE JOURNAL

OF

**The Madras Agricultural Students'
Union.**

Vol. IX.

October 1921.

No. 4.

Editorial Notes.

The First Science Congress met at Calcutta in January 1914 through the efforts of Professors MacMahon of Lucknow and Simonsen of Madras. The object and scope of this institution were, in the words of the President the Hon: Justice Sir Asutosh Mukhopadhyaya, Kt. C. I. E.,

"to be similar to those of the British Association, namely, to give a stronger impulse and a more systematic direction to systematic enquiry, to promote the intercourse of societies and individuals interested in science in different parts of the country, to obtain a more general attention to the objects of pure and applied science and the removal of any disadvantages of a public kind which may impede its progress."

The second Session was held at Madras in 1915. The Science Congress has since visited Lucknow, Bangalore, Lahore, Bombay, Nagpur and Calcutta. We are glad to learn it has been invited for a second time to Madras in 1922 and the meetings will take place for 5 days from January 30th. Last time at Madras, the Governor Lord Pentland deplored "that there were no papers on pure agriculture by Indian members of the congress and the papers on applied science were few and fewer still of them were offered by Indians." There have been some improvements no doubt since these words were uttered, but they are not adequate. Notable achievements have, we know, been claimed from the agricultural side. "The most urgent branch of research work to-day is the economics of farming" We confess this aspect of investigation has not been appreciably touched in this country without which the labours of the Agricultural Departments, will, we fear, result in their being charged with manufacturing formulas inapplicable to altered conditions of time and place. We hope officers of the department will contribute an adequate number of papers to the next sittings and carry the Madras sessions a few steps forward in the progress of science not incompatible with the advancement of the country.

Our readers will remember that at its business meeting held in December last the M. A. S. Union passed a resolution that it was desirable to affiliate the agricultural College to the University and forwarded it to the Director. We are led to think that, largely owing to the commendable attitude of the late lamented Director—Mr. G. A. D. Stuart—and the sympathetic support of the Minister, the

question has been satisfactorily settled. We understand that the Senate is discussing it shortly and we hope there will be no senator against the affiliation as, in the words of Lord Carmichael "the Madras has a passion for University education" and think that agriculture should occupy a fitting and honourable place in the highest seats of learning, if dignity of labour is to be duly recognised and agriculture should engage the attention of the best minds in the land. Fears are expressed in some quarters that such affiliation would tend to make aspirants for the degree merely theoretical and that practice would be divorced from theory. It is hardly thinkable that the Indian student will behave differently to his confreres elsewhere in this respect and that the Agricultural College alone would ingenerate in a student a habit which he does not get in an engineering or a medical institution.

Co-ordination of scientific work, interchange of views between Scientists and publication of their experiences were rendered possible in England since the British Association for the Advancement of Science was founded in 1831. For 73 years agriculture contented itself with being either in the back ground or represented by scientists who were discoursing on agricultural topics without any consciousness of it or conceding it. It was at its Cambridge sessions in 1904 that agricultural subjects received separate attention and a sub-section was formed over which Dr. Somerville presided. Since then this subject has maintained a conspicuous position which was re-inforced

Agriculture
and the
University.

Agriculture
and the
British
Association.

by conditions created by the war. This year the British Association met at Edinburgh in the second week of September last.

"Agricultural Economics" formed the subject of Mr. Orwin's Presidential Address in the Agricultural section in the course of which he said "Farming is a business and, if it is to succeed, it must be carried on with a clear regard for the economic forces which control the industry. The main concern for the farmer is to know not so much that which he can grow and how best to grow it as that which he can sell at a profit. Transport facilities determine much. The production per man employed varied with the size of the holding. The best system of farm management is that which utilises—land, labour and capital—all together so as to secure the maximum result from each. The disparity between the retail prices paid for market garden produce in big towns and the small proportions of these prices received by the growers is utterly indefensible. On the subject of agricultural costings there is much confusion of thought. This is evident in nothing perhaps so much as in connection with the valuation of the raw materials grown in the farm, hay, straw, roots, pasturage, consumed by the farm. There could be only one basis of value possible, namely their value to the farmer; yet it is contended that their market price should be substituted for the sums he has actually paid for them. As a matter of fact, the bulky feeding stuffs usually produced and consumed at home rarely have any market value at all. A market value is one that can be realised in the market. For the farmer

to regard himself as the merchant and not a manufacturer and then to trade with one department of his farm against another is to engage himself in transactions on paper which have no foundation in fact and may lead to disastrous consequences. The actual cost is the measure of the value of all raw materials."

Dr. E. T. Russell in his lecture on "Science and Crop Production" observed, "The undoubted benefit of artificials led some chemists to believe that they were at least as good as farm yard manure for ordinary use on the farm. But wider knowledge has shown that this is not the case. The Broadbalk wheat crops show less variation in yield from year to year and less variation in fertility in consequence of the use of farm yard manure. Farm yard manure never lets us down even in the worst seasons, but on the other hand it never makes record crops. Farm yard manure produces remarkable physical effects upon the soil, improving the air and water supply, lightening the work of the village implements and improving the tilth. Farm yard manure and green manure put into the soil are not really agents of fertility but only raw materials out of which fertility is manufactured." Incidentally he referred to the manufacture of artificial farm yard manure from straw on which a note appears in this issue.

We invite our readers' kind attention to a letter from Veritas' which speaks for itself. We understand that the Madras Agricultural Students' Union
A Plea. Council has taken action already. For their vigorous plea on behalf of the staff on Demonstration work grateful thanks are tendered to the Sugar Committee.

The older I grow.

The older I grow the more patient I am,
 And kinder of people I seem to become;
 I find much that's real hid deep in the sham,
 I know that life's juices are under the scum,
 The cares that once fretted as trifles appear,
 And the faults that loomed large in friends that I know,
 Seem to fade in a background of kindness and cheer,
 The older I grow.
 Time was that I questioned the purpose of life,
 In the mad way of youth I was quick with my hate,
 But I knew not the depth nor the breadth of the strife,
 And I knew nothing then of the workings of fate.
 I judged from the surface and not from the deep,
 I was wasteful with pleasure and fearful of woe,
 But I find that my joys I'm more eager to keep,
 The older I grow.
 I chose all my friends with particular care,
 Heedlessly wounded the truest and best;
 To many false Gods I sent up a prayer,
 Then real things of life seemed a subject for jest.
 And the bad seemed the good and the good I seemed the bad,
 I scorned in my haste what was splendid below;
 But I find myself longing to have what I had,
 The older I grow.
 I have learned that men's follies are not printed deep,
 That things youth mocks at are splendid and fine,
 And young people scatter the joys they should keep,
 In the very same way that I once wasted mine.
 I'm more tolerant now, I am slower to sneer,
 For I've suffered my griefs and I've winced at a blow;
 And money I find matters less and less here
 The older I grow.

(Selected)

American Agriculturist, May 21, 1921.

'Nolla' a levelling implement in Narasapatam Taluk, Vizagapatam District.

A. Venkobachar, Asst. Manager, Hagari.

This simple implement is entirely made of wood chiefly babool which is within the easy reach of an ordinary ryot.

It consists of a wooden shaft pole with two arms diverging from one end in the shape of "V." Towards the end of each of these arms there is a hole and into these holes a wooden plank is loosely fitted by its projections on either side. The edge of the free end of the plank is sharp, for it is intended to scrape the earth. A cross rod is fixed between the two arms so that it might prevent the handle from touching the ground when it is let fall forwards. This implement is light and is worked with one pair of animals of these parts which are poor in condition and stunted. The work turned out is more than is possible with manual labour.

This can be used for levelling the land both in the dry and in the puddled state before planting paddy. This is also used for raising big bunds all round the fields reclaimed for paddy cultivation—a practice commonly followed in these parts.

The land to be levelled is first stirred well by ploughing. Then "Nolla" is passed from a higher to a lower level. While passing it from a higher level the wooden plank is held by the handle inclined towards the shaft, so that the sharpened edge of the plank might scrape the soil and carry the earth with it. When the lowest level is reached, the handle is let forward and it leans upon the cross rod and all the earth is dumped in the low-level-ground. This implement does not require much repairing and if it goes wrong, it is not beyond the skill of the village carpenter to repair it. To increase its efficiency and reduce wear and tear, the plank can be provided with an iron edge. Work done with the implement is compared below:—For a lead of 50 yards for carrying earth, time taken by the animals to draw the implement to and fro is two minutes. Each time the implement removes 5 baskets of earth. This works out as follows:—

For 2 minutes, 5 baskets

„ 8 hours, $5\frac{1}{2} \times 480$ equal to 1200 baskets.

Taking that one cartload is equal to 50 baskets, this works out to 24 cartloads a day.

We shall see how this compares with work turned out by manual labour.

“2 men and 6 women” is a convenient minimum for digging earth, carrying and spreading.

1 man to dig and fill the basket at 5 annas a day.

1 woman to lift the basket at $2\frac{1}{2}$ annas a day.

5 women to carry.

1 man to receive the basket and spread the earth

2 minutes may be roughly taken as the time required for each woman to carry the earth with a lead of fifty yards and return.

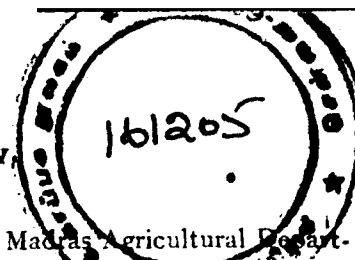
Thus in 2 minutes 1 woman carries 1 basket.

„ 8 hours, 5 women, $8 \times 60 \times 5$ equal to 1200 baskets

or 24 cartloads.

The cost of removing 24 cartloads of earth by manual labour comes to Rs. 1-9-0. But the expenditure incurred by working with “Nolla” comes to only 2 annas for 24 cartloads. The cost of ploughing before levelling may be left out of account as that operation is necessary in both cases to facilitate rapid work.

In Coimbatore Farm levelling operation is done by an implement called “Buck Scraper.” This is an improvement over the indigenous implement. The difference between the “Nolla” and the “Buck Scraper” lies in the fact that the latter is provided with an open box to hold a larger quantity of earth which of course demands more draft power, whereas in the former, there is flat surface to hold the earth. Cheapness, simplicity, little need of repairs, are points really in favour of this time-honoured implement.



The 1920—21 year book of the Madras Agricultural Department just published contains useful articles. Cane pests and diseases occupy a fair amount of attention. In “Sugarcane in South Kanara” are described the different stages through which the cane cultivation has passed in that picturesque but oft forgotten district of this Presidency. It is refreshing to note that in parts where there were professional juggery makers it was easier for the department to work through them than to deal with the tenants directly. “Livestock of the Farm” and “Some temperature experiments in Butter making” give information which are instructive to people concerned with milk. Very suggestive though tentative results due to variations in the treatment of seedbeds are recorded in “Effect of quality of seedlings on yield of paddy” “Note on the trials of Nitrolim” summarises the inconclusive results obtained by the application of this new fertilizer to four important cereal crops of this Province, namely, paddy, cholam, ragi and tenai. “Analyses of varieties of Rice” indicates the marked differences in the nutritive ratios found in the samples furnished by the Deputy Director of Agriculture, Cocanada. It is noted that the largest percentage of crude Protein and consequently a bigger nutritive ratio are scored by Garikisumavari, Swarnala and Poombalai—varieties to which consumers do not accord a high place. Amateur cane growers will derive much benefit from a perusal of the article on “Irrigation water for sugarcane cultivation” where the warning is given that anything over 75 parts of common salt in water is not desirable and its evil effects persist for a long time even to the unpromising extent of rendering raw sugar unsolidifiable, besides probably impairing the physical condition of the soil as well.” “The Mango in Madras” is a very descriptive study of this delicious fruit and its cultivation in one of the most favoured tracts of the Telugu districts.

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The Dairy course is one of eight months' duration (from October to May). No practical instruction is given in butter or cheese making. Scholars are expected to know that part of the work before coming to the school. In both the agricultural and dairying courses one hour in every four is devoted to questions and answers in different subjects.

The best students from an agricultural school pass on to the Royal Agricultural College at Copenhagen.

This is a non-residential college and has no farm attached to it.

The students who take the agricultural course are sons of farmers. Those who fail in the examination return to the farms and those who are successful obtain posts as teachers, lecturers or experts.

There are six agricultural experiment stations belonging to the state, the administration of each is vested in a state committee of 5 elected members.

Each station is under the charge of a Director. At all stations the size of the experimental field is always very small, usually only 30 square yards and each plot is duplicated at least six times. In Aarslev for example there are no fewer than 2976 different plots on 85 acres of land.

The experiments with farmyard manure are interesting. The food fed to each cow is weighed and analysed and the comparative analyses of droppings from each cow detect any abnormal cows. Special pits one for each cow have been made in concrete 3½' x 4' x 6' to receive the manure and the liquid manure is stored in an air-tight tank underneath. The contents of each pit are applied to separate plots of land.

There are over 130 local agricultural societies which are amalgamated through Provincial societies into one Associated Agricultural Society. These societies do very good work. The number

of field trials has been annually increasing. A recent development of their work has been cost accounting. The accounts of 235 arms were analysed in 17—18 and of 312, in 18—19.

The results are tabulated below.

	Below 25 acres	25 to 50	50 to 75	75 to 125	125 to 250	over 250.										
No. of Farm.	11	24	42	51	68	78	70	95	29	38	12	12.				
Average size in acres.	17	16.3	37.	39.3	63.2	6	12	95.	94.8	168.5	163.3	467.7-501				
Capital per acre	£ 53	61	54	55	56	56	53	50	48	50	47	45.				
Gross profit	16.18	25.4	16.15	20.7	16.10	19.12	15.12	17.18	14.5	16.16	14	15.19.				
Expenses including farmer's labour	13.10	18.7	11	11	13	1	11	7	12	12	10.8	11.5	9.15	10.11	9.14	9.11.
Net profits	3.8	6.17	5.4	7.6	5.3	7.0	5.4	6.13	4.10	6.5	4.6	6.5				

News and Notes.

Cotton Stalks and Paper pulp.

As cotton is grown on large areas in India, what the Popular Science Monthly says of a new use of cotton stalks ought to enable the Indian capitalist to make money. It says:—

"There is now a pulp mill in Greenwood, Mississippi, that turns out one hundred and fifty tons of cotton stalks into 50 tons of valuable paper pulp every day. A careful analysis of the cotton plant has led to the discovery that a certain thin tubular fibre in the plant will make excellent cellulose for durable papers. It is strong and flexible.

If a quarter of the annual supply of the cotton stalks of the South were put to this use each year, there would be no fear of paper shortage in this country."

This short extract from the Modern Review for October 1920 reminds me of another note in the Hindu of the 12th February 1917, wherein it was stated that experiments on a laboratory scale were made by the Government Agricultural Chemist of the Agricultural

Research Institute, Nagpur, to determine the details of the process and nature of the product obtained. Analysis of cotton stalks was made and they were found to contain 42.4% cellulose, 10.3% moisture, 15.8% mineral. After describing the method employed in the preparation of paper pulp, the report states that samples were made which went to show that paper could be prepared from cotton stalks. The Governments of Bengal and Burma are said to be making efforts to extend paper production in India.

Now it is three years and over, since that extract appeared and experiments were conducted by the Nagpur Agricultural Chemist.

It is not known what further experiments were made and what were their results.

India produces large quantities of cotton year after year and the stalks go to supply the fuel needs of the people and the ashes therefrom are returned to the manure pit. Of course from an agricultural point of view it is really a gratification to see that what is removed from the soil is being returned to it, first by the goats browsing and the return of the ingredients in the shape of the droppings and secondly in the shape of ashes. Thus the time-worn practice of goat-browsing prior to pulling out cotton stalks and that of returning ashes to the manure pit, and finally to the fields is to be really commended. Besides the return of the ingredients to the soil, the ryots get their minor needs by using cotton stalks for baskets, side protection for the carts, for fodder trough, muzzles for cattle and so on.

Thus the extension of paper pulp manufacture out of cotton stalks will have to be considered well before being so done on any extensive scale, since the same will really be the certain drain on the fertility of the land and a tendency for the ryots to sell away cotton stalks for paper pulp, and go in for purchase of firewood which in turn will demand a heavier toll on the forests. But if it is finally proved that conversion of cotton stalks into paper pulp is

more profitable, surely the money obtained therefrom may be spent in the purchase of fertilizers for their crops and balance of fertility kept up.

A. K. G.

It is a matter for congratulation that in the hamlet of Kalipalayam, Sankupuram Village, Palladam Taluk, excellent work is being carried on in the breeding of buffaloes. There are about eight stall-buffaloes in this village maintained purely for breeding purposes for the last 3 or 4 generations by a class of people known as Wollers (brick layers). There are good dry uplands in this hamlet and quarrying for rough jelly-stone is their main profession. They rear the buffaloes as their secondary occupation. A large number of sheo-buffaloes from all the neighbouring hamlets is brought to service just three days before and after the full and new moon days. There is no fixed charge for service and the rate varies from 6 to 12 annas per service.

P. V. H.

E. M. East and D. F. Jones in their article on "Protein content of Maize" observe that merely as a matter of probability it would be more difficult to secure a high proportion of certain ingredients together with high yield than it would be to secure either alone. The truth is that inbred strains showing the highest protein percentage are weak and unproductive. As a rule high protein strains are less vigorous than strains not so selected and crosses between them generally gave lower yields than other crosses. It may well be therefore that high protein maize can be secured only at the expense of maximum total production."

(Genetics, November, 1920)

Artificial farmyard manure:—

When cattle are fed with food rich in Nitrogen, their excrement considered on a chemical basis, is correspondingly enriched and cake fed dung has been given a high value by the man of

science and also by the farmer, so much so that Hall and Voelcker have published Tables giving residual manurial values of food stuffs. The perplexing fact remained, however, that dung with this higher theoretical value did not give crop increases proportionate to their chemical content. Hutchings and Richards of the Rothamsted station indicate the solution of the conundrum in their paper published in the August number of the journal of the Ministry of Agriculture. They have proved that the whole of the nitrogen in the urine of animals will not be present in the manure as applied to crops, unless a certain ratio exists between the nitrogen voided by the animals and the carbonaceous matter of the litter which absorbs the urine. They show that the factors involved are purely biological and not chemical. The making of farmyard manure is essentially the fermentation of straw brought about by a new *terolus* organism *sphaerolus cytophaga* which requires oxygen, and nitrogen in the form of ammonia or urea. 100 lbs. of straw require 0.72 lb. of such nitrogen. If the nitrogen is in excess, it passes into the air as ammonia or is picked up by those of the manure where the proportion is less, until in all cases the whole heap reacts the characteristic and uniform 2.4 nitrogen.

This result has been utilised to prepare an artificial product, resembling farmyard manure in appearance and properties by adding calculated quantity of ammonium salts to straw. The advent of the motor has resulted in less farm animals being maintained, less straw being utilised and farmyard manure being produced. The new artificial manure will supply the need, when manures containing humus are required. It has also been shown that, if liquid sewage is used to ferment the straw, the effluent is practically free from nitrogen and the straw has retained all the nitrogen.

The above discovery is a notable scientific advance and makes another stage in the capture by the biologists of the field of agricultural research. (From Nature 25 August 1921.) M. R. R.

Java and British India as sugar producers.

The Dutch East Indies remain as a fraction of that great empire that the Dutch controlled more than three hundred years ago, reaching from the East Indies to the West Indies, from New Amsterdam, or New York, north of the equator, to New Zealand south of the equator. The Dutch seem to make friends of the natives wherever they have settled and the Dutch East Indies now have possibilities in the way of development that we, or they may scarcely have dreamed of. The great island of Borneo is one of their possessions and may be to the Dutch a source of immense wealth. Java, Sumatra and the Spice Islands have been the chief centre of Dutch activities in the Far East and it doubtless came as somewhat of a shock to the more slowly-moving Spaniards some thirty years ago, when they found that the Dutch island of Java was producing more sugar than the Spanish island of Cuba. Under American domination, Cuba of course has practically outdone itself and has become the chief centre of cane production of the world and has the capacity for retaining that position. Java's resources in cane sugar are certainly unknown even to the Dutch themselves but they have produced in Java some 1,700,000 or 1,900,000 tons of sugar in a single year and that had never been done in Cuba, and not even approached in Cuba until after the American domination there.

The utilisation of the vast population of the British East Indies where they have thousands of natives to the square mile, will give Great Britain the opportunity of utilising that vast mass of human labour and the vast areas of sugar cane producing land, but it may take many years to bring these results about. The germ has been planted, the possibilities have been considered and efforts are now being made and plans are being prepared that, it is hoped, will lead to the development of a genuine commercial sugar industry in British India that will exhibit to the rest of the world

a conspicuity that in cane sugar is now only enjoyed by Cuba, and a conspicuity similar to that of the great plains of central Europe which for thousands of years supplied wheat and other cereals to nearly all the nations of the world all that time. British India, with the people on the spot and with available capital, as soon as it gets over the shock of the recent war, may and will open up the gates of the East in due course, and send a flood of cane sugar into the western world.

(Abstract from page 114 last para of the *Louisiana Planter and sugar manufacturer* dated August 20, 1921, Vol. LXVVI.)

T. S. V.

Students' Corner.

The college met first the Stanes European High School, the winners of last year, on Mr. Narasiah's compound. The school took first tenancy at the wicket on winning the toss but being unable to withstand the attack of Hegde, who was in charge of the leather on the college side, were all dismissed for a small total of 84 runs. The college replied with 200 and K. T. Bhandary exhibited a lively game for his 55.

The next fixture was against the Coimbatore European club. In their first venture they were all disposed of for a meagre total of 55 runs. Mr. Anstead monopolised the bowling honours. The College also put in a poor total of 103; Hegde with his 32 was the principal contributor. The final match came off on the 22nd October against the Coimbatore United Club. The College on winning the toss curiously enough put their opponents in. This unusual move was intelligible to me only after the match had come to a finish. They were evidently out to give them an innings defeat and in this attempt they succeeded. The United Club fared no better than its predecessors, their contribution with

first innings all told reached 54. For the College, Doraisamy with clever change of pace and pitch kept in check the hitting propensities of the opponents and captured 6 wickets for only 25 runs. The college piled up 143 runs mainly through the efforts of Venkataramanan who played an excellent innings of 55. In the next attempt the union fared worse; Mr. Anstead who bagged 6 wickets conceding 19 runs, chiefly being responsible for their poor exhibition.

Letter.

To The Editor,
Madras Agricultural Students' Union.

Sir,

I send herewith an extract from the Sugar Committee report. Don't you think, dear editor, that the present difference in pay between a demonstrator and a scientific subordinate is rather invidious—There are cases where a medalist or a first class Diplomat gets only Rs. 70 as a Demonstrator or Farm Manager while the 3rd or 4th of the same set of students is started on Rs. 100 as a scientific assistant. It would certainly damp the enthusiasm of the Demonstrator, if things continue as at present. Please bring this to the notice of the wider public and try to remedy the defect.

"VERITAS."

Extract from "Report of the Indian Sugar Committee" page 370.

It would be idle to deny the existence in some quarters of the Agricultural Service at least of an impression that demonstration work is of a definitely inferior order to research work. And we are profoundly convinced that the object of spreading agricultural improvements will not be realised as fully as it ought to be realised so long as demonstration is not given the recognition and the esteem it deserves. Demonstration is not the handmaid of research, but its full and equal partner. It is hardly an exaggeration to say that research without demonstration is as useless to Indian Agriculture as demonstration without research. It is not, perhaps, surprising that the Agricultural officer, fresh from his studies in whatever branch of scientific

agriculture, should sometimes betray a predisposition to see in the laboratory and the research station, in the publication of treatises and the commendation of fellow scientists, the whole future and aim of his life's work in India. It is a defect of his training for which, his subsequent experience must provide the remedy, for experience will show him that with the achievement of the most definite results on the Government farm the problem of improving Indian Agriculture has only begun. The task of disseminating those results calls for a concentration undistracted by other labours and for attainments and qualities of the highest order. Demonstration requires its full share of the best men in the department; and it has work to give them in every way worthy of their abilities. It offers constant opportunity both for the use and the enlargement of their scientific knowledge in the observation of existing agricultural conditions and practice and in detecting local variations and behaviour and result upon the conclusions established at the research stations. For the enthusiasm and practice which always imbue the true scientist they will find no less scope in touch with the realities of Indian rural life than they found in pure research; while human sympathy and understanding will be required of them in greater measure than before. There is thus no valid ground for holding that, if the functions of research and demonstration are separated in the interests of efficiency, any invidious distinction will be involved. Each is in the same degree essential to the solution of the great problem of promoting the ryot's prosperity; each is in the same degree dependent on the other for assistance to that end.

Ramasastrulu Nayudu Memorial Fund.

Gentlemen who have subscribed to the Fund will be glad to know that about Rs. 450 has been collected. It is proposed to finally settle the form of the Memorial on the occasion of the next College day.

Those who cannot be present are requested to communicate their wishes. It is tentatively suggested that the interest on the amount may be utilised in giving pecuniary or other help to any agricultural student from the present submerged classes.

(Sd). K. Krishnamurthi Rao,
Provisional Secretary.

M. A. S. Union Building Fund.

Gentlemen who have promised are requested to remit the amounts. Those whom the appeal has not reached but who are interested in the Union are also invited to help.

(Sd.) K. T. Bhandary.

Departmental Notes.

Appointments and Transfer:—

Mr. B. S. Narasimha Ayyar, Sub-Assistant, Government Agricultural Bacteriology section, to be assistant in that section on Rs. 100-5-150 on probation. To take effect from the 11th October 1921.

Mr. K. Narayana Ayyangar, Farm Manager, Anakapalli to be Farm Manager, in charge, Koilpatti Farm, vice Mr. S. Narayana Ayyar, granted leave. To join on the expiry of his privilege leave for three months from 25th July 1921.

The following officers are confirmed in their appointment:—

1. Mr. B. Narasimha Ayyar.
2. Mr. P. S. Suryanarayana Aiyar.

Leave:—

Mr. K. K. Subramania Iyer, Agricultural Demonstrator Gobichettipalayam privilege leave for 17 days from 23rd September 21 to 9th October 21.

Mr. A. Gopalakrishna Ayya, Farm Manager Chintaladevi, 15 days privilege leave from 20th September 21. Compensation leave is cancelled.

Mr. Ramachandra Naidu, Assistant Agricultural Demonstrator, Avanashi privilege leave from 4th to 19th October 1921.

Mr. K. Vasudeva Shenoi, Assistant Demonstrator, three weeks' privilege leave from 1st October 1921.

Mr. P. Janakirama Ayyar, Assistant Agricultural Demonstrator, privilege leave for ten days and furlough on half pay for one month and 20 days in continuation of the privilege leave already granted.

Mr. A. Sachichananam Iyer, Farm Mechanic, Anamali, Agricultural Station, Anamalai, privilege leave for 28 days from 4th September 1921.

Mr. K. Unni Krishna Menon, Agricultural Demonstrator, privilege leave for three months from date of relief.

Mr. R. Subrahmanyam, Assistant Agricultural Demonstrator, leave on medical certificate from 11th Sep. 21 to 21st October 21 both days inclusive.

Mr. N. Sadagopa Acharya, Farm Manager, Palur, with effect from 1st September 21, privilege leave for 18 days and furlough for 4 days on half pay in continuation thereof.

Mr. K. K. Subrahmanya Iyer, Agricultural Demonstrator, extension of privilege for 24 days in continuation of the privilege leave already granted to him for 17 days from the 24th September 21.

Mr. M. Raghavula Nayudu, Agricultural Demonstrator, is granted privilege leave for four months from or after 1st November 21.

Mr. T. V. Subrahmanya Iyer, Assistant in Entomology, extension of privilege leave for 16 days, in continuation of the two months' leave already granted.

Mr. A. K. Subrahmanya Iyer, Supervisor, privilege leave for one month from date of relief.

Mr. P. Susainathan, Assistant in Entomology, is granted privilege leave for 45 days from the 9th November 21, with permission to suffix the Christ holidays under article 220, C. S. R.

Resignation:—

Mr. N. Ananthanarayanan, Assistant in Chemistry.

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Editorial Notes.

The Report has been published of this Committee which was appointed by the Government of India in October 1919. The Committee visited all important Provinces in India and spent a month in Java—the sugar store-house for India. That this country should annually import about 800,000 tons of sugar is a matter of serious concern both for her and other sugar-consuming countries of the world. That her present acre-yield of 1.07 tons can be increased there is no manner of doubt. The Committee examined witnesses in detail and has submitted its conclusions and recommendations relative to each province separately. This is eminently satisfactory, as in a vast country like India the several provinces vary considerably in climatic and other conditions.

Indian Sugar
Committee
Report.

The Committee has rightly come to the main conclusions that extension of area under sugarcane is not possible except in the undeveloped provinces—Assam and the N. W. F. Province and improvement is possible on the industrial side. The committee's account of the cultivation and manufacture of cane sugar in Java is interesting and unravels the mystery about her methods. We are told that "as the result of the traditions of forced culture system, the Java sugar industry has had exceptional advantages."

The Committee recommended in respect of Madras that agricultural farms should operate in the four sugarcane tracts.

The opening of a Sugar School in Upper India is a proposal to which few can demur.

We hope and believe that the labours of the committee will bear fruit and its proposals, materialise in the shortest time possible so that this country may, with its abundant natural resources, become self-contained once again.

We learn from the 'Louisiana Planter' for October 29, 1921, that 3 Indians,—G. N. Annayya, G. P. Uplap and R. C. Padhye, graduates of the leading local universities—have been sent by the Government of India to the Louisiana State University to learn sugar business. We very much wish that these young men had been sent to Cuba or Java—the two foremost countries for sugar production at present

Indian Sugar
Students.

Louisiana is about 10,000 miles away and has, owing to its peculiar conditions, not been able to increase its sugar output even during the over-stimulating war-period.

We are happy to learn that Messers. D. Balakrishnamurthi, S. Sundararaman and G. N. Rangaswami Aiyangar have been admitted into the Indian Agricultural Service, and tender our hearty congratulations to them.

Agriculture in a Tinnevelly Village.

P. R. SUBRAMANIYA AYYAR, ASSISTANT FARM MANAGER,
KOILPATTI.

Nalattinputtur is a big village about 5 miles south-west of Koilpatti. It boasts of a post office, a board primary school and a co-operative credit society. Messers. Ralli and Volkart Brothers have flourishing cotton agencies here. The Kammavars, the Konars and the Thevars form the chief agricultural classes.

Soils. The arable lands comprise an area of 6,000 acres, of which nearly 4,000 are typical black, and the remainder, red-soils. Here the black soil is the best of its kind and the Red soil is differentiated by the two names, *Eri-sevval* (Red Loam) and—*Manal sevval*—(Red Sand.) The latter kind of soil is met with at the foot of 'bare' rocky eminences situated in the south western portion of the village. The productive layer—*Manal sevval*—is however very thin. Major portion of this area is cultivated dry. There are small areas under wells.

Rainfall and the Sowing seasons. The main sowing season commences here with the setting in of the North-East Monsoon i. e. from the closing days of September to the end of October. During this period the staple cereal of this tract—cambu—and the most important

commercial crop—cotton—are sown. In the red soils if a sowing rain is received, cholam is sown in Purattasipattam (September 15th to 25th) and Red gram, in Anipattam, (i. e. in the middle of June.)

Agricultural Practices. (a) *Implements.* These are (1) the common wooden plough, (2) the hoe for weeding, (3) the crowbar for breaking up black soils, principally for digging out hariali, (4) the sickle for harvesting (5) Kapparakkatti (a small sickle) for harvesting ear heads (6) the mammutti and above all the gorru (the two tined drill) and guntaka are also found in fair numbers.

(b) *Fallowing.* Lands are regularly fallowed, usually ploughed with the rains of April and May in the red soils. Keeping the land fallow after ploughing is common in this tract. Generally in the black soils the land is ploughed and fallowed after the harvest of cambu and Nathu (Fodder cholam). The obvious advantages of this practice are very well appreciated by the ryots. Experience has crystallised into the proverb "Speed the Kar plough."

(c) *Ploughing.* There is nothing noteworthy to write under this head except the old country plough is invariably used. The ryots here do not plough the lands by turning down the stubbles. On account of fuel scarcity the stubbles, especially of cholam, are carefully collected and stacked. Such heaps form a common feature in this village.

Another important point may also be added. In the wet lands immediately after harvest the land is ploughed in padlied condition and green manure applied and allowed to remain so till April and May rains when summer plougings are given.

Manures. The value of farm yard manure is appreciated here. People do not utilize the manure for making bratties. Here the same amount of care observed in Thittangulam in the preservation of farm yard manure is not taken. Uncovered heaps of farm yard manure are very common.

Green leaf Manure. The practice of growing green manures directly for manuring though not unknown, is not carried out. The

chief green leaf manure used here is that of *Cassia Auriculata* (Avarai) Well-to-do pattadars take annual leases of sirkar peramboke lands adjoining the roadway and cut and utilise the cassia leaves grown wild here. The lease amount varies from Rs. 3 to 5 per mile along the road on both sides.

Mineral Manures. The chief mineral manures used are potash earth. This is used for top-dressing tobacco plants. Tank silt is carted and applied to red soils to make them more retentive. Black soils are improved by adding red earth when found too stiff for garden cultivation.

Other Important Manures. Pig manure is very much utilised in paddy lands and there is a great demand for this in connection with the plantain cultivation. The local supply cannot meet the demand so much so that ryots go to Sattur and cart manure at 16 Rs. per cart load ex-cart hire.

Sheep Penning. Shepherds are tending sheep as a profession. In this village there are about 5,000 sheep. They are calculated as so many 'mois' which is a very convenient number. It may be from 25 up to 50 sheep. For one acre to be manured 1,000 sheep are penned for a single night. The cost is either paid in kind or in money. Rs. 10 every night is the average cost for 1000 sheep or the grain equivalent according to the current prices is given. In addition to this, the owner of the land pays watching fees which are nominal and amount to Re. 1 per day. For a flock of 120 sheep, 4 shepherd boys are necessary for tending. They are paid Rs. 25 per year, with meals. They are provided with clothing and sandals. Their chief duties are as follows:—

- (1) To gather babool pods
- (2) To shear wool before the rains set in
- (3) To tend the young sheep
- (4) To see that the sheep do not go astray

They say that sheep tending is more paying than being a day labourer or a farm servant. They realise profits under these heads,

- (1) By selling young sheep
- (2) by disposing of old sheep and the most important item is
- (3) sheep penning.

There may be some casualties on account of some diseases but yet they find it paying.

Rotation. The following rotations are followed here.

Black Soil. Cambu is rotated with cotton;
cholam fodder or nathu is rotated with cotton;
in fields where Bengal gram is sown
Bengal gram is followed by cotton.

In black cotton soil, certain portion is reserved for what is known as *kambadi*, where people by intense manuring grow cambu without any rotation.

Red Soil. One rotation in the red soil. Red gram is followed by a cereal. There is no regular rotation here in the red soils. Cereal (usually sown as a mixture with a pulse crop), fallow for a season and then again a cereal is the usual scheme for cropping.

Garden lands. This is the rotation in garden lands.

Vellai cholam followed by Ragi, which is followed by Tobacco in stubbles, the previous ragi crop being heavily manured. This is the rotation followed usually in Coimbatore.

Seeds and Sowing. Some care is taken in the selection of cotton seeds. Usually the seeds from season picking are reserved for sowing. The old karunganni has completely disappeared. The new improved strains have supplanted old karunganni. Company 2, Co. 3, A-1 and A-2 and so on are the prevailing jargon pertaining to cotton seeds.

Quantities of seed. The seed rate used is often extravagant. Some 150 lbs. of seed are used in Chola Nathu. In paddy cultivation as it is usually done here, under dry or partially dry condition the seed rate is as follows.

48 Madras measures per acre.

In cotton 8 Madras measures, usually mixed with $\frac{1}{2}$ Madras measure of coriander and $\frac{1}{4}$ Madras measure of black gram.

In Bengal gram a seed rate of 30 Madras measures is used.

Methods of Sowing. The usual methods of sowing carried here are (1) Broad-casting (2) dibbling behind a country plough, and (3) drilling. Paddy is usually sown broadcast. No nurseries are being raised.

Mixed Crops. The usual mixtures in the black soil are:—

(1) Cotton mixed with Tenai.

(2) Cotton mixed with coriander and black gram. The black gram is dibbled in furrows 8 feet apart.

In the Red Soil. The only mixture is Cholan mixed with Thattappayaru.—Cow-pea.

In the absence of cholam, usually any cereal is mixed with a pulse and sown broadcast.

Deccan Hemp—*Hibiscus Cannabinus* is grown along the bunds in garden lands.

After cultivation. In red soils, hoeing, weeding and thinning are given. In black soils especially the cotton crop receives good after-cultivation. The tools used are (1) a sharpened stick (2) Seda-kkitti. (1) Kuchikilai (2) Sedukkikilai (3) Vettukilai are the suggestive names given to the successive hoeings done to the cotton crop.

Agricultural Labour. Kammars, Konars and Maravars form the chief labouring class. Owing to the proximity of Koilpatti, labourers are attracted to non-agricultural pursuits, and consequently there is a dearth of labourers for agricultural operations. Consequently there is a demand for higher wages. Agricultural labour is usually paid in kind. 2 Madras Measures of cambu or ragi are given to an adult while $1\frac{1}{2}$ Madras measures are given as wages to a female. Cotton picking is paid by piece work. Usually $1/16$ of the cotton picked is paid as the day wages.

The Pink Boll Worm and the Pest Act.

Y. RAMACHANDRA RAO, M. A., ASSISTANT ENTOMOLOGIST.

The Pest Act is a much maligned piece of legislation. No enactment can be more honest or has been made with better intentions. Its sole aim is to reduce the sum total of ills, due to the depredations of insect pests or the spread of injurious weeds.

What is really needed to make the Act popular or better understood is a systematic education of the public mind by distributing posters, leaflets etc. Since the Pest Act deals with measures of a preventive nature, which an intelligent ryot can adopt of his own accord, the necessity of such an act may perhaps be questioned. Where large areas are concerned, it would be rather difficult to expect all individuals affected to follow the measures recommended. There are always some individuals who, out of ignorance, out of indifference or even out of perversity, may not be prepared to act according to advice. In such cases negligence on their part is not only against their own interests, but has even the effect of nullifying the efforts made by the rest of the community in following the advice, and renders all the expense incurred fruitless. To tackle people of this category it is essential to have a weapon whereby they can be compelled by law to follow such advice, and to make them adopt measures conducive to the general good. As an instance may be quoted the case of the Water-Hyacinth which, originally introduced from foreign countries as a curiosity, has, with its power of rapidly increasing in numbers, become a veritable nuisance, over-running ponds and tanks, blocking up water channels and harbouring malarial mosquitoes which breed in security. Unless the whole community attends to its destruction in co-operation with one another, its eradication cannot be accomplished. Hence the application of the Pest Act.

In the Coimbatore, Salem, Trichinopoly and Madura Districts, the Pest Act has become familiar to the people, owing to the efforts to keep down the spread of certain cotton pests which had become increasingly abundant during recent years. One of these is the cotton

Stem-Weevil, which attacks the stems of cotton plants and causes a swelling in the parts affected. This part is weakened and affected parts are liable to break in high winds, while young plants are actually killed outright. Another is the Pink Boll Worm. This insect attacks the bolls of cotton, bores into them, empties the seeds and spoils the lint. Where infestation is bad, there may be as many as 11 worms in one boll, while all the seeds may be eaten hollow and the lint, rendered worthless. Even in moderate degrees of infestation, even though the unattacked part of the cotton collected—supposing it could be separated from the affected kappas—could fetch full value yet in practice it is not possible to keep them separate and they get mixed together; so that the value of the adulterated kappas is brought down perceptibly—not only because the lint of affected bolls is stained brown, but also owing to the circumstance that it becomes "killed" i. e., it becomes deficient in tensile strength.

In India the pink boll worm is no new introduction, but, into other countries as Egypt and America, has been unwittingly carried by means of infested seed or lint. In Egypt the damage assumed such immense proportions that it has led to the maintenance of a huge staff for its investigation and check. The net value of such investigations was the discovery that in that climate the pest was carried over from one season to another in the form of resting long-cycle-larvæ which passed the winter, hidden in the hollowed seeds, and emerged as moths in the spring. This led to the enactment of laws making it compulsory for the ginners to have all seed treated by heat so as to kill such resting boll worms. The cotton crop was also compulsorily pulled off the ground by November and all bolls, destroyed; and early maturing varieties of cotton were recommended to be raised. The result was the percentage of infestation went down considerably.

In South India, on the other hand, the conditions are entirely different. The pink boll worm is a native of the soil, and in country cottons, the infestation was not and is not even now of much account. The conditions changed when a superior variety like the Cambodia was introduced. Not only were the Cambodia plants less hardy but as the new cotton could be grown as a

perennial and heavy yield, taken for two years or more, the ryots were tempted to keep them on the ground continuously. Facilities for the increase of all cotton pests were thus provided. The quality of Cambodia was deteriorating rapidly, mostly on account of the boll worm attack and there was bound to be a crash in the prices. An investigation of the life history of this pest around Coimbatore was taken up and worked out on the lines of the Egyptian commission. It was soon obvious that in South India there was no appreciable cold in winter, long-cycle-larvæ were non-existent, and the only way to check the increase of this pest was to secure sufficient break in the growing period of cotton, whereby the pest could be starved out altogether or at least diminished to so low an extent that it could not get a good start in the succeeding season. This, in short, was the genesis of the application of the Pest Act for the control of the pink boll worm in Coimbatore.

In this connection, it would perhaps be advantageous to have a knowledge of the life-history of the pink boll worm. The moth is a dusky coloured insect, which hides in dark corners during day time and actively flies about at night. It lays small pearl-white eggs in corners on the leaves, the bracts, the bases of bolls and on the flowers. The egg hatches in about 4 days into a young caterpillar which wanders actively on the plants in search of bolls and rarely flower huds, into which it begins to bore. The minute hole by means of which it enters the rind of the boll soon heals and all external sign of the attack is lost, until the time when the caterpillar becomes full grown and bites its way out through a round hole. The young caterpillar after entering in, seeks the seed, and, boring its way in, begins to feed on its contents; 4 to 6 seeds may be eaten in succession before it becomes fullgrown. It is generally a clean-feeder—usually restricting itself to the seeds alone and attacking the lint only in young bolls; whereas the other boll worm—the spotted one—makes a mess of the whole fruit attacking the lint, seed and rind.

When, fullgrown it leaves the boll and may descend to the ground, and prepare its cocoon in the soil or among fallen leaves

or it may construct its cocoon in the kapas of open bolls; or sometimes at the base of the bolls between the bracts. Inside the cocoon it turns into a seed-like object—the pupa, which emerges after about a week as the dusk brown moth mentioned above. Each female moth lays after mating as many as 200—400 eggs so that the progeny of a single moth in one generation, occupying the space of about a month, will be about 400 pink boll worms, while in the second generation, supposing that only half the number are females, the progeny will number 200×400 or 80,000, while in the third, it will be 16 millions. It will thus be seen that supposing there were only one male and one female moth at the time cotton was sown, there is a likelihood of there being at the end of the cotton growing period, millions of boll worms resulting from such a single original pair. If at this rate a continuity of plantfood is provided, the resulting enormousness of the numbers can better be imagined than described. The chief point on which the Pest Act relies for bringing about the check of this pest is the elimination of this factor of the continuity of food material throughout the year; and what is more important, the destruction of the bolls after pulling out the crop. By this means, a check is provided against the unlimited multiplication of the insect; and allowance being made for a clear off-period for cotton, it may be expected that the greater number of the boll worms would be starved out and that the succeeding crop may consequently be expected to start with as few a number of the moths as possible.

Requisites for the proper working of the Pest Act. From the above it may easily be judged that, if the Pest Act is to show convincing results, the all-important point to be attended to is thoroughness of the application. If, in a village out of a hundred fields cotton in one field is left unremoved, enough moths will be produced from that one bit to nullify the results of all the trouble taken in the rest of the area. Unfortunately there is a desire in some quarters to evade the law and from yet other quarters applications pour in for exemption, in some cases on the ground of poverty and in others due to little else than selfish gain. It is very important that people should recognise that such

exemptions—if granted—go against the spirit of the Act. One of the requirements of the Act with regard to the cotton pests is that the cotton should be off the ground by the 1st August. It is needless to say that it only marks the time limit for the completion of the operation and not of the beginning and that the aim is the creation of a definite interval, when the whole tract affected would be without cotton on the ground.

Results of application and statistics. Though it is regrettable that the Pest Act has not yet been applied with the requisite degree of thoroughness throughout the required area, yet the statistics collected at the office of the Government Entomologist during the past two years serve to give a decidedly favourable view as to the efficacy of the Act. Arrangements have been made for the collection and forwardal to the Government Entomologist every week about 100 green bolls from certain localities within the Pest Act area and from certain others without. These bolls are thoroughly examined on receipt. A comparison of the figures, a mass of which have thus been accumulated clearly makes it evident that where the Act has been thoroughly applied there has been a perceptible reduction in the infestation.

(1) Central Farm	Green boll infestation at Central Farm
July 1919	July 1920
75%—84%	42%—51%

(2) Green boll infestation in last week of March 1921.

Pest Act area averaged 10.6%. Non-Pest Act area averaged 33.85%

(3) Examination of ginned seed	April—May 1921
Tiruppur	Virudupatti (Non-Pest Act area)
5% damage.	15%

(4) There is consensus of opinion among cotton merchants at Tiruppur that the quality of the kapas is decidedly better than in previous years—evidently the effect of the Pest Act.

(5) Mr. Osbourne of Harvey & Co., Virudupatti, also declared that Tiruppur lint is decidedly better now than previously.

Agriculture Science as a Career.

“BY MISUNDERSTOOD.”

An article under the above heading in the Journal of the Ministry of Agriculture September 1921 forms interesting as well as instructive reading. It is not a general dissertation on the subject, as one may naturally mistake from the title, but deals with the present prospects of Agricultural Science as a career in England. As compared with the United States where the development of Agricultural Science has received special attention since a long time, England has been rather late in starting: in fact it was war that gave a definite impetus towards the expansion of research in Agricultural Science.

Whereas in the United States, as in India, Agricultural Research and propaganda are thoroughly state-controlled, in England at the present time, they are conducted by private bodies assisted by grants-in-aid from the Ministry of Agriculture. Research work in Agricultural Science is conducted in Research Institutes—generally attached to a University or a University College and usually specialising in particular branches of science—such as Plant-breeding, Soil Physics and Animal Industry—while propaganda and demonstration work forms the duty of an “Advisory” staff of specialists in various branches such as Botany, Chemistry, Entomology and Veterinary Science. These latter are attached to every one of the “Provinces” into which England and Wales have been divided for purposes of Agricultural Education, and their services are always at the disposal of the farmers of the particular Provinces.

Each of the Research Institutes is independent and self-governing, but certain grades of staff appear to have been established common to all.

(1) There is a Director of the Institute with a personal salary (perhaps about £ 1000 to £ 1200 per annum).

(1225 Rs.—1500 Rs. per mensem.)

(2) *Principal Assistants*—£ 600 to £ 800 rising by annual increments. (Rs. 750—Rs. 1000 per mensem.)

- (3) Senior Assistants—£ 400 to £ 600 with annual increments.
(Rs. 500—Rs. 750 per mensem.)
- (4) Assistants—£ 300—£ 360. (Rs. 375 to Rs. 450 p. m.)
- (5) Temporary Junior Assistants with varying salaries.

In addition a bonus, the amount of which is subject to revision from time to time as the cost of living falls, is stated to be given at present to Assistants, Senior Assistants and Principal Assistants. At the present time the bonus is reported to be £ 150 on salaries of £ 400 and under and 15% on amounts over that sum. The Senior and Principal Assistants are permanent and are equal in rank to a Professor or Reader of a University, while the Assistants are considered to be more or less temporary.

The recruitment to the Scientific staff mentioned above is from graduates with honours in Natural Science who have since specialised in some branch of science with an agricultural bearing—frequently with the aid of a Research Scholarship from the Ministry. There appear to be 5 Research Scholarships granted annually—carrying about £ 200 a year and in addition a few travelling scholarships are also granted, enabling post-graduates to get further specialisation in their subjects for foreign Universities. It is rather important to note that the Research Institutes are independent and self-financing, but at the same time recipients of contributions from the Government in the form of grants-in-aid voted every year by the Legislature. In the opinion of the writer this method of control and supervision, in which administrative responsibility ensures the most efficient use of the science combined with the most favourable conditions for research; for according to him, “while it is not possible to conduct research in a Government Department, it is not possible to conduct research in a Government Institute. It is a matter of doubt that the atmosphere of the Government is conducive to good work.” In support of this he quotes the speech of Sir D. Hall (Treiman Wood) at the Royal Society of Arts (1921). “When one considers the nature of Research, the slowness and irregularity with which results of economic value accrue, the remoteness of its methods from those

of a public Department, and particularly the character and personality of the men who distinguish themselves in research, it will be generally agreed that the looser system of control prevailing in a University is the most appropriate. The true investigator is somewhat anarchical in temperament, his work is apt to be continuously destructive of accepted opinions and established reputations..... The type of man wanted for Research is more attracted to a University than to a Department..... A second advantage which comes from the association of Research Institutes with the University lies in the informal co-operation that is thereby ensured with the workers in the field of pure science.....

Lastly contact with the business of farming is more readily attained by the association of Research Institutes with a University which is teaching agriculture and dealing with the farmers of its district than with a Government Department.”

There is little doubt that Indian conditions are entirely different from those obtaining in England. It is but natural that, in England, where there exist Universities of long standing and with accumulated traditions of centuries and a scientific atmosphere created by a brilliant galaxy of workers, Agricultural Research Institutes should be attached to them, but in India, where Agricultural Research had to be started by the State, the Institutes are naturally of a Departmental character. Nevertheless there is no gainsaying the fact that, if the real Research work is to be done, it should be shackled as little as possible by the worries and ways of officialdom. The proposal to affiliate our college to the Madras University is from this point of view a step very much to be welcomed.

Again a comparison of the salaries that the staff of the Research Institutes get, with those obtaining in India, is of some interest to us here. Even allowing for the high cost of living in England as compared with India, the poor start given to the Agricultural graduates here in proportion to the salaries of the men in the top rungs, and again the disproportionate difference of

salaries between men in the intermediate stages, are striking. Barring a few, the majority of the people that take up Agricultural science as a profession find it an ill-paid one; for they start low and the intermediate stages are so slow that in middle age they find themselves handicapped by insufficient salaries.

In words instinct with nobility and patriotism the writer concludes his article on "Agricultural Science as a Career" as follows:—"To the country the scheme (now working in England) promises a succession of able investigators making Agricultural Research their lifework, to the worker it promises a career free, as far as is reasonably possible, from the disheartening cares of an ill-paid profession; to the young graduate it promises a ladder, not to riches, but to the highest rewards of Science—the discovery of truth, the advancement of public good, and the esteem and appreciation, never unduly bestowed, of his fellow-countrymen." May the same prove true in India.

Students' Corner.

Inter class Tournament for the "Victory cup."

Matches in connection with the above tournament that commenced in the early half of November did not come to a close before a month elapsed for the reason that the victors failed to come out successful in two out of the three games, viz., cricket, football and hockey. The third year class which possessed an all round team won the much coveted trophy after a hard fight, especially in hockey. The details of the games are appended below.

Cricket.

Class I.	}	B won by 115 to 52.	}	B won by 64 to 55.	}	III won by 114		
Class B								
Class II.	}	III	}	III				
Class III.								
Class A	}	Won by 9 wkts.	}	III				
Class IV								
		Scratched.						

Hockey.

Class I	}	I won by 1 goal to Nil.	}	II defeat I by 1 goal to nil.	}	III won by 3 goals to nil.		
Class B								
Class II	}	III won by 2 goal to nil.	}	III				
Class III								
Class A	}	Scratched.	}					
Class IV								

Football.

Class I	}	B won by 2 goals to nil.	}	B won by 1 goal to nil.	}	Finals was not played as the 3rd year had run out successful in the other two games.		
Class B								
Class III	}	Won by 6 goals to nil.	}					
Class III								
Class A	}	Scratched.	}					
Class IV								

WANTED.

A cotton Cultivation Expert, knowing Tamil language for Gandamanayakanur Zemindary, Periyakulam Taluk, Madura (S. I). Applicant should be connected with cotton cultivation and its improvement, one who has successfully cultivated. He should be energetic and of active habits and able to ride about. Free quarters and better pay and prospects than in Government service to the selected candidate on a three years' agreement. Apply giving fullest particulars, age qualifications, previous experience, references terms and conditions to Pestonji D. Patel, Ismail Buildings Hornby Road, Bombay.

(v)

WANTED.

Applications from educated and qualified men for the post of Assistant Farm Overseer in this depot on Rs. 50-3-75.

2. Applicants should have knowledge of cultivation of fodder crops such as Oats, Lucerne, Jowari, Cowpea and various kinds of grass and with a certain amount of knowledge of Arboriculture and Vegetable gardening, also the management of bullocks.

Applications should contain the following particulars.

1. Name
2. Age
3. University certificate held
4. Certificate obtained from an Agricultural College.
5. Previous experience on an Agricultural Farm, if any.

J. C. HOTHAM, Major,
Supdt. Hosur Remount Depot.

G. O. No. N. Mis. 1390 dated 28-7-21.

The Government have carefully considered the memorials of the Lower Subordinates of the Agricultural Department and regret they are unable to accede to the requests contained in paragraphs 1, 2 and 4 of the memorial.

The Government will in future be prepared to allow the promotion of competent Lower Subordinates to the Upper Division in special cases on the recommendation of the Director of Agriculture.

(By order of the Government, Ministry of Development).

(Sd.) K. Nageswara Rao,
For Secretary to Government.

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Editorial Notes.

COLLEGE DAY AND CONFERENCE.

The recent celebration of the College Day in December 1921 helps us to realise—with perhaps a tribute to the inexorable might of Father Time—that a dozen eventful years have already passed, since our Agricultural College and Research Institute was formally opened by His Excellency, Sir Arthur Lawley, in July 1909. During all these years, the Union has had every reason to congratulate itself on exhibiting a record of steady and uniform progress and on showing an expansion both in strength and in the sphere of its usefulness. The College Day festivities—including the Annual Athletic Sports and the Agricultural Conference in its programme—celebrated under the auspices of the Union, have become the great event of the year in our Institute, and its advent, not only provides a welcome relief to the District and the College Staff from the humdrum daily round of routine work, and affords facilities for members to meet old friends and colleagues, but also forms a most fitting opportunity for workers in different lines to compare notes with one another and to draw an inspiration for further work from the experience of other workers, as detailed in papers read at the Conference.

Following the change in date inaugurated in 1919, the Twelfth College Day and Conference were held in the third week of December 1921, instead of in the month of

July, as was the practice in the earlier years. Though this change is advantageous in many respects, it is to be feared that it handicaps the "artistes" among the students in the progress of their studies owing to the clash between their preparation for December Examinations and the rehearsals for the dramatic entertainments.

The weather—which is usually liable to sudden outbursts of the North-East monsoon in the month of December—was fortunately very propitious throughout the period of the celebrations; and with fine bright days and cool nights, none of the functions were marred by the vagaries of the weather.

The Guests. Some of the visitors arrived on the 18th December but the major number reached Coimbatore on the 19th. The band of student-volunteers, working under the Captainship of Mr. K. Ramiah received the visitors at the station and further attended to their comforts. Our thanks are due to the Warden—Mr. T. V. Ramakrishna Aiyar for making the new block of students' quarters available for lodging the visitors; and their boarding was catered to by the Officers' Mess newly opened in the premises of the Officers' Club under the supervision of a special committee. The following were some of the non-departmental visitors:—(a full list of departmental visitors is appended elsewhere).

Mr. N. MacMichael, M. A., I. C. S.

Mr. and Mrs. H. L. Braidwood.

Mr. K. Brahma Sastri, Honorary Visitor.

Rao Bahadur J. Chelva Ranga Raju.

Mr. C. V. Venkataramana Ayyangar, M. L. C.

Mr. V. C. Veilingiri Gounder, M. L. C.

Rao Sahib Ratnasabhapathy Mulaliar, B. A., B. L.

Mr. V. Arumugam Pillai of Sundakanuthur.

Mr. Venkata Rao Badami, etc., etc.

We express our feeling of indebtedness to the Director of Agriculture—Mr. H. C. Sampson, B. Sc., C. I. E., for having permitted many of the subordinate staff to attend the conference and read papers. One, however, missed the presence of some of the familiar figures of the previous conferences: as for instance, Mr. Vengail K. Krishna Nayanar who telegraphed his inability to attend owing to ill-health. We are glad to announce, however, his splendid offer of Rs. 1,000/- towards establishing a prize for the first successful student in Practical Agriculture, for which the Union is extremely thankful.

Athletic Sports. On the morning of the 19th December the whole of the play-ground looked as if it had been transformed by magic. With three large tents to accommodate, respectively, the European and the Indian guests and the Indian ladies, with the sports-arena neatly fenced round and fitted with all its paraphernalia of hurdles, scaffolds, casks and similar appurtenances, and with the whole area decorated with flags and bunting of all sizes, the ground presented an altogether gala appearance. The guests began to arrive at about 2 p. m., and by 3 p. m. when the sports commenced, a large crowd of sightseers from the villages and the town had already gathered.

The grateful thanks of the Union are due to Mrs. Anstead, who gladly undertook and was entirely responsible for the arrangement of the refreshments for guests of European habits of living, while the Indian guests were attended to by the band of volunteers, and refreshments were served to them inside the Students' Pavilion. The success of this section is due to the energies of the Reception Committee to whom our thanks are due.

The various events. The cross country race of five miles—the most arduous of all the events—had been run two weeks earlier, while the preliminary heats were

finished on the 17th December. There were 32 entries, of which 24 competed for all the events; keen competition was noticeable in many of the items as a result of which previous records were broken in no less than four of them. The Sports Secretary very much regrets that none of the elderly Old Boys showed spirit enough to partake in the Old Boys' Race of 100 yards. The Obstacle Race—which symbolises the experiences of most people in the race of Life—proved the source of much amusement to the spectators. Other interesting events were the Inter-tutorial Tug-of-war, races for children over seven years of age, and for those under, the peons' race and the greasy pole. The inter-tutorial Relay Race was adjudged two days later, as it was not run satisfactorily on the 19th December.

The special feature of this year's sports was the arrangement devised by the Sports Secretary, Mr. U. Vittal Rao, whereby the results of each particular event were immediately made known to the spectators by a system of signboards and numbers—indicating respectively the event and the serial number of the winning competitors. Another very interesting feature was the help received from the little troop of Estate Boy-scouts and cubs, under the lead of their Scout-Masters, Messrs: D. Marudarajan and C. S. Gopalaswami Rao. These citizens in embryo deserve all praise for the efficient way in which they performed the little tasks entrusted to them for keeping order among the spectators.

At the close of the evening, all the spectators gathered round to witness the distribution of prizes to the successful competitors. In requesting Mrs. Parnell to present the prizes, Mr. Parnell said that the present year's sports were specially noteworthy, as the winners in some of the

events had beaten all previous records. Vengail Krishna Nayanar Cup for the champion of the year, Mrs. Anstead cup for one mile race and Dr. Norris cup for cross country race were won by C. S. Doraiswamy, while the Saidapet "Old Boys" cup for 100 yards race was won by H. Balraj, Ramnad Shield for inter-tutorial tug-of-war was won by Rao Sahib Ramasami Sivan's wards and the Victory cup for the inter-class sports, by Class III. Father Rondy's shield for cricket won by the College team this year was also presented on this occasion.

After the prizes had been kindly given away by Mrs. Parnell—many of the prize-winners being greeted with loud applause at the time of presentation—Mr. Parnell announced the glad news of the promised offer, by Mr. V. Arumugam Pillai of Sundakamuthur, one of our Patrons, of a cup—to be styled the "Prince of Wales Cup"—for one of the College Day events to be decided by a Committee later on. We voice the feeling of thankfulness of the Union to the donor for this generous gift.

The eventful day was brought to a close by a hearty response to a call for cheers to Mrs. Parnell and the guests of the evening.

The heartfelt thanks of the Union are due to the following gentlemen who helped to make the sports a success:—Messrs. R. D. Antead, R. N. Savur, A. C. Edmunds and Rao Sahib M. R. Ramasami Sivan for acting as Judges, Messrs. F. R. Parnell and F. T. T. Newland as Time-keepers and Dr. R. V. Norris and Messrs. D. G. Munro and N. S. Kulandasami Pillai as starters. The thanks of the Union are due to the Sports Committee who spared no pains to make the evening's sports the unqualified success it was.

At 8 A. M. on the 20th December, all the Farm Managers met in Conference to discuss certain details in the management of Farms.

The Agricultural Conference. The conference met in the large hall on the ground floor of the College at 12 noon on Tuesday the 20th December, when the President-elect—N. MacMichael Esq., M. A., I. C. S., Commissioner of Land Revenue and Settlement, declared the conference open.

The President of the Union—our Principal, Mr. R. C. Wood—then delivered his address of welcome to the visitors (printed elsewhere in extenso), assuring them that his welcome was not merely an official formality, but was in most cases on a personal footing. He then traced the history of the past conferences and delivered a note of warning to the students regarding some of the probable consequences of the coming change in the college courses, but declared that he was confident that all the impending changes could be faced without anxiety, since he believed in the soundness of the present courses.

The General Secretary—Mr. K. T. Bhandary—then read his Annual Report, giving an account of the progress made during the year by the Union in various directions.

The President-elect, then, delivered his Presidential address which is printed elsewhere in extenso.

Diplomas were then presented by the President to the successful candidates of the Old Diploma Course. It is very pleasing to note that all the seventeen students of the class secured the Diploma this year. (For complete list, see Appendix V). We congratulate V. T. Subbaya Mudaliar on securing the Robertson Medal for General Proficiency, P. Krishna Rao, the Keess Medal in Chemistry, and E. K. Govindan Nambiar and Vasudeva Rao Nayudu (declared equal) on getting the D'Sylva Medal.

The President then called on Mrs. Dorothy Norris, M. Sc., Government Agricultural Bacteriologist, to read her

paper on "Agricultural Bacteriology" (published elsewhere) wherein she set forth the importance of Bacteriology in Practical Agriculture.

In the absence of the writer of the paper and in view of the fact that it was received very late, Mr. E. V. Sundara Reddi's paper on "Agricultural Production" was taken as read. It is published in extenso in this issue.

Mr Venkata Rao Badami—Senior Assistant Botanist in the Mysore State, and one of the brilliant Alumni of this College—was then called on to read his paper on "Harvest Exhibitions".

Supplementing his paper by the exhibition of numerous mounted sheets of Ragi earheads of various types cultivated in the State of Mysore, he explained how exhibitions—especially Rural Shows—may be exploited for actively encouraging the ryots to gather only the best earheads for purposes of seed and to use only such selected seed for sowing. He gave an interesting account of his own experiences in the matter and of the important results achieved in Mysore by continued selection on pure lines. A very interesting discussion followed.

At 3 P. M. the Conference adjourned till 8 A. M. the following morning.

At 5 P. M., there was an interesting Hockey match played by the Present Students against the "Old Boys", in which the present students won, scoring five goals to one.

At 7 P. M. the customary Bonfire was lit in orthodox fashion on a part of the Maidan, to commemorate the presentation of the diplomas. Though the pile of cotton stalks was not as large as usual and the bonfire did not last long enough, as on some similar occasions in the past to induce the formation of tug-of-war teams, yet a fair number of spectators gathered round to enjoy the warmth and glow of the bonfire, so pleasant in the chill of a December evening.

At 9 P. M., the visitors—European and Indian—and the denizens of the estate gathered in numbers in the theatre improvised for the evening in the Conference Hall, to witness the performance of a Telugu Drama—*Harischandra*—by the students. The performance was very interesting, and the dance of Bhagiratha Phadi as a dancing-girl drew great applause. The versatile genius of Sudarshanam, who impersonated no less than three characters and acted superbly in every one of them, and the comic acting displayed by V. Suryanarayana as *Nakshatraka*, are specially worth mention.

The usual Group Photograph was taken at 8 A. M. on the 21st December inside the College quadrangle, after which the gathering adjourned to the Conference Hall.

At 8-15 A. M. the President called on Mr. Y. Ramachandra Rao to read his paper on "Juniors and Research work," wherein the writer exhorted the Juniors to begin work in earnest and set about to build up an atmosphere of true scientific spirit in our Institute.

This was followed by a paper by Mr. K. T. Alwa on "Why the Department has not impressed the public so far?," which was read by Mr. K. Raghavachari in the absence of the writer. He was of the opinion that the failure was due to the Department not having gone to the ryot direct in the earlier years; it had instead sought the mediation of the rich lawyer who was at best only an absentee landlord. He declared that the demonstrator should shake off all urban influences and seek to reach the ryot at his own door. A very interesting discussion followed, in which Messrs. C. V. Venkataramana Ayyangar M. L. C., Vellingiri Goundar M. L. C. and Rao Sahib M. R. Ramaswami Sivan took part.

Mr. M. Ananthan L. Ag., then read his paper on the "Possibilities of Plant-Breeding," illustrating his paper with diagrams as to how the Laws of Heredity work and demonstrated with specimens of Paddy plants the inheritance of characters by the progeny of crosses. There was an interesting discussion in which Messrs. C. Tadulingam and S. Sundararaman took part.

The Conference adjourned for lunch at 11 A. M. and met again at 1 P. M.

Mr. Govindan Nambiyar L. Ag., read his paper on "Coconut cultivation in the Laccadives" wherein he gave an interesting account of the nature and habits of the inhabitants, laying special stress on the importance of coconut cultivation in their internal economics.

An interesting discussion ensued in which Messrs. Sampson, Sivan, Norris and J. Chelva Ranga Raju took part.

Mr. B. Viswanath was next called upon to read his paper on "The Management of Alkaline soils", in which he dealt with the movements of salts in soils and the practical aspect of irrigation and conservation of moisture in the management of salt-affected lands. Mr. R. C. Wood and Rao Sahib Sivan took part in the discussion.

Mr. Jogi Raju D. A. then followed with his paper on "Paddy Varietal Experiments," wherein he laid stress on the many difficulties encountered in conducting experiments in Paddy. Mr. Parnell then spoke making certain observations in support of Mr. Jogiraju's experiences.

Mr. Sitarama Patrudu L. Ag., then read his paper on "Gogu cultivation in the Vizagapatam District" in which he showed that it was a profitable crop in the northern part of the District and declared that it found much favour among

the ryots of that tract. In the discussion that ensued Messrs. D. Balakrishnamurthi, J. Chelva Ranga Raju, and Vellingiri Gounder took part.

Mr. Huidekoper's paper on "Agriculture as a profession" having been taken as read for want of time, the President made his concluding remarks, wherein he requested the members of the Legislative Councils to get themselves acquainted with the work of the Agricultural Department before they launched on criticisms. After announcing Mr. Vengail Krishnan Nayanar's donation of Rs. 1000 towards a prize, the President declared the Conference closed.

At 7 A. M. Mr. K. Venkata Rao Badami exhibited numerous lantern slides, illustrating the work done in Mysore towards improving the strains of Ragi by continued selection. The exhibition was interesting as well as instructive.

At 9 P. M. the Tamil students staged "Kamalesan" which was greatly appreciated by the crowded audience. Though it is invidious to make distinctions between the various actors, when all of them did well, special mention must be made of the splendid performances of Balakrishnan—the hero,—Ramayya Mudaliar—the heroine and Swaminadhan—the Queen, who repeatedly received the approbation of the audience and lastly of the clown—P. Rajaratnam, who, by his ready wit, kept the house in roars of laughter.

Towards the close of the performance, Mr. Venkata Rao Badami announced his intention of presenting the Union with a fine drop-curtain—containing the figure of our College—before the next annual meeting. Our sincere thanks are due to him for this splendid offer.

We have since received the promise of the presentation of a curtain each from Rao Bahadur J. Chelvaranga Raju Garu on behalf of his brother, and from Mr. K. Ramiah, for which the Union feels grateful.

We take this opportunity of thanking the entertainment committee—especially Mr. Rajagopalayyar—and several other gentlemen for their invaluable help, unstintingly given, in making the dramatic entertainments a success, and to Mr. Newland and all his staff—especially Mr. Venkateswara Ayyar—for fitting up the stage and installing the electric lights.

Last—but not least—our grateful thanks are due to our President, Mr. R. C. Wood, for help given in various matters, and to all the Heads of Sections for assistance readily rendered.

The business Meeting. At 8 A. M. on the 22nd December, the annual business meeting of the General Body of the Union was held with the President—Mr. R. C. Wood—in the chair, when the following subjects were discussed. (1) The building fund, (2) The Journal and its Finance, and (3) The difference in the initial pay in the Scientific and Agricultural sections.

Regarding items (i) and (ii), it was decided after much discussion that attempts should be made to raise a building for the permanent habitation of the Union and to try to run the Journal more regularly in the future.

As to item (3), the following resolution was carried unanimously.—"that Licentiates and Diplomates in the Agricultural Section be given an initial pay as that in the Science Sections, if not more, and the Director of Agriculture be requested to take early steps to give effect to this."

The election of fresh office-bearers for the coming year was next proceeded with, with the Vice-President in the chair. We are glad to state that Mr. C. Tadulinga Mudaliar—our popular Vice-President has again been re-elected.

In the course of the meeting, Mr. K. Adinarayana Rao announced his donation of a sum of Rs. 100/- to the Building Fund which was accepted with thanks. We appeal to the generosity of our members to follow his excellent example, so as to make the proposal to house the Union a tangible reality.

A vote of thanks was next proposed to the members of the retiring committee, individually as well as collectively, in appreciation of the work turned out by them in spite of adverse circumstances; and was adopted unanimously amidst cheers.

At 2 p. m., the subscribers to the Ramasastrulu Nayudus Memorial Fund met together and discussed ways and means of perpetuating the memory of the late Mr. Ramasastrulu Nayudu. The resolution arrived at, at the meeting, will appear in the January issue with full particulars.

At 5 p. m. on the 22nd, the working committee of the Union was at home to all the visitors and to the members of the various sub-committees who contributed to the success of the present College Day and avails itself of this opportunity to render them its heartfelt thanks for their ungrudging services.

The majority of the guests departed from Coimbatore by the evening mail of 23rd instant, leaving the little colony on the estate—itsself numerically thinned by the exodus due to the Christmas holidays—to feel its loneliness all the more by contrast, after the crowded programmes and the altogether busy time it had, during the College Day Festivities.

REPORT
OF THE
WORKING COMMITTEE
for the year 1920—21.

The Working Committee begs to submit its annual report for the year ending 30th November 1921.

The year under report has been very momentous in the annals of the British administration in India in that, on the eve of the opening of a new chapter which ushered in parliamentary institutions in this country, a member of the Royal House, His Royal Highness the Duke of Connaught paid a visit in January last as the representative of the King Emperor and inaugurated the opening of the several Legislative assemblies.

We are glad to mention that the Heir-apparent, His Royal Highness, The Prince of Wales is now in our midst to acquaint himself with his Indian subjects and we extend our respectful welcome to him.

This year witnessed a notable change in the control and administration of the Department. It has now come under the portfolio of the Minister for Development. We welcome the appointment of the Hon'ble Rao Bahadur K. Venkata Reddi Nayudu Garu, B. A., B. L., M. L. C., as our Minister and hope that this department will, under his care and able guidance which has been amply testified during the past few months, expand in all directions consistently with the advancement of the country.

A signal instance of the change was witnessed in the due recognition given to the claims of Indians for positions of trust and responsibility in the Imperial cadre. We are sure this was, to a great extent, hastened by the large-hearted and liberal attitude of the late Mr. G. A. D. Stuart whose loss we mourn to-day.

This Union at its meeting held on 22-12-1920 passed a resolution that it was desirable to affiliate the Agricultural College to the University and forwarded it to the Director. It is gratifying to us to know that the Government was pleased to view this question favourably and the subject is now before the Senate. We are sanguine that Mr. Sampson, our present Director, will with his usual perseverance, endeavour to get the College affiliated and raised to a status on a par with that of the Agricultural Colleges in other parts of the Empire, securing the benefit of such affiliation to the students who were admitted in 1920. We congratulate ourselves on the splendid response students made to the call of the then Director the Hon'ble Dewan Bahadur L. D. Swamikannu Pillai Avergal, M. A., L. L. B., I. S. O., who was very enthusiastic in this cause.

The Madras Government have been very generous in allotting funds for this Department. In regard to their solicitude for the advancement of Agriculture no better evidence is needed than the construction of a separate building to house the Teaching Section and thus meet the ever-growing demands for accommodation. They have been further liberal in increasing the percentage of Indians in the superior grades for

which this Union and the members of the Department feel very grateful.

The proposals in connection with the salaries of the subordinate staff have equally engaged the attention of the Government whose orders on what is known as the Knapp's Scheme have been just received and are being given effect to. The general feeling is that the orders do not afford adequate relief though they are a step in advance towards that end. The smaller percentage of appointments in the higher grades would still leave unsolved the question of the pay and prospects of men in the bottom grades.

The discriminatory treatment given to the Licentiates in Agriculture in the matter of pay and grade in the Executive and Science Sections is, in the humble opinion of the Committee, very discouraging and tends to perpetuate a difference which is not based on facts. The Committee would in this connection urge the vigorous plea put forth on behalf of the Executive officers by the Indian Sagar Committee, as the result of their intimate knowledge of conditions in the various Provinces visited by them—the plea “we are profoundly convinced that that object (the great acceleration in the process of spreading agricultural improvements) will not be realised so long as demonstration is not given the recognition and the esteem it deserves. Demonstration is not the hand maid of research but its full and equal partner. Research without demonstration is as useless to Indian Agriculture as demonstration without research. Demonstration requires its full share of the best men in the Department.” There is thus no valid ground for any invidious distinc-

PAY AND
PROSPECTS.

UNIVERSITY AFFILIATION.

EXPANSION.

tion. The Council of this Union has taken action already in this matter and is hopeful that, during the regime of the present Director who has firsthand knowledge of District conditions, the matter will be set right.

During the year under report it was our melancholy duty to record the death of Mr. G. A. D. Stuart, the Director, than whom a more capable, conscientious and hardworking officer it is rare to find. We do hope that some generous gentleman will come forward to keep his memory green in this College and in the Department with which he was connected for over 8 years and which he marvellously developed.

The choice of Mr. Sampson as his successor is in keeping with the policy now obtaining in the other Provinces and we are sure that his tenure of office will prove an all-round success.

There have been changes in the Presidentship of the Union consequent upon changes in Principalship of the College. We express our heartfelt thanks to Dr. R. V. Norris and Messrs. G. R. Hilson and F. R. Parnell who took warm interest in the affairs of the Union.

The last conference was held during the three days—20th to 22nd—of December 1920. It was our proud privilege to invite Dewan Bahadur Sir P. Theagaraya Chettiar, B. A., M. L. C., the distinguished President of the Madras Corporation and one of the foremost leaders of public opinion in this Presidency, to preside over our deliberations. With a geniality and with a profound knowledge

OUR
DIRECTORS.

Our
Presidents.

PAST CON-
FERENCE
AND SPORTS

of trade and commercial problems extending over 30 years' he gave wholesome advice to the successful students and the young members of the staff and impressed upon them the necessity, in these days, of looking to the uplift of people in the rural parts, unmindful of the glammers of town life. Owing to the urgency of work at Madras, Sir Chettiar could not sit through the whole sessions and on the Second Day, Mr. G. A. D. Stuart took the chair. During these two days in accordance with the wishes of the Hon'ble Mr. M. E. Couchman B. A., I. C. S., the previous year's President, a larger number of the members of the Union contributed papers.

Mr. G. R. Hilson on "Cambodia Cotton."

Mr. K. T. Achayya on "World's Silk Industry—A comparative study."

Mr. S. Sitarama Patrudu on "Cultivation of Sugarcane and its influences on the economic condition of the Hospet Wet land ryot."

Mr. K. Krishnamurthi Rao on "The Sugarcane Industry."

Mr. S. Sundararaman on "Our invisible plant enemies."

Mr. Swami Rao on "How to make farms more popular."

Rao Sahib Seturama Ayyar on "What has been done to fertilise the exhausted soil of the Tanjore Delta."

Mr. S. Subramania Ayyar on "Propaganda work in Agriculture."

The Annual sports were held on the 20th December and Mrs. Hilson kindly gave away the prizes. They were a splendid success, the visitors, the students and the staff evincing greater interest than ever before. The Champion of the year and winner of the Vengayil Nayanar's Cup was again B. Dasappa Malli who scored 59 marks. He also won Dr. Norris' Cup for the Cross Country race as well as the Cup for the Hundred Yards Race instituted by the old Saidapet Boys. Mrs. Anstead's Cup for One Mile Race was secured by K. S. Krishnamurthi again for a second time this year. B. Dasappa Malli was the all-round sportsman of the year and won the Parlakimedi Cup. We wish these both similar success in life and hope other students will emulate their example. We congratulate Messrs. C. Tadulingam and D. Ananda Rao on their wards securing the Chunampet and Ramnad shields for the Relay Race and the Tug-of-War respectively in the Inter-tutorial Competition.

The Committee begs to thank Sir Theagaraya Chettiar, Mr. G. A. D. Stuart, Mrs. Hilson and other ladies and gentlemen who contributed to the success of the Conference by their presence, by the reading of papers, by their suggestions and help or by contributions. The Committee tenders its thanks to Mr. H. Shiva Rao, the Captain, and the volunteers, to Mr. T. V. Ramakrishna Iyer, the Hostel Warden, and Mr. P. A. Raghunathaswami Iyengar, the Assistant Warden, for their ungrudging help.

Besides the irreparable loss caused by the sad death of Mr. Stuart in harness, the Committee deplores the demise through blood—poisoning of Subbaratnam, student of Class I in the middle of March. This is the first instance of the death of a student at the College. We equally mourn the death of Mr. J. Lakshmayya, Assistant Farm Manager, Nandyal, during the year.

The collections for the D'Silva Memorial Fund amounted to Rs. 300 and with the Government grant of Rs. 150 totalled up to Rs. 450 which has been, at the instance of the Accountant General, Madras, invested in the Government Securities and the prize is awarded from this year. We thank the Director for taking pains on behalf of this Committee to secure the Government grant. We are glad that Mr. K. Krishnamurthi Rao,—the provisional Secretary—has been able to secure Rs. 475 towards the Ramasastrulu Naidu Memorial Fund. The question of settling the form of this Memorial will be discussed during the current session. The late Mr. Subbaratnam's student friends and admirers have resolved to perpetuate his memory and subscriptions to the extent of a little over Rs. 200 have been promised.

Mr. R. C. Wood, M. A., is again our President. His long acquaintance with the affairs of the Union, his genial sympathy, his vigilant eye and active help will, we feel, surely promote its interests. We thank Mr. D. Ananda Rao who was for several years our Vice-President and who worked with zeal and enthusiasm but could not continue in office this year owing to more onerous duties. Our genial Secretary

Mr. C. Tadulingam was unanimously elected Vice-President which office he worthily fills.

We congratulate Rao Sahibs M. R. Ramaswami Sivan and T. S. Venkatraman and Messrs. D. Ananda Rao, D. Balakrishnamurthi, S. Santharaman and G. N. Rangaswami Aiyangar on their promotion to the Imperial Agricultural Service, and Rao Sahib Y. Ramaswami Row and Messrs. B. V. Nath, K. Gopaldakshana Raja, and K. Krishnamurthi Rao, on their attaining Gazetted rank.

Our young friends Messrs. P. V. Isaac, C. Baktha Samuel, C. R. Ranga Reddi and K. Krishna Row Naidu, are still in the United Kingdom. We hope they will soon be appointed to responsible posts under the Crown. It is the unique experience of another member of the Union, Mr. B. Chinna-thambi Pillai, to go to Sierra Leone, to act as Technical Adviser in Rice culture. We hope his experience in the Tamil country stands him in good stead there and that he will come back to us with the approbation of his superiors. We send forth our prayers to the Almighty for His blessings on these young friends abroad.

We are glad to learn that old students of this college who are either employed in Native States or have settled down there are doing very useful work. One of them Mr. K. R. Sankar has under the auspices of the Pudukotta Agricultural Union been publishing a weekly Agricultural Journal.

Besides the 18 Patrons referred to in the previous report three more, Diwan Bahadur Sir P. Thegaraya Chettiar, B. A., M. L. C., Madras, M. R. Ry., V. Arunugam Pillai Avl., of Sundakaputhur, and Khan Sahib Haji Abdulla Sahib of Udipi, have become our Patrons for which we express our thanks. The present strength of the Union is, Patrons 21, 1st Class Members 69. Ordinary members 371.

It is a matter for gratification that gentlemen taking interest in Agriculture are increasing in number in the Local Legislative Council and with our Patrons already there of whom the Educational Minister the Hon'ble Rao Bahadur A. P. Patro Garu is one, the Council should be largely conversant with the work of the Department and help it to improve the status of the ryot.

From the limited funds at its disposal the Union is rendering pecuniary help in the shape of a loan to student A. Sivarajan of Class III.

We beg leave to remind our members of the appeal made in December last towards donations for the construction of building to house the Union. We regret, however, to note inadequate response from the bulk of the members though 18 more have signed the list and two have already paid. We request the members to liberally contribute towards the fund so as to bring into existence a building worthy of the traditions of the Union.

We thank the Coimbatore Amateur Dramatic Club for their gift of side screens in addition to a money present of Rs. 52/8, the savings from the performance enacted by them here in the College.

We sincerely regret that owing to unavoidable circumstances January to June issues of the Journal could not be published. The committee hopes that next year its publication will be more regular. In this connection, the committee begs to add that arrears of JOURNAL subscription for both the Journal and the membership of the Union have during the past few years totalled up to about Rs. 1,700—0—0. The committee have taken steps to realise this amount and requests that arrears may be kindly paid up, so that the finances may be placed on a stronger basis.

Before concluding the committee begs to express its warm thanks to Mr. R. C. Wood, the President, and Mr. H. C. Sampson, the Director, for their continued interest in the Union and the auditors Rao Sahibs M. R. Ramaswamy Sivan and T. S. Venkataraman and Mr. Sundaraman who acted during the absence of the latter.

K. T. BHANDARKY,
General Secretary.

Statement of receipts and charges of the Madras Agricultural Students' Union 1920—21.

Receipts.

PARTICULARS.	Rs.	A.	P.
Opening Balance on 1-12-20.	...	250	9 7
By Subscription from Members and Patrons under permanent fund	...	1291	13 7
" Subscriptions under Journal Account	...	464	12 9
" Donations for the College Day	...	460	0 0
" Donations for the Building Fund	...	50	0 0
" Miscellaneous	...	52	8 0
		<u>2569</u>	<u>11 11</u>

Charges.

PARTICULARS.	Rs.	A.	P.
Expenditure from the Permanent Fund	...	222	1 0
" towards the Journal	...	1006	6 0
" towards the College Day 1920	...	600	5 9
" Cash on hand including the amount in the Current Deposit in the Urban Bank	...	740	15 2
TOTAL	...	2569	11 11

Finance of the Union.

By Fixed Deposit in the Urban Bank	...	1200	0 0
" Advance with the Printer	...	300	0 0
" Advance with the Clerk	...	10	0 0
" Loans yet to be recovered from the Students	...	450	0 0
Excluding the interest.	...	740	15 2
" Cash on hand	...		
TOTAL	...	2700	15 2

Audited and found correct by
Messrs. Rao Sahib M. R. Ramaswami Sivan Ayl.,
S. Sundararaman. 17-11-21.

(Sd.) V. Ramanathan,
Treasurer.

RECEIPT.	AMOUNT, RS. A. P.	CHARGES.	AMOUNT, RS. A. P.
Permanent Fund.			
Subscription from Members	203 0 0	Loans to Students	105 0 0
Donation from the patrons	500 0 0	Stationery and telegram charges.	2 1 0
Loans returned by		Cost of Type-writer	107 1 0
Mr. S. Kuppasamy Iyengar	247 13 4		115 0 0
Mr. M. Venkatarangam	50 0 0		
Mr. P. Lakshminarayana			
Mr. Achutaramayya	105 0 0		
Interest on the Fixed and Current deposits.	75 15 8		
Sale of rations from Associate Members	10 0 0		
	1201 13 7		222 1 0
Journal Accounts			
Rs. subscription for Vol. IX & VIII	429 12 9	Establishment charges	100 4 0
Advance subscription to Vol. XI.	14 0 0	Printing charges	290 0 0
Advertisement charges	19 0 0	Stamps and V. P. charges	93 11 6
Miscellaneous	2 0 0	Miscellaneous	7 6 6
TOTAL ...	464 12 9	TOTAL ...	1000 6 0

RECEIPT.	AMOUNT, RS. A. P.	CHARGES.	AMOUNT, RS. A. P.
College Day Account.			
By sale of rosettes	73 8 0	Sports, Decorations, Prizes, Medals fitting up of tents	220 5 9
By donations	386 8 0	Rosettes and repairs to Volunteer Badges	34 11 6
		Group Photo	20 0 0
		Drama and Stage fittings.	116 9 6
		The Union at home	178 2 6
		Stamp and Telegram charges	15 10 6
		Stationery & Printing	4 8 0
		Miscellaneous	4 6 0
TOTAL ...	460 0 0	TOTAL ...	600 5 9

Welcome Address.

By MR. WOOD.

LADIES AND GENTLEMEN,

Once again, I find myself as Principal of this College and President of the Madras Agricultural Students' Union in a position to utter the official words of welcome to our numerous visitors. Those who know me will I trust believe me when I say that that welcome is not only official, but in most cases a personal one, though it often is not possible for me to show it, in the crowded days, we have before us.

I may perhaps be pardoned on this occasion for opening my address of welcome on a personal note. I have been looking up the accounts of the previous ten conferences, held under the auspices of our Union, in this hall and I find that it has been my privilege to deliver this welcome address at no less than seven of them. In fact, at our eleventh conference we have such an extensive past, that I think you would be interested to hear something of it.

The first conference was held in July 1911 and was apparently a small affair. At the second our President was Sir John Nathaniel Atkinson, and it is interesting to notice the fact that the then Acting Director of Agriculture was Mr. Sampson. I note also that an excellent practice prevailed at that conference, which has now been dropped. I was allowed to deliver my remarks after the President elect had opened the conference and finished

his speech. At the next conference Sir Harold Stuart presided, while this chair was occupied by Mr. Sampson, who was acting Principal in 1913, when I was away on short leave. During the next three years, we were honoured by Mr. Buckley, of the Board of Revenue; Sir Fairless Barber, the Planting Member of Council, and Sir Alexander Cardew, a Member of Government. Among the distinguished visitors at the last, the seventh conference, I note our present President elect Mr. MacMichael, who was then, if I mistake not, occupying the position of the Collector of Coimbatore.

The eighth conference was notable in that His Excellency the Governor, Lord Pentland, was our President elect. He was accompanied by a number of Rajahs and Zemindars and I may recall to you that it was in that year that our very good friend Mr. Vengail Krishnan Nayanar founded the Pentland Scholarship and that on the suggestion of Lord Pentland himself the Tutorial system was introduced.

The ninth conference marks a change in date. College Day had till then been in July, the 14th of that month being the day the College was opened in 1909, by His Excellency Sir Arthur Lawley. This was inconvenient for the sports as new students had barely settled in, while it was not the best time for visitors to find opportunity to visit the college, nor was it the best time for them to see the crops on the Estate, nor was the weather usually so agreeable. For these reasons the College Day celebrations and the conference were shifted to coincide with the

presentation of Diplomas and to make in this way that combination of business and pleasure in which we are now involved.

That conference I attended in the comparatively unimportant, for that day at any rate, post of Director. Mr. MacRae being Principal at the time. Mr. Conchurn, whose connection with the Department dates back to the earliest days, was the President elect.

The next conference that of last year was presided over by Sir P. Theayagaroya Chettiar, with Dr. Norris, in the Principal's chair. One of the most welcome guests at that conference was the late G. A. D. Stuart and I feel that I cannot let the occasion pass without paying some tribute to his memory. I knew Mr. Stuart probably better than any one in this Department as he lived close to where I did in England, and on two occasions we foregathered when on leave. I little thought that when I saw him off on his return to India last year that it was the last time I should see him. I also had opportunity for seeing Mr. Stuart's work when I acted for him as Director, on two occasions, and I can assure members of this Department that we have lost a good friend, and the Department is the poorer by his loss. He worked wholeheartedly and devotedly for the service, though he was not one of us, and I trust that opportunity will be found for perpetuating his memory in this Department in some appropriate form.

And this brings us to the present conference, when we welcome again Mr. MacMichael, who has kindly consented

to tear himself away from the busy atmosphere of the Board of Revenue, to assist us in our deliberations. That Mr. MacMichael has qualifications as a farmer, I know. He will perhaps remember that the first time I met him, when I called on him in the Collector's bungalow at Chatrapur in Ganjam, he vouchsafed the information that the cap he was wearing was made of wool, shorn from his own Scottish sheep and dyed, spun and woven into cloth on his own ancestral property; it was in fact Khudder of the most approved kind!

So much of the past and the present. What of the future? You will perhaps expect from me some statement of the changes which are being made in the teaching given in this College—at any rate, those of you who are students will. Firstly we must thank the Government for the generous way in which they have allotted funds for the New Teaching Building, which is rapidly arising to the South West of the present block which will I hope greatly improve the standard of the instruction we are now giving. Next, it is, I suppose, a matter of common knowledge that this College has applied for affiliation to the University of Madras, and I have just heard that a Committee of inspection has been appointed, consisting of Rao Bahadur K. Ramunni Menon and Mr. Sampson, and will be visiting this College. I feel confident that the results of that inspection will be favourable. We shall then in due course become affiliated to the University and students who succeed in their College Courses will be able to write after their names the magic letters B. Sc. in Agriculture. It is probable, mind I only say

probable, that special arrangements will also be made to enable the A and B classes at present in the College to obtain these degrees.

What is to be said of the change? Like most changes it has its good and its bad points. I personally shall be sorry to see the passing of the Old Diploma, but there is no doubt that more value is placed on a University Degree and I welcome anything which adds reputation to the College of Agriculture, Coimbatore. But let me warn students that the greater and the more worth winning the prize, the harder must be the struggle to obtain it. There will be no allowances for weaklings in the new Examinations; class marks and practical work will not count, as they do here, for the position, a student obtains, and if the successful ones obtain a superior title there will doubtless be less, of them to obtain it.

Ladies and Gentlemen my time is up and I have yet said nothing about the Union. I feel however, that the Secretary who is shortly to read the Report, will give you the usual uninteresting account of that steady general progress, which the Union has shown in the past.

Once more I wish you welcome, and trust that your visit here will combine both pleasure and instruction in no common measure.

Mr. MacMichael's Presidential Speech.

I should like in the first place to express my deep appreciation of the honour the Director of Agriculture has done me in asking me to preside at this conference. All

officers whose good fortune it has been to serve in Coimbatore welcome every opportunity of revisiting a district which has always had a high reputation for sober common sense, and which, I rejoice to know, has worthily maintained its reputation during these days of storm and stress. For myself the pleasure seems to increase with every visit, and I am delighted to see so many old friends here today.

The aims and objects of the Agricultural Department and of the College and Research Institute here are well known, and I do not propose to provoke your patience by piling up ponderous platitudes on the point. Briefly, your work is to supplement by experiment and research and by practical tuition the hereditary skill and aptitude of the people,—in fact to apply science on a large scale to the study and practice of Indian Agriculture. It is quite true that the Indian ryots, and may I say the Coimbatore ryot in particular, knows as well as any peasant in the world how to make the most of the soil and the fruits of tillage. But his greatest admirers cannot pretend that he knows much of scientific discovery or experiment.

I had a few days ago the advantage of—I am afraid—a somewhat superficial perusal of the Administration Report of the Department for last year. May I take this opportunity of associating myself with the tribute paid by Mr. Hilson in that report and by Mr. Bhandary and by Mr. Wood today to your late Director Mr. G. A. D. Stuart. His untimely death was a very great loss not only to the Agricultural Department but to the whole Presidency.

I should like to congratulate all the officers of the Department on the steady and satisfactory progress made during the past year. The ramifications of the department are becoming so numerous that one can only refer to a few points out of a report that is full of interest from first to last page. When under the head of "Economic Botany—Paddy" I read that a new strain of the local Coimbatore Tuluk a Samba gave an increased outturn of 16%, and other new strains increases of 15, 12 and so on; or, again, when under Mycology I find that by spraying vines in Madura district at a cost of some 180 Rs., the result was a crop of grapes worth some Rs. 3000 more than the previous years crop, I realise to some extent what a great work this Department is doing and what tremendous possibilities lie before you. I sincerely hope the Legislative Council will also realise these facts and will vote you all the funds required for the satisfactory development of the Department with the same unanimity with which, I am glad to say, it votes money for one of the branches of the Administration for which I am at present responsible.

And mention of the Legislative Council brings me to "the middle of my song" and to a subject on which I wish to say a few words to you today. It is just a year ago since a substantial step was taken towards the realization of responsible Government in India and since with the assumption of office by the present Ministry in Madras a new and important chapter in its political history was opened. The manifold advantages of a democratic form of Government are so well known that I shall not weary you by attempting to enumerate them; but one obvious advantage from

your point of view I may mention. It is your good fortune that today the Agricultural portfolio is held by a Minister who is himself a practical agriculturist. But many though the advantages of the new form of Government may be, I take it that no one now-a-days is so early-Victorian in his views as to imagine that democracy is the ideal form of Government in *all* respects. I dare say it is quite true that under the old regime the fetish of efficiency played too great a part and threw into the shade other considerations that deserved to have greater weight attached to them; that too little regard was paid to the importance of developing a sense of responsibility amongst the various agencies of Government, and insufficient weight was given to local sentiment and tradition. As a member of that "hoary institution" which, to quote from a recent appreciation of the Board of Revenue, in a Madras news paper, "represents the quintessence of Civilian experience and wisdom; and is the repository of Civilian conservatism and prejudice."..... I say, as a member of that hoary institution I suppose I ought to assume the role of '*laudator temporis acti*' and shed a tear or two over the good old days that are no more. As a matter of fact I have neither time nor inclination for any such vain regrets or tears. But I do wish to warn you of a real danger to which you will be more exposed in the future than you have been in the past. Briefly I may call it the danger of substituting "eyewash" or showy work on paper for the honest unostentatious work which has been your guiding principle in the past; for, as Mr. Couchman truly said two years ago, it has never been the fashion of the Agricultural Department to advertise itself.

Perhaps I ought to explain a little more clearly what I mean by eyewash. I shall do so by taking a case within my own experience. Some years ago the Department was trying to boom what were called informal village panchayats; and of course I was doing my best to work them up in my district and to impress on my Divisional Officers the importance of the subject. In one division I noticed from reports received that these panchayats were springing up like mushrooms after a shower of rain; they were as numerous as certain insects in most railway carriages in this country. I looked into the matter a little more closely and enquired what exactly had been done. I learnt that the panchayatdars had been duly appointed and the fact had been intimated to them; the panchayats were all reported to be working smoothly; but, though six months had elapsed, not a single meeting had been held by any of them. That, gentlemen, is what I mean by eyewash. It is true it looks well on paper and it may bring you promotion and honours—though in the case just mentioned it brought to the official concerned neither the one nor the other—but it will bring you no real satisfaction. The temptation to substitute eyewash for efficiency is much greater under a democratic form of Government; but for a scientific Department like yours to yield to the temptation will be absolutely fatal; and it will be a bad day for the Agricultural Department when the true scientific spirit becomes as rare in it as the old Highland spirit is in my native land to day.

For myself, the result of my experience in this country for 27 years is to leave me a confirmed optimist as to its

agricultural and economic prospects. We shall never, I suppose, be free from the croakings of that school of pessimists which is always proclaiming to the world the sad and increasing poverty of the Indian ryot—without, by the way, doing very much that is practicable to remedy the evils of which they complain. Certainly let us not shut our eyes to the poverty and misery; but let us be honest enough to admit that there has been an enormous improvement, that there is everywhere more money in the country, in investments, in deposits, and in the pockets of the people; that the wages of the working man have risen, that the standard of living amongst the poorest has gone up and that they employ conveniences and even luxuries which a quarter of a century ago were undreamed of. The Madras Agricultural Department may well be proud of the part it has taken in the past in bringing about this improvement; with the traditions which it already has behind it and with its present personnel, I look forward with full confidence to its producing still greater results in the future.

Agricultural Bacteriology.

BY MRS. DOROTHY NORRIS, M. SC., A. I. E.

One of the outstanding agricultural problems of the present days is the question of manures.

In western countries where mechanical power is rapidly replacing that of animals, supplies of natural manure are quickly diminishing and the position is little better in this country where much of available farm yard manure is utilised for fuel. China and Japan on the other hand appear to have realised the gravity of the situation and conserve every scrap of human and animal excreta for use on the land.

In view of the foregoing it is therefore of great interest to note research work on artificial manures carried out by Hutchinson and Richards at Rothamsted. So far as can be gauged at present this work has opened up fresh possibilities which may revolutionise the question of manuring in the near future, for its limitations should be very quickly disposed of now that the main problem appears to have been solved.

The process may be briefly described as follows:—

It consists in the bacterial fermentation of straw or other waste cellulose-containing material, in the presence of suitable nitrogenous compound.

The three essential factors are:—

1. Air supply,
2. Favourable temperature, and
3. Supply of suitable soluble nitrogen compounds.

The basic material is waste straw from any available source and this is fermented aerobically.

The temperature rises during fermentation to 65° C when the nitrogen supply is properly adjusted.

The reaction must be neutral or only slightly alkaline. Hence ammonium sulphate alone as a source of nitrogen is no use because the medium soon becomes acid.

Nitrogen must be present in an available or indirectly available form and must not exceed a definite amount both actually as well as in concentration e. g. If ammonium carbonate from decomposition of urea is used and exceeds a certain limit the breakdown changes cease until the concentration or the alkalinity has been reduced by loss of nitrogen.

(a) If the straw is overloaded with nitrogen, loss occurs.

(b) If the exact amount is present the straw rots without loss.

(c) If the straw is undersaturated, nitrogen particularly in the form of ammonia can be picked up by the organism present.

The nitrogen appears to be stored in an organic or non-ammoniacal form.

The amount of nitrogen necessary varies from 0.70 to 0.75 parts of nitrogen per 100 parts of straw and stabilised product is obtained when rotting has proceeded to 40% which usually possesses a nitrogen content of 2% calculated on the dry material. Urea and ammonium carbonate have been found the most suitable carriers of nitrogen on a large scale, as they give a favourable reaction. They are however expensive. Cyanamide and ammonium sulphate may be used but the latter must be supplemented by a base. Hence future work should be directed towards the provision of cheaper sources of nitrogen. In preparing the straw for fermentation it is best to heap it and sprinkle with water and leave for 2 days when a further sprinkling may be given. When the interior is uniformly moist, the nitrogen may be applied in solution or broadcasted and watered in. The resultant manure is a well-disintegrated plastic material which closely resembles well-rotted farmyard manure and has so far given excellent results during trials.

At the same time although it is possible in this way to make manure without the intervention of animals, the process can be made to utilise liquid manure as the source of nitrogen, by allowing this to run through the straw under conditions which encourage the absorption of nitrogen compounds.

To turn from this to the many bacteriological problems connected with the soil itself, it is at once obvious that an immense field for work exists.

It is well known of course that the soil is inhabited by a great variety of micro-organisms but, we know very little about them either individually or in their relationship to growing plants although soil fertility is greatly affected by their activities.

The usual methods of investigation are extremely artificial, the organism is picked out and studied on arbitrary medium, that is to say, it is brought under unnatural conditions the moment it is removed from its ordinary environment. The method has undoubtedly given useful results, but it is naturally open to defects. For one thing micro-organisms are considerably influenced by the medium in which they happen to find themselves and may react totally differently according to the conditions in which they are placed. In fact this method which may be termed the direct method has proved very difficult and has given good results only in the hands of a few workers such as Winogradski, Beijerinck and others.

The more useful methods in use are indirect and may be classified as follows:—

1. Use of various culture media arranged to bring out different groups of organisms. These are usually arranged to favour nitrification, ammonia production, nitrogen fixation and denitrification.

Here again the fundamental objection to the method is that the reactions are studied in medium very different from ordinary soil.

2. Counts of bacteria are made from soil suspensions suitably diluted on solid culture medium. This method is also faulty, because firstly no medium is known which will bring out all the soil organisms so that the results are always low and no medium even distantly resembles the soil in composition or structure so that the flora obtained on the plates does not necessarily reflect the flora active in the soil.

3. Chemical determinations of the rate of progress of the various changes going on in the soil—absorption of oxygen, evolution of carbon dioxide, production of nitrate etc.

If the second and third methods are used in conjunction useful results may be obtained. For example increases in bacterial numbers are so often associated with increased production of nitrate that one is justified in making the assumption that the phenomena are connected. This is not always the case however, for example, when ammonia-producing organisms are caused to multiply by partial sterilisation of soil, they do not increase the stock of ammonia and nitrates beyond a certain limiting amount.

On the other hand bacterial activity may show no sort of relationship with soil fertility, because there is some limiting factor other than nitrogen supply or rate of decomposition of plant residues.

The bacterial activity may on the surface appear to be directly related to soil fertility, but the relationship is accidental, both bacteria and plants being limited by the same factor e.g. by acid rain water in districts where there are chemical works.

The above outline indicates very briefly some of the principal methods by which soil bacteriological problems are attacked. Soil conditions have naturally a considerable effect on bacterial numbers and on flora generally and in this country with its vast extremes of climate interesting results are certain to be obtained as soon as data have been collected.

Bacteria being living organisms, it is natural to suppose that their activity increases with the temperature up to a certain point. The amount of nitrate produced does show this increase but bacterial numbers do not.

Increasing moisture supply also causes an increase in bacterial numbers but this is not regular and the rate of nitrate production rises to a maximum and then falls consequent on the lack of air caused by the saturation of the soil. Excess of water will of course also wash out the resulting nitrate from the soil.

The effect of added organic matter is to increase the supplies of energy and therefore to increase bacterial numbers, although whether nitrate supplies will be increased, depends on the proportion of nitrogen present in the added matter.

The effects of lime, calcium carbonate and magnesium carbonate have been studied and the results are somewhat contradictory. Where the work has been done on acid soils, benefit has naturally been derived from neutralisation. In neutral soils less concordant results have been obtained, some observers having observed detrimental effects from further addition of calcium carbonate, while others have obtained beneficial results—bacterial numbers, ammonifying power and nitrifying power all being increased.

Magnesium carbonate may be more effective than calcium carbonate in small quantities, but it is toxic in larger amounts. Lime in excess of a certain amount acts as a sterilising agent.

Enemies of bacteria in the soil.

I should like now to refer to a remark I made earlier about partial sterilisation of soils resulting in the increased production of ammonia producing organisms.

On the surface this would appear the direct opposite of what one should expect. As a matter of fact the apparent contradiction is resolved when one realises that the soil population does not by any means consist mainly of bacteria.

It was found that antiseptics in general first of all diminished the bacterial population and then led to an enormous increase in numbers and heat was shown to have the same effect.

Various chemical and physical explanations have been put forward to explain this, but they do not account for the facts.

Russell and Hutchinson consider that the soil population is complex and that some of its numbers act detrimentally on the

bacteria which produce plant nutrients. These detrimental forms are more readily killed than the useful bacteria with the result that the new population produces more ammonia and nitrate than the old one.

This view is still under dispute as some investigators do not admit the presence of any biological factor in soils detrimental to bacteria.

I have gone into the question of soil bacteriology in some detail in order to point out that almost the whole of the results so far have been obtained in temperate climates, thereby indicating how much is to be worked out in the tropics.

Another aspect of Agricultural Bacteriology is that of plant disease.

It is now becoming more and more generally realised that bacterial diseases of plants are as common as any other kind.

This branch of Agricultural Bacteriology is a very young one, the first mention of a bacterial disease being that of pear blight about forty years ago. Since that announcement the subject has increased enormously and it is now generally realised that the distribution of bacterial diseases of plants is universal. This again is a subject which has not received a great deal of attention in the tropics and so again a large field for research awaits the attention of the investigator.

The commonest method of infection is probably through wounds in the plant either above or below ground. This indicates the care that should be taken in pruning and also shows the part which insects may play in the dissemination of disease.

At the same time it is possible for bacteria to infect plants through their natural openings such as nectaries, water pores and stomata.

Blossom blight of the pear is an example of the first, black rot of the cabbage of the second and angular leaf spot of cotton is mainly stomatal.

Plant diseases have many features in common with those of animals. There is usually a latent period or a period of incubation during which the disease establishes itself in the plant before it is serious enough to be recognised as such by the damage it does. Like an animal disease it may be thrown off without doing much damage, if the plant is under more favourable conditions than the parasite. Everything depends on whether the parasite finds the initial conditions entirely suited to its needs or can by means of its metabolic processes quickly make them so and thereby make rapid growth.

To illustrate the variation in the appearance of disease from time of infection, one can cite the various soft rots which usually appear in one or two days after inoculation and Cobb's disease of sugar-cane and Stewart's disease of sweet corn which may take one to two months. Of course as with animals the greater the initial infection, the shorter the time in which the plant succumbs.

I have already stated that diseases may be transmitted by insects—they can also be carried on the seed and thereby continue from one crop to the next or they may be carried in the soil itself, wind and water may also carry infection and possibly birds. The case against the insects, molluscs and worms is complete.

I have no time to consider the prevalence and distribution of bacterial plant diseases but I should just like to touch on the methods of control. I may say at once in most cases these still remain to be worked out.

Where diseases are transmitted by seeds, bulbs or tubers and cuttings, the obvious remedy is to use these from disease-free stock.

Some seeds will stand treatment in various antiseptics but care has to be taken in the use of these as germination may be injured. Germicidal sprays and control of insects by sprays will keep certain diseases in check and disease-resistant varieties should be grown wherever possible.

Possibilities of Plant Breeding.

By M. ANANDAN, L. AG.

An attempt is made in this paper to show what a plant breeder can achieve in the field of Agricultural improvement, and on what particular principles he bases his methods for bringing about such improvement.

The necessity for such an attempt, though very feeble on my part, has arisen from the fact that there is a great deal of mysticism attached to this subject in the minds of even the highly educated section of the people of this country, as evidenced by the trend of the discussions that ensued on the motion for funds for the furtherance of this kind of work, during the last Budget Sessions of the local Legislative Council. The necessity for explaining certain salient features of such work becomes all the more insistent when one considers the fact that the future of such lines of work mainly depends upon the will of the legislature for providing necessary funds, as it is admitted on all hands that no useful investigation of any kind can be carried on, on definite and progressive lines, unless funds are forthcoming.

The specific subject that I allude to, for which a good many of the members of the Council showed great reluctance to vote funds, was the question of opening a Paddy Breeding Station in the Tanjore Delta during the current year. Some people, I am afraid, attach to the term "plant breeding" a meaning almost akin to the mere growing of any crop with a view to

supplying seeds in bulk without any reference whatsoever to the quality of the seed so supplied. Some others, I believe, imagine that the object of such schemes is to introduce the cultivation of a crop into localities that never grew it before. Though the ultimate aim of a Breeding Station may merge into one or both of the above objects, the primary and the most important object for which a Breeding Station exists, is for discovering or isolating superior strains of plants from varieties that are mixtures of good, bad, and indifferent individuals, and also for evolving new individuals that never existed before, by the method known as "cross-breeding."

The fundamental difference, in my opinion, between the aims of Plant Breeding Station and an ordinary agricultural experiment station is that the one tries to explore the possibilities of plants and the other, the possibilities of the different kinds of environment so as to establish the best medium for plants to grow and give their maximum yield. Each forms a separate member of an organic whole and in consequence is interdependent. So it is not within the province of a plant breeder to carry out any manurial or other cultural experiment station to evolve varieties or strains of any crop. Of course, in years that have gone by, when breeding-stations were not in existence, agricultural stations had to take on the work of the plant-breeder also, along with their legitimate work.

A plant-breeder is a creative genius in the sense that he tries to evolve certain strains of a crop which have in combination certain economic characters of value to man. Let me illustrate my meaning by taking an actual example from some of the results obtained by the Government Economic Botanist at the Paddy-Breeding Station on paddy which, among other things, ripens a fortnight earlier than other local varieties without sacrificing the yield in any way. That it really is an achievement of

real economic value can only be appreciated to its full extent by a man of Coimbatore, who knows how very disappointing the irrigation tanks are during seasons of scanty rainfall and how very advantageous it is to knock a fortnight off the duration of a crop in such situations. That this strain is really being appreciated and grown by the ryots in increasing numbers can be verified by an actual inspection of the crops now growing round about here in Coimbatore.

Let me now try to show you the ways in which a plant-breeder tries to effect improvement in a crop he deals with. As previously stated, isolation of pure strains or types from any variety of a crop is the foundation for all his work, because he cannot proceed further, unless the material he deals with, is pure. A variety as commonly understood is generally a composite mixture of distinct hereditary types or bio-types. Each one of these is marked by certain distinct hereditary characters, and if propagated separately, breeds true. These true breeding types are what are known as pure-line cultures. This method of isolating pure lines from varieties of a crop is the first step a plant-breeder takes, before he does anything else. When once he has isolated the true-breeding types, he tries to probe into their economic possibilities. He keeps a record of all the hereditary characteristics of each type, i. e., its height, duration, uniformity of flowering, ripening, fineness of straw, heading, size of grain, shape of grain, yield and various other characters which may turn out to be of economic importance under certain special conditions. It is easy to see that the field for selection of suitable strains for particular situations becomes wider, when the number of strains is large. Therefore, any addition of material to what already exists on the station is to be welcomed, because it increases the scope of the work.

Before leaving this subject of isolation of pure breeding types, I may be permitted to state something about the crops

grown by the ordinary ryot. It may be taken, as a general case that you will not be able to come across a single field that has on it pure crop in the strict sense of the plant-breeder. When field crops are mixtures of various hereditary types, as they unfortunately are in most cases, it will be idle to expect all the individuals in such a population of plants to behave exactly alike. Each one type will have its own height, duration, yield and other habits so that it will not be possible to get a uniformly maturing crop, or even the maximum yield that is possible, if the high yielding type among the various types forming the crop, were the only one grown instead. It is exactly here that the plant-breeder's pedigree cultures or strains score over the farmer's unselected varieties. After securing pure lines, he proceeds to find out the promising ones among them by what is known as comparative trial of these strains under suitable arrangements so as to keep down as low as possible the experimental error involved. Such trials are further repeated for several seasons so as to eliminate the effect of seasonal variations in different types. The strains that come out successful through such tests and maintain their superiority intact are multiplied in sufficient quantities and given out to farmers for growing as their bulk crops. These strains in time replace the unselected varieties that the ryots were growing before. Judging from the results so far obtained with paddy, wheat, and other crops by the application of this one single method of isolating superior strains from them, it will not be an over-estimate to state that the yield of the several crops that are largely grown in this country can be raised at least by 10 per cent. over what is obtained at present. What this 10 per cent. increase exactly means in the aggregate, will be apparent if we take into account the actual area under these major crops. Nearly 25 million acres are under cereals alone in this Presidency, of which paddy claims about half.

But when once a pure line is isolated and fixed it is not possible still further to increase its yield by any more selections from it.

The second method, and by far the more important and far reaching of the two in its results, is what is technically known as "hybridisation or cross-breeding." Though this method was practised by breeders in various countries for a long time, the true significance of the principles involved in crossing the individuals which differ in one or more hereditary characters came to be understood only comparatively recently. In fact it was only towards the close of the last century that the true interpretation of the behaviour of hybrids and their progeny in succeeding generations was offered in a way that was at once convincing and mathematical in its accuracy. The whole credit of the discovery of the principles involved goes to an Austrian monk named Gregor Mendel, so much so, very rightly, the principle of heredity since his time is commonly known as 'Mendel's Law of Heredity.'

I do not propose to trouble you with the details of the crosses which Mendel carried out between various kinds of edible pea, the behaviour of which and whose progeny in succeeding generations gave him the clue to the real state of affairs that occurs when two individuals differing in one or more character pairs are crossed together. I shall merely state the truths he discovered and try to show you what bearing they have on the question of plant as well as animal breeding. The following are some of those facts:— 1) an individual, whether a plant or an animal, is distinguished by various heritable characters and each of these is a unit in itself and is independently transmitted from parents to offspring. (2) The opposing characters that come from the two parents from what Mendel called a character pair or an allelomorphic pair. As examples of these character pairs, I may give the following few:—Tall and dwarf stature of some plants; black and white colour; hornless and horned character of certain breeds of cattle; round and wrinkled nature of certain seeds;

starchy and glutinous nature of rice; pigmented and non-pigmented nature of certain plants. (3) As the sexual cells viz., the sperm and the egg are the only material contributions from parents to the offspring, it is reasonable to suppose that the material, whatever it is, that is responsible for the reproduction of the parental characters in the progeny must be present in these cells. So Mendel naturally concluded that a sexual cell carries a something (now known as a factor) for each character of the individual. As a corollary to this it follows that a sexual cell will have in it, at least, as many factors as there are unit characters in the individual, if not more. (4) In many cases it is noted that the hybrid exhibits either one or the other member of any character pair. The member so exhibited in the cross he called a 'dominant' and that which failed to so appear as the 'recessive' character. (5) Whatever may be the appearance of the hybrid, whether it looks exactly like one of its parents, or is an intermediate in appearance between the parents or is a totally different individual from either of them, one fact is common to all hybrids, that the members of each character pair segregate when a hybrid organism produces its sexual cells so that half of them would contain one and the other half, the other member of the allelomorphic pair and none of them, both. This last is what is known as the gametic segregation theory of Mendel and forms, in essence, the corner stone of the whole question of heredity. It is in the enunciation of this great principle that Mendel made his mark as a profound thinker. I shall try to give you, by way of illustration, a simple case of segregation of characters. When a tall plant is crossed with a dwarf one, the resulting hybrid has brought into it a factor for tall habit from the tall parent and a factor for dwarf habit from the dwarf parent. It is immaterial whether the hybrid plant looks exactly like one of the parents or not, for the appearance of the hybrid does not in any way affect the assortment of the

factors for the two parental characters when such a hybrid plant produces its sexual cells. 50 per cent of both the pollen grains and ovules will contain only the factor for tall habit and the remaining 50 per cent of them the factor for dwarf habit. Now when such a plant is allowed to self-fertilise, there is an equal chance for a pollen carrying the factor for the tall to fertilize an ovule carrying tall or dwarf factor. If the former event takes place a pure-breeding tall is the result and if the latter, a hybrid individual will be the result. Similarly a pollen grain carrying the factor for dwarf habit has a chance of meeting either a tall or dwarf carrying ovule. In the first case, a hybrid will result and in the latter a pure breeding dwarf will result. From the above chance mating we get the original parental forms namely tall and dwarf, and in addition hybrids between the two. From the above example we can draw the conclusion that when the material and the paternal contributions are similar for any character, the offspring resulting out of such a mating will be pure as far as that particular character is concerned; when such contributions are dissimilar, a hybrid progeny is the result. This fact of the segregation of parental characters alone is not enough to give the breeder a hope for improving his crops or animals. For instance, if in all cases characters coming from one parent were to remain together in one half of the sexual cells and those coming from the other parent, in the other half, it will be next to impossible for us to combine the parental characters into one individual that will breed pure for them in succeeding generations. There are really cases of this nature. To give you an example from paddy:—Two strains of paddy one having a purple internode and green glume, and the other, a green internode and a purple glume, when crossed together, gave a hybrid having purple internode and purple glume, due to the dominance of purple. But when seeds of this hybrid plant were grown again, it was found that the two parental forms alone, were

reproduced, in addition to the hybrid full purple plant. We have not been able to get a plant with green internode and green glume at all, nor a purple internode and purple glumed plant which bred pure, though during the past few years thousands of plants out of this were cross grown. In similar cases it will be merely a waste of time and energy in trying to breed individuals with new combinations. Fortunately for us, as shown by Mendel, the situation, generally speaking, is different from this. He had been able to show that factors for various characters, irrespective of the parents from which they come, are capable of re-combination in the second generation of a cross in all possible ways so long as such factors do not belong to the same allelomorphic system as previously explained.

To make this clear, I shall give you an example. Suppose a black hornless bull is mated to a red horned cow, the offspring will be black hornless animals, due to the fact that black colour and hornless condition are dominant characters. When such black hornless hybrid animals are mated together, we get four kinds of individuals. (1) Some black hornless animals as one of the parents. (2) Some horned reds as the other parent. (3) Some horned blacks and (4) Some hornless reds. These last two are two new combinations of the parental characters. These new combinations are made possible because of the production of the following four kinds of germ cells with factors (1) for black colour and hornless nature (2) for black colour and horned nature (3) for red colour and hornless nature and (4) for red colour and horned nature.

In the same way, Professor Biffen in England has been able to combine the rust resistance of one variety of wheat and the high cropping power of another into a new individual. What this actually means to the wheat-grower, and how profoundly it can affect the total out-put of wheat in the whole world, if this method

is followed up everywhere, will be realised when it is known that rust on wheat alone causes more loss than all other fungoid diseases on all cereals put together. I hope the Government Mycologist will be able to bear me out here.

Pursuing the same line of work as above, it may not be too much to hope, that in time it may be possible to breed strains of highly-yielding paddy or ragi that will be immune to the attack of blast which is another very destructive form of fungus that attacks paddy and ragi.

Here is another example of a second generation (F₂) of a cross between the well-known strain number 24 of the Government Economic Botanist and a Java variety of paddy which is tall-growing and characterised by a long gracefully drooping ear, head set with very big grains. 24 is a short plant with open ear head and very fine medium rice. In the second generation (F₂) which I am now shewing to you, you will notice that it partakes of the length of Java parent and the open nature and small grain character of strain 24. There are various other combinations of parental characters that are visible in this as well as in other crosses in paddy. I can only suggest that those that are curious to know more about this aspect of the question of breeding, will visit the Paddy Breeding Station one of these days, and I can assure them that they will be amply rewarded for the trouble.

An important truth that has been observed by breeders in various countries is that the hybrid is always more vigorous than either of the parents and in consequence more productive. This fact has been taken advantage of in increasing the outturn of such crops where hybrids are easily obtained in sufficient quantities for growing as bulk crops. One case is that of maize breeding in America. Cross-fertilization is the general rule in maize. What they actually do is to grow two strains of maize in alternate lines in sufficiently large areas and detassel completely any

one of these strains so that cross pollination is the only course open to such plants to develop their cobs. This practice ensures that all the seeds developed on the detasselled plants are necessarily hybrids. These hybrid seeds are given to farmers for growing as their bulk crops. Production of such hybrid seeds will have to be carried on, year after year, on an increasing scale to meet the demands of farmers and it has been found after a series of experiments that hybrid seeds give much higher yield than any of the pure strains used as parents in such crosses.

So far we have been dealing with the plant as such without any regard to the environment, but the story will not be complete if we omit to mention something about it, because it is the environment that gives a chance for the highest expression of the hereditary peculiarities of any organism. It may act as a help or a check to the expression of the potential characters of the organism. Environment is as complex as the organism itself and is determined by various intricate soil factors in combination with the meteorological elements as solar insolation, clouds, rain, wind, dew etc. All these factors, forming what we term the environment of a plant, act and react on the plant. Different plants respond to the same environment in different ways, and the converse also is true. That this is the case has been amply proved by the failure of plants to develop to their full stature when transplanted from one locality to a widely different one. Perhaps it may be due to the very favourable environmental conditions of soil and climate that the paddy plant in Spain is able to produce on an average 6 000 to 7 000 lbs of grain to the acre. From aught we know these Spanish varieties if grown in India, might not give the same yield. But the subject deserves closer study and it would be worth while, I think, to study the conditions under which paddy is cultivated in Spain and find out if the factors contributing to such high yield are controllable by man and obtainable here. This question of environment and its effects on plants leads us to the question of improving local varieties of crops in the localities themselves. It is no use producing a very good strain in Coimbatore and trying to grow it in

Godavari or Malabar as we know the conditions of soil and climate in those tracts are radically different from those of Coimbatore. It is for this very important reason that sub-stations in different parts of the country, in addition to the Central Station, are considered highly essential; because it is only then that we will be in a position to bring into practical use, on a largely extended scale, the results of the very painstaking research work done at the Central Station. A Central Breeding Station, I consider, should function as a clearing house for precise scientific information for men engaged on the sub-stations.

Before concluding I beg to express my humble thanks to Mr. F. R. Parnell, M. A., the Government Economic Botanist, under whom I have the privilege to work, for the very valuable suggestions he offered me for making this paper as far as the nature of the subject would permit, a popular one and also for permitting me to make use of some material from the Paddy Breeding Station and the services of his artist, Mr. Alwar Ayyengar, to whom I am indebted for the diagrammatic representations of the cross between the black hornless bull and the red horned cow.

Discussion.—

Mr. C. Tadulinga Mudaliar supplemented Mr. Anantan's observations on the Possibilities of Plant-breeding, by quoting his experience with G. E. B. No. 24, a new strain of "Kichili Samba" paddy produced at the Paddy Breeding Station. Struck by the excellent quantities of this strain, he introduced it in small quantities into his village near Ponneri in Chinglepet District, where he declared, it had now become so popular that it was fast replacing other varieties.

Mr. S. Sundararaman spoke on the importance of plant-breeding in combating certain fungoid diseases of plants and remarked that the strain—G. E. B. No. 24—referred to by the previous speaker was according to his own observations, resistant to "Paddy-blast." He indicated similar lines of work in the checking of other diseases of paddy such as Ephelis and "blackstick" and of the leaf-fall disease of Rubber.

Some difficulties in conducting Varietal tests of Paddy.

BY G. JOGI RAJU, D. A.

There was a time, when, for a varietal or manurial test, a paddy field was divided into a number of square or rectangular plots according to the shape of the field, each variety or manure under trial occupying a plot, or sometimes two. The bigger the area of the plot, the more accurate was the result considered to be. Owing to the frequent irregularities and inconsistencies noticed in the results, however, it was later on found advisable to increase the number of plots under each variety or manure, the average of the results from a large number of plots having been considered more reliable than those from a single plot or two. In course of time, a method of testing the reliability of the results of an experiment by calculating its 'Probable error' was also brought out. It was also found that, to minimise 'Probable error' it is necessary, not only to select as even a piece of land and to have each variety or manure repeated on as large a number of plots as possible, but also to have the plots as long and narrow as practicable. Experimental work has thus gradually settled down on a reliable basis, empiricism having given place to precision.

Though reliable lines of conducting experiments have thus been evolved, there are yet several practical difficulties met with in laying them out to perfection. An attempt will be made in this paper to briefly narrate some of the difficulties confronted in conducting a varietal test of paddy on the Samalkota Agricultural Station during the past two seasons, and to make a few suggestions towards their solution, with a hope that from the discussion which will follow, correct lines for future work will be arrived at.

In testing the productivity of different varieties of paddy, three chief factors, besides the unevenness of the land, which as already indicated, tends to show a high 'probable error' interfere with results viz., the spacing of the plants in the plots, the fertility of the soil, and the nature of the season. How each of these affects the results will be explained below.

Spacing. The productivity of any variety of paddy may be judged either from the average yield of a large number of individual plants or from the collective yield of a mass of plants in a unit of area. It is doubtful if both mean the same thing. If both be found always to go together, varietal tests become pretty simple, and a number of lines of each variety planted side by side sufficiently wide (say about 1½ ft. from line to line and plant to plant) and repeated several times will suffice. If, however, the two do not go together, and as the practical cultivator judges his varieties only from their collective yield, we are to test them for this alone, these tests become more complicate.

The yield of any variety from a unit of area depends upon the number of ears that are produced from that area and their size, judged by the average weight of sound grain in them. There is an optimum spacing for each variety under which the number of ears produced and their average size tend to the largest yield per unit area under a certain set of soil and other conditions. Experience tells us that, under normal conditions—Garikasannavari a variety which has a comparatively light ear, even under wide spacing, generally gives high yields when closely planted (about ½ link apart), while Palagummasari which has a heavy ear does best under wide spacing (about 1 link). It is not therefore proper to compare varieties with such different habits under the same spacing. It therefore appears necessary to determine the optimum spacing for each variety and adopt that spacing for that variety. But this optimum spacing again, as already indicated, varies with the soil and seasonal conditions, so that the optimum determined in a certain field or in a certain season does not hold good for another field or season. It therefore becomes necessary to adopt 2 or 3

different spacings with each variety every year so that each variety will have a chance of having a spacing as near the optimum as possible under the soil and seasonal conditions obtaining.

On the Samalkota Agricultural Station 15 varieties-five early, five medium and five late are under comparison and with the above view, three spacings $\frac{1}{2}$ link wide, (or 4000 plants per cent), $\frac{3}{4}$ link (or 1960 plants per cent) and 1 link (or 1000 plants per cent) are adopted, the early and medium varieties being compared under $\frac{1}{2}$ link spacing in one field, the early, medium as well as late varieties under $\frac{3}{4}$ link spacing in another field and the medium and late varieties under 1 link spacing in a third. Each plot is 100 links X 5 links or $\frac{1}{2}$ cent in area, and each variety is repeated 8 times. In this arrangement of the plots the yields of the different varieties are comparable for each spacing separately, but the yields under one spacing are not comparable to those under another spacing, as the plots under different spacings are in different fields which may differ in fertility or be more or less favourably situated with reference to irrigation, drainage etc. No field on the farm is large enough to accommodate all the plots under the three spacings and even if there were one, it cannot be expected 'to be uniform enough to admit of the results showing a reasonable probable error.'

To get out of the difficulty two courses may be suggested. One is to select one or two standard varieties and compare the other varieties in small groups, the varieties in each group being tried under all the three spacings in the same field, and to apply the axiom 'things which are equal to the same thing are equal to one another.' Another is to have, among the present series, plots of one or two standard varieties under the same, preferably medium spacing so that the relative fertility of the soil with reference to the standard variety may be gauged and the yields of the plots of the three fields corrected to one standard of fertility.

2. *Fertility of the soil.* Apart from the evenness of the soil as regards its fertility, its richness or poverty, though even, may affect

the results of varietal tests considerably. A varietal test on unmanured land is likely to favour late and medium varieties against early varieties. On a heavily manured land, the early and medium varieties may sometimes have an advantage over the late ones which are liable to lodge before earing. Is the land on which we conduct varietal tests therefore to be manured or not? If it is to be manured, to what extent and with what manures? It would probably be better to make varietal tests under fairly heavy manuring, with fish-guano, or standard mixture of some oil cake and bone-meal or super-phosphate, the quantity applied being what a ryot can profitably be expected to use. Under fairly heavy manuring, the varieties undergo a real test as to their responsiveness to manuring. Those which lodge before ripening when thus manured, may soon be eliminated, our chief object in testing the different varieties being to get at those varieties which respond to good cultivation and manuring and are therefore capable of giving as high and remunerative a yield as possible.

If however a varietal test is started with the idea of selecting varieties which do well with little or no manure, such a test may be conducted on unmanured land.

The nature of the Season. Differences in the seasonal conditions affect the results of our varietal tests considerably, certain varieties doing best under certain conditions. In some varietal tests carried on, on the Samalkota Agricultural Station from 1912-13 to 1917-18, of 17 varieties tried, 5 gave their maximum yield in 1912-13, while 12 gave their maximum yield in 1914-15, the yields being poorer in the remaining years.

Figures for 4 of these varieties are noted below—

	1912-13	1913-14	1914-15	1915-16	1916-17	1917-18
	lb.	lb.	lb.	lb.	lb.	lb.
Basangi	3620	3255	3711	3148	2750	3190
Kohamani	4062	4027	3380	1944	2080	2100
T. A. Akkula	2197	2102	2704	1800	1660	2600
Batnachudi	3370	3671	3348	1923	1870	2280

The following figures again show how great is the variation in the yield of of certain varieties, even when grown year after year in the same plot, left continuously unmanured.

Year.	Samalkota Agricultural station (Konamani.)		Palur Agricultural station Ramagarudan Samba		Remarks.
	F No. 9.	F No. 8.	58 D.	58 H.	
	lb	lb	lb	lb	
1908-09	"	"	2068	1432	Figures for grain only are noted.
1909-10	2075*	2680	1320	1920	
1910-11	1740	2080	2112	3028	
1911-12	2510	2720	2464	2952	
1912-13	3085	3524	2354	2886	
1913-14	2948	3540	1986	2955	
1914-15	3655	3628	2116	3072	
1915-16	2985	3154	2760	2992	
1916-17	"	"	3876	4314	
1917-18	"	"	2616	3168	
1918-19	"	"	8060	4392	
1919-20	"	"	1992	2448	

* yield per acre.

To gauge the productivity of any variety, therefore, it will be necessary to try it for a number of years, to give it a chance of doing its best. Moreover, though we are not yet in a position to foresee or alter any of the seasonal conditions, a careful study of the seasonal effects on the different varieties enables us to change the variety or the method of cultivation at least when the conditions previous to transplanting indicate such necessity. Last summer, for instance, was very severe in the Northern Circars, the maximum temperature having risen up to 118 F on the Samalkota Agricultural Station. There was also no rain during the whole of the hot season. These conditions were expected to be favourable to the growth of the paddy crop in the following season and though according to the Cropping Scheme the whole of the bulk crop was to receive manure, it was withheld. As expected, the crop grew very luxuriantly in spite of no

manure having been applied and in spite of the planting having been somewhat later than usual owing to the late receipt of water in the canal. The lodging of the late varieties before or at the time of flowering also indicates that in such seasons it is advisable to plant early or medium varieties on all good lands, in preference to late varieties.

Besides the three main factors referred to already, there are other minor ones which have to be controlled, if the merits of the different varieties are to be correctly gauged.

One is the time of planting. Owing to the delay in water being received in the canals, the planting has sometimes to be deferred. But this affects some varieties—generally the early ones—more than the others. Care should therefore be taken to see that the planting is done at about the same time every year. After a certain date the yield drops more considerably in the case of most varieties and no comparison is then possible. Another is the quality of the seedlings planted. It affects the yield considerably. Experiments conducted on the Samalkota Farm last year and this year indicate that good thinly grown seedlings give a larger yield than poor thin sown ones. Last year good seedlings of Konamani gave 10.6% and those of Navakotisannalu 20.6% more than poor seedlings of the same varieties. This year good seedlings of Palagummasari gave 15.5% more than poor seedlings. Experiments on the Paddy Breeding Station also confirm the above results.

To obtain seedlings of the same quality from the different varieties, it may be necessary not only to make the seedbeds for each variety uniform and of equal area, but also necessary to vary the quantity of seed sown according to their number per unit weight, say an ounce, for this varies considerably with different varieties and makes much difference in thickness of the stand if the same quantities are sown. Palagummasari for instance gives 1040 grains per ounce, while Navakotisannalu gives 1457 grains per ounce. There is another aspect, however of the question. Seedlings from small seed like G. E. B. strain 24 have a slender growth while those from big

seed like those of Palagummasari grow robustly and may naturally require more space. If the robustness of the seedlings always varies with the size of the seed, and this is very doubtful, it would probably be right to sow equal quantities of seed, in which case the space available corresponds to the natural robustness of the seedling. If, on close study it is found not to vary regularly with the size of the seed it will be necessary to sow the seed thin enough to allow of the free growth of the most robust of the varieties. In determining the quantity of seed to be sown, the percentage of germination should, of course, be also taken into consideration.

Another difficulty which has to be met, in conducting varietal experiments, is the effect of the shade of one variety over another, when they are grown in strips side by side. Some varieties like Turpu Sanna Akkullu grow tall from the beginning while others, like G. E. B. strain 24 and Ratnachudi, are dwarfish in the early stages and grow tall in the later stages. The extent of interference of one variety with another has not been determined in the case of paddy, but is likely to count for something in the case of some varieties at least. In sugarcane such interference has been marked. The difficulty may be met by arranging the varieties in their order of height, the shortest being on the sunny side, or strips of a dwarf variety may be grown between every two experimental plots. But this latter means more space and may not therefore be practicable in many cases.

To summarise, the questions that have to be answered in connection with varietal tests to enable us to proceed on safe lines, are:—

1. Does individual high yielding capacity mean collective productivity in all cases.
2. If so, what is the best spacing to give, in testing varieties for individual productive capacity.
3. If not, under what different spacings are we to try them to determine their collective productive capacity and how best are we to lay out the experiment so as to get a fair comparison?

4. Are we to manure plots under varietal experiments and if so whether lightly or heavily and with what manures?

5. Are we to vary the quantity of seed sown in the plots according to size of the seed? If not, at what rate are we to sow?

6. Do the plots of one tall growing variety materially affect those of the other dwarf varieties by casting shade and if so what precautions are taken?

Discussion on "Paddy Varietal Experiments."

Mr. F. R. Parnell, Government Economic Botanist, expressing his sympathy with the difficulties met with in conducting varietal experiments mentioned in Mr. Jogi Raju's paper, said, that the trial of a simple agricultural experiment was not such a simple and easy affair, as it would appear at first sight. It was not a simple matter, as experiment might take several years before definite results could be obtained. Various strains were being tried at the Samalkota Agricultural Station and it was only after getting definite results that the task of bringing large areas under the improved strains could be undertaken. Referring to the question of thickness of sowing, he stated, that remarkable results had been observed in the Paddy Breeding Station last year, on this point.

Gogu Cultivation in Vizagapatam District.

BY S. SITARAMA PATRUDU, I. A.

In this paper on "Gogu" cultivation in the Vizagapatam District, I will deal briefly with a survey of the crop in pre-war periods, its present commercial importance and the prospects of its future development.

Before proceeding to the subject proper, I draw the attention of the audience to one important fact. It is needless to point out that Gogu or Bhambulpatam is a staple food in our household.

the shape of gunny bags, cords etc., and people may be tempted to question me as to why I took up a paper on an article giving us bags to hold the grain, while we are anxiously looked upon, to increase the output of food stuffs themselves. I wish it to be clearly understood that I mean dealing with the importance of this cultivation only in those tracts where other crops are found failures and hence for want of a proper commercial crop, the lands remain waste.

Gogu or Bhimlipatam jute, as it is otherwise called is technically known as 'Hibiscus Cannabinus'. It is said to have been introduced from Africa and the earliest mention of it, is found in the *Ain-i-Akbari*. Its use as a fibre plant is known to us from time immemorial. This plant is seen very commonly thinly sown in all sorts of crops, throughout the eastern Districts of our Presidency, but as a pure fibre crop sown extensively can be seen only in the north of Vizagapatam District.

This fibre received sufficient scientific recognition at the hands of members of the Agricultural conference held at Pusa in 1908, when it was declared to be second to none in the country excepting Bengal Jute. Special scientific investigations showed that Bhimlipatam Jute contained the same percentage of cellulose as Bengal Jute and could be put to practically the same uses. Also Bhimlipatam Jute was declared superior to the ordinary Bengal Jute in the smaller loss in mercerising and in the large increase in weight on nitration. (This I quote from Sir George Watt). Thus the reports conclude that Gogu is deserving of attention. The cultivation of this as a fibre crop on an extensive scale is very recent and its age from a commercial point of view may be put down as 20 years. For the first time in the Foreign market it appeared in London in 1903 when fibre worth 2 lakhs of rupees was exported from the ports of Cocanada, Bhimlipatam and Vizagapatam. It may be interesting to hear as to how this Gogu assumed commercial importance among the chief products of the tract. The ordinary spectator will be struck at the variety of crops grown in this tract not merely once but very often twice and even thrice in one and the same year both in wet and dry lands. On wet lands

the chief crop grown is paddy, which is transplanted in July, August or September and harvested in December or at the beginning of January. Then, irrigated gingelly will be sown in January and harvested in April. As an alternative or very often, in addition, a crop of Gogu or Ragi or red Gingelly is cultivated in June ~~usually~~ *without irrigation*. This is harvested in time to admit of transplantation of the succeeding paddy crop. On dry lands there are two cultivation seasons and two crops are usually raised, Ragi or red Gingelly being sown in May or June followed by Ragi or ~~hemp~~ gram. Groundnut is also grown in considerable areas on dry lands. Indigo once grown on an extensive scale in the wet lands above specified is extinct now.

From the list of crops above mentioned it may be seen that, excepting paddy which is both a food and commercial crop, the other two commercial crops are gingelly and groundnut. 'Gingelly is notoriously untrustworthy' so says a Settlement Officer. It is apt to fail entirely if there be no timely rains. As for groundnut, complaints are being frequently made about the ravages of wild boars and about the difficulties in realising the crop whenever the North-East Monsoon fails. Gingelly, Groundnut, and Gogu occupy about 9, 2 and 6% respectively in the cultivated areas of this tract. The tract is purely rain fed with the exception of a portion, irrigated by the Nagavali in Palakonda and Parvatipur Taluqs under the recent project.

It may be well known that, from olden days, Palakonda continues to be one of the richest Taluqs in the Vizagapatam District. This Taluq, the only Government Taluq in the north of this district was once leased out to late Messrs. Arbuthnot & Co. They arranged for indigo being raised in the Taluq to an enormous extent to as much as 5000 acres and thereby developed the indigo industry. But when synthetic indigo happened to be manufactured by the Germans, there was a terrible crash of the industry and hence of the indigo crop. This led to a sudden collapse of the company about 20 years ago, when Gogu was just raising itself into prominence. At this juncture, certain special factors contributed to the importance of this crop amongst others.

The untrustworthy nature of gingelly, the failure of indigo, the erection of a factory for preparing Jute at Chittivalasa near Bhimilipatam, the existence of innumerable tanks facilitating the retting and extracting of fibre, quite characteristic of this tract—the opening of a Branch Railway line from Vizianagaram to Parvatipur to facilitate transport, surety of the crop when once established, the absence of irrigation facilities, the risky nature of seasons, all added and contributed to the rapid spread of this crop.

The cultivation of the Gogu crop is also simple in nature and consists in broadcasting seed after proper tilth with or without manure. A hoeing or two are given when found necessary and when once the plants are established they require no more attention and grow to a height of 10 to 15 ft. and many a plant could be seen rising as high as the College hall.

To extract the utmost of the fibre the crop is not cut but the fields are, if possible, flooded and the stalks pulled out singly and splashed in the water to wash off mud. After lifting the crop it is either immediately retted or stacked and allowed to wait until the owner has leisure to attend to it. Retting takes about 15 to 20 days and the extraction of fibre is as follows:—

The stem is broken about 12 inches from the root, the fibre held in the left hand while the broken end of the stick is thrown away. This process is repeated until a fair handful of fibre is obtained when the upper portions are all removed together. The fibre is then passed to a cooly who gives it one or two swirls, in the water and twists it up. It is dried, bundled and kept ready for sale. The normal outturn may be taken as 800 lbs. of dry fibre per acre, the percentage of fibre to green stalks being about 3½.

Marketing. Between the cultivator and shipper, many middle men intervene. Generally, the cultivator disposes of his stuff to a petty dealer who had received advances from a merchant or a broker. These merchants sell the stuff to a big buyer who may be an agent for an exporting firm or of a mill. The chief exporting

centres are Bhimilipatam, Vizagapatam and Cocanada with percentage shares of 58, 32 and 5 respectively. The principal pre-war destinations were, the United Kingdom (67%) France (8%), but in 1913-14 Germany took 5000 tons equivalent to nearly 25% of the whole. There are at present 4 mills one at Bhimilipatam, one at Vizianagaram now under construction, one at Ellore and the other at Guntur. The price on the whole can be put down as Rs. 40 per candy of 450 lbs.

In dealing with Indian Jute Industry an eminent authority says "It is not perhaps easy or possible to say any thing now concerning Jute Manufacture. An industry that exerts so great an influence on the fortunes of an important section of India's Agricultural Population, that gives employment to so many factory workers, that utilises large amounts of capital, that holds in its hands the industrial status and future of so important a city as Calcutta, has necessarily been much written upon. It has been again and again insisted that no country in the world is so favourably situated for manufacture of all forms of Jute goods as Bengal and no city so favourably situated as Calcutta. The fluctuations in the prosperity of the mills, the varying prices but enormous aggregate values of jute crop, the great profits and abnormal dividends Jute mills have earned are known to every business man and investor in the country.

The first shipment of raw Jute was made apparently in 1795 but the recorded exports in 1828 were 364 cwts. only. In 1832-33 the figures rose to 11,800 cwts. and 1839 the flax and hemp spinners of Dundee began the manufacture of Jute fibre on power looms.

The handwork industry in Bengal, however, possessed such vitality that up to 1850 the exports of manufactured goods exceeded those of the raw material. The demand for the latter was largely increased by the cutting off at the end of the Crimean war of the United Kingdom from supplies of Russian Flax and exploitation of Jute as commercial fibre crop of the first importance during the

that epoch. The first power mill in India to spin Jute started work at Riahra near Serampur in 1855 and the first weaving mill at Baranagore four years later.

Calcutta began to compete with Dundee. In 1896 Sir John Lang M. P. representing Dundee interests complained that "Calcutta has not only taken the whole of the Indian, Burmese, the Straits and Chinese, the Californian and Australian trade in Gunnies but is making large in-roads in North and South America, the Cape, Mauritius, Egypt, the Levant and the Continent. But not only so but large shipments are coming into the country (United Kingdom), while to the continent they were tenfold what they were in 1892. In the modern phrase, Calcutta Jute manufacturers have been on the 'boom' for several years. The manufacturers have made large profits with the inevitable result the large extensions of Machinery and the building of new mills is now in progress." This was 20 years ago and the industry is now going through a more prosperous process. During the war the industry received enormous profits and it is said the year 1918-19 was one of unparalleled prosperity for the Indian Jute Mills, in spite of a rise in the price of raw material.

Values, percentages and totals of raw and manufactured Jute exported in 1913-14 and 1918-19.

Articles.	1913-1914.		1918-1919.	
	Value.	Percentage.	Value.	Percentage.
Raw	£ 20,55100	53.7	£ 84,80000	19.5
Manufactures	18,849000	47.3	35,101000	80.5

Bhimjilipatam Jute is given a very respectable place in the Statistical world. It satisfies all conditions which Jute does. When tried in our localities it gives better yields. It can be easily grown on fields which are away from water facilities and can be put to all

uses, but what is its position when compared with its sister industry? The following figures give the progress of the industry during the war.

	Tons.
1913-14	22006
15	6822
16	5867
17	6090
18	32
19	2376

There are only 3 mills and one just started. These mills do not consume even 1/10 of the crop that is produced and there were practically no exports. There is no commercial organisation of any kind for this industry and the fate of the ryots can better be imagined than described. Want of proper commercial organisation, fraudulent ways of watering the stuff and thus deteriorating the value, proper demand, lack of enterprising spirit on the part of the capitalists, all contributed to give a set back to this industry. In spite of all the difficulties the ryot is persistently cultivating this crop and this all the more supports the view that the ryot cannot think of another crop and it is also admitted on all sides that it is very exhausting and the succeeding paddy crop generally gives very low returns.

What are the ways and means to bring this into prominence and secure reasonable profits for the producers? Who is to come to the rescue is the question? The solution is not far to seek. More than 9/10 of the biggest district in India are Zamindari lands. If the Zamindars should feel that the greater the encouragement they give to their tenants as per details given above, viz., proper commercial organisation, erection of factories in the vicinity etc., and render such help as capitalists do in England, they would not only be profiting themselves and encouraging their tenants but also be giving a great impetus to this important industry. But such help is generally conspicuous by its absence. To add to this, we have absentee land holders, merchants and the indifference of these is proverbial and the only hope is to effect a thorough investigation into the methods of cultivation and industry and selection of good types to suit the needs of the existing mills

and exporting firms and proper organisation on the lines of Cotton Improvement Work effected by the Department in the South and Ceded Districts. It may very well be borne in mind that no substitute synthetically prepared as in the case of Indigo is to be found in the world's market in the near future, all such attempts having failed in toto, that this crop is to be raised only in places where other and more remunerative crops could not be grown and that, once raised, this crop grows well, that the condition required is the existence of innumerable tanks for retting and extracting fibre and that such tanks are found in plenty in the Vizagapatam District. Hence it may be fairly concluded and this Industry would have a brilliant future improved by the combined efforts of the three main Departments, Agricultural, Industrial and Co-operative mitigating the disabilities specified above.

Discussion on "Gogu cultivation in the Vizagapatam District."

Mr. Balakrishnamurthi, Dy. Director of II Circle, remarked that in his opinion, it was not at all profitable to invest money in this crop, since it mainly served to give employment to poor families and the net profit on the sale of the fibre was but little. He further stated that experience of this crop in the Government Farms confirmed this view. He further doubted whether, as stated by the speaker, this crop could thrive when gingelly failed, since both were dry crops that would be equally affected by adverse seasons.

Mr. Patrudu replied that he agreed that the experience of the Samalkota Farm was not very encouraging, but submitted that conditions were quite different in the North of the District, where better methods of extracting the fibre were known. He affirmed that the crop was really profitable in the tract he referred to.

Mr. Vellingiri Gounder, M. L. C., enquired of the speaker what sort of manufactured products were turned out of Gogu fibre, when Mr. Patrudu informed him that it was chiefly used for preparing gunnies and was besides put to various domestic uses.

Juniors and Research Work.

BY RAO SAHEB Y. RAMACHANDRA RAO, M. A.

By proposing to plead the cause of Juniors in Research Work, let me not be misunderstood to imply that the present Juniors of the staff of this Research Institute are of inferior stuff or to insinuate that they are being unfairly prevented from taking part in research work. I do not mean anything of that sort. On the other hand, it is a real fact that a good many are actually employed in Research work, as also that some have shown no mean abilities therein. However, one has to admit that the general level of work of the average junior is not in all cases high. In some cases he exhibits an easy-going nature with a tendency to drift with the wind and the tide, or in others manifests a stunted growth due to improper nature or unfavourable surroundings. The general result of such a junior staff cannot but be a decrease in efficiency in the general work of the Institute, which will not only reflect discredit on the chiefs of the various sections but also on the general reputation of the Institute as a whole. The object of this paper will have been served, if it will result in giving an impetus to the juniors to undertake responsible work and in thus making them efficient members of the Institute.

It is a widely known fact that the Agricultural Department as a whole, including our Institute, formed the subject of much adverse criticism in the April Sessions of the Madras Legislative Council. Uncharitable views were freely expressed by several members regarding the general working of the department, stress being laid on particular sections thereof. It is unfortunate that, owing to the wide publicity the discussions in the Council got in the papers, the department stands accused before the general public with no chance to clear itself straightaway. The Institute is by no means intolerant of criticism. Criticism is really welcome, for it will let us know what our shortcomings are and where we have gone

wrong. "Oh! for that ability to see ourselves as others would see us!" as the poet exclaims. The Agricultural Department is one that has been created for the benefit of the ryots and it is its manifest duty to attend to the needs of the cultivating public. It therefore freely welcomes frank bonafide criticisms on its various activities and honestly tries to benefit from them. But if criticism is to be productive of good, it must be actuated by sympathy and made after deep scrutiny. Criticism must be constructive in character not destructive. It is no good to cast aspersions which cannot be substantiated and which will do more harm than good.

Let not the public, however, understand that our Institute considers itself above criticism. It has never yet claimed to have said the last word about agricultural improvements, nor arrogated to itself a state of perfection. Compared with various famous Research Institutions of Europe, it is but a child of yesterday, and has but just entered the threshold of usefulness. Considering its extreme youth, we claim that it has shown no mean achievement. In an applied science like Agriculture, only practical results tell. They are the only evidence of the usefulness of an Agricultural Research Institute and form the sole measure of its success or failure. Tangible progress, we claim, has been shown in various branches of Agricultural Science, as for instance, in breeding new varieties of paddy and sugarcane, in making soil surveys of definite areas, in improving methods of cultivation and devising remedial measures against plant diseases and insect pests: and we hope and trust that with the maturity of time, fuller results will follow.

In judging the outturn of work of a Research Institute dealing with Agricultural problems, one is apt to overlook the special difficulties of research in Agricultural Science as compared with the Pure Sciences. Agriculture is essentially an applied science wherein various branches of knowledge are pressed into service, as for example, Chemistry, Physics, Botany, Zoology, Veterinary

Science, Entomology, Mycology, Bacteriology, Engineering, Economics and Commerce. Owing to the large field it covers, and the number of factors which affect it, Agricultural Research is beset with innumerable difficulties. As compared with Research Work in Pure Sciences—such as Pure Chemistry—Agricultural Research suffers from numerous handicaps. Whereas problems in Pure Physics or Chemistry can be attacked within the four walls of the laboratory, agricultural problems can only be solved in the field; and whereas in the former case, conditions can usually be controlled at will, in the latter, conditions cannot be kept under check, since they are subject to such variable factors as the fickleness of the weather, the incidence of insect pests and plant diseases, and local variations of soil composition. In Physics and Chemistry and in many of the other Sciences, experiments may generally be repeated as often as one could wish, but in agricultural work one has to depend on the seasons and if an experiment is inconclusive, one has to wait till the following year for repeating it, and it may happen that owing to the numerous factors concerned, it may not be possible to repeat the experiment at all. A confirmation of results require the sum-total of experience of a series of years. Real Research in Agriculture is thus a waiting game: one has to wait sometimes for years for getting conclusive results. As an example of this phase of Agricultural experiments, the classic instance of the Rothamstead Experiment Station may be cited, where it took many years merely to perfect a simple standardisation of the plots preliminary to the experiments themselves. Veritably "*Truth is the daughter of Time.*"

While pleading for a recognition of the slowness of growth of knowledge in Science in general, and in Agricultural Science in particular, we ought to recognise that the public have a right to assure themselves that the machinery of Research, maintained at state cost and financed from the contributions of the ryot, and explicitly designed for his benefit is in good working condition, and

further to insist on its maintaining a state of efficiency. The very fact that there were lively discussions in the Legislative Council on the working of the Agricultural Department shows the interest the elected representatives of the public are taking in us, and such interest is specially to be welcomed, as it evidences the newly-born democratic spirit of a "government of the people, for the people and by the people."

That the cultivating public is showing greater and greater evidences of its recognition of the useful functions of the Agricultural Department—and of this Institute in particular—is becoming manifest by the increasing number of enquiries received from them. These enquiries are of a very varied character. Some of them solicit information regarding remedies for insect pests and plant diseases, others seek advice on manurial problems, and while yet others voice a demand for improved varieties of seeds. Whereas certain of the queries refer to problems keenly felt throughout the land, others regard special conditions of certain restricted areas. A certain percentage of the enquiries are of a character that may be satisfactorily answered forthwith, whereas others are of so complicated a nature that a special investigation, which may perhaps take several years, is needed before a solution can be suggested. There is, on the whole, a distracting variety in the enquiries received; and if it is expected that a Research Institute should consider it its duty to satisfy very one of them, it is necessary to see that the mechanism of research should be made comprehensive enough to deal with the work without much strain. When, for example, one recognises that even in such a simple case as a routine analysis of a soil sample or manure, the work taxes the attention of a worker for several days in succession, or that in the case of insect pests reported, the study of the life history may take a month or more even in ordinary cases, (and sometimes several years where a complete study is necessary). One will understand how greatly the energies of the Institute may be taxed.

In certain cases problems could not be taken up for investigation for want of sufficient staff, and in other cases, insufficiency of hands has led to insufficiency of work. When one considers what a large area of territory a single Institute like ours is expected to serve, and compares it with the innumerable institutions with which a much smaller country like England is equipped, one will understand the insistent demand for an expansion of staff and admit its real expediency.

But, as is well known, the present moment, owing to the existence of a financial crisis, is not the time for indulging in hopes of an accession of strength to the staff. Perhaps the present crisis may pass away soon, but it is more probable that it will last for some years to come, till the equilibrium upset by the Great World War is once more restored. Until more propitious times dawn on us, it is to be feared the Institute will have to get on as best it can with the available staff. As, notwithstanding the financial stringency, enquiries continue to pour in and work continues to increase, the only course left to the Institute is to adapt itself to the altered circumstances. In my humble opinion, the adaptation needed under the present conditions should be two-fold; viz., (1) Concentration of energy on particular problems and (2) increasing the efficiency of the present staff.

Firstly, so long as sufficient hands are not available, it will not be possible to attend to enquiries of all sorts. Dissipation of energies on non-essential questions will not be productive of any good, while if all the available energies be economised and directed to the solution of the more pressing problems, useful work will have been done.

What is wanted at the present time, is more and more of intensive work, vigorously seeking a permanent solution of problems on hand, rather than diffuse work of a superficial nature not leading to any particular issues. Only questions of immediate importance—main problems needing urgent attention—should be

taken up, and all the available staff should be concentrated on them, care being taken to keep hammering at the questions till a definite solution is reached.

Secondly, the mechanism of research as it exists at present, is in my opinion capable of great improvement. If readjusted and remodelled, it is capable of being brought to a higher state of efficiency, enabling it to produce an output not only larger in quantity but higher in quality.

Research work in the various branches of Science is now attended to by a staff of Assistants and Sub-Assistants of various grades, under the direction of Experts. As a general rule, the individual members of the staff are given such work as happens to come to hand at the time and when in due course that piece of work is finished, attention is turned to some other work that happens to turn up then. The result of such continual shifting is that the particular individual is not enabled to specialise in any particular line of work and thus acquire the efficiency that is born of continued experience. Though such a specialisation need not be strictly enforced under *all* conditions, yet it would be beneficial not only to the worker but also to the Institute, if encouraged wherever possible.

Again, implicit obedience to instructions is, of course indispensable in many matters, yet if a more satisfactory type of work is desired, it would be a better plan to induce the individual to take a living interest in the work on hand by making him absolutely responsible for results and thus compelling him to show his own individuality in the matter. By this method not only does the worker escape the pit-fall of following the letter of the order without understanding the spirit of it, but is compelled to use therein all his resources as well his powers of observation and deduction, thereby ensuring a more efficient performance of the work undertaken. This plan will not only have the effect of improving the junior but enabling him to develop a power of

initiative and take up independently problems of a minor importance, which he may be expected to work out of his own accord during his leisure hours, guided of course by the willing help of the expert where necessary.

The following extracts from the suggestions for Research given to the Lac Committee by the late Mr. Howlett may be useful in this connection. "Many people forget, or do not know that what is officially known in this country as 'Research' should really be considered as two practically distinct types of enquiry. One type of 'researcher' must be born, while the other may be made. The first is the man with the original mind seeking new discoveries; he looks for unknown relations between things, invents ways of explaining known relations in some new way, or devises some fresh method of technique which shall reveal the expected facts and relations. Originality of thought, method, or outlook is the characteristic of his work. Work of the second type, on the other hand, does not require and is not characterised by originality, though it may demand technical skill and accuracy of observation. It consists mainly in description, on the collection of data, and the application of familiar laws and methods to particular cases. Of these two types, the first may be the more valuable but the second is the more common, and is the only one amenable to direction and control....."

Of these two types, the first type of 'researcher' is as Mr. Howlett says, born, not made. If one of this class exists among the Juniors, he can never be suppressed nor does he need any coaxing to come out of his shell; for he cannot hide his light under a bushel for ever. But the ordinary run of Juniors can anyday become 'researchers' of the second type. The only requisites needed are a spirit of sincerity, enthusiasm and devotion to Truth. Though the 'researcher' of the first type is of supreme value, the second type is not without his use. He collects the

facts and gathers the material on the basis of which the original thinker erects his far-reaching generalisations. In this connection, Mr. W. A. Locy observes in his "Biology and its makers"—"In the progress of Science, there is an army of observers and experimenters each contributing his share, but the rank and file supply mainly isolated facts, while the ideas take birth in the minds of a few gifted leaders, either endowed with unusual insight, or so favoured by circumstances that they reach general conclusions of importance. These advance guards of intellectual conquest, we designate as founders.....A study of the lives of the founders shows that that the scientific mood is pre-eminently one of sincerity. The men who have added to the growth of Science were animated by an unselfish devotion to truth, and their lasting influence has been in large measure a reflection of their individual characters. Only those have produced permanent results who have interrogated Nature in the spirit of devotion to truth and waited patiently for her replies. The work founded on selfish motives and vanity has sooner or later fallen by the wayside.Some of the glories of the human race are exhibited in the lives of the pioneers of scientific progress in their struggles to establish some great truth and to maintain intellectual integrity."

The uphill paths of science are arduous, tortuous and tedious; thorns and thistles bristle in every direction, and one is easily tempted to throw the burden down, halt by the way side, and dream and languish like Tennyson's Lotos-eaters. This happens only because the driving power of enthusiasm is lacking. Enthusiasm is a species of intoxication, under the influence of which the worker feels neither despondency nor weariness. When possessed by that madness, he is aflame with the yearning to grapple with obstacles and to work on, and on until the goal is reached. Without the help of this Godgiven force, most of the discoveries of Science could never have been accomplished and none of the wonders of this wonderful century could have found the light of day. The full

force of this power is never so well demonstrated, as in the lives of the founders of modern science, wherein we recognise how deep their enthusiasm should have been, to enable them to toil for the discovery of truth, in spite of well-nigh impossible conditions. The example of these great founders of science should have the effect of firing us with enthusiasm and inciting us to do what we can in our humble way, towards the advancement of knowledge.

A great factor in the stimulation of Research is what may be termed an atmosphere of Science. It is this atmosphere of Scientific research that is characteristic of the famous centres of learning in England and Europe and that is responsible for all the great scientific activities of those institutions. It ensures that all the young workers that come within its charmed circle, catch that noble infection and become inspired to work in the cause of science. The great advantage of these old Universities of England over our institutions in India, would appear to lie, not so much in the spaciousness of the laboratories, nor even in the richness of the equipment, but in the possession of an atmosphere instinct with the spirit of Research. The votary of knowledge that seeks these Universities feels with a sense of awe that within the very same walls had lived and worked famous scientists, who had created land-marks in the various branches of science; he further feels that though dead long ago, these great men continue to live not only in the portraits that adorn their halls, but also in the glorious traditions that they had bequeathed to their successors. Added to mere traditions, these institutions further possess a galaxy of earnest workers devoted to the cause of science, and is it a wonder, under such influences even the dullest novice finds an inspiration for work?

Can we not create such an atmosphere in our Institute? Can we not borrow a modicum—however little—of that Promethean Fire from over the seas and establish it here to serve as an inspiration for our workers and students here? I for one, would most

emphatically reply that we can; but only if we are prepared to gird up our loins and work for it selflessly, and with a will. In a young institution like ours, we naturally lack the traditions: for our traditions are yet only in the making. Not only have we to build up our traditions but we have also to bring into being a spirit of camaraderie of scientific Research. Every worker should set about to work with determination; each in his own subject, in a spirit of devotion to truth and with the help and guidance of our chiefs—many of whom have drunk deep at the fountain of knowledge in the old English Universities, conditions would be ripe for the establishment of traditions and ultimately that of the needed atmosphere of Research. Just as a single tree however huge or old it might be, cannot make a forest, in a similar way a solitary investigator or two, however eminent they may be, cannot bring into being, the scientific atmosphere. It is necessary that he should collect round him scores of enthusiastic followers, all engaged in interrogating Nature and solving her problems; and when numbers of investigators, no matter what their status may be or their age—but all permeated with a spirit of earnest enquiry, are found grouped together in any Institute, the essential conditions for the creation of the scientific atmosphere are fulfilled.

In this connection it is needless to point out that the ways of a Scientific Institute are quite different from those of a Public Department of Government. In the Military or the Police or even in the Revenue Departments in India, the consideration that rules the relation between the superior officer and the subordinate is chiefly a question of discipline. One gives an order and the other is bound to obey it implicitly—unaffected by considerations of right or wrong. The realm of Science, on the contrary, is a democracy, where the relations of the Senior workers to the Junior are animated more by the feelings of brotherhood and sympathy and are rather those of an elder to a younger brother than that of master and servant. The workers are swayed by the feeling that

all are working in the selfsame cause of science and are engaged in the selfless search for truth. The true scientist is actuated by the same spirit as inspires the sportsman in the world of sports and whatever be the individual status of the workers in life or in society,—sportsmanlike—the scientist considers all are equal so long as they are engaged in the same pursuit of knowledge.

There are a few snares into which we—the Juniors—sometimes are prone to fall and which we should be careful to avoid. We have generally a tendency to weigh out work according to the amount of Rs. As and Ps it procures us or is likely to secure for us in the future. I confess to have sometimes asked myself "Is not the work turned out sufficient for the pay I get?" No doubt the argument is faulty and the sentiment not praise-worthy, but the pinch of the stomach is absolutely the most insufferable danger of enthusiasm and of even a conscientious view of duty. It is the middle class, to which most of the Juniors belong that is the hardest hit in any economic crisis, and yet it has to maintain a rigid irreducible minimum of social decencies and is expected by society to make a show which it cannot really afford to bear. The unseen canker of care and anxiety serve to destroy all the enthusiasm of an ill-paid worker. It is therefore incumbent on the State to see, that in the interests of science, if not of the worker, the staff is assured a decent competence. In spite, however, of the force of this fact, an attitude of a scientific worker, whereby he brings the level of scientific work so low as to measure it with a mercenary eye, is absolutely to be condemned. Whatever the conditions be, work should be done, not by considerations of money but for its own sake and the right view must be work for work's sake and the right outlook a feeling of pride and thankfulness that he has been given the *privilege of working*, for science and ultimately for the good of his country.

Again deluded by false logic, we are often tempted to measure the importance of a work allotted to us, by the prospective

results or reward that are likely to follow. It often happens that good or even indifferent work is followed by a magnificent reward—in the shape either of fortune or of fame: but if one, on this account, works in the sole expectation of such a reward, he is really gambling on a chance. It has often happened that rare type of work has remained unnoticed, until, in the course of the general advancement of knowledge, long after the death of the poor honest soul, the real greatness of his work has burst on a repentant wondering world. I refer to Mendel. When a piece of work is viewed with an ulterior motive—and not in a spirit of pursuit of knowledge—it becomes contaminated and is almost immoral. In the words of Lord Krishna in the Gita, the motto of the scientific worker should be "Thy outlook should be simply thy duty and never the consequences thereof." The Juniors should set before themselves this high and lofty ideal of work and discard a vulgar outlook of the probable or possible consequences thereof.

If the Juniors should remember one point more than any other, it is that their greatest asset is their youth. Youth is the age of vigour, enthusiasm and all noble impulses. It is the time when the mind is fresh and elastic, pure and uncontaminated. The blood courses at breakneck speed in the veins and if these wild impulses are curbed and directed in the channels of scientific enquiry, achievements of great import will be the result. If, on the other hand, the age of youth is allowed to run riot without being utilised, the great chance of a lifetime would have been lost. With the passing of years, cold, selfish calculation takes the place of the generous impulses of enthusiasm. The ingenuous, frank ways of youth are lost and motives of policy and tact take their place. Instead of the golden impulses of generosity and self-sacrifice, the mind is filled with the dross of selfish and sordid motives. The man may be a success in life so far as the ways of the world are concerned, but he is a nonentity in the realm of Research.

It is therefore the duty of the Juniors to make hay while the sun of their youth shines. If, realising their potentialities, they set

about to work in earnest, they would not only shed glory on themselves, but bring credit to the chiefs under whom they may be working and add to the reputation of the Institute and the glory of the Motherland.

Further, the juniors should realise that in questions which are mooted in popular assemblies or Legislative councils, it is not the chiefs of Sections alone that are responsible, but ultimately also member of the staff however low in the rungs. It is only when we recognise our ultimate responsibility, not only to the Councils but to the country in general, that we will realise how important the work of each individual member of the staff really is. If the senior officers are responsible for their work to the Councils and to the Government, each individual of the staff is similarly answerable to the questions of the ryots he meets with in the course of his duties.

Sometimes the plea of want of encouragement of work from the chiefs is urged, but it does not really matter, even if it be true. Real improvement must always come from within, not from without. External influences such as encouragement and advice will certainly be of great help, but if improvement is to be permanent, such temporary props cannot set us on our legs. If we develop a real thirst for knowledge and realise our responsibilities not only to the Institute and the country at large, but to our own selves, the encouragement from our chiefs will surely follow as day follows night. The main point is to realise that it is never productive of good to shove the responsibility on "the other man." With this sense of responsibility and with a real enthusiasm for work, our Juniors, let us hope, will under the fostering care of our chiefs, develop into very efficient members of the Institute.

The spirit of Research may be likened to a flame and the Research Institute to a Parsi Fire Temple. Just as it is the sacred duty of Zoroastrian Priest, to maintain the sacred fire,—to keep it, to tend it and to see that it is never extinguished, equally sacred similarly are the duties of the Specialists—our

chiefs of the various branches of Science—to keep the torch of knowledge alight, feeding it with the incense of enthusiasm, and to see that it burns brighter and brighter till the darkness of ignorance is utterly dispelled,—till everything shines with the effulgence of truth.

May God help us in the attainment of this sublime Ideal!

Why the public is not impressed with the work of the Agricultural Department.

BY K. T. ALWA, L. AG.

Nowadays it is not unusual to hear from Council Chambers, platforms and the Press that the Agricultural Department has not impressed the Public, the money spent on it is a waste of public money and the only remedy is to abolish that Department. Before we go deeper into the question, we are to consider who represent the public and whence they get their impressions. The present representatives of the public are mostly lawyers and they get their impressions from urban surroundings. Agriculture is a rural subject and the Agricultural Department has to make an impression on rural population. The general temperament of an urban population is enthusiastic and progressive, whereas that of a rural one is dull and retrogressive. The condition of towns and cities is improving day by day and the people feel that they are advancing in civilisation, material prosperity, education and other things. They feel the present is better than the past and the future is still more hopeful. Whereas the condition of villages is retrogressive. The man with the slightest progressive ideas and enlightenment deserts the village, thinking that it is a fit place for never-do-wells to live in. The majority of the village people think that the past was good, the present is bad and the future will be worse. The highly developed intellect of a lawyer cannot

grasp the difficulty of creating an impression on the mind of the illiterate ryots. The lawyer always deals with the trained minds of judges who get impressed with the arguments of the lawyers very soon. A trained mind is operating upon another trained mind having similar lines of thought and aspirations. In the case of an agricultural officer operating on the mind of an illiterate ryot, the case is quite different. There is a wide gulf between the two minds. The ryot thinks that his forefathers were happy without new methods being adopted and the advice of an outsider who comes to his doors unasked would make his miserable lot still worse. To get over these prejudices of the ryot and to develop him to receive our impression takes a good deal of time.

There are two ways of making a man advance, one by pulling and the other by pushing. A powerful orator of Cape Comorin runs up to Madras, holds a bench meeting and appeals to the audience to destroy the foreign goods. Some among the crowd throw their caps and a bonfire is made. The enthusiastic orator thinks that he has impressed his audience and the bonfire is the result of his efforts. The general tendency of the urban population is to jump for advancement, and the worker is only to touch them from behind by way of pushing. They jump forward without knowing where they jump. With rural population, especially with ryots, the case is quite different. They are as gold as ice and as firm as a rock and to kindle a bonfire is very difficult with them.

To push a ryot forward in the advancement of agriculture is not a sound policy and might lead to failure. The agricultural officer is to pull him towards improvement. The act of pulling is more difficult and takes a longer time than that of pushing. One cannot run up to a ryot who is firm in his village, and attempt to pull him. The ryot is in an advantageous position regarding the knowledge of local conditions and hasty attempts may lead to undesirable results. Before one attempts to pull a ryot, he must

press his heels well, look the ryot eye to eye and then stretch his helping hand,—and that is, the agricultural officer has to study the local conditions of soil and season, has to make enquiries of local practices, has to observe the ryot in and out of season and then only suggest improvements. When the ryot stretches his hand, he should be gently pulled and taken as a comrade along the path of progress. All this means time and the impatient public might think that we are not creating an impression. To push a ryot forward who is unprepared to receive your shock is dangerous and the first duty of a rural worker is to prepare the ryot to receive his instructions.

Very often the Agricultural officer has to answer the ryot for the work of other departments. He will have grievances against certain Departments and he takes privilege with the Agricultural Department to discuss the policies of various other departments before he makes up his mind to take up our suggestions. The Agricultural Department is a smooth spot in the Government Machinery and the ryots freely handle it with due respect to other thorny spots.

Once I suggested to a ryot to grow green manure crops and the ryot suddenly got irritated and asked me whether I belonged to that Department which deprived the ryot of his mother. I asked him what he meant by that. He told me that one department deprived him of the benefits of forests, and green leaf is mother's milk to a cultivator. I immediately told him that I did not belong to that Department but to another Department which helps starving ryots. "It might be you were deprived of your mother's milk and you were starving, but the only way of saving you was to give you some other milk in the shape of green manure crops." On another occasion, one ryot asked me whether I was not a Hindu. I replied him yes. Then he raised his eyes and hands to heaven and asked me, was not the curse of his starving cattle on our heads? I asked him why. He told me

that we had deprived his cattle of their grazing ground. Such instances will be numerous and every agricultural officer is familiar with them. This Department has to work in the midst of uncompromising elements, on one side, the poverty and the ignorance of the ryot and on the other side the rules and regulations of several departments. We are to pity the one and to respect the other and to carry on our mission with the ryot by explaining to him the policies of various other Departments. I think the Agricultural Department has explained to the ryot the policies of the Forest and the Revenue Departments more than those Departments ever cared to do. Our task with the ryot is not merely agricultural, but a good deal of preparatory work has to be done in dispelling the ignorance and the prejudices of the ryot before he takes up agricultural improvements. All this means time and slow progress.

Another important cause for the slow progress is the vastness of the work and the insufficiency of men in the field. The whole Department is manned by about 32 men in the superior service and a little over two hundred men in the subordinate service. Men in superior service are engaged in teaching, research and supervision of the work of the subordinate staff. Out of 200 men in the subordinate service, 72 are engaged in research and teaching, 65 manage 22 experimental stations and 63 are available to carry improvements to the doors of the ryot of 40,000 villages of this Presidency. Imagine, gentlemen, what impression we can produce with this small number of men taking into consideration the vast field of work. The present strength is after the reorganisation and the expansion of the Department. A dozen years back even one-fifth of this number was not available for work. When a small number of workers is asked to cover a large area, the work must necessarily be superficial. The few men that were in the field might have, in the hurry

approached wrong persons who promised them to carry improvements. In earlier days we approached lawyers, big absentee landlords, District and Taluk Board Members and members of the District Agricultural Associations. These gentlemen were kind enough to purchase our seeds, manures and ploughs and gave us some encouragement in the beginning. We gave them hopes of cent per cent additional profit by adopting our methods and they gave us hopes of cent per cent of carrying out our suggestions. Well, gentlemen, both sides were disappointed. We found in many cases our seeds, manures and implements never saw the light of day. They were bundled up and kept in a safe place and were shown to us when we visited these gentlemen next year saying that the things were safe and their tenants were so bad that they never took up their suggestions. The few that tried found that the profit was small, only 5 to 10%, which was not worth their consideration and gave up the trials thinking that the practice of law paid better than performances in Agriculture. They admit that to persuade their own tenants and relatives to adopt new methods is difficult, but they raise their hands to give a deathblow to our Department saying that we have not impressed the public, forgetting that our struggle is one of persuasion, and not of power, in the midst of poverty, ignorance unfavourable seasons, famines, pests and pestilences. When we get more men to work, we concentrate our work, get better knowledge of our surroundings, go the ryots in villages who need our help and not to men in towns who call us for a show. We are not satisfied with the quantity of seed distributed or sold, but we look into the area sown with these seeds. We are not satisfied merely with the area sown and the green manure crops grazed by cattle, but we see that these crops are ploughed in and used as manure. When these are used as manure, we see that ryots get better results and are satisfied with our suggestions. If not, we further investigate the question. We realise our satisfaction consists in the satisfaction of the ryot.

We thought that ryots would visit the experimental and demonstrative farms maintained by the Department and get benefited by the results. But we hear from our offices that in Government farms, sovereigns are sown and rapeseed are reaped and the Department can afford to grow good crops, because the Government Treasury is at its back and improvements will not stand the test when they are tried in the ryots' lands. We have taken this criticism in a cheerful and constructive spirit and our Demonstrators have begun to start private demonstration plots in ryots' lands. Fairly well-to-do land-owning and cultivating farmers are approached and they are requested to place one or two acres at the disposal of the demonstrators. These plots are worked jointly, the ryots supply labour and capital and the demonstrators give advice and supervision. In these plots simple improvements on paddy cultivation such as green manuring, this strategy, sort of better varieties of paddy, and some manuring, weeding and application of well-prepared cattle manure are tried. In the current year eight such demonstration plots were started in the North Arcot District and the results are encouraging.

Here I may say a word about improvements. The improvements we suggest do not aim at making a millionaire or multi-millionaire. They are simple improvements intended for poor working farmers. They aim at economy, better yield, prevention of waste and supplying the wants of the ryot at a cheaper cost. These improvements may not be the inventions of the Department, but the Department takes the credit for popularising these good practices among ryots who do not know them. These improvements might not add cent per cent additional profit, might not pay as much as law, or commercial speculations, but surely bring in a substantial saving and an additional profit. Our suggestions are simple but of great importance. As an example, the actual working farmer is too poor to invest money on manure, but the little manure he gets from his cattle is not properly

collected and returned to the field. Every one would admit, that a good portion of the cattle urine is wasted and the dung is not properly preserved. The Agricultural Department has been preaching to the ryot to minimise this waste by adopting better methods of collection and preservation. The response is feeble and we are not satisfied with preaching alone. Now we take our head coolies to the doors of the ryots, dig pits, construct sheds, collect manure in these pits, carry it to the field, apply it to the crops and show better results to the ryots. All this means time and slow progress. The ever anxious public might ask us whether our experts and Demonstrators are paid for doing such a simple work as the collection of manure. Our lot is such as to do simple things in this world. Our Experts find out the manurial value of this waste and suggest methods of preventing it and our Demonstrators demonstrate it at the doors of the ryots. We realise the importance of this national waste, and try our best to minimise it.

The Public might think that the result of work entirely depends upon our exertions. This is not so. There are several factors which are beyond our control, the most important being the season. Unfavourable seasons might not give the full benefits of our suggestions and ryots get disheartened, or we might not be able to start an improvement at the proper time for want of seasonal rains. Our works are guided by seasons and not by hours and minutes, losing a season means losing the whole year. If an improvement is started under unfavourable conditions, it cannot be immediately wiped out and started again. This means slow progress.

The educated portion of the public who condemn us have no faith and patience in Agricultural improvements. They hate rural life and all rural questions have been neglected. Sanitary commissions have sat, Educational Commissions have discussed,

Public Commissions have decided and many Commissions have come and gone, but the rural conditions remain the same. Social, Religious, Educational and Political Reformers have begun their work long before us, but the results of their work have not penetrated the rural areas. The condition of the villages and the man who actually handles the plough is the same as it was a century back. There is a steady migration of better brains from country side to towns. Every reformer wants better brains to deal with, but the public expect us to achieve immediate success with the most neglected portion of the population. It is our experience that with a man having slightly developed brain, who actually remains in his village and cultivates his land we are making quicker progress. It is a pity in many cases the actual farming is passing into the hands of penniless and brainless people.

When an improvement is worked out successfully in the field of a ryot, the next step of carrying it to the door of his neighbour and spreading it in the village has also to be done entirely by the Department. We do not find any village organisation or educated man to assist us in this work. No doubt we look to rural co-operative societies for this help, but at present they are engaged in organising themselves and putting their finance on a sounder basis. They are assisting us, but we hope they would see a greater portion of their finance is spent for productive purposes, such as agricultural improvements. We see here and there a few retired officials returning to their villages and putting their hands in to agriculture. With such people we get into popularity very soon, and although we cannot expect much active propaganda work from them, they are of great help to us. If greater numbers of educated men return to their villages and take up questions of rural advancement, the Agricultural Department will make greater and faster impression on the public mind. It is the repulsion of the educated public for rural life and rural questions that makes it difficult for us to create an impression and not the hollowness of the Department.

We sometimes hear that a fresh student from an Agricultural College is no better than a Mahi, so the College should be abolished. Well, gentlemen, in life do we not find a fresh law graduate is sometimes no better than a law tout or a life-long litigant, or a fresh medico is no better than an experienced compounder, or a fresh graduate in Engineering is no better than a road Maistry? But do anybody dare suggest the abolition of these colleges? And if one is bold enough to do so, he will be considered by our public men as a fit object for a lunatic asylum. Then where does the difference lie? The only difference is that these colleges are University Colleges and Agricultural Colleges are "Mammaty colleges" and University men are our Public men. To attract public attention, there must be a certain amount of show. Knowledge and good work alone will not catch public attention. A certain amount of show and self-advertisement is required to create an impression on the public. If Agricultural College students become University men, a certain amount of dignity will be added to their knowledge and they will become one among the public. They will have a voice in sending their representative to the Legislative Council, who will think twice before he talks anything against their work, and protect them from the destructive criticisms of others.

Public spirited men put their hands into various honorary works, but not to agriculture. Title is showered on them and it is a sufficient incentive in many cases. We are to learn a lesson from our sister department, the Co-operative Department, which has a host of honorary workers in the name of honorary Assistant Registrars. Co-operative District and Provincial Conferences are often held, resolutions are passed and the public are brought into touch with the work of the department. I think that department is more popular with the public than the Agricultural Department. I do not know why we should not have recognised honorary Agricultural organisers from the actual cultivators who help the department in carrying out improvements. Dr. Slater once said that knighthoods should be conferred upon men who help the Government in the advancement of agriculture. There is much truth in this saying and if

not knighthood at least we may start with Rao Sahib and Dewan Bahadurs on people taking interest in agriculture.

Well, gentlemen, I am afraid I have overstepped the time limit. The object of this paper is not to retaliate the criticisms of the public, but to place before them our difficulties in making quicker progress. We receive all constructive criticisms in good light, but destructive criticisms might dishearten our young workers, prejudice the mind of our sympathisers and make our work still more difficult. Our policy is to work with one who wants to test our merits and not to argue with him. We are not magicians to revolutionize agriculture in a day, but we are humble workers toiling to add annas and ples to the purse of the ryot from year's end to year's end. What seems to be a public waste to urban population is not a public waste to rural population. The ryot in a village thinks that money spent on University education and medicine is a public waste to a rural population. But, gentlemen, are we to consider these questions from such a narrow standpoint of view? I leave it to you for an answer. The students of this college might not possess provincial tongue or Imperial eye, but they will not be wanting in rural eye and rural tongue. We leave Provincial and Imperial questions to University men, but we are qualified to take our part in rural advancement, our country's greatest need. When this college produces more men, they will have to handle rural education, rural credit and such other branches of rural advancement in addition to agriculture.

A word more to our young workers and then I have done. You are placed in the midst of two rocks, on one side, the slow yielding ryot and on the other side, the quick judging public. To the one give your heart and to the other show your back. The ryot needs your heart more than your back. Your work is a tedious one. You are to go to the door of the ryots as if for begging. When you go to a ryot you will not find him, even if you find him, he will not come out of his house, even if he comes out he will not talk to you, even if he talks he will talk evasively. Then you will get disappointed, but do not lose your head or heart. After your repeatedly going to him

a time will come when he will pity you. That is the time for you to catch him. You have moved his heart and now you give him your heart and lead him very cautiously. The life of a real demonstrator roaming about villages is not a pleasant one. It is full of hardships and disappointments. In your odd moments, I request you to think that you are undergoing all those difficulties for discharging your debt to the ryot who has contributed to give you sound education in this Institution.

Discussions on "Juniors and Research work" and "Why the Department has not impressed the Public so far?"

Mr. C. V. Vencataramana Aiyangar B. A. B. L., M. L. C. stated that he was the owner of a large extent of land in the Coimbatore District, and that therefore he was, though not an actual tiller of the soil, much interested in Agriculture. As a proof of his interest he had sent his son to the college to take up agriculture as a profession. He remarked that he had heard many of the speakers use hard words against the Legislative Council and added that if they had thought that the council had misunderstood the Agricultural Department, the truth was that they had misunderstood the council. He deplored that the speeches of members of the Council were not published and were thus liable to be badly mangled by Press Reports. He declared that, as the Agricultural Department formed one of the transferred subjects, the council as a whole sympathised with it, as contrasted with the reserved subjects, and promised that they would try to vote as large a sum as possible in the next budget. He however considered that the Department ought to be popularised to a greater extent, and that in his opinion, the best method of popularising it was to Indianise its personnel to a greater degree. He declared that he did not agree with Mr. Alwa when he said that the Department had not impressed the public so far, but asserted that it had really made an impression on the public mind. He only deplored that the Department had not made such a mark as one might have expected it to. He exhorted the demonstrators to go to the ryots in a missionary spirit and with patience and perseverance to bring home

to them the usefulness of the Department. As instances of cases where the people were dissatisfied with the work of the Department he cited the application of the Pest Act against the Cotton Bollworm, and the ravages of the Betel-vine worm. In the first case, he suggested that remedies other than the present destructive methods might be found out and in the second, he wished further investigation might be made to check it, adding that he was personally a sufferer by the existence of this pest.

[The speaker is referred to an article under the heading "Pink Bollworm and the Pest Act" in the November Issue of this Journal, with regard to his enquiry about remedies for the Pink Bollworm. *Editor.*]

Mr. V. C. Vellingiri Gownder M. L. C. declared that it was true that criticisms were made, and are being made, in the Legislative Council regarding the Agricultural Department, but that they were not to be taken to be a discouragement or a reflection on the work of the Department. It was true that in certain instances he did not approve of its wisdom, but that need not be taken to mean to be a condemnation of the whole Department. He further said that the ryot did not understand, nor care, what "Research" was, but what he *did* care for was something that would immediately benefit him, and desired that the Department would endeavour to be of use to him.

Rao Sahib M. R. Ramaswami Sivan, Government Lecturing Chemist, said that, while he accepted the idea that there should be a spirit of brotherhood between the Seniors and the Juniors, he considered that the scientific sections should be relieved of certain non-scientific routine that took up a large part of their time. He therefore welcomed the proposal of creating a central office at the institute to look after such work, so that the experts may be enabled to devote more time to real research work. He then appealed to the members of the Legislative Council of the Coimbatore District—whom he *funny* remarked, many of the officers of the institute, had taken personal trouble to vote for—to form themselves into an informal committee and to visit the Institute as frequently as possible, not only

to find out what was being done, but to give suggestions as to what might be done, and instanced the visits paid by our Development Minister, the Hon. Mr. K. V. Reddy Naidu and by the Hon. Mr. Sarma of the Government of India. He next explained the difficulties of Research and stated that experiments often ended in failures and that from such failures, knowledge grew. He declared that the Department did not ask the ryot to undertake experiments, but, on the other hand, tested methods in all possible ways to satisfy itself before it recommended them to the ryot's adoption.

The President, in closing the discussion, suggested to the council members to fix upon a day and move a discussion in the council about the activities of the Department, and pass a resolution thereon.

Why we should study Agriculture.

BY J. HUIDEKOPER.

I am bringing before you the subject of my paper to-day. I wish to speak to you as to young men who are on the eve of entering on active service for your Motherland. Now, or at most within a year or two, your course of preparation for your life's work will be over and you will become members of the active generation,—the generation on whom the future of your country will largely depend during the next thirty years or so, if not for centuries.

This time in your lives is one which recurs in every generation,—your fathers had to decide on the line of activity, on the motives, which should guide them throughout their lives,—and your sons will later do the same. The problem is ever recurring, but there are times when a nation is, as it were, at cross roads, and when its active generation has to make a decision, the results of which may last for centuries.

There is no need to tell you that such is the position of India to-day, but there may be the need to tell you that such is the position of probably every nation in the world to-day, and that no nation will

choose the right cross road at this critical period of the world's history if it chooses its line of action regardless of the other sister nations, which share with it the life of this globe. The time has come when nationalism must not be narrow, when nationalism must be to internationalism what citizenship of a town is to citizenship of a country. Each nation must be willing to give something to other nations, all nations must be as members of a family,—the family of humanity.

It is therefore necessary to cultivate broad views, to study the history, both political and economic, of other countries than our own and this not only to obtain a sympathetic understanding of our fellow nations, but to get a better outlook on all the problems confronting our own. In this country not enough stress has been laid so far on the necessity of the study of economic problems.

The attainment of political freedom is a legitimate and right aim, but political freedom without economic freedom is after all but slavery or the first step to slavery and to the loss of political freedom, as history has shown over and over again.

To you young men of the present time comes indeed a splendid opportunity, the opportunity to have a share in the building of a nation—to choose your ideal of the India of the future—to make that ideal as beautiful as possible and then to strive to attain that ideal with all the burning enthusiasm, all the pluck and endurance of which you are capable. To attain it within your life time should indeed be your aim. This may seem impossible, but what a united nation can do in attaining its ideal within a single generation, Japan has shown.

But before throwing your whole self in such a way into the task of nation building, you must not only see that your ideal is a wise one, but you must study the means to obtain that ideal.

Let us consider the present condition of India. We have over 80% of the population engaged in agriculture and only a very small percentage in industrial life. The need of industries in order to have a healthy and independent national life is keenly felt in India to-day, so keenly indeed that there is a tendency to think that in industrialism lies the safety, the happiness, the prosperity of India in the future.

But let us look at other nations, at those called industrial. Are they independent? Are their people prosperous? Are they happy? Does industrialism bring a golden age in its train?

But a short glance at the industrial cities of the West will answer these questions in the negative. The late war showed that industrial England was dependent on other countries for food, for the very continuance of the life of her people.

Industrialism neither makes for independence, nor does it make for happiness, at any rate not as carried out at present.

And there is a great danger that India may take a wrong turning at the present cross roads and endeavour to become industrial to the detriment of her life as a nation. Several warnings in this direction have indeed already been uttered by far-seeing persons.

Does this mean that India should remain as at present an agricultural country, with 80% of her population engaged in agriculture? No by no means, for this is as wrong and as extreme a position for national prosperity and national economic independence as is the excessive industrialism of the West.

In a mean position lie true independence and prosperity. India must certainly have her own industries, which will supply her with all the commodities required for all the necessities of the life of her people and for her life as a nation, and indeed with an excess of some of these for exchange with other nations in return for such luxuries as she may wish to purchase from them.

But no very deep thought is required to see that as long as mankind have physical bodies, so long will the prime necessity for the existence of a nation be food for those bodies. Agriculture is then necessarily the basal occupation, from which all other occupations will spring,—the foundation on which the whole superstructure of the nation will rest. Moreover agriculture is not merely the base of physical life, but to quote one of your own modern students of these problems,—“As we look at the growth of a nation we see that the

highest forms of cultured expression are in a way linked with agriculture. You do not have a high development of art, or of music unless you have a nation which is agricultural. It is not the machinery-loving nations which produce the finest products of the human spirit. There is a subtle relationship between the soil and the intuition in man, and therefore agriculture must be the basis of the nation, if the nation is not merely to be materially strong but also spiritually strong.”

It is clear then that for the right development of a nation along sane lines as far as the physical, mental and spiritual needs of the nation are concerned, agriculture should take the high place in the life of a nation, which its importance demands.

Those concerned in this aspect of national service,—for national service it is,—will necessarily be of several grades;—those who direct at the one end, and those who actually labour on the soil at the other, but all should rejoice in their work, should feel the joy of serving their Motherland in this way. The man who makes the soil yield a higher income is the benefactor of his country and must be respected as such.

In order to attain to an ideal India in this most basal aspect of agriculture, you young men must study agriculture even more after leaving your agricultural college than during your student days.

As you return to your villages you should endeavour to picture the village life into an ordered series of activities, such as existed in the past,—in the days of India's greatness.

As a student of these days has said:—

“In ancient India the village was a definitely organised unit of the nation, villages were grouped in tens, these groups of ten grouped again in hundreds and so on. Now that system has gone and nothing has taken its place. In every place where there are a large number of villages and large numbers of the population are engaged in agriculture, we ought also to have village industries. There are times in a seasonal occupation like agriculture where a great deal of leisure is

laid on the hands of the cultivator; in all countries which have been organised in village communities, village industries have also been well developed. If you read any of the old inscriptions which describe the occupations in Indian villages, you will find there were the artisans who supplied the needs of the villagers,—you have the village weaver, spinners, carpenters, ironsmiths and many others. The result was that the needs of the villagers were largely supplied by men in the village who received in exchange a piece of the common land which was cultivated for their benefit. The land was held largely in common and given to individuals for cultivation. That system in its entirety has passed away, but there are parts of which should be revived; that is, there should be village industries, in which people can be employed in addition to agricultural work, so that the village might not be so dependent as it is to-day on exporting its produce and in buying in towns what it wants."

The root of the ancient prosperity was agriculture, and the root of India's future prosperity is necessarily agriculture, and no greater national service can be conceived than of reviving successfully agriculture in its best form.

In trying to do so, the development of agriculture in Europe and in America must be carefully studied and as carefully adapted to the conditions which obtain in this country. It has been said that an increase of one bushel per acre in the cereal crops of India would be sufficient to pay all the taxes. Here then lies a splendid field of work, we have to unlock the gates of wealth present in the soil.

How is this to be done? Primarily by the uplift of the raiyat class and to attain this there must be aroused the feeling of organic unity in the villages. The sons of large landowners must study agriculture, they must be fit leaders for the raiyats, they must become leaders in agricultural co-operative combines, in agricultural industries, experts in agricultural economics.

They must see that the sons of the raiyats have a vocational education, and this vocational education must fit them not only as

agriculturists, but as citizens of their Motherland,—must give them the self-respect which comes from the consciousness of filling a useful, an honourable, part in the organic life of the nation.

The whole social life in the villages requires to be uplifted, to be brought back to the ancient basis of mutual service between the various sections of the community, and of fellow-service to the Motherland.

In such a short paper, it is impossible to develop my theme, impossible to show you in detail how by travelling exhibitions, by the distribution of vernacular pamphlets and seeds, by cattle shows, by exhibitions of implements and of horticultural products, by the institutions of village granaries on a co-operative basis, by demonstration farms with their vocational schools, by instruction in home industries and by many other means, this service to your motherland can be rendered:

My aim will have been accomplished if I have given you some indication of the imperative necessity for a thorough study of agriculture and of agricultural industries at the present time, and if I have given you a glimpse of the absorbing interest, of the intense joy to be found in serving your Motherland along the lines of Agricultural Re-construction.

Harvest Exhibitions.

BY BADAMI VENKATA RAO, L. AG.

Mr. Badami Venkata Rao delivered an extempore speech on "Harvest Exhibitions" in the course of which he said, that in Mysore they had been following a novel and a very popular method of reaching the ryots and spreading such agricultural improvements as had been tested on State Farms. This was effected not merely by holding big costly exhibitions in a few isolated cities, but by arranging small Exhibitions in important villages, where agricultural officers would collect a number of ryots and

make an award to them of money presents varying from Rs. 1/- to 5/- for specimen exhibits of earheads and similar agricultural products of notable shape or size or for similar simple improvements in other directions. The State had found that this move had brought about the required change in the attitude of the ryot and had wrought more real improvement and in a shorter period of time than did the orthodox exhibitions, the agricultural stalls of which were neither encouraged by the literate public nor appreciated by the ryot population.

In support of his statement, Mr. Venkata Rao exhibited mounted specimens of earheads of Ragi of different strains, of which one was whitish in colour and all had a remarkably large number of spikelets, and compared them with the average local Ragi earhead. He also showed a few other samples, which illustrated the several stages through which the improvement of this particular crop had passed, as a result of the study which he had taken up during the past eight years.

As an agriculturist with an abiding interest in the welfare of the State, he was proud to mention that the selections he had made were attested to be good by the ryots, and had been grown this last season over a total extent of over a lakh of acres, out of a total area of over two million acres under cereals and that his selection gave an increased yield of 33% over the local variety.

In reply to Mr. T. V. Rajagopalachari, who wished to know if the white variety was the one Mr. Badami referred to as being under cultivation on a very large area and whether it had become very familiar to the ryots, Mr. Badami said that his selections were very well known to the ryots and this particular one was just being issued out.

Rao Bahadur J. Chelva Ranga Raju congratulated Mr. Badami on the excellent work he had been doing for the past

eight years and said that, given equal opportunities, any agricultural student ought, under similar circumstances, to do equally well even in British India.

Mr. Wood, while appreciating Mr. Badami's work, remarked either that agriculture in Mysore should be in a bad state to score an improvement of over 33% in yield of Ragi in one year or that Coimbatore agriculture should be far too good to be unable to show such results.

The management of Saline soils*.

BY B. VISWANATH.

One of the important problems presented by the agriculturists of this presidency is the occurrence of alkaline or salt lands. A white incrustation on the surface of a soil indicates alkalinity. In other cases patches of damp looking soil occur which maintain a certain degree of moisture. The white incrustation is the salts of the soil brought to the surface by the soil water which is there evaporated, whilst the darker moist patches are salts, similarly brought up, which happen to be hygroscopic in nature. When the amounts of these salts are comparatively small, the result is that germination of seed in the land is poor, and subsequent development stunted. Patchy, inferior crops are thus produced. As the percentage of salt increases the effects are more and more obvious in the crop, and more and more water is necessary to bring the crop to maturity. Finally, when the quantity reaches a still higher figure, the lands become unfit for cultivation, and are generally known as "Alkali" or "Salt" lands.

*This paper by Mr. Viawanath is published in an abridged form as the 1st paper dealing with the purely scientific aspect of the problem is being published as a memoir of The Department of Agriculture, Mesopotamia.

The formation of these salts is largely due to climatic reasons. A soil exposed to the natural agencies of rain, drought, heat and cold changes gradually its chemical nature. In this process salts are produced. If the rainfall is insufficient to leach out these salts into the subsoil, whence they would pass normally by springs and rivulets to the main drainage of the tract, they accumulate in the upper soil. Some are useful plant foods and may be used up as such by natural vegetation or by crops. Others are useless to crops and when accumulated to a sufficient degree are harmful.

Even plant foods, if their accumulation is sufficiently great become harmful, and eventually inhibit growth.

Dr. Harrison in an article in the Year Book of 1918 has drawn attention to the nature and extent of saline soils occurring in this presidency. Although they occur in isolated patches they are distributed throughout the Presidency except in the Nilgiris Wynad and other places of high elevation. They do not occur also on the slopy westcoast where the rainfall is upwards of 100 inches and fairly well distributed.

Barring a few exceptions, it may generally be stated that the occurrence of salts may be directly traceable to one of four main causes.

1. Imperfect drainage of an entire tract resulting in accumulations of salts formed by weathering.
2. Accumulation of salts by evaporation of seepage water from the rivers at the soil surface.
3. Accumulation of salts due to similar seepage from canals.
4. Accumulation of salts from water applied as irrigation water.

The amount of soluble salts which the ordinary cultivated plants will tolerate is a very variable figure, depending on a great many factors, such as nature of salts, nature of soil, nature of the crop, climate etc.

The salts that usually occur in saline soils are the carbonates, chlorides and sulphates of sodium, calcium and magnesium. Some or all of these salts may be found in a saline soil. Sodium carbonate either alone or in proportionately larger amounts than the other salts contributes to the formation of the so-called "black alkali," while the presence of salts other than sodium carbonate is responsible for the so-called "white alkali."

Captain J. F. Webster and myself have studied the problem of salt formation and the rationale of management of the saline soils of Mesopotamia and the results of our investigations and observations may be held to be applicable to the soil of this presidency also. I do not propose to worry you with the technical details of the investigation, but only place before you the general conclusions arrived at and the practical aspect of the investigations.

The practical aspect of the salinity problem so far as it is elucidated by the experiments may be stated as follows.

When the soil solution, as it may be deemed to exist in a soil, which has a moisture content equal to its minimum capillary capacity to a depth of our feet, has an osmotic pressure of more than six atmospheres, the soil may be considered too saline for ordinary agricultural purposes. Crops such as wheat and juar will be greatly stunted in growth and their germination will be greatly impeded.

Other crops may be more resistant, and still others even less so, since the powers of accommodation of plants to such conditions vary considerably. In general, however, a soil solution of osmotic pressure greater than six atmospheres, will be sufficient to prevent the successful growth of farm crops.

When a water table exists in the sub-soil at a slight depth the conditions are modified greatly, and by upward translocation of salts with the capillary moisture, the whole of the salt down to this sub-soil water level may be moved up into the top six inches. Particularly is this liable to happen in the ordinary preparation of a seed bed.

Established plants, will not feel this accumulation, since it forms an incrustation on the surface and is harmless, unless washed down by irrigation or rain water. In this connection it is interesting to note the fallibility of field observations on salinity. A crop may be growing well in soils which contain enormous amounts of soluble salts. These plants are feeding on the comparatively sweet subsoil water, and the salt is present as an accumulation on the surface. Irrigation may kill the crop, by washing down these salts into the feeding zone of the plant. Under such circumstances extraordinary care is needed to prepare a seed-bed sufficiently free from salt to permit of growth, and as a rule this can only be compassed by the digging of drains.

The most serious effect of salts on the plant is to cause shortage of available water. The cultivator of salty lands will therefore benefit by applying most of the particular methods of cultivation which have proved successful in "dry farming."

The seedling plant is most affected by salty conditions and only by taking great care at this critical stage of the plant's life will successful crops be produced. The particular precautions to be taken in cultivating soils with a tendency to saltiness are given below.

Ensure a good start for the seedling plant. This may be done (a) by soaking the seed for as long a period as practicable before sowing.

(b) By giving a second irrigation soon after sowing even though the soil be apparently moist. This will wash down accumulated salts from the surface and allow the germinating seed to make its first growth in a sweet environment.

(c) Whenever practicable sowing should be done in dull weather when evaporation is low. The excess water of the soil is then lost by percolation rather than evaporation, and concentration of salts in the upper layers of soil is lessened. In addition to this the plant's water requirements are less under these conditions.

(a) *Reduce evaporation from the surface soil.*

The successful achievement of this object is very important, since so many benefits accrue therefrom. Excessive concentrations of salts are prevented, water requirements of the crop are reduced, and the percolation is increased, which in turn increases the amount of soil wetted, thereby increasing the plant's root range, and diluting the strength of the soil solution as it exists at the minimum capacity of the soil. The means by which this evaporation reduction may be brought are about follows.

- (a) by furrow irrigation instead of flood whenever possible.
- (b) by the avoidance of soil pans, which prevent percolation and cause all excess water to be evaporated.
- (c) By mulching as soon as possible after every irrigation.
- (d) By digging drains.
- (e) *Increase the water holding capacity of the soil.*

Successful accomplishment of this object is followed by a proportionate dilution of the salts in the soil water and consequent reduction in osmotic pressure.

It may be assured by the following methods.

- (a) Frequent and copious applications of organic manure.
- (b) By thorough and good cultivation, and consequent good tilth.

(c) By less frequent irrigation greater in amount than those normally given preceded by sub-soil cultivation if this is found to be necessary. This causes a greater depth of soil to be wetted and the salts are thereby diluted. In addition a deeper rooting habit is given to the plant which is of great importance in all soils, but particularly more so in those which are at all salty.

The evil affects of frequent insufficient applications of irrigation waters are usually attributed to the restoration of capillary connection between the surface soil and sub-soil waters, and consequent renewed losses by evaporation. Under the conditions under

which such irrigations are usually given however, it is unlikely that any serious loss, over and above that of the water added, could take place. It seems much more probable that the undoubted ill effects which follow, are due to the encouragement of formation of root hairs in the top soil layer, which have no sooner begun to function than they are destroyed by lack of water. In this way a plant may be gradually killed. Similarly hoe-mulching of root hairs at the surface thereby increasing the formation inhibits the formation at lower depths, and rendering the plant more drought resistant.

(4) *Reduce the surface tension of the soil solution.*

If this can be achieved the moisture content of the soil at the wilting point will be minimised, and consequently a greater proportion of the water actually applied as irrigation water will become available for the plant.

This may be done by the copious application of organic manure.

(5) *Prevent whenever possible accumulation of sub-soil waters.*

The effect of such accumulations of water is, as has been previously pointed out, to concentrate practically the whole of the salt in the upper layers of the soil. This is disastrous particularly for seedling plants. Where sub-soil water tables exist at a slight depth, there is only one real remedy. This is the provision of a drainage system.

If the above precautions are taken in the cultivation of saline lands it is highly probable that increased crops may be obtained, and that much land which is otherwise unsuitable for cultivation may be utilised.

Discussions "on the Management of Saline Soils" by B Viswanath.

Mr. R. Cecilwood, M. A.

From a long experience gained in the actual application of water in irrigating crops, I would emphasise the importance of infrequent heavy applications as against frequent light ones. It is true, that it is not so easy to apply water in this way, but I

am convinced that better use is made of the water. Certainly from the particular point now being discussed, namely the avoidance of alkalinity, I agree with Mr. Nath that light waterings are dangerous, they tend to keep a continuous layer at the surface, encourage evaporation and the upward movement of water, and so assist in the accumulation of salts at the surface which is the direct cause of the trouble.

Rao Sahib Ramaswami Sivan referred to the work done on alkaline soils in Egypt and America and said that the limits of toxicity for the various salts as found by Hilgard working with Oats, Peas and Lupines were different from those given by Messrs. Nath and Webster. He also pointed out that the views of the authors with regard to sodium carbonate were somewhat opposed to the generally accepted opinion and suggested that this interesting and important piece of work should be continued. Mr. Nath, in reply to Mr. Ramaswami Sivan said that his observations were based on experiments made with Barley and Chulam. He said that work, on limits of toxicity of various salts, done in America and elsewhere was done under conditions which could not be said to be an imitation of field conditions in any degree and claimed that in the new method of experimenting devised by captain Webster and himself the conditions were very much nearer to those obtaining in the field.

Coconut cultivation in the Laccadives & Minicoy Islands.

BY K. G. NAMBIAR, L. Ag.

The object of the paper is to present in a concise manner an idea about the general conditions and the coconut cultivation of the Laccadives and Minicoy Islands which I had an opportunity to visit in November 1920. The very limited time spent on each Island has precluded me from making a detailed enquiry

into the practices and needs of the islanders. Before dwelling on the subject proper, a brief description of these remote islands, will, I hope, be of interest.

The Laccadives are a group of small islands of coral formation off the Malabar Coast. The Northern groups are attached to the South Kanara Collectorate and consist of the inhabited islands of Amini, Kiltan, Katamath, and Chatlat. The southern portion is attached to the Malabar Collectorate and consists of the following islands:—Agathi, Kavarathi, Androth and Kalpeni. The island of Minicoy known also as Manakayam is separate from the Laccadive group and is the northern most island of the Maldive group. Here there is a light-house which is about 250 feet high. Besides the above there are a number of very small dependant islets scattered in the group. The islet of Viringelli near Minicoy is sometimes used as a segregation place for the small-pox patients of Minicoy. The other islets I visited are Kalpatti, Bengaram and Thaniakara.

The approximate distance from the mainland, area and population of these islands are given in the following table:—

Name of the islands.	Approximate distance from the mainland.	Area in acres.	Population (census 1920).
Amini ...		622	2,148
Kiltan ...		397	675
Katamath ...			577
Chatlat ...		255	761
Agathi ...	218	688	1,051
Kavarathi ...	195	865	1,461
Androth ...	139	1,067	2,497
Kalpeni ...	147	494	1,375
Minicoy ...	250	1,120	3,093

Physical Aspects. The topographical features of all these islands are identical. Each island is contained within a coral

reef stretching generally from north to south. In all the islands on the western side there are extensive lagoons intervening between the shore and the sea. The scenery of the lagoon at Agathi is very interesting. Adroth has no lagoon worthy of the name and this island, unlike the others, lies in an east-westerly direction. The islands are almost flat, but in the interior of each island small inequalities are observed. They are mostly of artificial origin and in only few cases they present the nature of sand-dunes. The elevation is nowhere more than 10 to 12 feet above the level of the sea.

People. The inhabitants are all Mohammadans (Moplahs) speaking Malayalam which differs slightly from that spoken on the mainland. At Minicoy the people are Mahls and speak the Mahl language. A few goldsmiths are found in almost all these islands. These are the emigrants from the mainland who have come and settled here for making jewelry. The island Moplahs are divided into different classes:—(1) Tharvads, Karanavans (2) Kovas (3) Kuchiders or Malis (4) Melachers (tree climbers and tappers). The Karanavans are said to have descended from the Nambudiris and Nayars of Malabar and the islands of Adroth, Kavarathi and Kalpeni are still known as the Tharvad Islands. The Melachers claim descent from the Thiyyars of Malabar and Agathi is said to be a Melacheri island. At Minicoy the people are divided into four classes:—Malicans or Karanavans (2) Malis or boatmen (3) Thakkarus or sailors (4) Ravethis or tree climbers. The women of these different classes have different titles. Thakkaru women hold the title of Bibi, Malis women, Bisan and Malikkan woman, Malikka. In every island the land and the headship are vested in the highest caste and labour in the hands of the lowest class. There is no intermarriage between the highest and lowest classes. There is some discontent and unrest between the higher and lower classes in all the islands except Minicoy. At Minicoy the people live in a compact village divided into wards called Attiris. There is good discipline here in each ward in everything. In social

matters also Minicoy is much in advance of the rest. Here there are clubs for both men and women. A description of the Ladies Club at Minicoy will, I hope, be interesting. The room is built like the saloon of a large sailing vessel with roof, scuttles, port-holes etc. The wood-work is beautifully carved and painted in different colours. Round the sides of the room, benches are put up, on which they sit and make coir with their children playing in the centre. The women wear long red chemises reaching from the neck to the ankle. Men's clubs are quite plain in all the wards and it is from here that they train the troupes of dancers for each ward. Their performances are remarkable for their uniform dress and precision in every act. Moplah women of all these islands observe no Ghosha system as is done in the mainland. At Minicoy especially it is the women that take the lead in everything. The inhabitants of all these islands are quite hospitable, contented and cheerful.

Dwellings. Houses are built of quarried slabs of coral stones with a fine coating of washing. Coral stones burnt in pits and mixed with sand make fine mortar for building construction. Tiled roofs are of recent introduction and are seen occasionally here and there. Very poor people live in small sheds made of plaited coconut leaves. Dwellings are more or less in a consolidated nature in the middle of each island. Most of the houses are ill-ventilated and kept dirty.

Soil. The soil is a fine white sandy loam, porous but not too dry. The soil extends to a depth of about 10 or 12 feet where a sub-stratum of coral limestone is found. In some places loose coral stones alone are found. Waste lands are numerous and good pastures are also found. Some of the extensive Pandaram lands (Government lands) are being leased out for planting coconut trees with certain stipulations. Thick growth of shrubs and screwpines (pandanas) make penetration impossible in some places. The accumulation of humus formed by the decomposition of plants for many years has added greatly to the fertility

of the soil. The presence of lime, (since the islands are of coral formation,) also forms a valuable asset and contributes greatly to the fertility of the soil.

Tanks and Wells. Small-sized tanks are found everywhere. Those near the mosques are beautifully lined with slabs of coral stones. Circular wells with parapet walls are of recent introduction and about half-a-dozen wells of this kind are found in some islands only. Everywhere fresh water is found at a depth varying from 5 to 8 feet but it is affected by the tide and rises and falls accordingly. The water in some of the wells is not very wholesome.

Climate and Rainfall. The climate is insular and extremes are never experienced. The rainfall is about 50 to 60 inches and its distribution is the same as in the West Coast. There is a Meteorological station at Amiri.

Crops. Coconuts form the only contribution towards the resources of these islands. But for this, these islands would have been quite uninhabitable. In small excavations in the centre of the islands of Androth, Agathi, Kavarathi and Kalpeni, paddy, ragi, sweet potato, cowpea and colocasia are cultivated on a very small scale. At Kalpeni a small plot of sugarcane was noted. Bread-fruit trees (*Artocarpus incisa*) are grown largely in every island amidst coconut trees. I was told that lime trees were once growing very well in all these islands especially at Amiri. Now only a few trees are noted here and there. Lime fruits ripen here in August-September when there is no communication with the mainland and so the fruits cannot be marketed. At Minicoy betel vines were found grown largely on coconut trees. Around the dwellings, pomegranates, melons, papayas, plantains, moringai, (horse-radish) betel vines and cholam were grown enclosed by plaited coconut leaves. There is a shrub known locally as Wagai which is quite different from the mainland Wagai. These are grown near the houses and the leaves

are made use of in removing oil during an oil bath. On the beach side, a shrub locally called chentalam (*Pemphis acidula*) is found growing wild. In the uninhabited islet of Vengaram and Thinnakkara a plant known locally as Eathul (*Dioscoria oppositifolia*) is found grown in abundance. The islanders make a fine edible colour out of the tubers. Screw pine flourishes everywhere. The other trees found growing in these islands worth mentioning are *Thespesia*, *Ficus Bengalensis*, wild almond, *Zizyphus jujuba* and tamarind trees. Shrubs of *Calotropis* were also noted in some islands. Leguminous plants, *Desmodium* and *Kolingi* were observed here and there. In waste lands grasses of the species *Andropogon*, *Eragrostis* and *Ischaemum* were found growing luxuriantly. *Lantana* has made its appearance and is growing largely at Kavarathi.

Implements Bill hooks and a few Mammutties form the sole implements of the islanders.

Live Stock. Cows and goats are found in small numbers in each island. They are brought from the mainland only. There is no regular breeding done here. These are slaughtered at times and their slow increase in numbers may be attributed to this. Grazing is done in the coconut garden and pastures. Beyond this no special care is bestowed on them.

Poultry. Fowls are plentiful in all the islands. In the absence of the natural enemies of fowls such as snakes, crows, kites, jackals, and dogs etc, poultry farming has a bright future. In other birds the islands are singularly defective. A few crows were found only at Androth and Kalpeni.

Insects. Insects are few. Some of the common wasps, houseflies and eye flies are found in all the islands. The mosquitoes of Minicoy and the sandflies of Agathi will ever be remembered by visitors. At Minicoy the mosquitoes were found breeding in *Thondus* (coconuts eaten by rats) which may be found scattered throughout. These *thondus* with rainwater collected

therein remain on the ground until they decay. I would strongly advise any one intending to visit this island to provide himself with a mosquito curtain. Even the poorest people there sleep under curtains. At Kiltan the leaves of some coconut trees were found eaten by grasshoppers. It appears that the attack occurs in the months of June and July. The rhinoceros beetle contributes its share of damage to coconut trees in every island. The accumulation of rubbish, rotten stems of coconut trees, and decaying vegetation form a congenial breeding place for the grubs of these beetles. Fallen nuts and seedlings are sometimes found destroyed by hermit crabs. They are found lodging inside shells of coconuts.

Rats. The damage done by rats is neither insignificant nor transient. I think it will not be an exaggeration when I say that in some islands the loss due to the ravages of rats amounts nearly to 50 per cent. of the normal produce. Although the islanders have begun to realise the importance of the damage, the measures adopted for combating it are neither perfect nor satisfactory. Of the various devices of the islanders, in which their simplicity and dexterity are manifested the plaited leaf collar tied round the stem is peculiarly interesting. The principle involved is the same as in the same zinc sheet collars used here in the Central Farm. In spite of repeated rat huntings at regular intervals and use of rat traps of various designs there is no decrease in the amount of damage. Isolation of individual trees and regular cleaning of their crowns may do some good. The rats are found breeding on the crowns of trees only. In some islands, specially at Amini, the whole ground is, as it were, littered with rat-eaten coconuts.

Boat Building. The islanders are expert in boat building. The timber required is brought from the mainland. The boats are quite different from those found on the mainland. The planks are sewn together by means of coir ropes and caulked. They

make large coasting vessels known as Odams as well as small rowing boats. The boats found at Minicoy are peculiar and much better than those found in other islands. The mass boats and racing boats of Minicoy are particularly interesting and of special designs.

Fishing. Fishing is done in all the Laccadives group on a very small scale only. There are very good facilities for fishing in these lagoons. There are different kinds of nets called Kanduvala, Olavalai, Veesuvalai, Adivalai, etc. Fishing outside the reef is done by lines and hooks only. Fish is caught also by harpooning both during day and night. During day time, a wooden dummy called poymeen (false fish) made of small pieces of breadfruit timber and painted in different colours is floated in water and when fish approach they are harpooned. At night with the help of a torch harpooning of pipe fish is done. There are also peculiar traps used for catching fish from the lagoons. Some of the common fishes found here are seer, flying fish, shark, sword fish, skate etc. Green turtle is present everywhere and is locally known as Mirugam. Turtle eggs are taken whenever found on the beach and are eaten by the islanders. The sea slug, *Holothuria* (sea cucumber) is plentiful in every lagoon. The mass fishing at Minicoy deserves special mention as this industry has developed successfully and the income from this source is estimated to be about Rs. 25,000 per annum. The mass fish (Bonito,) which is a large species of mackerel is caught in nets by using live baits which are caught and kept alive in fishing boats of special designs.

The island trade. There are no big shops or stores to sell or buy the necessary article of daily life. When the Odams or the island vessels return from the mainland after disposing of copra, jaggery, coir etc., the necessary articles are purchased and brought. There are Dalals or middle men on the mainland to whom the current of island trade flows at present. The sailing of

Odams takes place in the months of October-November and lasts till May. There is the system of bartering of every article for coconuts from these islands. It was observed on several occasions that one good coconut is given for one or two beedies, betel leaves or a piece of tobacco. The chief exports are island coir, copra, jaggery, coconuts, plaited leaves, fire wood, shells, cowries etc. The chief imports are cattle, goats, rice, cloths, arecanuts, tobacco, kerosene oil etc., in short all the daily requirements excepting coconuts, jaggery and oil are imported.

The economic condition of the islands. People who work for daily wages are very limited. As remarked before such people are the dependents of the higher classes Tharvadis or Koyas. There is not much of money transactions in the islands. Their savings are to a great extent utilised for making jewels. On the whole there is more of economic deterioration, to outward appearance than improvement. But there are possibilities of improvement in several directions.

Education. There are elementary schools at Agathi, Aminni and Kalipeni. It was a strange sight to me to see robust Moplahs aged 20 and 25 attending the 3rd and 4th standards. Regarding education the islanders as a class are backward.

Health. Epidemics such as small pox and cholera pay occasional visits. Medical aid is afforded in the South Kanara islands by the presence of a Sub-Assistant Surgeon stationed at Aminni. The general sanitation of the islands on the whole is better than the mainland. Some of the common diseases found are eye and skin diseases.

Tenancy and ownership of lands. The property possessed by these Moplahs is of two kinds (1) ancestral property known as Velliyacha property or Friday property for which Marumakkathayam system is observed (2) Self-acquired property known as the Thinglacha property or Monday property for which Makka-thayam is observed. The custom regarding tenancy is peculiar

and almost feudal in character. For trees given to tenants, one tenth of the produce will have to be given as rent and also service to the landlord. The important service will be to sail odams to the mainland and back, to attend festivals, thatching houses etc. The right of plucking nuts from the uninhabited islands is generally auctioned out by the inspecting officer for rent for five years or less at a time, on condition that a specified number of seedlings must be planted during each year of the period of lease. Lands are owned in the islands by the number of trees and not by acres and cents. All trees bear the owner's property marks.

Coconut cultivation. The easy going life of the islanders will strike anybody who visits these islands, which can be properly called 'groups of coconut forests.' Planting is done very close. Due care is not given to the judicious choosing of planting sites, selection of seed nuts and management of garden. The nuts obtained here are usually very small. Very long leaves are found on trees growing in absolute shade and most of the trees are without fruits. Under-plantings are done indiscriminately and do not receive enough light and breeze to make them vigorous and healthy. Nuts differing in form, colour etc., are given different names, but the more conspicuously different varieties are very few. There is a variety called Kaitha thali (the husk of which is very sweet). For decorative purposes trees with nuts of different colours are cut and brought completely. Under favourable conditions trees attain general bearing in 6 to 7 years.

Seed nuts and nursery. Seed nuts are selected from heaps of nuts at any time when they show signs of germination. The seed bed is invariably chosen in an ill-drained place where there is the most shade and is always kept weedy.

Planting. Planting is done on the surface. Transplanting from the seed bed is customarily postponed sometimes even up to 3 or 4 years. Planting seedlings in groups is the method usually adopted. Here the outer ones alone thrive better.

Cultivation and manuring. These operations are unknown to the islanders. Even the faintest attempt is not made towards manuring the seedlings round the dwellings with the ashes collected daily from their houses or to remove the weeds that grow thick round the seedlings.

Diseases. Bleeding disease and Pestallozzia were noted everywhere, but nowhere is it on an alarming scale. From what I could gather from the islanders and from my own observations I am led to think that bud-rot has not made its appearance in these islands.

Coir Industry. This is done on a very large scale in all the islands. Men do the work of husking and retting and women do the work of beating and spinning. Retting is done for about 10 to 12 months in coral rocks between high and low water marks on either lagoon beach or sea beach. Retting is also done in the interior of islands in fresh water ponds, but the quality of the fibre is not so good as the other. The fibre is then taken and washed in the sea water to clear the dust and improve the colour. Twisting is done by the help of hand and feet by Melacheti women. The yarn made is light-coloured and very strong. The introduction of labour-saving machinery in the preparation of the fibre and the subsequent manufacture of coir and ropes is likely to prove advantageous as the hand labour required at present is enormous. The best coir is made at Chetlet, but the twist of the coir made at Minicoy is superior.

Coir Monopoly. The Government have monopoly over the coir made in all these islands except Minicoy. The coir yarn is graded before purchase into three classes by the Port Authorities at Mangalore, to which place the coir is taken now. The coir is paid for one fourth in cash and three fourths in rice. The price paid for is Rs. 21-14-0, Rs. 17-8-0 and Rs. 13-12-0 per candy of 560 lbs. of 1st, 2nd and 3rd class respectively.

Copra Making. Copra making is done only during the months of December to March. The island copra known as the Divi Copra is very small in size but this always fetches a better price than the mainland copra. It appears that this copra is marketed to Bombay where it is used for edible purposes. The husking and copra making are done as in the mainland. The average yield of copra is very low. About 7 to 8 tulam (1 tulam is 28 lbs.) are obtained from thousand nuts. This may be due to the very small size of the nuts. As copra making is not done throughout the year introduction of artificial driers may be useful in making copra even in the rainy season.

Oil extraction. There are no oil mills of any kind in these islands. The primitive wasteful method of oil extraction is practised even now. Scraped meat is mixed with water and boiled in copper pots. It is well squeezed out after a few hours and reboiled. About one bottle of oil is obtained from 15 to 20 nuts. A large percentage of the oil is undoubtedly left in the residues and the keeping quality of the oil also is impaired by this process. Cheap modern mills for the extraction of the oil may be tried.

Tapping and Jaggery making. Tapping is done in all the islands by the Moplahs (Melacheris). Their methods of climbing and tapping are peculiar. The appliances used and the methods adopted are very simple. After the juice is seen dripping the spadix is removed and the inflorescence tied firmly by coconut leaves. Bamboo pieces or coconut shells are hung to this spadix to collect the juice. There are no mud pots at all. Lime is not applied in the receptacle. Tapping is done twice a day. The tapping season commences in October—November and lasts till May-June. Boiling is done in copper vessels only. Coral stones are put in the juice while boiling. When the juice attains the syrupy consistency the vessel is removed from the fire and stirred briskly with a wooden rod about an hour and kept in jars or kerosene tins and exported to the mainland.

Conclusion. It is much to be regretted that the care and culture bestowed on coconut trees of these remote islands are not satisfactory.

All the islands are better favoured by nature and the only disadvantage is that they are far from the mainland. The islanders as a class are sure to adopt easily the improved methods of cultivation etc., if their utility can be practically demonstrated. The fall in the yield of nuts is now being increasingly felt year after year and the time has now come to attend to the proper spacing, cultivation and manuring of the trees, though the natural fertility has contributed for some time to giving a more or less steady yield. These remote islands deserve the early attention of the Madras Agricultural Department.

Discussion on "Coconut cultivation in the Laccadives."

Mr. H. C. Sampson C. I. E., Director of Agriculture—in complementing Mr. Nambiar on his very interesting paper, remarked that a study of the economic condition of the people was essential, before a Demonstrator doing District work could attempt to bring about agricultural improvements. He was of the opinion that all the District officers should make it a point to study the economic conditions of the tract they worked in. As regards the subject proper, he affirmed that the coconut cultivation of the mainland had not much to learn from the islander.

Mr. Kidavu stated that he understood that proposals had been made to start a Farm in the Laccadives and that in the event of the project taking shape, effecting agricultural improvements therein would be an easy matter.

Rao Bahadur J. C. Raju enquired of the writer if he could inform the conference if tapping was considered more profitable than the gathering of the nuts for sale and if he had studied the comparative economics of the sale of nuts and the yield of jaggery. Mr. Nambiar replied that jaggery was made chiefly for home consumption. The methods adopted were crude, coral stones being put into boiling juice and the industry was not profitable.

Rao Sahib Ramaswami Sivan was of the opinion that the coral stones prevented inversion and wished to know if lime was never added to the juice.

Dr. Norris stated that while lime was beneficial in the case of cane jaggery, it was not beneficial in the case of coconut jaggery and probably detrimental.

Some Aspects of Agricultural Production.

BY E. V. SUNDARÁ REDDI M. A., B. L.

I must first express my thanks to the members of the Madras Agricultural Students' Union for their kind invitation to me to read a paper before this Conference. I have chosen this subject as I desired to draw the attention of the members of this Conference to certain aspects of our Agricultural production which seemed to suggest immediate consideration.

Recently in an article on "A Study in Rural Economy" I ventured to suggest that there were four things which the ryot regarded as of importance in his scheme of agricultural production. These were (1) Ploughing, (2) Selection of seed, (3) Manuring and (4) Water. I do not mean to suggest that these exhaust the factors of production but they are recognised as of overwhelming importance. I propose to deal with these and also the other factors, which we cannot afford to neglect.

First in importance perhaps is land. The character of the soil and the degree of fertility constitute undoubtedly the pre-eminent conditions of favourable production. There is a growing feeling which is not altogether unsupported by official documents that there has been a deterioration of soil in many parts of this presidency. The problem has naturally been engaging those concerned with the development of agriculture, namely, of preventing this process of deterioration and of augmenting the fertility of the soil. It is in this connection that the use of manures and of appliances designed to secure a deeper ploughing of the soil than what is possible with the country plough have been advocated. The possibilities of green manure have investigated

and the industries of chemical and fish manures have also come into existence here. We are all aware of the very wide use of 'Punnac' as a form of manure. What is most needed in view of the fact that a very considerable portion of the land in this presidency is held by small pattadars is cheap manure. Our efforts should therefore be directed towards placing within the reach of the smallest cultivator, implements designed to secure deep ploughing and manures at prices which would enable him to have recourse to manuring so that he may keep up, if not increase the fertility of the soil. I am inclined to estimate that there would be at least a 15 per cent increase in our production if better appliances are adopted and the soil is treated to a more systematic manuring.

The second subject to which I must draw your attention is the size and the constitution of our holdings. On more than one occasion I have pointed out the enormous waste involved in the scattered character of the lands comprised in a holding and also the uneconomic character of a considerable number of our holdings by reason of their minute size. Improvements in agriculture are to a considerable extent hampered by these conditions and attempts ought to be made forthwith to reconstitute our holdings in a manner calculated to secure as far as possible compact areas. This subject is one which bristles with difficulties and may possibly involve changes in the laws of inheritance and succession.

I must next ask you to consider whether a rapid extension of irrigation works and the development of well irrigation are not urgently called for. To me it has always appeared that the most effective guarantees of famine are in the direction of extending and utilising the resources for the supply of water. Well irrigation seems to have possibilities which are still unexplored and a vigorous effort ought to be made by the State to encourage the construction of wells and the use of oil engines for the purpose of irrigation.

This leads me on to the question of agricultural finance. In well-informed circles there is a growing feeling that the co-operative societies alone will not succeed in tackling the problem of rural indebtedness. There is a tendency to under-estimate the extent to which the ryots are indebted. But careful inquiries and detailed studies into the economics of a few villages lead to an irresistible conclusion that in spite of apparent prosperity there is a depth of indebtedness which most of us are unable to gauge accurately and there is rather an intimate connection between prosperity and debt. Co-operative credit seems to be especially failing where it is most needed as in the case of long-term loans for the redemption of old debts. It would be as well for us to see if we cannot introduce here the system of agricultural banks which have been tried with such remarkable success in Egypt and elsewhere.

It is a matter for congratulation that the Agricultural Department has been since its inception devoting its attention to the question of the selection and the improvement of seed in the case of paddy and sugarcane especially. The efforts of the Department have already resulted in an appreciable increase in production and the investigations with regard to other crops will, I have no doubt, lead to similar results.

If the measures outlined above are taken on hand forthwith the increase in agricultural production may easily reach 50 per cent and with the present proposals for declaring the assessment on ryotwari holdings permanent, the incentive to production will be larger and, with developed facilities for marketing, the ryot would be better enabled to bear the burdens imposed on him by the State and the society.

Before I conclude, there is one other thing to which I must refer, namely, the spread of Agricultural education. I do not mean by this term the task of training a limited number of

students who could be absorbed in the service of the department but what I really mean is the much larger and wider function of linking the life of the ryot intimately to the work of the department. Demonstration forms have only served in a very restricted manner to spread the object of the department but what is needed is something much larger than this. I have in my mind particularly the great work that has been done in Canada and United States in this direction by means of extension lectures and demonstrations and the lessons of America have considerable significance to us. The extent to which the department can really permeate the life of the ryots in their every day labour is really the acid test of the department's worth. In this great task of rural education it behoves us all to contribute our little shares and if this is done, I have no doubt, we can confidently look forward to that era of plenty and prosperity which the new constitution may be said to have inaugurated.

(As the paper arrived too late for the last session of the conference it was taken as read and hence there was no discussion).

President's concluding remarks :—

The President in bringing the Conference to a close said :—
Ladies and Gentlemen,

Before bringing the deliberations of the Conference to a close, I should like to thank you very much for the warm welcome you have accorded me and I trust that every time I come to Coimbatore, I will pay you a visit. I should thank Mrs. Norris and the other gentlemen who read the papers yesterday and to-day to which we have listened with very great interest, and I trust, with some profit.

I just want to give one word of advice, especially to the visitors of the conference. I would advise you to get at the Administration Report of the Agricultural Department, and if you

read that Report carefully, I think you would find that the criticism about the waste of money on this Department is absolutely unfounded. You will also find that the object of the Department is not to enable rich land-holders to extract increased rent from their tenants.

I should like to thank the many visitors who have come from long distances, and on behalf of the members of the Agricultural Students' Union, I convey to them thanks for their coming so far to the Conference.

In conclusion let me announce a piece of good news, that is, of a donation of Rupees One thousand, from Mr. Vengail Krishnan Nayanar towards the establishment of a prize for the best student in practical agriculture.

(Loud applause.)

APPENDIX I.

List of winners and records.

		This year's record.
100 yards race.	1. J. Balraj 2. K. S. Ramanna Rai 3. M. J. Sadasiva Reddi	11 seconds.
Long jump.	1. S. N. Venkataraman 2. K. S. Ramanna Rai 3. M. Narasimham	18' - 2½"
Puttting the shot.	1. F. B. Anderson 2. K. S. Ramanna Rai	29' - 6½"
High jump.	1. C. S. Doraiswamy 2. K. K. Hegde 3. M. Narasimham	4' - 8½"
Quarter mile race.	1. J. Balraj 2. M. J. Sadasiva Reddi 3. K. K. Hegde	61 seconds.

Throwing the cricket ball.	1. T. G. Anantaraman 2. M. R. Balakrishnan	84½ yards.
Half mile race.	1. C. S. Doraiswamy 2. R. Balasubrahmanyam 3. K. M. Venkatachalam	2 min. & 26½ sec.
do. open.	1. M. S. Ayyana, Forest College 2. Srinivasalu, London Mission School	2 " 18½ "
Hurdle race.	1. M. J. Sadasiva Reddy 2. K. S. Ramanna Rai	20 seconds.
Old Boys' race.	1. U. Vittal Rao 2. S. Dharmalingam 3. K. Achuta Nambiar	
One mile race.	1. C. S. Doraiswamy 2. S. M. Kalyanaraman 3. K. M. Venkatachalam	5 min. & 35 sec.
Obstacle race.	1. P. Zachariah 2. M. J. Sadasiva Reddy 3. A. K. Annaswamy	
Intertutorial relay race adjudged on 21-12-1921.	Rao Sahib M. R. Ramaswami Sivan's wards.	
Cross country race.	1. C. S. Doraiswamy 2. P. Zachariah 3. K. M. Venkatachalam	38 min & 40½ sec.
Intertutorial Tug-of-war.	Rao Sahib M. R. Ramaswami Sivan's wards.	
Champion of the year	C. S. Doraiswamy.	

U. VITTAL RAO,
Sports Secretary.

APPENDIX II.

Championship records.

The record of 40 marks got by C. S. Doraiswamy for Championship this year is fairly good. It is creditable to note that he secured

first rank in four events; going through the Championship records, he can be classed as the fourth in the order of champions so far. The following are the championship records since 1911:—

Year.	Marks obtained.	Name of Champion.
1911	39	K. M. Gururaja Rao.
1912	39	R. G. Mal.
1913	39	do.
1914	33	Venkatachala Mudaliar.
1915	32	do.
1916	53	K. S. Ramanna Rai.
1917	39	S. Dharmalingam.
1918	51	A. V. Babi.
1919	59	B. Dasappa Malli.
1920		do.
1921	40	C. S. Doraiswamy Ayyangar.

U. VITTAL RAO,
Sports Secretary.

APPENDIX III.

Athletic records.

The college records for events have also considerably improved and some of them we can certainly be proud of. The following table will be of interest for future competitors.

Events.	Record.	Year.	Name.
100 yards race.	11 seconds.	1921	J. Balraj.
Long jump.	18'—2½"	1921	S. N. Venkataraman.
Putting the shot.	29'—6½"	1921	T. B. Anderson.
High jump.	5'—0"	1913—14	U. Vittal Rao.
½ mile race.	61 seconds.	1919	B. Dasappa Malli.
"	"	1921	J. Balraj.
Throwing the cricket ball.	97 yards.	1918	A. V. Babi.

Half mile race.	2 min and 26½ sec.	1921	C. S. Doraiswamy.
Hurdle race.	18½ seconds.	1919	T. Seshachari.
One mile race.	5 min. & 4"	1918	K. S. Krishnamurti.
Cross country race.	38 minutes.	1919	K. S. Bhandary.

U. VITTAL RAO,
Sports Secretary.

APPENDIX IV.

The list of newly elected Office-bearers.

PRESIDENT:

Principal *ex-officio*.

VICE-PRESIDENTS:—

Resident: Mr. C. Tadulingam.

Mofussil: Rao Bahadur J. Chelvaranga Raju Garu.
Mr. D. Ananda Rao.
Mr. D. Balakrishnamurti.

WORKING COMMITTEE.

Vice-President: Mr. C. Tadulingam.

General Secretary: Mr. B. Viswanath.

Treasurer: Mr. M. Anandan.

Editor: Rao Saheb Y. Ramachandra Rao.

Sub-Editor: Mr. V. Muthuswami Iyer.

Manager: U. Vittal Rao.

Members: Rao Saheb M. R. Ramaswami Sivan.
Mr. T. V. Rajagopalachari.

Auditors: Mr. V. Ramanathan.

Mr. K. Krishnamurthi Rao.

APPENDIX V

Diplomates in Agriculture, December, 1921.

- | | |
|------------------------------|-----------------------------|
| 1. Govindan Nambiar, E. K. | 10. Sitaram Sastri, G. |
| 2. Krishnamurti Ayyar, K. S. | 11. Srinivasachari, K. |
| 3. Krishnan Nayak, S. | 12. Srinivasa Rao, N. |
| 4. Krishna Rao, P. | 13. Subbiah Mudaliar, V. T. |
| 5. Kunduchi Nambiar, V. K. | 14. Vasudevarao Nayudu, R. |
| 6. Rama Rao, K. | 15. Venkatarama Ayyar, S. |
| 7. Ramaswami Ayyar, A. | 16. Vijayaraghavachari, C. |
| 8. Sankaram Rao, G. | 17. Viswanatha Ayyar, |
| 9. Seshagiri Ayyar, C. S. | |

^aD'Silva Prize (equal).

^bKecas Prize.

^cRobertson Prize.

APPENDIX VI.

List of Departmental Visitors.

Gazetted Officers.

H. C. Sampson, Esq., B. Sc., C. I. E., Director of Agriculture.

Mr. D. G. Munro.

" D. Balakrishnamurti.

" P. H. Rama Reddi.

" M. Govinda Kidavu.

" C. Narayana Ayyar.

" N. S. Kolandaswami Pillai.

" K. Gopalakrishna Raju.

" S. Subrahmanya Ayyar.

" A. V. Thirumuruganatham Pillai.

" R. C. Broadfoot.

" Littlewood.

Subordinate Officers.

- | | |
|----------------------------|-------------------------------|
| Mr. T. R. Venkasami Rao. | Mr. P. Abhishekanatham Pillai |
| " C S. Madayya. | " E. Kunhappa Nambiar. |
| " K. Narayana Ayyangar. | " K. Govindan Nambiar. |
| " M. A. Balakrishnan. | " S. Subbayar. |
| " V. Muthayya Nattan. | " A. Venkatarangam. |
| " K. Raghavachari. | " U. S. Ayyaswami Ayyar. |
| " Aaron Yesudasan. | " S. Sithapathi Rao. |
| " S. R. Srinivasa Iyengar. | " P. S. Venkuswami Ayyar. |
| " S. Sitarama Patrudu. | " G. R. Venkatachalapathy. |
| " G. Jogi Raju. | " P. V. Hanumantha Rao. |
| " K. Balaji Rao. | " S. K. Hanumantha Rao. |
| " K. G. S. Bhandari. | " M. V. Kondala Rao. |

Mr. K. M. Thomas.

From Pudukotta :—

Mr. K. R. Sankar.

Mr. G. Doraiswami Ayyangar.

From Mysore :—Mr. Venkata Rao Badami.

WANTED.

A cotton Cultivation Expert, knowing Tamil language for Gadammanayakour Zemindary, Periyakulam Taluk, Madura (S. I) Applicant should be connected with cotton cultivation and its improvement, one who has successfully cultivated. He should be energetic and of active habits and able to ride about. Free quarters and better pay and prospects than in Government service to the selected candidate on a three years' agreement. Apply giving fullest particulars, age qualifications, previous experience, references terms and conditions to Pestonji D. Patel, Ismail Buildings Hornby Road, Bombay.

WANTED.

"Wanted teachers who could impart instruction in the Elements of practical agriculture to the pupils of Elementary schools and lower forms of Secondary Schools."

Apply to the President, District Educational Council, Tinnevely, stating salary required, qualifications etc. etc.

M. Sivagnanam,

President.

WANTED.

Applications from educated and qualified men for the post of Assistant Farm Overseer in this depot on Rs. 50-3-75.

2. Applicants should have a knowledge of cultivation of fodder crops such as Oats, Lucerne, Jowari, Cowpea and various kinds of grass and with a certain amount of knowledge of Arboriculture and Vegetable gardening, also the management of bullocks.

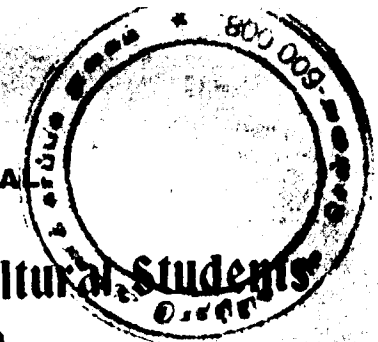
Applications should contain the following particulars.

1. Name 2. Age 3. University certificate held
4. Certificate obtained from an Agricultural College.
5. Previous experience on an Agricultural Farm, if any.

J. C. HOTHAM, Major,

Supdt. Hosur Remount Depot.

THE JOURNAL
OF
The Madras Agricultural Students
Union.



Vol. X.

January 1922.

No. I.

Editorial Notes.

To the members of our Union and to the readers of this Journal, we beg to offer our heartiest greetings for the New Year and wish them all success and happiness.

Yet another year has passed by ; and an event-
The New Year.
ful year for India in various ways. The year, 1921, saw the inauguration of the Reform, found the beginnings of real representative government, and witnessed the visit of H. R. H. the Prince of Wales ; but it was also marked by great political unrest, and by the occurrence of the Malabar trouble and of various strikes and riots. Unalloyed happiness and undisturbed peace would appear to be denied to man in this work-a-day world. Perhaps they are, in reality, like a surfeit of sweets, too good and wholesome to be relished by him, unless they are set against a background of trouble and misery. Unmixed happiness is clogging to our tastes, while with the admixture of a spice of unhappiness we appreciate

it all the more. Let us hope and pray to the Almighty that the New Year 1922 may bring us real happiness and peace, after all the trouble and misery of the year now past.

In our microcosm too, we have had a varied experience of trouble and happiness, of disappointments and realisations, but, on the whole, the year 1921 has ushered in progress in many directions. We find tangible signs of the New College Building rising rapidly above the ground, wherein future students will receive their training. We similarly note substantial steps have been taken to bring the college under the ægis of the Madras University. The past year has seen a growth of staff and especially the elevation of as many as six of our members to Imperial rank, but it has, unfortunately, also ushered in a policy of retrenchment and a ruthless cutting down of expenditure, which, we fear, will cause a set-back in the orderly progress of the department and will call a halt to the steady expansion of its useful activities. Let us, however, hope that the New Year will see the dawn of better days for our Department and that, in course of time the threatening clouds will melt away and allow us to march on in the path of progress.

However, progress cannot be the product of a mere passivity. If we sit with folded hands expecting that the New Year will, under the benign influence of our stars, bring us luck, we may continue to sit for ever. On the other hand, we ought to work, and to work strenuously, each in his own line, with the steadfast purpose of doing

what little one can do, in spite of all impediments, to help the onward march of the department; and we believe, when our members take stock of what they have been able to accomplish at the end of the year, they will find the year 1922 to have turned out a very good year indeed.

As far as our Journal is concerned, the year gone by was an unfortunate one, since it saw its disappearance for a period of nearly 6 months, but we trust the new year will be more merciful and will see the Journal kicking and very much alive all through the year.

On behalf of the Madras Agricultural Students' Union, we beg to extend a loyal and respectful welcome to His Royal Highness, the Prince of Wales, on his first visit to our Presidency town. The reception accorded to the Prince, whether at the Harbour, or along the routes of the Procession, whether in the Legislative Council, at the Senate House, or at the Races at Guindy, was, according to all authentic accounts, quite enthusiastic and cordial. We learn that his popularity was, to a great extent, attributable to his lovable character and unconventional ways. His replies to the various addresses were clear and well-delivered and breathed candour and sympathy. His sporting abilities especially, as exhibited in Polo in which he took part, appealed strongly to the people. "May God vouchsafe to him long life!" is the fervent prayer that follows his further progress on Indian soil.

The Madras Agricultural Students' Union rejoices to find that two of its patrons—Lieutenant The Rajah

His Royal
Highness the
Prince of
Wales.

Sahib of Parlakimidi and Mr. T. A. Ramalingam Chetti-
 yar—have been the recipients of New year
 honours. The Rajah Sahib has had the title
 of “Rajah” conferred permanently on him,
 while Mr. Ramalingam Chettiyar who is a member of the
 Legislative Council and was the Chairman of the Coim-
 batore Municipality for several years, is the recipient of
 the title of “Rai Bahadur.” We beg to offer our hearty
 congratulations to them on the recognition they have
 thus received from the Government.

Mr. Ananda Rao, who was for several years our Resi-
 dent Vice-President and was promoted to the Indian Agri-
 cultural Service last year, left for St. Thomas Mount on
 the 19th instant, to take up the duties of the
 Deputy Director of Agriculture, IV Circle.
 Their friends and well-wishers—European and
 Indian—entertained Mr. and Mrs. Ananda Rao on the eve
 of their departure and the farewell functions were fully
 representative of the colony. We hope Mr. Ananda Rao's
 transparent sincerity and Mrs. Ananda Rao's sociability
 will endear them to all people, wherever they may be.

We are pained to hear that the Agricultural Com-
 mittee appointed by Lord Sinha's Government have re-
 commended the abolition of the Sabour Agricultural
 College. The apparent reason seems to be
 the poor response of the Beharee and his in-
 difference to agricultural education. It is an
 irony of fate that the sons of the land of Mithila should
 have become so degenerate as to despise the plough-
 share—which is reputed to have turned up from Mother

Earth, Sita, the Chaste, whom millions of Hindus adore
 even to-day. We hope it is not yet too late to save the
 institution from extinction. Will the Government and
 the people of Behar take counsel together and find a way
 out of the difficulty by a change in the method of ad-
 mission and a betterment of the prospects of successful
 students.

We are glad to learn that the Madras Government
 have appointed an Agricultural Committee composed
 of certain members of the Local Legislative
 Council. Though its functions are purely
 advisory, yet we hope the Committee would
 prove a source of strength to the department and the
 ryot population, untrammelled, as it is, by the red-tapeism
 and the delay usually associated with a department of
 Government.

As we go to press, we are informed that two of our
 members, Messrs. S. R. Venkatakrisna
 Mudaliar and K. Ramiah, have been pro-
 moted to the Provincial Grade and we extend our hearty
 congratulations to them.

We are glad to announce that the following two
 gentlemen joined our Union as Patrons in December
 1921 viz., Rao Sahib Ratnasabapathi Mudaliar, B.A., B.L.,
 Present Chairman of the Coimbatore Municipality and
 Mr. C. V. Venkataramana Iyengar, B. A., B. L., M. L. C.
 We offer them our heartfelt thanks.

Agriculture in the time of the Mauryas.

P. R. SUBBAMANYAM.

The recent discovery of the Arthasastra of Kautilya throws a flood of light on the realities of administration in Ancient India, as concerns administration, law, trade, war and peace, especially during the spacious times of the Mauryas—a period unique in many ways in Indian History. That it is a work coming to us from those remote times has been established beyond doubt, confirming as it does, even in points of minute detail, the account of that period left to us by Megasthenes.

In these papers we propose, with the aid of the Arthasastra and also of the available historical material, to give an account of Agriculture, Irrigation and Cattle breeding,—subjects which touch us agriculturists more nearly. In India from very early times 'Agriculture, Cattle breeding and Trade' have been considered as the most important branches of the Science of 'Vartha' and it was enjoined on the King, to encourage it, as it was by means of the treasury and army obtained through 'Vartha' that kings would be able to keep both their party and that of their enemies under their control.

The first faint beginnings of an Imperial Department of Agriculture may be traced to this period of Indian History, about which we are writing. A special officer with ministerial qualifications and also with expert knowledge in the sciences of agriculture, arboriculture and meteorology, was appointed to superintend the occupations connected with land, with a subordinate staff of agricultural experts. The duties of the agricultural officer were many and varied. He was responsible for the cultivation of crown lands. He with his assistants formed an agricultural directorate concentrating their attention on the distribution of good seeds in

*Kautilya's Arthasastra translated by Mr. R. Sham Sastry, B. A., Mysore Government Oriental Library series No. 37-Part ii.

time, and also in propagating improved agricultural methods. To some extent, he also directed the agricultural operations of the state, according to the conditions of rainfall and climate. In addition to this, tree-planting and growing of medicinal plants, were under his supervision.

To facilitate the agricultural administration of the state, the whole empire was divided into various portions, according to the amount of actual annual rainfall. These portions were further grouped together into regions fit for agriculture and those unfit for agriculture. It is also probable that conditions of soil were taken into consideration in such a division. The total amount of annual rainfall of some of the portions of the Empire is recorded to be as follows.

Jangala (desert countries)	6 dronas.
Moist countries	24 "
Maharashtra	13½ "
Avanthi	23 "

Konkan, the borders of the Himalayas and portions of the Magadha Empire, are included within the zone of heavy rainfall. Jangala and moist countries were excluded as portions unfit for agriculture. It may be of interest to note that the amount of actual rainfall was measured by means of rain-gauges, which were erected in front of government warehouses.

Certain important hints are given to guide the departmental officers in their forecasts. When one third of the requisite quantity of rain falls during the commencement and the close of the rainy season and two-thirds in the middle, then the rainfall is considered to be very evenly distributed for agricultural operations. In such forecasts, meteorology played a not unimportant part. The Protean forms of clouds, and the mystic meaning they convey as to their rain contents were closely studied and this knowledge was utilised either in confirming or contradicting the average ryot's pessimistic prognostics. For instance, it is said that there are three clouds that rain continuously for three days and 80 clouds are said to exist that pour minute drops and 60 are they, it is noted, 'that appear with the sunshine.'

In addition to this, the position, motion and pregnancy of certain celestial bodies, chiefly Jupiter, the rise and set and motion of Venus, were also taken into consideration in determining such forecasts. The position of the Sun, and that of Jupiter were taken into consideration in forecasting the good sprouting of seeds and also in the formation of grains respectively. We are not now in a position to say how far these forecasts were helpful. It may be added that the reaping of a good harvest was considered certain, 'where rain free from wind and unmingled with sunshine falls so as to render three turns of ploughing possible.'

Knowledge and practice of Agriculture. Cultivable lands are classified under the following heads. (1) Lands beaten by foam, such as banks of rivers, were considered fit for growing pumpkins, (2) lands over-flown by water were selected as suitable for growing long pepper, grapes and sugarcane, (3) lands in the vicinity of wells, for vegetables and roots and (4) low grounds such as moist beds of lakes were considered suitable for green crops. Marginal furrows between any two rows of crops are said to be suitable for the plantation of fragrant plants, medicinal herbs, cuscus root and lac etc. Megasthenes briefly notices the crops and treats about them in a more general way. He writes "that, in addition to cereals, much millet is grown throughout India, which is kept well watered by the profusion of rivers and streams and much pulse of different sorts, rice and also what is called Oorporum as well as many other plants useful for food." In Arthashastra, we find a more detailed and interesting treatment; crops are divided according to seasons and also classified according to their commercial value. Kautilya divides crops as summer, winter and wet crops. Rice crops are given the first place, vegetables occupy an intermediate position and sugarcane, which is according to Zenaide A. Ragosine, a crop indigenous to India, was considered the worst as it is subject to various evils and is expensive.

Sali (a kind of rice), Vihhi (rice), Kodrava, Tila, Priyangu (panic seeds) and varuka are sown at the commencement of the rainy season. Mulga, masha and saibya are sown in the

middle of the rainy season, Kusumbha (safflower), masura (*Ervum kirsutam*) kulutua, yava, Godhuma, kalaya, Atasi (linseed) and Sarshapa are sown during the last portion of the rainy season. Cotton, the cultivation of which in India is noticed by Herodotus, was cultivated during this period in many places throughout India and the cotton fabrics of Madhura south, of Kalinga and of Kasi were considered to be the best. It may be of interest to note that betel vine (Nagalatha) was included under forest products.

(To be continued.)

Mildew on Grapes.

C. RANGASWAMY AYYANGAR, SUB-ASSISTANT TO THE GOVT.
MYCOLOGIST.

The disease known as Mildew appears on many useful plants such as ladiesfingers, cluster-beans, betel leaves and makes them unfit for use.

This disease affects grapevine very badly and in some places it not only appears on grapevine leaves, but also extends to shoots and fruits, spoiling the latter and making them unsaleable.

The following description will make the fruit-growers identify this disease on their vines, and take necessary precautions to check it.

Nature of infection and description of the fungus. At first the lower portions of young and old leaves are covered over with white powdery patches. These white patches gradually spread and appear on both surfaces of leaves and finally cause them to shrink, dry and fall down.

These powdery white patches are also found on the shoots and the stem. The affected shoots and stems become stunted in growth and dry up.

When the fruit appears, this fungus covers the green bunches and turns them from green to white colour. In advanced stages the fruits shrink, crack and fall down.

The white colour is nothing but a white thread-like structure of the fungus (known as mycelium) which aids to absorb nourishment from the parts affected. This white thread-like structure absorbs nourishment from the plants which it infects, gradually producing chains of spores (which are compared to flowering seeds). These spores when they happen to fall on healthy portions of the vine, begin to grow there and again form the white thread-like structure (mycelium).

Treatment for checking the disease. Spraying with Bordeaux mixture is found quite successful and the same is prepared as follows:—

Equal quantities of copper sulphate and quicklime are taken and dissolved separately in a definite quantity of water and then they are mixed together in a separate wooden or earthen vessel.

Similarly required quantities of washing soda and resin are taken and the former is first boiled in a tin containing a small quantity of water. When the soda is well boiled the powdered resin is added and the mixture is allowed to boil till the whole liquid changes to a red colour like that of coffee decoction. (When boiling, care should be taken to add a small quantity of water when the mixture begins to overflow). Then the boiled liquid is cooled for a while and is added to the previous copper-sulphate and lime mixture. (If the season is summer, resin and soda need not be boiled and added to copper-sulphate and lime-mixture, as it is used only during the rainy season as adhesive).

Number of Spraying.	Cu So. 4.	Water in gallons.	Quick Lime.	Water in gallons.	Resin.	Soda.	Water in gallons.	Quantity of mixture.	For 50 Vines.
	lbs.	gals.	lbs.	gals.				gals.	
1st Spraying.	10	24	10	24	4	2	2	50	
2nd Spraying	5	"	5	"	2	1	"	"	
3rd Spraying.	"	"	"	"	1	½	"	"	
4th Spraying.	2½	"	2½	"	Nil.	Nil	Nil	"	

Table showing the quantity of chemicals required for each spraying.

The diseased gardens should be sprayed at least four times in a season. First spraying should be given as soon as pruning of the vine is over, secondly when the fruits are the size of pepper, thirdly when the fruits are about to ripen and lastly when the fruits are ripe.

Precautions to be observed by grape vine cultivators.

1. Generally grapevines are grown by cuttings and as such, cuttings should not be brought or taken from a diseased garden.

2. When a diseased garden is pruned all the waste material must be burnt.

3. Plants which are capable of harbouring this disease ought not to be grown near vinegardens.

4. The soil in which vines are grown should be kept clean without any weeds.

5. Pruning of the vines should be done in such a way as to allow proper sunlight inside the gardens.

6. There must not be too much of watering to the crop. It is advisable at first to water vines twice a week (when it is not in fruits) and when there is a crop, every alternate day.

7. The grower should always be on the lookout for the appearance of the disease and when he perceives any infected leaves, shoots or branches, he should collect and burn them.

8. The grower must try to check the disease in the earlier stages without allowing it to take a new turn.

9. No man, animal or any conveyance should enter a healthy garden from a diseased one and no implements should be got from an infected garden.

Oleander—a poisonous plant.

R. SWAMI RAO, L. AG.

Oleander—a poisonous plant, a danger at home. Bot. name—*Nerium oleander*; Telugu name—Ganneru; Tamil name—Arahi.

There are many poisonous plants in this world. Most of these are generally unknown to the common-folk, excepting perhaps to herbalists and physicians. Oleander is a shrub familiar to one and all, but by the way it is harboured everywhere as an ornamental plant in parks, in gardens and in the use-fronts or back yards of the houses, it is absolutely certain that many are entirely in the dark in regard to the poisonous nature of this plant, or if they know at all, they consider it innocuous. There are two kinds of this plant, one bearing white and the other pink flowers. The following extract shows the magnitude of the dangers of Oleander poisoning:

1. Five soliders were poisoned by stirring a pot of barley soup with an oleander branch. Vomiting occurred. In one case there was dizziness and abdominal pain; in another dullening of the senses and insensibility to external pressure.

2. Three hundred French soldiers in the army corps of Marshal Suchet in Catalonia became sick after eating roasted meat that had been skewered with oleander sticks. A number of them died.

3. A French soldier near Madrid used an oleander branch, freed of its bark, as a skewer. Of twelve who ate the meat, seven died.

4. Three Italian women drank alcoholic tincture of oleander, thinking it was brandy. There was pain in the abdomen, vomiting, unconsciousness and bloody stools. But all recovered.

The above references to the dangers of oleander poisoning to human beings and the antidote for this are matters concerning physicians.

This plant is considered to be very poisonous equally to animals. But here it is observed that cases of oleander poisoning of live stock are very rare, as they have generally got a natural aversion to this plant, except perhaps when driven to necessity out of starvation. But still it is taken that the following experiment conducted in Arizona University, America, will not be out of place in informing all ryots of the oleander poisoning of live stock. After receiving several reports of the losses of livestock of oleander poisoning, a series of experiments were conducted by the above University, to find out the exact symptoms of oleander poisoning and also to determine the quantity of leaves necessary to cause death.

Two horses, a cow, a mule and several sheep were experimented upon. Investigations were made with green and dry leaves, flower stems, portions of the branches and bark and roots and the following conclusions were drawn.

1. Oleanders are poisonous to human beings, rodents and farm animals. The animals get poisoned accidentally.

2. Dry and green leaves are poisonous. The amount of oleander necessary to cause death ranges from 15 to 20 gms., of green leaves or 15 to 30 gms., of dry leaves. Cows require only 10 to 20 gms. of green leaves or 15 to 25 gms. of dry leaves. For sheep 1 to 5 gms. of leaves form a fatal dose. There is little danger in the bark, roots and flowers, since livestock would hardly obtain sufficient poison in that way.

Increased temperature and pulse, coldness of the extremities, warm body temperature, dilatation of the pupils of the eyes, and discoloration of the mouth and nostrils followed by sore mouth are the general symptoms of poisoning. The body becomes wet with sweat. The animal refuses to eat or drink during the 24 hours preceding death and due to the soreness of the throat and mouth, the bowels act often and the faeces are usually greenish in colour. The action of the kidneys is increased slightly and the colour of urine is normal.

That oleander is highly poisonous must be clear from the above. May I appeal to the residents of this colony then to banish this "Villain with a smiling cheek" from our midst, as nothing is so common as to grow this as a favourite ornamental plant. We ought to go in for harmless ornamental plants. Children playing under these trees in front of our houses, in their puerile antic plays, might pick up a few leaves, start their imaginary kitchens, cook them and eat them. There is therefore absolutely no justification in growing this shrub in parks, in public highways or roadsides. If people still say that they have not come across even a single instance of its poisoning, I put forward the analogy that the persistent failure to detect pilfering is no justification for committing the crime. Anyhow there is the well known adage in which one can take solace that "Prevention is better than cure."

Lessons in Nature Study.

Water plants.

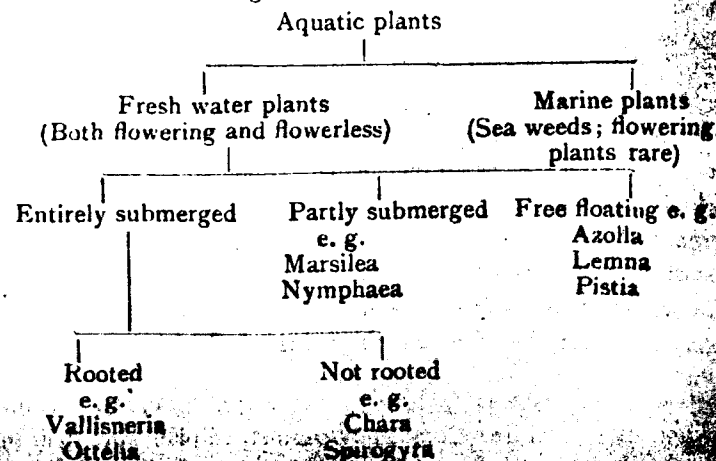
P. S. JIVANNA RAO.

Plants inhabiting water form an interesting subject for the study of nature. Various adaptations have arisen in them to fit them for an aquatic environment and a study of these in the different types would serve to impress on the young pupil the meaning of such adaptations as characteristic of aquatic plants in general. What are the plants that live in water? How do they manage to live in the special medium in which they are placed? What is the nature of the adaptations both internal and external and what are their possible functions? These are some of the questions which the pupil can be stimulated to ask and an answer to these involves careful observations and experiment which he may with profit be encouraged to make.

The special features that are characteristic of aquatic plants are of a most varied nature. Completely submerged plants get their light,

air and food from water. Those that are rooted in mud get their additional food supply from the soil and the floating ones receive light and air directly from the atmosphere like land plants. The reduction or complete absence of the root system, the presence of large air spaces in the inner tissues, the poor development of conductive and mechanical tissues and the special contrivances for pollination are some of the interesting features that characterise water plants in general and a knowledge of these in the particular types taken up for study will afford a most pleasant theme for the student of nature.

The following table gives a rough scheme of classification of water plants according to their habit with reference to their substratum and it will be necessary to use as many examples as possible. The plants must be exhibited in large museum jars or tubs and a morning excursion to the nearest pond or tank must be promised to the pupils and arranged immediately. The plants should be pulled out entire with their root stocks wherever they are fixed in mud. Variations in shape and size of leaves must be noted in all cases. Specimens of a striking nature may be preserved either in dilute formalin or spirit and also in a dry condition mounted on paper of a convenient size and quality and the collecting instinct of pupils must be fostered by forming a herbarium collection of all aquatic plants that are to be found in the neighbourhood.



No.	Name.	Natural Order.	Common Name.	Tamil.	Vernacular Name.	Telugu.
1.	<i>Nymphaea stellata</i>	Nymphaeaceae	Water Lily	Ali	Nallakalaya	
2.	<i>Nymphaea pubescens</i>	do	do	do	do.	do.
3.	<i>Nelumbium speciosum</i>	do	Lotus	Tamarai	Tamara	
4.	<i>Aeschynomene aspera</i>	Leguminosae		Takkai	Niratalavatum	
5.	<i>Nepenthes oleracea</i>	do		Sundokiri	Karambapunda	
6.	<i>Jussiaea repens</i>	Onagraceae	Horn-nut	Singara ali	Antaratamara	
7.	<i>Tropea bispinosa</i>	do				
8.	<i>Limnanthemum cristatum</i>	Gentianaceae		Sarkaravalli	Tarikura	
9.	<i>Limnanthemum indicum</i>	do				
10.	<i>Ipomoea aquatica</i>	Convolvulaceae	Bladderwort			
11.	<i>Utricularia stellaris</i>	Lentibulariaceae	Hornwort			
12.	<i>Ceratophyllum demersum</i>	Ceratophyllaceae	American water weed			
13.	<i>Elodea canadensis</i>	Hydrocharitaceae				
14.	<i>Hydrilla verticillata</i>	do				
15.	<i>Vallisneria spiralis</i>	do				
16.	<i>Ottelia alismoides</i>	do		Nirkulirichedi		
17.	<i>Richardia spectiosa</i>	do	Water Hyacinth	Pisaratamara		
18.	<i>Monochoria hastata</i>	Pontederiaceae		Vertililaral Kipundu		
19.	<i>Monochoria vaginalis</i>	do		do.		
20.	<i>Pistia stratiotes</i>	do	Water cabbage	Akasatamara	Akasatamara	
21.	<i>Lemna</i>	Araceae	Duckweed			
22.	<i>Limnophyton obtusifolium</i>	Alismaceae				
23.	<i>Limnophyton indicum</i>	do				
24.	<i>Aponogeton monstrelchium</i>	Najasaceae		Kottikazhangukodi	Kottigaddanama	
25.	<i>Potamogeton indicus</i>	do				
26.	<i>Cyperus corymbosus</i>	Cyperaceae				
27.	<i>Panicum interruptum</i>	Gramineae				
28.	<i>Echinochiza aristata</i>	do		Amikrai	Madugentanara,	
29.	<i>Marsilea quadrifida</i>	Marsiliaceae		do	Ch. Sankakura	
30.	<i>Marsilea minima</i>	do				
31.	<i>Azolla</i>	Salvinaceae				
32.	<i>Chara</i>	Characeae	Stonewort			
33.	<i>Spirogyra</i>					

As the selection of types for study depends entirely on the material available, it is of the utmost importance that one should know the complete aquatic flora of the locality or district. A list of the more common water plants that are found in this Presidency is given on the opposite page and it is hoped that the subject will receive greater attention from all and further light will be thrown on the occurrence and distribution of this highly interesting group of plants.

The list is by no means complete and several other plants may be included when a thorough survey of the aquatic flora of the Presidency is made. The microscopic forms are many and deserve separate treatment.

It may be observed that whereas some of the species like the Water Hyacinth predominate in ponds to the utter exclusion of others, a large number of them may also occur together in a single pond, as many as 17 species having been collected by the writer from a pond near the Government Farm at Manganallur in Tanjore District. A study of the competition existing between the different species and the success or failure of some of them will constitute a profitable line of investigation by the advanced set of pupils.

An endeavour will be made in the next few articles to bring out the salient features of some of these plants in so far as they will interest the young student.

Reviews.

The following publications of the Imperial Department of Agriculture in India are acknowledged with thanks.

Memoirs Vol. VI. Nos. 4 and 5, Chemical Series.

In these Memoirs, Messrs: Plymen and Padmanabhayyar of Nagpur have investigated the Chemical and Physical properties of butter fats prepared by them from milk of known purity, derived from single animals as well as from herds of cows and buffaloes. The authors point out that from the usual chemical and physical

determinations, it is not possible to differentiate between cow—butter and she-buffalo butter. It has also been pointed out that single analytical constants widely differ from those of a herd. In the opinion of the authors much of the genuine butter fat produced by Indian milch cattle, if judged by the standards usually accepted in other countries, would be pronounced as adulterated. In the case of herds, the deviation from the usual standards is greatest during hot, dry weather. The authors have further shown that the analytical figures published for butter are also applicable to ghee and vice versa.

Vol. VI No. 2. Chemical series:—

The subject matter of this Memoir is an investigation on the effect of environment factors on the alkaloidal content and yield of latex from the Opium Poppy (*Papaver somniferum*) and on the functions of alkaloids in plant life, by Dr. H. E. Annet. The results show that, while changes in weather conditions have an influence on the yield of opium, the morphine content of opium is not influenced either by climate or weather changes. The author concludes that morphine is a useless end product of metabolism and the plant, having no means of excreting, stores it in such places where no harm can be done to its own metabolism, for instance the capsule.

B V. N.

News and Notes.

Rural Enquiry. A correct knowledge of the material condition of the population of a country is indispensable for its governance. Such knowledge can never be overfull or unwelcome in the case of India. Attempts have been frequently made in the past to collect reliable details on this question, but the stupendousness of the task has bewildered many an earnest student. Government has, from time to time, tried to gather accurate

information but has not been quite successful. Our readers have not, we presume, forgotten the bitter controversies that were raging on the conclusions arrived at by the late Mr. S. Srinivasa Raghava Ayyangar in his "Forty years' Progress in the Madras Presidency." The agency at the disposal of the Government then was either not fitted, or was looked upon with suspicion by the party concerned, namely, the ryot. Economic problems have become more familiar to the public and they are more eager now. The time is opportune for their investigation, which the agricultural department is quite competent to undertake. We may instance Mr. C. Benson's Statistical Account of the Kurnool district, the outlines of which were broadbased and the statements in which have not been seriously challenged by any sensible person. The agricultural staff are visiting the nooks and corners of a district. Agricultural improvements have been brought to the very doors of the ryots, who know the departmental officers intimately. It would therefore behove the present Director who has shown a readiness to appreciate the importance of the study of the economic and social condition of the ryot, to make this a chief item in the programme of the department's activities and bring the work to a successful issue. We hope the late Mr. Black's line of enquiry taking the district as a 'unit' will suit Madras conditions better than Dr. Mann's Method of working from part to whole in fixing upon the village as the 'unit.'

Seed selection and cotton improvement. The chief criticisms which are, according to the Journal of Agriculture, United States of America, June 1921, directed against South African cotton and which have a bearing for us in India as applicable to our own products, are that the staple is short, that it is mixed and that the cotton is not properly graded. These defects can be remedied by growing varieties the staple of which is long, by keeping them separate and grading the cotton on the basis of staple length.

Like most other plants, cotton can only be improved by propagating from good seed selected in one's own field or imported from other suitable tracts; such importation is, however, attended with the risk of the introduction as well of new diseases, if any. This point suggests a ready illustration in the Pink-boll-worm, to stamp out which the Madras Cotton Pests' Act has been in operation for the last two years. This disease got into Mexico in 1911, through a small imported packet of cotton seed from Egypt. The boll-worm multiplied so rapidly that in 1918—only seven years later—the damage to the crop was estimated at 50—75 per cent. The loss in Brazil in 1917—18 from the same source amounted to 27 million dollars. It would therefore seem safer to select seed from one's own field.

The Madras Agricultural Department has been doing seed selection on a field scale on its cotton seed farms, which are simply **ryots'** fields, in which the owners themselves grow crops for Government, with the aid of good seed and advances of money given to them. The cultivation is carefully watched by departmental officers who supervise ginning and purchase the seed for wider distribution. Selection consists in this case of discarding plants with undesirable characters and retaining those with desirable characters, which are productiveness, disease resisting qualities, large bolls, uniformity, length and strength of staple and high percentage of lint.

Plants exhibiting signs of developing these qualities may be marked by a strip of white rag, when the first bolls unfold and the crop from the selected plant is separately gathered and ginned. A few years' persevering will bring about much improvement in the crop. These remarks are meant for the practical farmer and Scientific investigation which is laborious and slow, though sure in its results, is in the hands of the Cotton Specialist—a senior member of the staff of this department. He has been devoting his entire attention to a close morphological study of individual plants in

different stages of growth and conditions of cultivation in the field. This is supplemented by a minute examination of the kappas, lint and seed in the laboratory.

M. R. R.

Farms in the U. S. A.

The percentage of increase in number of farms was much greater during the decade 1900—10 than during 1910—20. The reason is that, by 1910 most of the land suitable for farms had been homesteaded and the new states, largely settled. During the decade 1910—20, the largest increases in numbers have been made in those states where irrigation development has been most active.

No. of farms.			Increase.			
1920.	1910.	1900.	No.	1910—20. %	1900—10. No.	%
6,449,998	6,351,502	5,737,372	88,496	1.4	624,130	10.9

The Agricultural Review, December 1920.

Cotton. It is estimated that more than six million persons are directly engaged in its production, manufacture and distribution. Cotton production has grown from 500 million pounds in 1800 to 1,500 millions in 1850, 7,500 millions in 1900 and 14,000 millions in 1913 which is the last year that can be called normal.

(The American Review.)

Words of Wisdom. Man-made laws and plans are utterly impotent in the face of natural economic laws. No occupation of man can even be stabilized on a uniformly profitable basis, or so fortified that those who are engaged in it can be free from future worry. Occasional losses are inevitable in any business, but they need not discourage anybody. It is the average that counts.

Agricultural Review, December 1920.

The Fiji disease of Sugarcane. The disease probably existed in Fiji as early as 1905, but it is only in recent years that it has assumed very serious proportions. According to the Scientific experts of the colony, the so-called Fiji disease is the most-to-be-dreaded of all known maladies of the sugarcane and the most destructive of plant diseases and is one to be feared in sugar areas where the disease does not occur now. Fortunately the disease is not yet known in India, at any rate in Madras; but it is as well to be forewarned.

The most constant symptom is the presence of small galls on the undersides of the leaves and in the softer tissues of the cane tops, sometimes extending a long way down the stalk. More noticeable is the dying of the tops and the growth of lateral branches. The last leaves unfolding from the spindle become short and crumpled, attracting one's attention even from a distance. The shoot may have grown tall and be clothed with healthy-looking leaves, but all of a sudden, it loses the power to produce normal leaves, throws out a few bent and twisted stems and then ceases to grow. Some eyes may shoot, but repeat the antics of the main stem. The stalk may remain alive for sometime or soon die. The appearance of the galls is an advanced symptom.

The disease is said to be caused by a myxomycete, similar to *Plasmodiophora brassicae* affecting the cabbage. It is believed that the swarm spores may gain entrance to the cane tissue by penetrating the roots and following up the vascular bundles to the leaves. The organism may live in the soil for a long time and infection may be carried by cuttings or even trash.

The treatment is not yet known.

(Journal of Agriculture, Union of South Africa, June 1921).

M. R. R.

Improvement in the method of planting "Cassava" (Tapioca)

Those who are acquainted with the cultivation of Tapioca will remember that the tubers of this plant are propagated from

the cuttings of the stem. Small pieces about 6" to 9" long are planted on either long ridges or raised beds at about 3' part and sometimes even nearer. The tubers ripen in about 9 months. But it seems that by a pure accident, one Mr. A. B. Carr, a member of the Trinidad Agricultural Society, has found out that when the whole length of the stalk is planted, the tubers ripen and are fit to eat in about $4\frac{1}{2}$ months. The method of planting is simply to insert the lower end of the stalk into the ground not more than 3" or 4" deep and in order to secure the growing plant against the force of the wind, the plant should be tied to a stake. As the discoverer rightly says, this should have great importance in practically doubling the Cassava outturn from estates growing this. It will be of interest to know whether any farmer on the "West Coast" where large areas are annually brought under this crop, can corroborate the above statement from his own experience.

M. U. V.

Sugar keeps Bordeaux. Users of Bordeaux mixture as a 'fungicide' know only too well that the mixture has to be used immediately after being mixed and that, if kept long, it becomes absolutely worthless. The "American Agriculturist" of June 11th last, refers to a discovery recently made at the "Oregon Station" by which this trouble can be easily overcome. It is just to add $\frac{1}{4}$ ounce of granulated sugar to every pound of Copper sulphate used. For small amounts of the spray, dissolve one well-rounded, but not heaping, teaspoon of sugar in one quart of water and then use at the rate of a half pint of the solution for each pound of the Copper sulphate used.

This discovery must prove extremely advantageous to the arecanut garden owners of the West Coast, where the spraying operations against the "Mahali" disease have to be conducted when the monsoon is in full swing and more often than not, the work has to be suspended half way on account of intermittent heavy showers.

M. U. V.

Banana Beverage. The Agricultural News Vol. XIX No. 485, quotes the following recipe of a beverage known as the Banana wine. "Peel some thoroughly ripe bananas and cut them across into thin rounds. Fill an earthen jar with one third bananas and two thirds water leaving the contents to soak and ferment, watching the process of fermentation carefully, as it is very rapid, seldom lasting more than twenty-four hours. Strain the liquor which is then ready for drinking."

This drink is similar to an acid lemonade. An agreeable odour is given to it by the addition of slices of lemon, orange or pine apple. This ought to be drunk immediately, and cannot be kept any time except in tightly corked bottles."

C. S. G.

A remedy for the coconut beetle. A Remedy for the Rhinoceros beetle is mentioned in the report of the Deputy of Agriculture, Konkan Division, Bombay. The oil of the cashew-nut is said to repel the beetle and the method of applying the remedy is described thus:—

"Some cotton rags are to be dipped in the oil and to be kept on the topmost part of the tree in the crown or the axil of the bunch. One pint bottle is sufficient for 100 trees." The results are said to have been encouraging.

—From the Journal of the Mysore Agri. and Exn. Union, September 1921.

Y. R. R.

The Board of Agriculture. The Twelfth meeting of the Board of Agriculture in India will be held in Pusa from the 13th to the 18th February 1922, when the following items will be discussed:—
The line of demarcation between Agriculture and Industries as affecting the work of the departments concerned. Further discussion regarding measures for famine relief. The examination of the proposal to prohibit the export of certain manures from India. Subjects connected with cattle breeding. Motor tractor cultivation. For particular purposes motor tractors may prove useful in

India and the best means for arriving at suitable types of both tractors and implements for the various requirements. Manufacture of nitrogen fixation products in India. Need for the study of the movements of nitrates in soils. The improvement of the potato crops in India with special reference to the seed-supply for the plains. Discussion on the resolution passed by the last sectional meeting of Chemists and Bacteriologists regarding measures to be adopted to secure continuity of field experiments of a permanent nature. Agricultural Middle Schools. A discussion on the progress made and experience gained in the provinces. Whether biennial Sectional Meetings of (1) Botanists, (2) Agriculturists and Agricultural Engineers are advisable.

—From The Indian Trade Journal, January, 1922.

Castor Crop of 1921.

The area under castor in 1921 is estimated at 391,700 acres. The area actually recorded last year at the close of the season was 390,700 acres.

The season has been favourable in Anantapur, Cuddapah and Salem. Yields below normal are reported in other districts. The seasonal factor is calculated at 88 per cent of an average crop for the Presidency, and this works out to a yield of 34,700 tons as against 38,600 tons estimated at the close of the season last year.

From The Publicity Bureau.

First Wheat Forecast for 1922.

The department of Statistics of the Government of India has published its First Wheat Forecast for 1921—22. The returns refer to all the important wheat-growing areas except Kashmir. The figures dealt with in this report generally relate to the area sown up to the beginning of January.

The total area sown is estimated at 27,739,600 acres. As compared with the revised final area (25,821,000 acres) of last year, the present estimate shows an increase of 7 per cent.

Weather conditions at sowing time were favourable, and the present condition of the crop is reported to be generally good.

From The Publicity Bureau.

Sugarcane crop of 1921—22 : Third Report : Department of Agriculture, Madras.

The area planted with sugarcane up to the end of December 1921 is estimated at 121,500 acres. The actual area in 1920—21 was 103,308 acres. The increase is greatest in the central districts and the south where the area has increased by about 47 per cent. This is due to the stimulating effect of the high prices of sugar at the planting season and to the generally favourable season.

Except in the Central districts and on the West Coast yields are below normal. The seasonal factor is calculated at 91 per cent. of an average crop for the Presidency and this works out to a yield of 316,100 tons of jaggery against 273,410 tons estimated in the season and crop report of 1920—21.

Group.	Estimated area planted with sugarcane up to 25th December		Estimated yield of the area in	
	1921.	1920	Column 2	Column 3
1	2	3	4	5
	Acres.	Acres.	Tons.	Tons.
Circars.	51.2	48.0	127.1	118.6
Deccan.	12.7	11.9	26.0	29.8
Carnatic.	7.8	5.5	19.2	15.2
Central.	11.7	28.6	124.8	38.2
South.	4.5	2.9	2.5	7.7
West Coast.	3.6	2.9	2.5	7.4
Total	121.5	99.8	136.1	266.9

(Publicity Bureau).

Average Madras Prices in January 1922.

Weight.	Commodity.	Prices.		Quantity.	Index No. Base July 1914.
		July 1914.	January 1922.		
	Rice Nellore I.	4	2½	Measures per rupee.	
	„ Boiled I.	3½	2½	„	
	„ „ II.	4½	3½	„	
40.8	Rice	4½	2½	„	142.03
	Average of the three.				
5.9	Ragi	8	5	„	160.00
3.4	Dholl	3½	2½	„	200.00
1	Bengal gram	5½	2½	„	200.00
4.8	Jaggery	0 4 0	0 9 0	1 Viss.	225.00
1.2	Sugar refined	0 6 0	0 11 0	„	183.33
1	Tea	1 1 0	1 5 6	1 lbs.	126.47
1.9	Salt	0 1 3	0 1 4	1 measure.	106.67
1.7	Beef	0 2 6	0 5 6	1 lb.	220.00
1.1	Mutton	0 7 0	0 15 0	1 seer.	214.29
10.3	Milk	0 4 0	0 8 0	1 measure.	200.00
6.1	Ghee	2 0 0	3 0 0	1 Viss.	150.00
4	Potatoes	0 3 0	6 6 6	„	200.00
1.4	Onions	0 1 0	0 3 0	„	225.00
1	Gingelly Oil	0 13 0	1 4 0	„	169.23
1.8	Kerosine „	2 2 0	3 14 0	4 gallon tin	182.35
3.1	Firewood	0 5 6	0 8 0	1 Gundu	154.55
4.3	Clothing				283.33
9.1	House rent				180.75

The Weighted average index number for all commodities—171, indicating an increase of price of 71% over July 1914, for food only the weighted average index number is 163, an increase of 63% over July 1914.

The corresponding figures for December 1921 are 174 for all commodities, or 74% above July prices, and 168 for food only, 68% above July 1914.

For November 1921 the figures is 176 for all commodities (76% above July 1914) and 170 for food only (70% above July 1914).

The Publicity Bureau.

Students' Corner.

The Senior Students of the short course went on their annual cold weather tour on 19-1-1922. Owing to the call of other duties needing his presence at the College, the Principal could not accompany them and M. R. Ry. T. V. Rajagopalachari, Assistant Professor was sent instead in charge of them. The party visited Ambasamudram, Sermadevi and Koilpatti in the Tinnevely district. This tour has, we dare say, been very useful and we trust the lessons learnt in camp have made a lasting impression on their minds, especially as this will act as a prelude for more strenuous work, when they pass out of the College in the course of a couple of months.

Estate News.

Scout Movement in the Agricultural College :—

Organization and investiture. About six months ago, Messrs. C. S. Gopalaswami Rao and D. Marudarajan, Assistants to the Government Mycologist, underwent scout-master training at Coimbatore under the Organising Deputy Commissioner, and soon after they organized a small troop of wolf-cubs and boy-scouts enrolled from among the children of the Estate. A local Scout Association of the residents of the estate was formed and a working committee, consisting of Rao Sahib M. R. Ramaswami Sivan (President) and Rao Sahib T. S. Venkataraman, Mr. C. S. Namasivayam Pillai and the two scout-masters as members, was elected. The boys had, under the guidance of the scout-masters, their training in physical exercises early in the morning and in games of various kinds in the afternoons. The formal investiture was made in the presence of a large assembly of ladies and gentlemen, in the hall of the Agricultural College, — a very imposing

ceremony indeed, when every one of the scouts and the cubs marched up to the District Scout Commissioner and declared on his honour that he could be trusted and that he would be loyal to God, King and country. The cubs have been designated the "Rama Pack" and the scouts the "Krishna Troop."

The Scout Drama. The Ramakrishna troop, to whom a separate playground has been kindly assigned by the Principal, decided, with the object of collecting money for a club building of their own, to enact the play of "Dhruva" in Tamil, in which they were actively helped by many of the estate residents including Mrs. Ramaswami Sivan. The drama was staged on the evening of Sunday the 18th December 1921, between 6-30 p. m. and 8-30 p. m. in the Agricultural College Hall, before a crowded and appreciative audience of ladies and gentlemen. In the opinion of competent critics, the performance was one of the finest ever put on the boards in Coimbatore, the acting, the music and the scenic arrangements being all equally excellent. The following were the actors and every one of them is to be congratulated on an acting so natural and charming that the spectators were kept spellbound from the beginning to the end:—Thothadri and Kalyanasundaram, who acted each for a time as "Dhruva", Venkataraman as "Narada", Rangaswami as "Suresh", Krishnaswami as "Suresh", Narasinga Rao as "Maid", Ramachandran as "Hangman", Subharaman as "Maha Vishnu", Raghavan as "Maha Lakshmi", little Naranappa as "Uttaman", Lakshminarasimhan as the "Buffoon", and the Senior Patrol leader Srinivasulu as "King." The collections amounted to over Rs. 500/- but since some of the arrears remain yet uncollected, and certain bills still await payment, the exact net amount realised will be announced in a future issue of the journal. Rama Wariar of Kottakal and Mr. Sundara Rao Bhutgoswami were responsible for the excellence of the music programme. There has been an invitation to stage the play at Coimbatore and the idea has not yet been given up.

names. The ties were arranged by lottery and the matches were thoroughly amusing, as some of the competitors had probably never handled the bat in their lives. While it lasted, the noisiness of the cards parties paled before it and was actually drowned in the merry shouting of the spectators. Some very good play too was witnessed, in which Messrs: Marudaranjan, Rangasami, etc. etc., were conspicuous. The championship cup was for a second time won by Mr. H. Shiva Rao, while the runner up was Mr. T. V. Subrahmanyam. The presentation of the prizes was made after a suitable speech by the President in the General Body Meeting held on the 7th January 1922.

Y. R. R.

Officers' Mess. For various reasons, it was considered undesirable that officers should mess in the students' hostel. Steps were therefore taken by the officers' club, as long ago as 1916, for starting a separate mess for the officers and with the kind help of Mr. Wood as Principal and of his successors in Principalship, a pucca building has been built at Government cost in the compound of the officers' club and was handed over on rent to that body, for the purpose of locating the mess. The mess was started in October under the supervision of the club committee, and was after certain preliminary trials, handed over to a contractor, who has undertaken to supply meals to resident officers at certain fixed rates. The mess has supplied a long-felt need on the Estate, and has further stood its trial well, when called upon to cater to the large number of visitors at Conference time.

Y. R. R.

University Commission. The committee appointed by the Madras University, a reference to which was made in Mr. Wood's welcome address at the last M. A. S. U. Conference on 20-12-21, —composed of Messrs. Rao Bahadur K. Ramunni Menon and H. C. Sampson, our Director, arrived here on the 20th January and

inspected the college. We hope they found the conditions satisfactory and have made favourable recommendations for affiliation, which is the desire of both the Government and the College authorities.

Saudat Ullah Khan Esq. We extend our hearty welcome to Mr. Saudat Ullah Khan B. A., (Oxon), Bar-at-law, who has been recruited to the Indian Agricultural Service as Dy. Director of Agriculture and arrived here for the usual preliminary training. He hails from distant Peshawar and comes of a noble family. He was educated at the Chiefs' College, Lahore, where he stood first in the Final Examination and won the Mackworth Young Bikram Gold Medal as well as the Godly Essay Medal for the best English Essay. A few years later, he proceeded to England and took his Degree in Agriculture from the Wadham College, Oxford, where he also won Hockey Colours. At the same time he joined Lincoln's Inn and studied for law. He passed the Final Bar Examination in October 1921 and was called to the Bar on the 17th November, 21. Having received orders of appointment to the Indian Agricultural Service in England, he proceeded to India and joined his appointment at Madras. We wish him success in his departmental career.

Enquiries.

X—Wants to know the food value of dhol-husk.

Dairyman—Wants to know if there is any publication dealing with dairying in India.

(Some aspects of Dairying—by D. Ananda Rao.

Price Re. 1 Govt. Press, Madras.—*Editor*).

Business.—Wants to know if Pisasu Tamarai (Water Hyacinth) can be used to any purpose so as to pay the cost of its destruction.

Ramasatrulu Nayudu Memorial Fund.

As hinted in the report of the Secretary, Madras Agricultural Students' Union, read at the Conference on 20-12-1921, a meeting convened by the Provisional Secretary of the Ramasastrulu Nayudu Fund was held on 22-12-1921 in the small lecture room at the Agricultural College.

Of the subscribers the following were present :—

Messrs. D. Balakrishnamurthi.	Messrs. U. Vittal Rao.
" G. R. Hilson.	" B. V. Nath.
" K. Krishnamurthi Rao.	" Jogi Raju.
" V. Muthuswami Ayyar.	" T. V. Rajagopalachari.
" K. T. Bhandari.	" M. Ananthan.
" K. Cherian Jacob.	" M. U. Veilodi.
" Rao Sahib M. R. R. Sivan.	" R. Swami Rao.
" T. S. Ramasubramanian.	" C. Tadulingam.
" Y. Ramachandra Rao.	" S. Patrudu.
" C. V. Ramaswami	" Muthiah Nattan.

M. R. Ry. Balakrishnamurthi Garu, Deputy Director of Agriculture, II Circle, Guntur, was elected to the chair and after a good deal of discussion and consultation, which followed a general statement by K. Krishnamurti Rao in regard to the subscriptions collected, the following resolutions were passed:—

Proposed that the funds collected by the Ramasastrulu Nayudu Memorial Fund committee be utilised to perpetuate the memory of the late Mr. Ramasastrulu Nayudu in the shape of a medal to be known as Ramasastrulu—Munagala medal to be awarded in a way similar to that in which the Munagala prize used to be awarded.

Proposed by Mr. B. V. Nath.

Seconded by Mr. G. R. Hilson.

Proposed that the funds collected be entrusted to the Madras Agricultural Students' Union on 1-4-1922 by the present Secretary Mr. K. Krishnamurti Rao with the request that the Union will act as trustee for this fund.

Proposed by Mr. B. V. Nath.

Seconded by Mr. V. Muthuswami Ayyar.

Proposed that the medal be awarded to the member of the Union who submits the best account of original research work or enquiry on any Agricultural subject done by him.

Proposed by Mr. G. R. Hilson.

Seconded by Rao Sahib Y. Ramachandra Rao.

Mr. D. Balakrishnamurti was pleased to state that he would undertake to round up the amount of interest to Rs. 50 towards the cost of the medal, until such time that the capital swelled to yield an interest of Rs. 50. Mr. K. Krishnamurti Rao agreeably to the above resolutions forwarded to the General Secretary, Madras Agricultural Students' Union a copy of the above with a list of subscribers.

This was placed before the working committee of the Madras Agricultural Students' Union at its meeting held on 6th January 1922, when it was resolved to accept the offer of trusteeship and management of the Funds, inclusive of the right of calling for papers for award of prizes. But the Secretary was directed to remit to the Provisional Secretary, Mr. K. Krishnamurti Rao, resolution No. 3 for further enlightenment as regards the procedure contemplated by the subscribers' meeting, in the event of more than one science section forwarding papers.

Departmental Notes.

Transfers :—

Mr. C. Subba Rao, Assistant Farm Manager, to report to the Farm Manager Chintaldevi for duty on 25th January 1922.

Mr. T. Seshachalam Nayudu, Assistant Farm Manager, to report to the Deputy Director of Agriculture, Livestock at Madras for duty with Cross Bred Bulls.

Resignations :—

Mr. K. S. Sankaram Pillai, Farm Manager.

Mr. P. V. Isaac, Assistant in Entomology.

Leave :—

Mr. K. T. Bhandary, Teaching Assistant, privilege leave for 10 days from 3rd January 1922 with permission to prefix Christmas holidays.

Mr. T. S. Ramakrishnan, Assistant in Mycology, privilege leave for 5 days from the 3rd January 1922 with permission to avail of the Christmas holidays and the 8th January 1922.

Mr. E. N. Rangaswami Ayyangar, Assistant Agricultural Demonstrator, Chingelput, privilege leave from 13th to 24th with permission to affix the Christmas holidays.

Mr. P. A. Raghunathaswami Ayyangar, Assistant to the Government Agricultural Chemist, privilege leave for 20 days in continuation of the Christmas holidays.

Mr. G. L. Narasimha Rao, Assistant Farm Manager, Sirvel, privilege leave for 12 days from 27-11-1921 to 8-12-1921 inclusive.

Mr. V. Obidambaram Pillai, Assistant Agricultural Demonstrator, privilege leave for 11 days from 13th December 1921 with permission to affix the Christmas holidays.

Mr. E. K. Kunhappa Nambiyar, Farm Manager, Nileshwar, privilege leave for two months in continuation of the ensuing Christmas holidays.

Mr. A. Ramalinga Ayyar, Assistant Agricultural Demonstrator, privilege leave for two months from or after 10th January 1922.

Mr. G. L. Narasimha Rao, Assistant Farm Manager, extension of privilege leave by 4 days.

Mr. P. V. Sambhasiva Rao, Assistant Agricultural Demonstrator, privilege leave for one month and eight days from 16th November 1921, with permission to affix the Christmas holidays.

Mr. M. V. Kondala Rao, Assistant Agricultural Demonstrator, privilege leave for 15 days from 4th November 1921.

Mr. M. Ramachandra Nayudu, Assistant Agricultural Demonstrator, extension of privilege leave for six days and furlough for two months and twenty four days on half pay in continuation of the sixteen days privilege leave.

Mr. F. E. G. Bush, Superintendent, Potato Farm, Nanjanad, privilege leave for four and a half months from or after 1st December 1921, under the concession granted in G. O. No. 177, Finance, dated 7th March 1919.

Mr. K. G. S. Bhandari is placed in charge of the Potato farm.

Mr. T. G. Muthuswami Ayyar, Farm Manager, Mangalamallur, extension of privilege leave till 25th November 1921.

Mr. K. Sankaranarayananayyar, Assistant to the Lecturer in Agricultural Engineering for one month from the date of avail.

Mr. A. Latchumiah Nayudu, Farm Mechanic, to act as Assistant to Lecturer in Agricultural Engineering; to continue to be in charge of the workshop also.

Mr. P. Jaganadha Mudaliar, Head Artist, Mycology Section, privilege leave for three weeks from 20-1-1922.

Mr. N. Ramadoss, Farm manager, Samalkota, privilege leave for 15 days from 16th January 1922 to 30th January 1922 with permission to prefix holidays on 13th, 14th and 15th January.

Mr. C. Arulanandam Pillai, Assistant Agricultural Demonstrator, III circle furlough on medical certificate on half pay for 6 months from 10th October 1921 in continuation of combined leave for 8 months and 1 day from 9th February 1921.

M. R. By. K. Satyanarayana Gupta, Assistant Agricultural Demonstrator, is granted an extension of privilege leave for ten days, in continuation of the one month's privilege leave.

M. R. By. D. Marudarajan, Assistant in Mycology, has been granted privilege leave for 1 month from 16th January 1922.

Confirmations :—

Mr. P. A. Baghunathaswami Ayyangar from III grade permanent and I grade S. P. T. to I grade permanent from 1st January 1921.

Mr. K. Cheriyan Jacob from IV grade permanent and III grade S. P. T. to III grade permanent from 1st January 1921.

Mr. T. Lakshmana Rao from III grade permanent and II grade S. P. T. to II grade permanent from the 1st January 1921.

Mr. S. R. Venkatakrishna Mudaliar from III grade permanent and II grade S. P. T. to II grade permanent from the 1st January 1921.

Mr. V. Ramanadhayyar from Farm Manager V grade permanent and Assistant III grade S. P. T. to assistant III grade permanent from the 1st January 1921.

Mr. John A. Muliylil from IV grade to III grade S. P. T.

Mr. B. Thomas from sub Assistant IV grade and acting assistant IV grade to be assistant IV grade S. P. T.

Mr. A. Moses from Plant Collector permanent and acting sub-assistant V grade to be sub-assistant V grade S. P. T.

Mr. K. Ramiah from III grade permanent to II grade S. P. T.

Mr. T. V. Subrahmanya Ayyar from IV grade permanent to III grade S. P. T.

Mr. C. J. George appointed to IV grade S. P. T. as assistant in the Entomological Section.

Revision of Pay of the Executive subordinates of the Agricultural Department.

The Government have sanctioned with effect from 1st March 1921, the revision as shown below of the pay of the following establishment in the Agricultural Department:—

(1) Upper Division.

(a) Agricultural Section.	No. of grade.	Present pay. Rs.	Proposed pay. Rs.	Ultimate Strength in each grade.	No. to be filled up for the present.
I		200	250	5	1
II		175	225	7	4
III		150	200	11	8
IV		100-5-125	120-10-170	16	14
V		50-5-100	70-5-120	32 *	43 *
				70	70

(b) Science Section.	No. of grade.	Present pay. Rs.	Proposed pay. Rs.	Ultimate Strength in each grade.	No. to be filled up for the present.
I		200	250	5	2
II		175	225	7	4
III		150	150-10-200	10	9
IV		75, 75, 75-5-125	100-5-150	22	29
				44	44

(2) Lower Subordinates.

I		90	120	11	1
II		85	110	15	—
III		80	100	24	6
IV		50-2½-75	75-4-95	34	16
V		35-2½-50	15-3-75	68	103
				152	126

(3) Miscellaneous.

	Present Pay	Proposed Pay
1 Inspector of Agricultural Offices	160-2½-125	125-5-175
1 Sanitary Inspector	20-1-25	50-5-100 (If the Sanitary Inspector does not possess the qualification of the inspectors in medical department only a pay of Rs. 30-1-35 should be granted)
Artists {	6 (50-4-74)	6 (65-3-95)
	5 (25-2½-50)	5 (35-2-65)
1 Museum Curator	23-8-40	35, 35-1½-50-1-60.
Plant Collectors, Settlers and Laboratory attendants.	(20-1-30)	22 (20-1-35)
	15 (15-1-20)	

* Excludes one post sanctioned for the Borstal Institution, Tanjore.

With effect from 1st March 1921, the date of introduction of the revised scales, the establishment will cease to draw the temporary increase sanctioned in G. O. Nos. 700 Financial dated 2nd August 1920 and 780 Financial dated 28th August 1920.

The initial pay on which the existing incumbents will enter on the revised scale will be fixed with reference to the rules contained in the annexure to G. O. 711 Financial dated 11th July 1921.

The duty allowances of Rs. 15 per mensem and Rs. 50 per mensem to the Assistant in Chemistry in charge of the meteorological work and the Veterinary Assistant posted at the Agricultural College, Coimbatore, respectively will be continued. The duty allowance to the teachers in Agriculture at the Agricultural College sanctioned in G. O. 3441 Revenue dated 12th October 1918, will be withdrawn with effect from the date of introduction of the revised scales of pay.

(From the Publicity Bureau).

WANTED.

A cotton Cultivation Expert, knowing Tamil language for Gandamanayakanur Zemindary, Periyakulam Taluk, Madura (S. I.). Applicant should be connected with cotton cultivation and its improvement, one who has successfully cultivated. He should be energetic and of active habits and able to ride about. Free quarters and better pay and prospects than in Government service to the selected candidate on a three years' agreement. Apply giving fullest particulars, age qualifications, previous experience, references terms and conditions to Pestonji D. Patel, Ismail Buildings Hornby Road, Bombay.

WANTED.

"Wanted teachers who could impart instruction in the Elements of practical agriculture to the pupils of Elementary schools and lower forms of Secondary Schools."

Apply to the President, District Educational Council, Tinnevely, stating salary required, qualifications etc. etc.

T. N. Sivagnanam,
President.

WANTED.

Applications from educated and qualified men for the post of Assistant Farm Overseer in this depot on Rs. 50-3-75.

2. Applicants should have a knowledge of cultivation of fodder crops such as Oats, Lucerne, Jowari, Cowpea and various kinds of grass and with a certain amount of knowledge of Arboriculture and Vegetable gardening, also the management of bullocks.

Applications should contain the following particulars.

1. Name 2. Age 3. University certificate held
4. Certificate obtained from an Agricultural College.
5. Previous experience on an Agricultural Farm, if any.

J. C. HOTHAM, Major,
Supdt. Hosur Remount Depot.

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February 1922.

No. 2.

Editorial Notes.

The Indian Science Congress.

The ninth annual Meeting of the Indian Science Congress was held, under the auspices of the Asiatic Society of Bengal, at the Medical College, Madras, from 30th January to 4th February 1922 and was an unqualified success in every way, whether judged by the excellence of the various Presidential addresses, the number of delegates who attended, or the number and quality of the papers read. Nothing was wanting in the arrangements made to cater to the comforts of the delegates or to show them round places of scientific or industrial interest, nor was there any lack of entertainments affording opportunities to the members to meet one another socially. His Excellency Lord Willingdon opened the Congress on the 30th January and Mr. C. S. Middlemiss, who had been chosen President in the place of Sir Thomas Holland, amply justified his selection by a scholarly address, befitting a Fellow of the Royal Society, on the latest problems of Science. The eight sections of the Congress were presided over as follows :—

Physics and Mathematics	by Mr. T. P. Bhaskara Sastri,
Chemistry	„ Dr. N. R. Dhar,
Botany	„ Dr. W. Dudgeon,
Geology	„ Mr. G. H. Tipper,
Zoology	„ Dr. N. Annandale,
Agriculture	„ Rao Sahib M. R. Ramaswami Sivan in the absence of Rai Bahadur Ganga Ram,

**Medical Research
Anthropology**

By Major Cunningham, and
„ Rai Bahadur Hiralal.

A very influential local committee had been formed with the Hon'ble Sir Lionel Davidson as Chairman and Captain C. Newcomb and Khan Sahib Muhammad Azizullah Sahib Bahadur, as Secretaries. The Chemical and Medical sections had the largest number of papers and were best attended, but the contributions to, and the attendance at, the other sections were in no way smaller than those at previous congresses.

The visits to the Pallavaram Leather Factory, Guindy Bacteriological Institute, Buckingham and Carnatic Mills, Perambur Workshops, Madras Water works, Leather Trades Institute, Glass Factory, the Lunatic Asylum and the different Hospitals in Madras, were both instructive and interesting and were availed of every afternoon by many of the delegates. The staff of the King Institute, the Vice-Chancellor of the University, His Excellency the Governor and the Indian Medical Service Officers were 'at home' to the delegates on different occasions. A number of interesting lectures, some arranged by the Congress and some, by the Presidency College Chemical Society, apart from the closing University Lecture by Professor C. V. Raman, added to the pleasure and instruction of the delegates. A number of buses were always readily available to carry delegates to and fro. Great pains had evidently been taken by the committee for the comforts of delegates and credit is due especially to the two local Secretaries.

An interesting feature of the year was the exhibition of cinema films illustrating the life history and habits of certain human parasites like the malarial germ and the hookworm, which are the cause of dreaded diseases in man.

At the meeting of the General Committee, votes of thanks were tendered to all those to whom the success of the Congress was due, and a resolution was passed leading to the formation of a Council of the Congress composed of the past Presidents of the Science Congress resident in India, five elected members, and the two Secretaries, Drs. Simonson and Raman, whose duties will be to consider

and deal with, all questions concerning scientific matters or Congress policy which may arise in the interim between successive congress sessions.

For a second time, the second Madras Session of the Science Congress proved to be one of the most successful of the nine Congresses held so far.

Meeting of the Board of Agriculture, Pusa, February 1922.

The Board of Agriculture, the agenda of which were published in our January number, met on the 13th February at Pusa, under the Presidentship of Mr. S. Milligan, Agricultural Adviser to the Government of India. The representatives from the Madras Presidency were Mr. H. C. Sampson, Director of Agriculture, and Messrs. R. C. Wood and R. D. Anstead. Messrs. E. Ballard and P. H. Rama Reddi attended the Conference as visitors.

In opening the proceedings, Mr. Milligan remarked that under the reforms, the heads of Provincial Agricultural Departments were now responsible to the elected representatives of the people and that this fact would naturally lead to greater interest being taken in a department like theirs. He, however, added that there existed an element of danger which all technical departments had got to face. It was notorious that the average layman took little interest in Research work and was in fact impatient with it, and was apt to consider that undue time was wasted in arriving at results. That this was but natural in a democracy was illustrated by the fact that, even in an advanced country like Great Britain, the people would not have, but for the great World War, been convinced of the folly of neglecting research. In conclusion, he declared that whatever had been achieved by the Agricultural Departments was only after patient labour and that their future depended entirely on the continuity of Research and investigation.

improved and that the question of storage of seed in the plains be investigated.

In view of the seriousness of the Wart disease in potatoes, the sub-committee on the subject recommended that steps should be taken under the Pests Act to enforce the production of certificates in the case of imported seed. The view of the representatives of Bombay Deccan, however, was that, in view of the ruinous effect of an enforcement of the act on the potato industry in that tract, its enforcement might be kept in abeyance for two years, but the majority of the Board was of opinion, that, considering the seriousness of the disease, the whole of India should not be allowed to suffer for a possible benefit to Bombay and the recommendations of the sub-committee were accepted. On financial and other grounds, the Board next decided that biennial meetings of Agriculturists, Agricultural Engineers and Botanists were not necessary; and at the invitation of Dr. L. C. Coleman, it was decided to hold the next meeting of the Board at Mysore.

Mr. H. Adinarayana Rao.

We are glad to hear that one of our members, Mr. K. Adinarayana Rao, L. Ag. has been awarded one of the Government Industrial Scholarships, for proceeding to England and making a study of the question of the Production of Industrial Alcohol. We learn he will leave for England in April. He passed out of the Coimbatore Agricultural College in 1916 and, after a short period of service in the Mysore Agricultural Department, proceeded to Pusa for post graduate training in Agricultural Bacteriology under Mr. C. M. Hutchinson. He finished his two years' course at Pusa in 1920 and joined the Agricultural Research Institute, Coimbatore, as 1st Assistant to the Government Agr. Bacteriologist in April 1921.

We wish him all success in his future career.

Mr. P. V. Isaac.

We are delighted to hear that Mr. P. V. Isaac, who was for some time employed in the Entomological section here, and who

left for England in August 1919, for prosecuting further studies in Entomology, has been taken into the Indian Agricultural Service and posted as Dipterist at the Agricultural Research Institute, Pusa. We understand he would be required to stay some time longer in England in order to enable him to specialise in his subject. He was a familiar and attractive figure in our colony and used to take a prominent part in the celebration of our College Days and Conferences. He went at his own expense to England, but, after arriving in that country, he was able to secure a Research scholarship, through the kind offices of Professor Maxwell Lefroy. He studied at the Imperial College of Science and Technology, South Kensington, under the guidance of Professor Lefroy and, we understand, he took the degree of M. Sc., in Zoology at the London University, towards the close of 1921.

The best wishes of the Union follow him.

Mr. B. K. Shanmugam Chettiar, B. A., B. L.

We are gratified to learn that Mr. R. K. Shanmugam who is a zealous public worker and one of the foremost citizens of Coimbatore, has been offered and has taken up the post of Council Secretary to the Development Minister. In him the public as well as the Government has confidence. He is young and energetic and we hope his training in the Council will ensure for him, in due course, a higher place in the administration.

As we go to press, we are glad to find it announced that, of the successful Diplomates of December 1921, Messrs. V. T. Subbiah Mudaliar and C. Vijaya Raghavachari have taken First Class Diplomas.

Obituary.

We deeply regret to have to announce the death from cholera of B. Pushpanathan Thomas, Assistant Manager at the Sugarcane-breeding Station. B. P. Thomas passed out of the College obtaining the 'Certificate of Proficiency' in the year 1921 and entered our Department in June the same year, as Assistant Manager at the Sugarcane-breeding Station.

During the very short period of his service at the station, he came to be universally loved for qualities of both head and heart. He was a very promising young lad—hardly 25 years old when the sad event took place—and came out of a much respected and devout Christian family, his father being a Pastor at Katpady. Mrs. Thomas who is Headmistress at the London Mission School, Coimbatore, also comes of a family connected with the Church, and it is hardly a couple of years since they were married. Mr Thomas belonged to the London Mission Church and was known among his circle of friends as a good and devout Christian. As an officer he was known to be very conscientious and hardworking. We offer our sincere condolences to the bereaved family.

Agriculture in the time of the Mauryas.

T. R. SUBRAMANYAM.

(Continued)

Tillage operations and implements.

The plough (Karshana yantra) was the only implement about which any mention is made and ploughing would appear to be the only operation connected with the preparatory cultivation of the land. There is a vague mention of some other necessary implements the names of which are not given. The assistance of the blacksmith, the

carpenter, the rope maker and the snake catcher was found indispensable. Loss incurred by the negligence of these workmen was punished with a fine equal to the loss sustained. Such expressions as "often and satisfactorily ploughed" "three turnings of the soil with a plough," clearly indicate that the ancients understood to a certain extent the benefit of intensive ploughing.

Manures. While the manurial value of bones was only recognised in England early in the 19th century A. D., so early as this period in India, burnt bones mixed with cow dung were used to manure water pits around the roots of trees. The value of fish manure was known as well. A fresh haul of minute fish with a subsequent irrigation of the milk of Snuhi '*Euphorbia Antiquorum*' is specially recommended as a manure by Kautilya for the young sprouts of seeds.

Sowing of seeds. Kautilya ordains that a handful of seeds, bathed in water along with a piece of gold, shall be sown followed by this invocation: "Salutation to the Prajapathi Kasyapa. May agriculture always flourish and may the Goddess reside in seeds and wealth."

Irrigation. Instead of a statement of mere general truisms, about the importance of irrigation, we find in Arthasastra, clear rules and instructions for the promotion and maintenance of irrigation works, both public and private. Irrigation works were considered useful for crops, all the effects of a timely shower of rain being ensured in the case of crops protected by irrigation works. Rivers, lakes, tanks and wells formed the chief sources of irrigation. Among the 'powers' employed in lifting water, we find also wind power utilised for lifting water. Manual labour and bullock power are also mentioned. The water rate varied according to the sources of irrigation and according to the kind of agency employed in lifting water for irrigation.

Apart from the construction of irrigation works by the state, it also gave aid to private co-operative undertakings by providing them with sites, roads, timber and other necessary articles. It is ordained that taxes should be remitted for five years in the case of lands under new irrigation works such as tanks and lakes, for four years when neglected and ruined works are repaired, and for three years, when

water works were improved or extended. It was obligatory on the part of a landholder to help directly in any kind of co-operative construction of irrigation works, failing which he was enjoined to send his servants and bullocks to carry on his work; but in the latter case while he had a share in the expenditure he had no right to share the profits of the undertaking.

However generous we may find these concessions to be, the law regarding water offences resemble those of the *Medes* and the *Persians*. According to Kautilya, the condign punishment of death by compulsion or drowning was ordained for an offender who broke the dam of a tank full of water and the highest possible amercement to a person who broke the dam of a tank without water. Such petty offences as a diversion of water intended for cultivation, a reckless obstruction of water while issuing from the sluice gates and a letting out of water at any place other than the sluice gates, were visited with a fine of 6 Panas. The very severity of such laws, proclaims clearly the great concern of the state in the proper upkeep of irrigation works and in the proper use of water. It is noteworthy that Kautilya gives to Kings the right of ownership of fisheries in reservoirs and lakes.

Some agricultural pests. A considerable portion of chapter III of Book IV of Arthashastra, dealing with national calamities, is devoted to agricultural pests such as rats, locusts, birds and insects, indicating that the damages caused by these pests were considerable even in those days and occupied the minds of experts. In the Vedic times, it is mentioned that people resorted to the chanting of mantras and hymns to ward off such calamities, and we find mentioned in Arthashastra (book XIV) certain scientific methods of extermination such as the use of stomach poisons, and of mixtures emitting poisonous fumes when ignited, etc. Using grains mixed with the milk of the hedge plant as ratsbane, burning the essence of cotton seeds with the sloughs of snakes to scare away snakes, and exposing bovine carcasses mixed with the juice of the madana plant in the path of tigers, were also some of the simple remedies suggested.

Harvesting and thrashing. With regard to thrashing, Kautilya has some wise words to say. "Crops when reaped should be heaped in

high piles or in the form of turrets. The piles of crops shall not be kept close, nor shall their tops be small or low. The thrashing floors of different fields shall be situated close to each other" so as to help each other in time of danger.

The preservation of seeds. Some judicious directions are given for the preservation of seeds. The seeds of grains are to be exposed to mist and heat for seven days and nights. The seeds of green-gram and black-gram should be treated similarly for three days. The seeds of sugar cane and the like are to be plastered at the cut end with a mixture of honey, clarified butter and the fat of hogs and cow dung. The seeds of cotton are to be preserved besmeared with cow dung.

The rules of this period relating to agriculture and rural economy as recounted by Kautilya may be classified under two heads viz- (1) Laws relating to agricultural offences and (2) Laws relating to the marketing of agricultural produce.

Laws relating to agricultural offences. The rules under this heading prescribe fines for trespasses and grant compensation for damage done to cultivation. If a person steals any kind of agricultural produce, he was liable to a fine of three panas or the more effective punishment of parading him through the streets, with his body besmeared with dung—probably to indicate the degrading nature of the offence—and with a blaring pan hanging round his neck.

Rules regarding the marketing of agricultural products. The agricultural produce was not directly supplied to the consumer. Protection as well as revenue seem to have been the guiding factors in the framing of these rules. Kautilya puts forth a strict rule that "commodities shall never be sold where they are grown". Offences against this rule, such as the purchase of grass, grain, vegetable, fruits and flowers, direct from places where they are grown, were visited with fines, varying between $5\frac{1}{4}$ to 54 panas. Irrespective of these fines, there were fixed imposts, permanently levied on the sale of agricultural produce, one pana on the purchaser and one half pana on the seller.

The produce before it was supplied to the consumer had to pass, as we find in Arthashastra, through the hands of three officers viz.,

(1) the officer in charge of boundaries (Antapala) (2) the superintendent of tolls and (3) the superintendent of commerce. The Antapala (the officer in charge of boundaries) received $1\frac{1}{2}$ panas as road cess (vartani) on each cartload of merchandise and one masha ($\frac{1}{16}$ pana) on a head load. After examining the nature of the commodities and quality, he stamped the merchandise with his own seal and sent it on to the superintendent of tolls. It may be incidentally mentioned that in village parts, the head man of the village attended to these duties. The superintendent of tolls and his subordinates were to note the names of the merchants, the amount of merchandise and the seal mark and then these commodities were precisely weighed, measured or numbered before they were sold. There was a general rule that the tolls were to be levied according to local conditions. A toll of $1/8$ or $1/6$ of the value of either exported or imported agricultural products would appear to have been levied. Near the toll house, the merchants would appear to have been in the habit of selling the produce by open bidding, and if the commodities were sold for an enhanced price, the extra gain together with the tolls went to the Government. Severe penalties were in force for dishonest dealings.

The functions of the superintendent of commerce, were to ascertain the presence or absence of demand and also to find out the time and place suitable for their distribution, centralization, purchase or sale. Kautilya does not restrict the 'time and place' for the sale of those commodities for which there was frequent demand, nor were they subject to the evils of centralization. The superintendent of commerce after examining clearly, the outlay, the amount of toll, the interest on outlay and the quantity manufactured, fixed the price of the merchandise and allowed a profit of 5% over and above the fixed price on local commodities and 10% on foreign produce. In short the superintendent of commerce exercised all the functions of the civil supplies directorate established in certain countries in the west as an emergency war measure.

The irrepressible middle man, we find had come into existence in the commercial world in India even at such an early period. The

part played by him is not exactly known, but Kautilya lays down this stringent rule viz. "If middlemen (who taking advantage of their intermediate position) cause to a merchant or purchaser, the loss even of $1/8$ of a pana, by substituting with a sleight of hand false weights or measures or passing of inferior articles, they shall be punished with a fine of 200 panas." Most probably the middleman was as now, the retail dealer who neither produced nor consumed but tried to make large profits out of his small dealings and resorted to various subterfuges, to achieve his object.

(To be continued.)

The Agriculture Section at Science Congress, Madras.

An Engineer of the Department of Public Works, who had, since his retirement from service two decades back, taken up the profession of Agriculture with eminent success, who had introduced lift irrigation in the Punjab by means of Steam and Electricity and whose interest in Agricultural Education was keen, as was evidenced by his munificent endowment to the Benares Hindu University towards founding an Agricultural faculty therein,—such was Rai Bahadur Ganga Ram of Lahore, who had been selected to preside over the Agricultural section of the Indian Science Congress at Madras. Previous meetings had been presided over by distinguished heads of Agricultural Departments, and the eager expectations of the delegates to hear the message of a business farmer were doomed to disappointment by his inability to come to Madras. Rao Sahib M. R. Ramaswami Sivan was announced as President a few hours before the meeting and, before opening the proceedings, read a short communication from Rai Bahadur Ganga Ram, whose absence he greatly regretted. He then proceeded to deliver his spirited address on *The Scope of Agricultural Research*.

He said that, while research in general required deep knowledge, special training of the mind, systematic work and often wide

imagination, research in Agricultural Science was particularly difficult, especially in India where faith in science and scientific methods had still to be created. "First of all, the actual cultivator, unlike a settler in a newly colonized country, possesses a good deal of knowledge handed down by tradition, and those who seek to teach him have first to learn from him and, in some cases even unlearn what they had thought to be right so far. The cultivator knows his art, and it is the application of Science to art which is attempted by the research worker. The problem has to be attacked by one who has a knowledge of a number of Sciences and of a high standard in each rather than by a number of scientists, each a specialist in his own line. A research worker more often fails than succeeds in the pursuit of his hobby, and he learns as much by his failures as by his success. Most research work appears in the beginning to be of an academic character, and economic results may not follow as rapidly as the public want them. Agricultural experimenting, to be of value, has to be repeated for a number of years and in different localities, by reason of the vagaries of the seasons and differences in soils and methods of cultivation, and the factor of probable error has to be taken into account before final results can be announced for the benefit of the public. Even when convincing results are obtained, it is difficult to make people, who are conservative in most matters, to take up the new ideas as rapidly as one would wish. Experimentation in the field or the laboratory by the researcher has to be followed closely by practical demonstrations helped by the persuasiveness of the Agricultural missionary, in order that tangible benefits may accrue to the man behind the plough, the real paymaster."

Granting that it took time to carry on research and evolve useful results, the President exhorted the audience, especially the younger members thereof, to remember that, apart from the question of pay or remuneration, as lovers of their country they were

bound to work for the benefit of the cultivating classes, who were the backbone of the country. He welcomed the Indianization of the department in the higher branches of the service, which had come and which would come in a larger measure in the future, and pointed out at the same time that this Indianization implied increased responsibilities. While as subordinate officers they could have been content with carrying out orders, it became now necessary for them as responsible chiefs to be able to think, to design, and to direct. He asked them, in the end, to utilize to the fullest advantage and without waste of time, all the facilities placed at their disposal for research, each putting to himself the question "Is this all I can do?" without acquiescing in the view "This will do for what I am paid for."

Coming to the programme before the meeting, Mr. Sivan regretted that the printed programme showed few papers in this section. To whatever cause the paucity might have been due, the committee had he was glad to announce, authorized him to accept such papers as had been returned by the Secretaries as too late for the year. This announcement resulted in five more papers being read at the Conference.

With the short space at our disposal, it will not be possible to deal at length with the papers that were read, nor with the discussions which they elicited, and we must, therefore, rest satisfied with a general outline of the various papers.

The first was paper by Mr. P. S. Jeevanna Rao on "*Pollen sterility in relation to vegetative propagation*" in which he expressed the view that pollen sterility was a regular feature of plants vegetatively raised, and could explain the shedding of fruits in several cases. Based upon the results of an examination of the flowers of thirty different plants, the desirability was pointed out of propagating by seed and not vegetatively, crops like pepper, cardamom, Vanilla, Moringa and others which are valued for their fruits or seeds only.

The next paper was by Rao Sahib T. S. Venkataraman on "*studies in the development and the anatomy of the Sugarcane root systems.*" Mr. Venkataraman urged the need for a systematic study of roots in all plants, particularly in cultivated crops and showed, by a series of lantern slides, the effect of environment on root development in the sugarcane plant and the relative rapidity of this development in different cane varieties. He also showed how crossing in sugarcane had the effect of improving the type of root system.

Mr. N. V. Joshi of Pusa then read an interesting paper on "*Studies in preventing Nitrogen losses from Cattle Dung and Urine under storage.*" He stated that while loss of Nitrogen from Cattle-dung was small under both aerobic and anaerobic conditions of storage, great amounts of Nitrogen were lost from Urine when stored under aerobic conditions, while there was practically no loss under anaerobic storage. He observed that when straw or soil was used as an absorbent, very great losses were noticed, as also when cattle-dung and urine were mixed, and hence suggested the advisability of storing cattle-dung and urine separately, remarking that in the case of urine, a layer of oil on top served to bring about anaerobic conditions.

Another interesting paper, illustrated profusely by lantern slides, was contributed by Mr. T. V. Ramakrishnayyar on "*Insect pests of fruit trees.*" Dealing first with the general culture of fruit trees in Southern India, and the necessity for control measures in the case of an infestation of such trees by insect pests. Mr. Ramakrishnayyar explained the nature of the insects which attack native fruit trees such as the mango, the orange, the jack, the banana, the pomegranate, the guava, the fig and the grape and the introduced fruits such as, apple, pear and peach. He gave a short account of the life-histories of the different insects and indicated the general principles of control against their attack. He also drew attention to the necessity of preventing the introduction into the

country of undesirable foreign pests through consignments of fruits and tubers and living plants.

Rao Sahib M. R. Ramaswami Sivan next read a paper, illustrated with slides and figures on "*The availability of flour phosphate as a manure for paddy.*" He referred to his investigations in the laboratory, in the pot culture house and on ryots' fields and showed that increasing quantities of Carbonic acid, evolving from decomposing green manure, had the effect of dissolving increasing quantities of phosphates and that the application of green manure along with the Trichy phosphate was the best method of utilising this large deposit of mineral wealth lying close to the Cauvery delta, which was known to be particularly lacking in phosphoric acid. Manganallur experiments distinctly showed the advantage of all phosphatic fertilizers. Earlier pot experiments gave an increased crop with green manure *cum* phosphate, and later experiments showed that nitrogen was also a limiting factor, so that green manure *cum* nitrogen *cum* phosphate gave better yields than green manure alone or green manure *cum* nitrogen. Lastly co-operative field trials with the above combination on ryots' lands gave an increase of 250 to 400 pounds of grain over simple green manure, showing thereby that green manure made flour phosphate available to paddy under swampy conditions.

[Dr. Narasimha Ayyangar Ph. D. of Mysore presided, when this paper was read].

Mr. K. R. Joshi of the Indore Agricultural Department next read a paper on "*Improved methods of wheat sowing for Central India*", wherein he showed that rabi sowings in Central India should be shallower and wider than they were at present. The improvement suggested consisted in sowing with a two-tined seed drill and it was claimed that it was cheaper, quicker and productive of a larger crop out-turn.

Mr. D. V. Bal, Bacteriologist from Nagpur, read a paper on "The relative nitrifiability of different nitrogenous organic manures" in five different types of soils in the Central Provinces and Berar. It was noticed that castor cake nitrified best in all the soils, the Bassia (Iluppai—Tamil) cake the least. Groundnut cake, the richest of all oil-cakes in India, nitrified best in black cotton soils, while it was much slower in other types of soils.

Mr. K. Adinarayana Rao read a paper dealing with preliminary investigations on "Symbiotic nitrogen-fixing bacteria in the nodules of plants" other than those of the order Leguminosae, especially in two plants, *Chomelia Asiatica* and *Pavetta Indica*, in both of which innumerable nodules were found in the leaves. He then gave a short account of the bacteria concerned and indicated the possible economic importance of these nodules in the question of leaf manures for paddy.

Mr. S. R. Venkatakrishna Mudaliar read a short paper, giving a historical review of the literature bearing on "Fungi in Southern India" before the advent of the Agricultural Department.

Mr. Patwardhan of Poona, read a paper on "The utilization of the spent Mahua flowers" after distillation. Apart from the practicability of preparing further quantities of industrial alcohol by the action of sulphuric acid, its use as a nitrogenous fertilizer and, as a cattle food when dried, was indicated.

Most of the papers were followed by interesting discussions. After a session extending over three days, the deliberations of the Agricultural Section of the Science Congress were brought to a close with a few inspiring words from the President, followed by a cordial vote of thanks to the Chair.

(Contributed.)

Lessons in Nature Study

2

Water plants—(Contd.)

P. S. JIVANNA RAO.

Nymphaea. The water-lilies generally grow in shallow water and are perennial by means of their creeping root-stocks which are sunk in mud. The leaf blades are large and rounded and float on the surface of water. They are attached to the leaf stalks on their under surface and the length of the stalk varies according to the depth of the water. Of the two species, *N. pubescens* has leaves which are hairy on the under surface, whereas in *N. stellata* they are smooth on both sides.

The flowers are large and conspicuous and are either blue, white, pink or purple in *N. stellata* and white or red in *N. pubescens*. There are four sepals, many petals, many stamens which are petal-like in appearance and an ovary with many cells. The fruit is a spherical many-seeded berry, which ripens beneath the surface of water, and when it bursts the seeds come to the surface and separate from one another, at first floating for some time owing to the presence of air bubbles in them but later sinking to the bottom, when the air escapes by the decay of the outer covering of the seed.

The large swollen rhizomes which contain plenty of starch are collected by the lower classes of people and cooked and eaten in times of scarcity.

Nelumbium speciosum. The sacred Lotus, which is considered to be the flower, *par excellence*, of India, figures very largely in Sanskrit descriptive poetry and is known by various names e.g. Padma (being the seat of Goddess Lakshmi), Kamala, Nalini, Pankaja (meaning growing in mud) etc. "The white variety of this plant is called Pundarika, the red Kokanada, and the blue Indivara. The entire plant including root, stem and flowers is called Padmini. The torus or receptacle for the seed is called Karphikara, and the honey formed in the flowers Makaranda. The filaments round the base of the receptacle pass by the name of Kinjalka, and the leafstalk by

that of *Mrinala*. The adoption of such multifarious names for the different parts of the plant shows the extent of observation possessed by the ancients and also their attempt at systematising the knowledge they had about plants.

The plant must be compared with the water-lily as regards its habit and the following points of distinction noted viz.,

1. The leaf blades and flowers stand high above the surface of water and do not float as in water-lily.
2. The seed-containing parts are sunk separately in a special receptacle known as the 'torus', whereas in the water-lily they are united together into a compact mass.
3. The prickly nature of the leaf and flower stalks in Lotus.
4. The transition from the petals to stamens, some of the former containing anthers.

The underground stems are fried and eaten in Malabar as a delicacy and the seeds are said to be used as food in Cashmere.

Aeschynomene aspera. This is a leguminous shrub sometimes found growing near the margins of tanks and is very much restricted in its distribution. The most interesting feature in it is the pith which is derived as a secondary formation of wood in the stem. Being full of air, it not only enables the plant to float but also contains sufficient air for the use of the submerged parts.

If the plants are available for study, the pupils' attention may be drawn to a few facts concerning the highly divided nature of the leaves and their sensitiveness and also to the details of the floral structure.

The pith of the plant, which goes by the name of *Netti*, is put to various uses e. g. frames for turbans and hats, toys, garlands, artificial flowers, models of extreme fineness floats for fishermen's nets etc. Some of these products may well find a place in the school museum.

Neptunia oleracea. This interesting aquatic which is sometimes known as the Floating Sensitive Plant, is more common than

Aeschynomene and wherever it occurs it is sure to provide a satisfactory material for a quite instructive lesson.

The branches are zig-zag and bear masses of roots at the nodes and spongy white floats on the internodes. The leaflets are small and sensitive and up to 15 pairs may be present in each 'pinna' of which there may be 2-3 pairs in each leaf. The flowers are many and crowded at the top of a long stiff peduncle, but several of them are barren as may be evidenced by the fact that ultimately only about 4-6 dry pods are produced in each cluster.

Jussiaea repens. A handsome plant growing on the margins of tanks with the stem floating on water and both leaves and flowers appearing completely above the surface as in *Neptunia*. There are two kinds of roots developing at the nodes (1) ordinary fixing roots and (2) erect roots of a spongy white nature which grow upwards towards the surface of water. The latter serve as artificial breathing organs and the view that they act as floats can be maintained as it has been shown that the plant floats quite well even if all the roots are removed. (Goebel).

The leaves are simple, entire and narrowed into the leaf stalk. Flowers are white or pale yellow on fairly long pedicels with sepals, 5 petals, 10 stamens and an ovary which is below the petals and ripens into a 4- or 5-valved capsule.

Reviews.

Bird Friends and Foes of the Farmer, from the pens of Mr. S. S. Sathyanathan F. E. S., Assistant to the Government Entomologist, Coimbatore, published as Bulletin No. 81 of the Madras Agricultural Department, is a publication which is very much to be welcomed. Although by reason of their capabilities of destroying the ripening grains in the field as well as of keeping down insect pests of crops, Birds form, as a class, an economic factor to be counted by the Agriculturist, yet it is a fact to be deplored that the average ryot neither knows more than a few, nor takes more

than a passing interest in any. From the indiscriminate shooting of birds indulged in by certain professionals and by some of the amateurs, in an endeavour to secure specimens of their skins, some of the useful insectivorous birds are, it is to be feared, in danger of extinction. A decrease in their number is bound ultimately to react on the prosperity of the Farmer and the present book, which is amply illustrated, would serve, especially if translated into the Vernaculars, the useful purpose of educating the mind of the public as to the function of birds in the economy of Nature and letting them know as to 'who is who' in the avian world. Further, in the words of Mr. Ballard in his preface to the book, "apart from their importance to the agriculturist, they are of absorbing interest in themselves. We shall need recreation of some kind, and from personal experience, I can guarantee many pleasant and interesting hours to those who take up the study of birds and their ways." The author is to be congratulated on his effort and, we are sure the readers, especially those in the Agricultural line, would find instruction as well as amusement in a perusal of this handy little book.

In this connexion one may recommend for perusal to readers interested in the subject, the series of fine articles on Indian Birds from the pen of Mr. T. Bainbrigge Fletcher, Imperial Entomologist, Pusa, that have for sometime past become a feature of the Agricultural Journal of India. These articles contain a popular description of the birds and an interesting account of their habits and are accompanied by faithful paintings of the birds in their natural surroundings from the brush of Mr. Inglis M. B. O. U. A perusal of the articles will amply repay one's trouble and supplement the information given in Mr. P. Susannan's book.

News and Notes.

Manufacture of Building Material from Bagasse. According to the Louisiana Planter and Sugar Manufacturer, a plant has been erected

at Marrero, La. at a cost of 500,000 dollars for the manufacture of artificial building boards from sugarcane bagasse. The plant resembles that of a modern paper-mill; the bagasse is "chipped" "cooked" and then sent as pulp to the "beaters" where it is worked until the fibres are of the proper length. A special machine converts the finished pulp into a board, up to 12 feet wide and this passes for 4 hours through a long drying-system, emerging quite dry and hard. The new material, known as "Celotex" can be worked like timber and, although lighter than wood, is quite solid and homogeneous. Previous attempts to utilise bagasse for paper making were abandoned, because it was more valuable as a fuel, but it is stated that the promoters of the present enterprise are now buying the bagasse at a price exceeding its fuel value.

(Ind. Tr. Jour. Nov. 3 1921.)

B. V. N.

Sprays and Spraying. Mr. Savage, Manager of the Berrin Experimental orchard (South Australia) read a valuable paper on the above subject, at a meeting of the Agricultural Bureau of Eastern Districts. He was of opinion that a knowledge of the life-history of fungi and insects absolutely essential for effectively combating the diseases and pests of crops. Fungous diseases are divisible into two: (1) those caused by *Epiphytic* fungi, such as Mildews, and (2) those caused by *Endophytic* fungi, such as leaf-spots, scab, and rusts. He classifies similarly insect pests into (1) those caused by mandibulate or chewing insects such as moths and beetles and (2) those caused by sucking insects, such as scales, and aphids. Three factors are emphasised by him as being important for a really successful spraying. Those are 1. *thoroughness* of the work, 2. *proper* time of spraying and 3. *proper* spray. Then he comes to the "vexed" question of adhesives or "spreaders" as he terms them. He doubts if "spreaders" are necessary at all times and in all localities, on the other hand that the necessity for "spreaders" is purely a question which

depends upon local climatic conditions. Of the adhesives enumerated by him, soap, casein, and flour paste deserve mention. The last adhesive is highly recommended by him from his personal experience. Its preparation is as follows:—"Mix a cheap grade of wheat flour with cold water making a thin batter without lumps; or wash the flour through a wire screen with a stream of cold water. Dilute until there is 1 lb of flour to each gallon of the mixture. Cook until a paste is formed stirring constantly to prevent caking or burning. Add sufficient water to make up for evaporation." 4 gallons of the paste are to be mixed with 100 gallons of the spray."

Coming to spraying against insects he advocates timely spraying as there are some insects, like moths, which are exposed only for a short time and then get into the plant. Chewing insects should be killed by poison and sucking insects by contact sprays. Some common insecticides mentioned by him are arsenate of lead, kerosene emulsion, and tobacco wash. A mixture with paraffin and limesulphur are reported to be useful for combined fungicides and insecticides.

This was followed by an interesting discussion which centred round the use of casein as an adhesive. The dissolving of casein with lime was given up as impracticable and one member, Mr. Alexander gave his personal experience in using casein with Burgundy mixture. "He put 4 gallons of the solution on the fire, brought it between 170° and 180° and added 20 lb. of casein which dissolved as quickly as sugar—it would not dissolve at a lower temperature.

(From the Journal of the Department of Agriculture, South Australia, Vol. XXV, No. 5, 15th December 1921) C. S. G.

Vitality of seeds. A novel method of storing dry grains is reported from Australia. The grains are kept in an atmosphere of Nitrogen or Carbon dioxide which prevents the eggs of weevils and beetles from developing and at the same time the grains are not injured.

(Botanical Abstracts, Entry 778 Vol. VIII.) P. S. J.

Introduction of Parasites into Hawaii. Recently the experiment station of the Hawaiian Sugar Planters' Association turned out one lot of an insect, which Frederick A. G. Muir, Entomologist of the station calls *Blastophaga*, which is designed to aid in reforestation work in the territory. Upon this and similar insects depend the fertilization of the wild figs found in the islands and the experiment station selected about half a dozen varieties of figs, particularly *Ficus elastica* from which rubber is produced, and will use the insects in the fertilization of these varieties. If the trials are successful, the trees will be able to propagate themselves instead of requiring the slow process of propagation by cuttings. One of the insects, applicable to the Fig *Retusa*, came from David Fullaway, Entomologist with the Bureau of Agriculture and Forestry, who is now in the Orient. The insect enters the young fig and lays its eggs and the young generation as they emerge from the fig and fly to another tree, carry the pollen with them, and fertilize the seeds with the pollen. The process is repeated indefinitely and the presence of these insects affords the only means by which the tree can propagate itself.

T. S. V.

Milk versus Beef as food. Mr. C. T. Dowell in the 'Milk Dealer' discusses the relative advantages of using milk and beef as food. Milk is said to contain valuable food accessories called 'Vitamines' which are essential for growth and maintenance. It is said to contain proteins of a high quality easily digested by children. It also possesses mineral matter, chiefly lime, essential for growing children and a fat which is easily digested on account of its low melting point. He computes that from the standpoint of cost, it is cheaper to buy one's food in the form of milk than in the form of meat. Milk, he considers, to be a better food than beef. The cow is at least five times as efficient in the conversion of feed into foods as a beef steer.

I wish that the author would join the Cow-protection society of which we often hear in the papers. There is no doubt that the use of milk as food is a more humane way of making these dumb creatures cater to the needs of man for food.

T. S. V.

Rice.	Louisiana.	United States of America
Area sown in 1921	Acres 480,000	Acres 896,000
Average yield per acre	Bushels. 34.5	Bushels. 39.18
" price „ bushel	\$ 0.83	\$...
" farm value of this crop per acre	\$ 28.94	...

(The Louisiana Planter, January 7, 1922.)

Wheat. The latest bulletin of the International Institute of Agriculture, Rome, publishes the following information:—

	Area in 1000 of acres 1921.	Yield in 1000 of tons 1921.
France.	12,910	8,455
Italy.	11,780	5,165
Spain.	10,350	3,836
Roumania.	5,904	2,604
Germany.	3,562	2,621
England & Wales.	1,976	1,869
The area and yield of the 1921 crop in the United States of America are estimated at	62,408	21,292
Canada	23,261	8,059
Australia	9,733	3,902
Argentina	13,927	

(Indian Trade Journal, February 2, 1922)

The Agricultural Association has been formed at Chittoor with Mr. S. T. Gally, I. C. S., the Collector as President.

Exports. Bombay is the only port that has exported cotton seed; the quantity exported up to the end of 28.1.1922 being 12,319 tons.

Imports of Kerosine oil from Rangoon into Bengal for week ending 28.1.1922 were 8,200,187 gallons.
 into Bombay 416,579 „
 „ Madras 451,432 „

Cattle to the value of Rs. 19,96,000
 and Ghi do „ 32,94,000
 were imported into India during the half year ending September 30th, 1921.

The Cotton Crop for 1921—22, Fourth Report. The total area sown with cotton in Madras up to the end of January 1922 is estimated at 1,844,400 acres against 2,150,484 acres actuals last year and a 5-yearly annual average of 2,303,000 acres.

2. The decrease is general. It is most marked in the Northern and Western areas, owing to the failure of rains in August and September, which is the main sowing season in these areas. The decrease in the Coconadas tract is due to the lateness of the south-west monsoon. The decrease in the area under Cambodia cotton, grown as a dry crop, is responsible for the reduction in area in the central districts, and in the South.

A bumper yield is expected in the south, if the season continues favourable. Elsewhere yields below normal are expected. The total yield of the area sown is estimated at 383,600 bales, which is 5,700 bales more than last year's estimate. It is however too early to estimate this with any accuracy.

(From the Department of Agriculture, Madras.)

MADEAS PROVINCIAL COTTON COMMITTEE

(As constituted under G. O. 1895, Development, dated 11th October 1921.)

Official Representatives.

President.—The Director of Agriculture.

Members.—The Director of Industries.

The Government Cotton Specialist.

Non-Official Representatives

Mr. W. A. Turner of Messrs Binny & Co., Ltd., Madras.	Representing the Madras Chamber of Commerce.
Mr. Haridoss Visanjee, Manager, The United South and West Mills, Choolai, Madras.	Representing the South Indian Chamber of Commerce, Madras.
Mr. D. W. Osborne of Messrs. A & F Harvey, Virudupatti.	Representing the Chamber of Commerce, Tuticorin.
Mr. F. J. Stanes of Messrs. T Stanes & Co., Ltd. Coimbatore.	Representing the Cotton Marketing Association, Coimbatore.
M. R. By, Rao Sahib Vittaldas Anandjee Sait Ahi, Tirapur.	Nominated by Government

(From the Publicity Bureau.)

Estate News.

Mr. D. G. Munro arrived at Coimbatore from Trichinopoly during the 1st week of February and took charge of his duties at the Agricultural College and Research Institute as Assistant to the Principal, Agricultural College and the Superintendent, Central Farm, in the place of Mr. D. Ananda Rao transferred as Deputy Director of Agriculture, IV Circle.

The Scouts. The local troop of scouts and cubs celebrated the 60th Anniversary of the birth day of Swami Vivekananda on Sunday the 12th February on the Estate. There was a procession in the forenoon accompanied by a Bhajana party and a collection of money was made in aid of the Sri Ramakrishna Mission. There was a meeting in the afternoon, to which all the residents on the

estate had been invited, when speeches were made on the life and Teachings of the Swamiji as well as of his Guru Sri Ramakrishna Paramahansa.

The Officers' Club. There was a Tea-party at the club premises on Monday the 27th February at 5 P. M. in honour of the departure of one of its members—Mr. K. Ramiah, Assistant Economic Botanist—to take charge of the newly sanctioned Sub-station for breeding Paddy at Aduthurai, Tanjore District. A good many of the members spoke on the occasion, making felicitous references to his admirable traits as a friend and a colleague, and wishing him all success in his new sphere of work, Mr. K. Ramiah leaves for Aduthurai on the 1st March.

Students' Corner.

Students' Tour.

The senior students of the Proficiency course had their second agricultural tour of enquiry during the latter half of January last. They visited certain important agricultural centres in Tinnevely, Madura and Trichinopoly Districts. The tour began from Ambasamudram, an interesting wetland village of the Tinnevely District. The next place visited was Koilpatti Agricultural Station, where the students enquired into the agricultural conditions of the black soil tract and also acquainted themselves with departmental improvements. The next halt was at Sholavandan, another important rice tract under the Periyar system of irrigation. Here the students had the opportunity of studying and comparing the agricultural practices obtaining in these parts with those of the Tinnevely District. From Sholavandan the students went to Dindigul, where they halted for two days and visited some important tobacco gardens, Messrs. Spencer & Co's Cigar Factory, and Bombay Company's groundnut hulling factory. The tour came to a close with a day's halt at Pugalur in the Trichinopoly district, where the excellent cultivation of plantains and betel vines, especially on the Salem side of the Cauvery valley was noted. The tour was, we understand, on the

whole, instructive and informing. The Assistant Professor of Agriculture, Mr. T. V. Rajagopalachari and one of the Teaching Assistants, Mr. K. T. Bhandary, were with the students during the tour. Excellent arrangements for students' camping and enquiry were made by Mr. R. C. Broadfoot, Deputy Director of Agriculture VI Circle, Madurai and by Mr. D. G. Munro, Deputy Director of Agriculture, V Circle, Trichinopoly.

Foot-ball Match.

The final game in the Abraham Memorial football tournament, which commenced in the early half of November of last year, and for which only three teams competed, was, at long last, played between the London Mission School, the winners against the Government College, and the Agricultural College on the 11th of this month. The teams were equally matched, though the College had more opportunities to send the ball rolling between the posts.

The College, on winning the right to choose the side, allowed the opponents to sail with a strong wind. Within 5 minutes of the commencement of the game, the college centre forward put the outer right in possession of the ball, who rushing with it scored the only goal of the evening with a well directed cross shot, which completely beat the custodian. The game after this event was rather a tame affair, except for the very nice centres the outer right sent in, some of which were stopped by his colleagues in the forward line but not converted and the others actually allowed to go a-begging.

The school at times appeared very near scoring, but thanks to our stout defence, we successively averted the catastrophe by clever and accurate heading.

The college has to be congratulated on winning this cup for the first time, and also on the very enviable and unique distinction it has attained by also winning the Cricket Shield and the much-coveted Hockey Cup.

H. Shiva Rao.

Moonlight dinner.

Availing themselves of the serene moonlight of the Fullmoon on the 11th, the students had an enjoyable moonlight dinner on the maidan in front of the Pavilion.

Mr. K. Ramiah.

Mr. K. Ramiah received a hearty send-off from the students on the 25th February in honour of his impending departure on transfer to the charge of the newly opened Paddy Sub-station at Athurai, Tanjore District. As Assistant Warden—which post he ably filled for more than a year—he was very popular among the students and endeared himself to them. Mr. Swami Rao, Teaching Assistant in Agriculture, has been appointed in his stead and we wish him similar success.

Sericultural Lecture.

Mr. K. T. Acharya, the Government Sericultural Expert, delivered on the 18th February, a lecture on the "principles and practice of sericulture" to classes III and B (New Diploma class), amply illustrating it by an exhibition of specimens of silk worms, cocoons, yarn and breeding appliances.

Departmental Notes.

Appointments:—

Mr. M. Rajagopalan, M. A. to be Assistant in Chemistry on probation on Rs 100-5-150.

Mr. T. R. Rama Ayyar to be sub-assistant in Mycology, IV grade Rs. 75-4-95 on probation, under Rubber Mycologist, Mundakayam.

Mr. S. Venkataraman, L. Ag. 2nd clerk, Government Agricultural Chemist's Office to be lower subordinate V grade, in the agricultural section, V circle, Trichinopoly To draw Rs 51 in the scale Rs. 45-8-75.

Transfers:—

Mr. K. Ramiah, L. Ag., Assistant Economic Botanist, to be in charge of the new Lady Breeding Sub-station at Athurai, Tanjore Dt from 1st March 1923.

Mr. K. M. Thomas, Assistant in Mycology, Rubber Mycologist's Section, re transferred as Assistant in Mycology, IV grade, Government Mycologist's Section

Coimbatore, in the vacancy caused by promotion of Mr. S. B. Venkatakrishna Mudaliar to the Madras Agricultural Service.

Promotions :—

Mr. K. Jagannatha Rao, Asst. Agricultural Demonstrator, on probation V grade, promoted to upper division, V. grade, Agricultural Section, on Rs. 70-5-120 with effect from 1st October 1921, in an existing vacancy.

Reversions :—

Mr. S. Subrahmanya Ayyar, to be Agricultural Demonstrator I grade.
 " T. V. Narayana Rao from I grade S. P. T. to II grade permanent
 " V. Muthuswami Ayyar II " " III " "
 " A. Chinnatambi Pillai III " " IV " "
 " Rajagopal Mal G. IV " " V " "
 " M. P. Sankaran Nambiar, to be considered S. P. T. in an existing vacancy from the 7th February 1922.

Leave :—

Mr. K. Krishna Menon, Assistant in Mycology, privilege leave for 4 weeks from 18th February 1922.

Mr. A. Koudayya Sarma, Assistant Agricultural Demonstrator, privilege leave for one month and furlough on medical certificate on full pay for 22 days in continuation of the last Christmas and new year holidays.

Mr. V. Achyutham Pantulu, Assistant Agricultural Demonstrator, privilege leave for 15 days from 22nd December 1921 and furlough on half pay for 20 days in continuation thereof.

Mr. A. Ramaswami Ayyar, Assistant Agricultural Demonstrator, privilege leave for 30 days, from 20th February or date of availing.

Mr. M. Ramachandra Nayudu, Assistant Agricultural Demonstrator, extension of furlough on half pay for three months.

Mr. B. S. Narasimha Aiyar, Assistant to the Government Agricultural Bacteriologist, 15 days privilege leave from 3rd March 1922.

Mr. M. L. Narayana Reddy, Assistant Farm Manager, Madras, privilege leave for 15 days from 6th March 1922.

Mr. M. Mangesh Rao, Agricultural Demonstrator, Mangalore, privilege leave from 8th to 28th March, 1922.

Mr. S. Sabbayya, Agricultural Demonstrator, III circle, privilege leave for four months from or after 23rd March 1922.

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No. 3.

Editorial Notes.

University Affiliation.

We are glad to announce that the affiliation of the Agricultural College, Coimbatore, to the University of Madras was passed by the Senate at a meeting held during the month. The question of affiliation is neither new nor recent. As early as 1881 or 1882, a few years after the Saidapet College was established, the subject was mooted, the then Principal, Mr. W. R. Robertson, being appointed a fellow of the University. It was kept in abeyance pending the results of the working of the Technical Examinations Scheme into which the college curriculum was fitted. This scheme was modified a number of times during the following two decades by half a dozen committees that sat from time to time. The staff of the College in giving evidence before the Agricultural committee of 1889, of which Sir Frederick Nicholson was the Secretary, pressed the question of affiliation and the committee strongly recommended the same to Government, who did not, however, accept it. Syllabuses framed in the earlier years suited rather the Technical Examinations Scheme than the actual requirements of an Agriculturist. It was only about the year 1902 that proper curricula were framed by competent experts, like Mr. Mollison, Agricultural Adviser to the Govt. of India and Major

Leather, Agricultural Chemist, but the question of affiliation was still kept in abeyance. Even after its transfer to Coimbatore the question of affiliation was not accepted generally, until two years ago, when His Excellency Lord Willingdon, then in charge of the Agricultural Portfolio and Dewan Bahadur L. D. Swamikannu Pillai, then acting Director of Agriculture, started the new courses of studies at the College with Intermediates and Graduates in Science as recruits; and the formal recognition of the courses by the university has, at long last, followed.

The examinations for the Degree of B. Sc. in Agriculture will consist of the 1st and 2nd B. Sc. examinations at the end of the 2nd and 3rd years' courses of studies respectively. The subjects for the 1st B. Sc. will be Agriculture including Animal Hygiene, Agricultural Engineering, General Chemistry, General Botany and Plant Pathology (Entomology and Mycology). The minima are 33% in each of the above 5 subjects and 50% of the total for a Pass and 66% of the total for a 1st Class. The subjects for the 2nd B. Sc. will be Agriculture, Agricultural Chemistry and Agricultural Botany, the minima being similar to the 1st B. Sc.; but a candidate will have to get 66% in Agriculture, apart from the total, for securing a 1st Class degree. Students must pass in 1st B. Sc. before proceeding to the 2nd, but those of the present 2nd year course will, by a transitory regulation, be allowed to appear for both the 1st and 2nd B. Sc. in 1923.

Agricultural Education in Madras has been certified by various examiners to have been in no way inferior to that imparted in other Provinces. For nearly three decades, Bombay had been awarding the L. Ag. Degree when Agriculture was an adjunct to the Poona College of Science and more recently has been giving the B. Ag. and M. Ag. degrees to the students of the Poona Agricultural College. In 1918, Lyallpur Agricultural College was affiliated to the Punjab University, which gives B. Sc. and M. Sc. degrees to its Agricultural Graduates. The affiliation of Cawnpore Agricultural College to the Allahabad University is, we hear, nearly, if

not already, accomplished, while the opening of a University at Cawnpore has been referred to a committee of which the Director of Agriculture, U. P. and the Principal of the Agricultural College are Members. Nagpur is now considering the question of affiliation. Under these circumstances, we can only say that Madras has been rather unduly cautious in this matter.

We hope, however, that this affiliation will in no way impair the efficiency of the Certificate course as is feared by some. There is room for both the University and the Certificate courses, just as there is room for Medical and Engineering Graduates and Sub-Assistant Surgeons and Overseers. We congratulate the College staff and students on the institution of the University degree and are confident that the Agricultural Alumni of the University will so conduct themselves as to bring honour and credit both to the University and to their *alma mater*.

Annual Report—Madras Agricultural Department.

We are glad to be able to congratulate the Madras Agricultural Department on their report of another very successful year (1920—21). The year under review records uniform and steady progress in various directions and the Government have in their lengthy order shown their appreciation of its activities. A change in the standard of admission to the higher course was initiated during the year and a movement was set on foot towards the affiliation of the college to the Madras University—which became an accomplished fact this month. The Government feel specially interested in the success shown in the production of strains of high-yielding paddies and in the distribution of 128,000 lb of such strains to the public, and desire that future reports may be accompanied by a statement as to how far the practice of single seedling planting has been adopted in different districts. They further require definite information to be given regarding the chemical manures the use of which the department is now prepared to advocate, and the extent to which they have become popular. They

also show appreciation of the scientific experiments made by the Sugarcane Expert and the botanical work on South Indian grasses by Rai Bahadur Ranga Achariar. The enforcement of the Pest Act was extended during the year from Coimbatore to the neighbouring tracts of Salem, Trichinopoly and Madura districts. The report shows the existence of dissatisfaction among the ryots of the tracts affected on the loss incurred by the premature destruction of cotton plants, but such complaints disregard the fact that the infestation increases with great rapidity in August and that the result on the succeeding crop is disastrous, while the actual profits of disobeying the order are small. The Director reports that the quality of cotton produced has proved better and the price paid at the mills higher, as a result of the enforcement of the Pest Act. Practical results have been achieved by the Govt. Mycologist by measures demonstrated against the Mahali disease of arecanut and the mildew of the grape vine.

The Government remark that the figures quoted under Demonstration are a testimony to the energies of the district staff and will repay careful study. As instances, we may mention that 415 villages have had the benefit of demonstration of the copper sulphate treatment of cholam seed against cholam smut, and more than three-fourths million pounds of seed of improved strains of cotton have been distributed: a very creditable achievement on the whole.

In conclusion, we find it hard to refrain from adding our humble tribute to the memory of the late Mr. G. A. D. Stuart and to endorse every word of Mr. Hilson when as acting Director he recorded, "We have lost a chief whose sympathy with us was robust, who never promised if he saw no chance of performing, who, if he promised to help, helped to the best of his ability, and who never took credit that was due to another."

Punjab Experience.

Mr. C. A. H. Townsend, Director of Agriculture, Punjab, in the course of his Report on the operations of the Department of Agriculture, Punjab, remarks as follows regarding the qualifications of students entering the Lyallpore Agricultural College. "Our present degree or main course takes entrance-passed students for a four years' course in English. But as experience has shown, so deficient is the general knowledge, particularly of English, of these students, when they enter the College, that much of their time, during at any rate their first two years there, is taken up with English and Elementary Science, subjects which should have no place in an Agricultural College. I am inclined to think the eventual solution may be to take students only when they have passed the Intermediate Examination in Science of the Punjab University, as is, I understand, the practice at the Medical College. A three years' course at the Agricultural College would probably then fit them for the degree in Agriculture....."

This is interesting as it forms an instructive parallel to the experience in our own Province of Madras.

Plantain and Paddy cultivation in a Trichinopoly village.

BY N. R. RAJAGOPALAN.

Nangavaram is a village 12 miles west of Trichinopoly. It has 2,500 acres of wet land, of which about 1,000 acres are under plantains and the rest, under paddy. From a long time past the village has been noted for its cultivation of Valan (tailed) paddy. Plantains were not known until some 35 years back, when Rasthali was introduced for its sweetness and its big-sized fruits. Gradually the Poovan or Erode plantain began to oust it because of the larger number of fruits and the demand for it from Dharwar, Guntakal, and Poona. Rasthali ripens more rapidly and the fruits fall off more easily from the bunches under the rough usage incidental to long

distance travel and thus the Poovan is preferred from a commercial standpoint. Whereas there are about 250 fruits of 8 to 15 hands in Poovan, there are only 100 fruits of 4 to 9 hands in Rasthali. Other varieties are the Pachai valai and Pachai nadan, which bear 4 to 9 hands with 150 fruits per bunch.

The village affords a good scope for the successful cultivation and disposal of agricultural produce. The three Railway stations of Elamanur, Perugamani and Pettaivaithalai are conveniently near. Until 20 years back sugarcane was common and was only given up owing to the intrusion of plantain and the consequent diversion of labour to other channels. Further it is attributed to the comparatively higher cost and the inconveniently slow process of crushing with the indigenous wooden mills. Turmeric shared a similar fate.

This village has a separate irrigation channel, which takes off from the Cauveri near Pettaivaithalai. In low water temporary dams or *koramboos* are constructed across the river and the water diverted into the channel. The channel repairs are done by the villagers conjointly. The sluice and the source are under the control of the P. W. D. The portion of the channel higher up the sluice often gets silted up in September and October and the water supply in the channels becomes inadequate for the plantain and the newly planted Samba crop. Crops are watched by the Kavalgars or watchmen who receive mamools at a recognised rate per acre.

Natural irrigation and drainage facilities exist. A high level land is considered suitable for plantain. Clay soil with plenty of humus or clay loam is preferred. In these soils a three years' crop of plantain can be raised. Sandy soil comes next, but it cannot grow three crops in succession. For sandy soil heavy manuring has to be given and the yield is very low. The greater expense incurred in the frequent removal of the earth slipping from the sides into the trenches is another drawback. Rotation usually adopted is 4 years paddy, 3 years plantain immediately followed by one year of Kuruvai, Valan or Samba paddy.

Lands are commonly held in lease for four years and they are taken back after the harvest of paddy. The rate is 1 to 1½ Rs. per

cent of ground a year. Half the lease amount is paid in advance and the other half, at the termination of the period. The aim in keeping the land for one year after clearing plantains is to return the land in the same state as it was given by the proprietor, as a safeguard against delayed bunches of the plantain.

In most cases the lands are cultivated by the owner, but in two different ways. In one case, the landlord uses his own cattle for ploughing and pays the labourer one kalam of paddy for every 1¼ acres along with 1 kalam for every 12 kalams of paddy but no straw. In the other, the labourer uses his own cattle and gets a sixth of the paddy as also half the straw. In both cases the landlord bears the cost of seed, implement, manuring, extra work incurred in levelling, etc.

Season and age of plantain. For Rasthali the season is that which covers the Tamil months Panguni, Chitharai and Vaikasi (March—May). Poovan is planted in Arpasi—Thai (October—January). Thai and Masi (January—February) are the best. Patchai valai and Patchai Nadan are planted in Vaikasi to Adi. Poovan is a 12 months crop. Rasthali matures in 15 months and Patchai Valai, in 10 months. Rasthali withstands drought and wind and the fruits which ripen in summer are sweet. Poovan suffers from heat and wind, but the fruits being borne in the rainy season are big and numerous.

The preparation of the land. When the land gets dry after paddy harvest, it is given a mamutti digging and allowed to weather. When it becomes loose and friable and gets reduced to fine particles, water is let in. The fine particles of clay go together and form a spongelike mass which retains moisture sufficiently long to enable the suckers to shoot.

Seed and seedling. Suckers are secured from well-grown bearing trees of the first or the second year, preferably the latter. They should be round and stout and well formed. They are topped and the roots pruned. At 800 per acre, suckers are planted in parallel rows 8 to 9 feet apart both ways. When the spacing is less wide the crop gets covered with leaves and inferior fruits and delayed fruiting result. One or two days after planting ashes or farm yard

manure are applied round each sucker at 10 cart loads per acre. This preserves moisture and aids the suckers to strike new roots.

The next consideration is the construction of irrigation and drainage channels. Irrigation channels also serve as drainage channels for draining off surplus water. Care is taken to see that no water stagnates. Within a week after planting, trenches are dug 1' x 2' between two rows. Cross trenches are also dug so that six, and at times seven, plantain trees are enclosed in each bed or bund. The soil dug out is thrown over the bed. Later on one mamooty hoeing and levelling is given to aerate the soil, to conserve the moisture and to facilitate the spread of roots. In a week or two the shoots come up and as the soil gets dry, water is let in and kept standing in trenches, until the whole surface gets soaked, when it is drained. Poovan requires irrigation immediately after planting, but for Rasthali it may be given a month later. Usually one irrigation is given every month and occasionally two. The next operation is securing the stem with fibre as soon as the shoots come up. Any dried portions of the sheaths are pruned from time to time. The side suckers are removed once a month. During the third month the trenches are dug one foot deeper and cleaned once a fortnight. Two weedings are usually given during a month.

Manure and manuring. Plantain is an exhausting crop and it requires very heavy manuring. The manure applied is farm yard manure or pig dung. Now-a-days the scarcity of pig dung has ushered in ground-nut cake and tannery refuse. In the fifth month shallow trenches are dug round the stem and crushed ground-nut cake is applied at two barams per acre (1 baram equals 500 lbs). When this is not available, 15 cart loads of farm yard manure or 10 bags of tannery refuse mixed with ashes are applied. Immediately after the application of poonac, irrigation is given to promote its early decomposition. An improvement that may be suggested is to grow Dhaincha on the bunds and work it in sometime before applying poonac. Fish guano may be applied at 4 to 5 cwts., per acre. As yet this manure has not been given a trial by the ryot.

In the 5th and 7th months the trenches are dug a foot deeper. Whenever the soil gets hard, it is hoed and the mulch preserved. During the 6th or the 7th month, the sheaths are tied round to prevent splitting. Flowers appear in the 8th month. In the case of Rasthali, the flower bunches are tied well inside the leafy envelopes with plantain fibre, so as to protect it from the cold weather of Margali (December). Bunches take four months to mature. When the Poovan plantain is in bunches, one sucker is allowed to remain as a ratoon crop. In the case of Rasthali even in the 7th month one sucker is left for each plantain.

Harvest. Plantain comes to harvest in 12 months. Sometimes it takes as long as 13 or 14 months. In extremely moist conditions, bunching is delayed. In sandy soil fruit comes up slowly. In hot and windy seasons plantain, especially Poovan, requires special attention. It has to be supported with bamboo poles. Poovas finds a ready sale in Madras and is disposed of through commission agents, who are local people and get six pies per bunch. The bunch alone is cut and the stem is left, to help in the transfer of the food material from the stem to the ratoon crop. A poovan bunch costs roughly about half a rupee. Leaves are not sold even from fresh ratoons. The side suckers are sold or thrown away. Two crops of ratoons are taken. There is less of expenditure with these later crops. There is no digging of trenches. Manure is applied in the 5th month. The tying of bunches and stem, weeding and mamooty hoeing and other operations are similar to those given to the first year crop. Sometime back, Cambodia cotton was sown in lines in the bunds, but proved unsatisfactory. An attempt to extract fibre from Pachaivalai failed owing to an insufficient knowledge of the industry.

Paddy crop. After plantains the field is dug with a mamooty at Rs. 30 an acre, irrigated and puddled. Sadai Samba (a five months variety) is planted. Soaked seed at 30 M. M. per acre are broadcasted. Single planting is rare, but from bunch planting ryots have changed to economic planting.

Kolinji, Avarai, Erukkam, and Veppam leaves can be had with difficulty as head loads from dry lands near by. Kolinji is purchased at 10 annas per 100 small bundles. It requires nearly Rs. 20 worth of leaves for one acre. Pungam, and Erukkam are bought at 4 annas per head load. People have not yet understood the advantages of growing Daincha, Sunhemp or wild indigo in the field itself. Nearly 1½ months after sowing, thinning and filling in is done. Water is withheld until the seedlings show signs of fresh growth, which is indicated by a change of colour. Then Neem poonac worth about Rs. 20 is applied as top dressing. Two to three weedings are given. The crop comes to harvest in January and the yield is 20 to 25 Kalam per acre. One kalam equals 43 M. M. and costs Rs. 5. 10 head-loads of straw worth about Rs. 10 can be had from an acre. Generally two crops of paddy are raised in a double crop land, one, a Samba and the other, a Kuruvai or Valan, a 3-to 4-months crop sown in March and harvested in August. This crop practically receives no other treatment than one or two ploughings. Seed is mostly broadcasted. A total expenditure of Rs. 80 is made on the second crop of paddy.

The value of first crop of paddy, Rs. 135/- and of the second crop Rs. 40/-			
			Total
Expenditure for 4 years on one acre of land of plantain and paddy.	Rs.	A.	P.
Plantain.	175	0	0
Mamooty digging	15	0	0
Cost of 800 suckers	10	0	0
Lifting, carrying and planting suckers at 12 annas for 100 suckers	6	0	0
10 cart loads of ashes or farm yard manure and application	15	0	0
2 barams of groundnut cake at Rs. 18 per baram and application	40	0	0
Digging trench first time	15	0	0
do. second time	7	8	0
do. later	10	0	0

Mamooty hoeing thrice	18	0	0
Hoeing and weeding 12 times	24	0	0
Scraping out slipped soil Rs. 2—8—0 a month	30	0	0
Removing side suckers 10 months Re. 1/- a month.	10	0	0
Tying plantain.	4	0	0
Tying flower bunch.	2	8	0
Propping with bamboo poles at 1 anna per pole.	50	0	0
Irrigation.	20	0	0
Kaval.	5	0	0
The charges of harvesting are borne by the merchant.			

Expense for the first year.	282	0	0
second year.	150	0	0
Third year.	100	0	0
Total expenses	532	0	0
Lease for four years.	400	0	0
Expense on the two crops of paddy.	80	0	0
Total expenses	1012	0	0

Out of 800 bunches produced per acre only 700 will be fit for sale. The price for 700 bunches at 8 annas a bunch is Rs. 350.

For three years the total money value.	1050	0	0
Yield from paddy.	175	0	0

Total	1225	0	0
Deduct Expenditure.	1012	0	0
Net income for lessee for 4 years.	213	0	0
— do — for 1 year.	Rs. 53	4	0

There has recently been started a co-operative society with a capital of Rs. 15,000 which, in addition to other work, is purchasing manure on a large scale and selling to the ryots at about cost-price. It also lends money to cultivators at ordinary interest and is thus more or less proving a real boon to them.

Agriculture in the time of the Mauryas.

P. R. SUBRAMANYAM.

(Continued.)

Condition of Agricultural labour and of the Agricultural classes in general. Generally, the agricultural labourers were recruited from the classes of Vaisyas and Sudras, the two lower orders of the fourfold caste system. Slaves, prisoners, *grama-bhrithyas* and free labourers who worked for wages, formed the principal type of agricultural labour mentioned.

Labourers, while they were employed, received wages in cash or in kind, board, lodging and drink in proportion to the work done by them and when they were employed for more than a month a sum of a pana and a half was also paid to them.

Labour legislation, with regard to domestic industries, is animated by a broad spirit of equity, neither the employer nor the employed being placed at the mercy of the other. It was obligatory on their part to settle the conditions of employment in the presence of their neighbours, whose evidence, in the event of any dispute, was taken as conclusive. The servant was entitled to the promised amount of wages. If the wages were previously not settled they received wages according to the quality and the time taken in doing the work. If the agricultural labourer was employed for a complete season, he was to get for his wages $1/10$ of the crop yield and a herdsman $1/10$ of the butter clarified.

The employer was liable to a fine of 5 times the amount of wages or 6 panas in case of failure to pay wages, and 12 panas, or 10 times the amount of wages for misappropriating the same. If an agricultural labourer did not stick to the work as per agreement, he was to refund double the amount of wages and also double the value of food and drink he was supplied. Substitutes were allowed in case the employee was involved in calamities.

Kautilya also mentions guilds of workmen with separate regulations for their guidance. All the fines collected for breaking

these agricultural labour regulations were appropriated for the use of the village.

Lest husbandmen bred in principles of industry and sobriety, be led into temptations, Kautilya lays down these admirable rules for the efficiency and conservation of agricultural labour. "Lest workmen spoil the work in hand, liquor shall be sold in country-parts to persons of well known character in small quantities." "Nor with the view of procuring money, free labour, commodities, grains, or liquor in plenty, shall actors, dancers, singers, drummers, buffoons, and bards make any disturbance to the work of the villagers, for the helpless villagers are always at work in their fields, being entirely dependent on cultivation for their livelihood."

The condition of the agricultural classes. As already pointed out, vaisyas and sudras formed the chief agricultural classes. They were landholders by themselves and also cultivated the fields of others in return for a portion of the produce without any proprietary interest in the land. We have ample reasons to believe that private ownership of land was in existence then.

More probably to stimulate production, than to infringe on the rights of landholders, Kautilya lays down that "lands may be confiscated from those who do not cultivate them and given to others" or that "they may be cultivated by the aid of village labourers and traders," lest there should be a decrease in revenue by keeping lands uncultivated—a rule which finds a place in the Rent Recovery Act of modern days in India.

State aid to Agriculture. It was one of the chief duties of the King as detailed by Kautilya "to protect agriculture from the molestation of oppressive fines, free labour, and taxes." In addition to the facilities given and concessions granted for private irrigation works, if uncultivable lands were acquired for cultivation, either by mortgage, purchase or in any other way, there was a rule, according to Kautilya, whereby taxes could be remitted for two years. In times of scarcity the state undertook to provide cultivators with seeds and provisions. It may be added that, in times of calamities, cutting and carrying off branches of such trees as would be useful

for axles of carts etc., was not considered as an offence punishable under any forest law. As an incentive to a regular payment of Sirkar dues a favourable supply of grain, cattle and money was given to the ryots. Seeds imported from other parts of the country were exempted from oppressive tolls. In addition to this Kautilya concedes the enviable privilege of freedom from arrest for debts, while engaged in work on their fields,—a privilege shared only by Government servants.

While they enjoyed these privileges, they had certain definite obligations to the government, and to the communal life of the village. In addition to their contributions to the exchequer, they had to supply free labour for the building of forts and other government buildings. They had to co-operate in the preparation of public shows and it was imperative on their part to obey the order of any man to do a work productive of good to others. The 'parental government' assumed great responsibilities for the well being of their subjects. Their means, their uses and abuses of their private finance, and their ways of life were under the close observation of the state. Under the Collector—General, there were some subordinate officers called Gopas, whose duty it was to make a complete census of the inhabitants of the whole village according to their castes and professions, and also of the agricultural live-stock of the village for purposes of assessment.

Not satisfied with such public enquiry, "spies disguised as ascetics and house-holders were employed to 'ascertain' the total number of men and beasts as well as the amount of income and expenditure of each family and also as to the proceedings honest or dishonest of cultivators and cowherds. These reports both public and private were recorded in various registers maintained separately for them by the superintendent of accounts, whose business it was to keep an account of the history of customs, professions and transactions of countries, villages and families and corporations."

Some of us, who have witnessed the strange developments assumed by the spy system in general, under German Kultur, may be tempted to rush to conclusions. But the conviction is borne in upon

us more and more as we proceed, that these, far from being the highly organised engines of tyranny and oppression, were the unique and conscientious attempts of a state for the first time in the history of the whole world, to make a thorough and trustworthy enquiry about the agricultural, economic and moral condition of the people throughout the empire and the enquiries were necessarily private, as the state cared more for accuracy and utility and aimed at their real welfare.

The condition of the agricultural class and of the general agricultural prosperity of the state is well described in the following unsophisticated words of Megasthenes. "They—the agriculturists—devote the whole of their time to tillage, nor would an enemy coming upon a husband-man at work on his land do him any harm, for men of this class being regarded as public benefactors are protected from all injuries. The lands thus remain unravaged and produce heavy crops, which supply the inhabitants with all that is required to make life enjoyable" and continuing, the Greek writer affirms "that the dark shadow of famine never crossed India, and that there has never been a general scarcity in the supply of nourishing food." Will any of the most modern and enlightened governments desire for a higher eulogium upon the results of their administration than is bestowed in the above-quoted simple words of this veracious traveller?

Insects as carriers of Disease.*

P. SUSAINATHAN, F. E. S.

Microbes and bacteria are present everywhere, and unknown to ourselves, we meet with hordes of them in our daily life; nay, the very atmosphere we inhale is full of these micro-organisms. There is perhaps more truth than fiction in the following newspaper jingle:—

• "Sing a song of microbes

Dainty little things,

Eyes and ears, and horns and tails,

Claws and fangs and stings;

1.

* Being the gist of an article contributed by the writer to the Magazine of the St. Joseph's College, Trichinopoly (1913.)

- Microbes in the carpet
Microbes on the wall,
Microbes in the vestibule,
Microbes in the hall. 2.
- Microbes on my money
Microbes in my hair
Microbes on my meat and bread,
Microbes everywhere. 3.
- Microbes in the butter,
Microbes in the cheese,
Microbes on the knives and forks,
Microbes in the breeze. 4.
- Friends are little microbes,
Enemies are big
Life among the microbes is
Nothing 'infra dig.' 5.
- Fussy little microbes,
Millions at a birth,
Make our flesh and blood and bones,
Keep us on this earth." 6.

Of the innumerable micro-organisms we find around ourselves, however, a very great number are absolutely harmless, while some may be considered even useful, but it is the harmful forms, definitely known to cause deadly diseases in man and our domestic animals, that loom large in the public eye. For example, the plague, the cholera, malarial fever, typhoid fever, sleeping sickness and various other similar ills, mankind is subject to, are due to definite species of microbes and germs. Some of the bacteria are capable of spreading from man to man either by contact or through the medium of air, but the greater number is carried from one person to another by the mediation of insects. The malarial germ, for example, is conveyed from a malarial patient to a healthy man by the biting of the malarial mosquito, while *Bacillus pestis*, the plague microbe, is conveyed from rat to man by the mediation of the Rat-flea. In these cases, the steps to be taken for the prevention or spread of the disease therefore include the destruction or avoidance of the insects that carry the germs.

Instances of insects that have been proved to carry disease are indeed numerous and in most cases a study of their adaptations to suit this purpose are very interesting. It may be useful and instructive to examine in some detail a few of these adaptations.

Malaria is a fever with which most of our readers are probably familiar. It is perhaps not generally known that it is responsible for a larger number of deaths in India than any other disease. Giles declares that cholera and plague are insignificant enemies in comparison, that kill perhaps a few thousands a year—in an impressive way, it is true—but the quiet insidious malaria carries off its millions. The fever is caused by the microbe *Plasmodium* which attacks the red corpuscles of the blood. It is carried by mosquitoes of the *Anopheles* group.

Our domestic mosquitoes which sing us lullabies by night are roughly divisible into two classes: the *Anopheles* group and the *Culex* group. These can be distinguished at a glance by the posture adopted by them when at rest. While in the *Culex*, (Fig. 1), the body is parallel to the wall on which it rests, in the *Anopheles*, (Fig. 2) the body is tilted up at an angle of nearly 45° with the surface of the wall. Mosquitoes breed in water and the eggs laid on water hatch into worm-like forms known as "wrigglers" which one notices in rainwater pools. These wrigglers later on transform into the winged mosquitoes. The "wrigglers" of *Anopheles* mosquitoes are easily distinguished from the

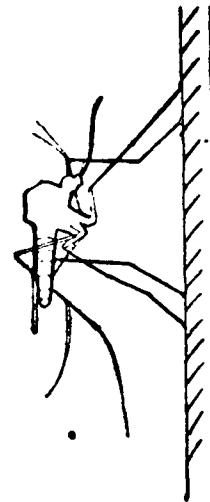


Fig. 1.
Culex Mosquito resting on wall (After Fletcher.)

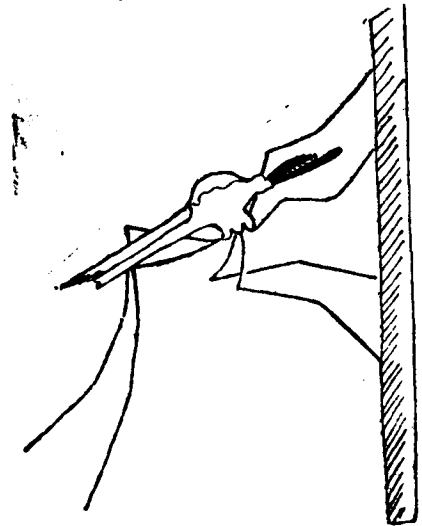


Fig. 2.
Anopheles Mosquito resting on wall (After Fletcher.)

Culex "wrigglers," by their bodies remaining parallel to the water surface, while in the latter case, they hold up their tails and hang head downwards.

An *Anopheles* mosquito biting a malarial patient sucks up a quantity of "*Plasmodium crescents*" and is in turn infected. The malarial parasite has to undergo a cycle of developmental changes in the body of the mosquito, before it is able to infect a fresh human subject and it is therefore important to note that some days have to elapse before an *Anopheles* that has fed on a malarial patient acquires the power of infecting a healthy man. When mature, the parasite bodies invade the salivary glands of the mosquito and when next the infected *Anopheles* bites man, some of these microbes get into his blood and invade his blood corpuscles, whereupon the malady gets a footing in his system.

Whenever possible one should try to avoid mosquito bites. In localities known to be malarial—and in fact in any new place, the character of which is not known—it is imprudent to go to sleep unprotected by a mosquito net. When this is not available, the mosquitoes may be kept off the exposed parts of the body by the application of a little mosquito-oil, which is prepared, "by adding sufficient citronella or lemon-grass oil to equal parts of kerosene and coconut oil, to give the mixture a distinct smell of citronella. This mixture is effective in repelling mosquitoes and does not irritate the skin, while one application lasts for 6—8 hours."

Mosquitoes breed in marshy soil and consequently the draining of marshes has the effect of lessening malaria. In rain water pools and stagnant sheets of water, application of kerosene to the water surface has the effect of stopping the breeding of mosquitoes.

Moreover certain species of fresh water fish are known to be effi-

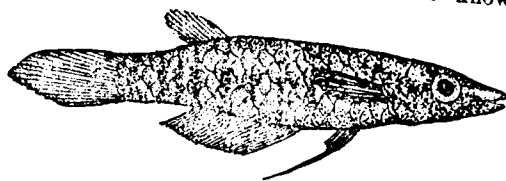


Fig. 3.

Haplochilus—a fish feeding on Mosquito larvae (From Fletcher's S. S. I Insecta.)

cient destroyers of mosquito-larvae, and in India the importance of the protection of such fish cannot be sufficiently emphasised.

As to the therapeutics of malarial patients, it might be stated that quinine is a specific and its use is indispensable.

(To be continued.)

Lessons in Nature Study.

3

Water plants—(Contd.)

P. S. JIVANNA RAO.

Typha bispinosa. (Water chestnut, Bull nut.) This plant appears to be getting rarer in this Presidency and the exact places where it occurs are not known with certainty. The writer saw this, about ten years ago, in the tanks close to Nagercoil in South Travancore and has not come across it in any of the other places since visited. An allied plant *T. natans* is believed to be in course of extinction in the countries where it once existed e. g. Belgium, Holland, Sweden etc. and to save the Indian plant from a similar catastrophe, it may be necessary to cultivate it extensively in gardens and tanks, firstly because of its rarity and secondly for the sake of its fruits, which are of high economic value as they contain starch and are eaten either raw or cooked in certain parts of this country under the name of Singada nut.

The plant offers a good material for study and where it cannot be had fresh, mounted specimens and fruits ought to be procured if possible.

The stem is submerged and several feet long and bears numerous adventitious roots which contain chlorophyll and assimilate. Leaves are crowded and form a compact rosette which floats on water. The leaf blade is rhomboid in shape and toothed on two of its sides and the leaf stalk has a characteristic swelling near its end which is an efficient adaptation for floating. The flowers are small and white and contain 4 sepals, 4 petals, 4 stamens and a two-celled ovary which is situated below the other parts. The fruit ripens under water and

later carries two spines which represent two of the sepals and resemble the two horns of a bull, whence the name 'Bull rut.'

Limnanthemum. Of the two species, *L. cristatum* is much the smaller and is common throughout the Presidency. In habit it resembles the young stages of the Water Lily, but an important difference in the nature and origin of the shoots must be noted. The long stalk given off from the underground portion bears a leaf in addition to the flowers and by careful study it has been found that it really represents a stalk of the flowering shoot, the leaf actually arising near its top and possessing a small stalk of its own. One advantage is claimed to be that whereas in *Nymphaea* the assimilated products from the leaf must reach the root stock and then be utilised by the flowers, in *Limnanthemum* they may reach the developing flowers directly as both the leaf and flowers are situated side by side being elevated on a common stalk.

The flowers are massed in clusters and the corolla when expanded appears attractive. The plant is known as Kumuda or Kumudvati and interesting references may be found in Sanskrit works.

Ipomea aquatica. A weed sometimes seen growing on the margins of tanks with more or less unbranched stems floating on water and attaining considerable lengths. The plant roots at the nodes and holds both leaves and flowers above water. The leaves are single and roughly arrow-shaped. The flowers are large and conspicuous with a 5-lobed calyx, a tubular white corolla, 5 unequal stamens and a 2-celled ovary.

The plant is allied to the sweet potato (*I. Batatas*) and the young shoots, leaves and roots are said to be eaten as vegetable.

Utricularia. The bladderwort is a unique plant, which is interesting not only as an aquatic of a very specialised nature but also as being one of those few plants which have adopted a carnivorous habit.

Roots are absent and the plant is completely submerged. It consists of an elongated axis which produces finely divided leaves on which the small bladders (utricles) are borne. Each bladder is a hollow spherical structure with a small aperture which is protected by

a valve opening inwards. Small aquatic animals are attracted by the secretions of the hairs covering the bladder and the creatures ultimately find their way into the bladder when it is 'hungry' and open and are there digested. There can be no better device in nature for alluring animals into plants, and it has been proved by experiment that the plants show only half the growth, when deprived of animal food. It must be noted that the bladder is a special arrangement for the nutritional requirement of the plant and not to serve as a floatative apparatus. For the plant is said to float even when all the bladders are removed.

The Utricularias are by no means very common and a careful search of ponds in several places will be necessary before one could be sure of the specimen. It is of some help to know that the flowering axis is raised above water and the flowers are often conspicuous by their colour. In *U. stellaris* the flowers are yellow and there are a few air-containing organs serving as floats at the base of the flowering shoot.

Ceratophyllum demersum. This is a completely submerged aquatic which is without roots and the leaves appear in whorls and are narrow and finely divided like the horn of the deer, whence the common name 'hornwort.' The flowers are unisexual, small and inconspicuous and develop completely beneath the surface.

Elodea canadensis. Omit.

Hydrilla verticillata. A submerged leafy herbaceous plant which occurs in large masses and is common in tanks of varying depths, in small channels and sometimes in paddy lands. The plants are dark green in appearance and the leaves are small, thin and narrow and arranged in tufts of 3 to 6 or more. The stems are thin and brittle and roots are thrown at the nodes.

This aquatic has an enormous capacity for vegetative propagation and fresh colonies are formed in new places by the chance introduction of small portions of shoots. The flowers are unisexual the male and female elements being found in different plants. Pollination occurs above water.

Vallisneria spiralis. This aquatic is fairly common and displays interesting adaptations for life in water. It is entirely submerged and is fixed to the soil by means of its roots. The stem adopts a running habit, rooting at the nodes and producing tufts of shoots at intervals and in this way the vegetative reproduction of the plant is assured. The leaves are narrow, long and ribbon-shaped and their length varies very much according to the depth of water.

A remarkable feature of the plant is in the method of pollination. The male and female plants are separate. The male flowers occur in large numbers (up to 2,000 or more in a single spathe) and by getting detached they come to the surface in a closed condition by means of the air bubbles present in them and then open. The female flowers which are solitary also come to the surface raised on spirally coiled and hence adjustable peduncles and receive pollen grains from the male flowers which are drifted by the air-currents. After pollination the peduncle contracts by coiling and the further maturation of the fruits is completed under water.

Ottelia alismoides. In this plant the stem is absent and the leaves appear in tufts above a mass of roots which are sunk in mud. The leaf stalks are long and the blades are extremely thin and curiously folded inwards (involute). The flowers arise from the axils of leaves and are raised above the surface of water on long peduncles. There are 3 sepals, 3 petals, 6-15 stamens and a 6-celled ovary and all these are surrounded by a common spathe which has 5 to 6 unequal wings.

Reviews.

COW-PROTECTION.

The January Number of the Agricultural Journal of India contains a very thoughtful article on this subject by Mr. W. Smith, Imperial Dairy Expert.

The "protection of the Cow" is one of the cardinal points of the Hindu Religion and is a subject dear to the heart of the pious Hindu, as is evidenced by the establishment of institutions

like Finjrapoles and Gowsalas, devoted to the care of aged or infirm cows. This religious belief has a real foundation in principles of Political Economy as far as the conditions of India are concerned, for, as the author remarks, the diet of the bulk of the Indians is mainly vegetarian in character and is largely dependent on milk and milk-products, such as curds, ghee and butter, for the supply of the necessary animal fats and proteins. In view of these facts, the writer declares that "even from a purely utilitarian point of view, it is good to have a very special regard for the cow and all which pertains to her well-being, and consequently cow-protection is a necessary plank in the economic platform of Indian progress."

The recognition of this principle has led at different times, to the proposal of various measures in the Indian legislatures to encompass the protection of the cow, such as the prohibition of cattle exports and the prevention of the slaughter of cows in butcheries etc., but, in the opinion of the writer, the average Indian is in utter ignorance of one of the main ways by which numerous young cows and she-buffaloes are destroyed, under his very nose, as it were. Whereas in the country and in the small towns, keeping of cows is, on account of the proximity of grazing areas, an easy matter, in the large cities of India, such as Calcutta and Bombay, the upkeep of a cow becomes a costly affair, and the milkmen find it absolutely prohibitive to keep a cow when she becomes dry. As the writer says "practically the total fresh milk supply of these large cities is produced from cows fed, housed, and milked right within the city limits. These are purchased in the prime of life, and generally with their second calf at heel; they are milked for one lactation period only, say, 9 months, and then immediately disposed of to the butcher to make room for another cow just calved, which of course shares the same fate as her predecessor, and so the pernicious system goes on."

This "cow-feeding" system, the writer observes, existed in most of the large cities in Europe and America, such as London, Paris, New York and Chicago, but has now become extinct, owing to the development of large dairy farms in the country, whence a plentiful supply of cheap and clean milk is railed into the city every day. Milk produced by the "cow-feeder" from cows ill-fed and ill-kept and tied up all the year round in the crowded lanes and back-alleys of a great city cannot but be insanitary and unclean, and further, on account of the great cost of housing and feeding, it is highly expensive. The author suggests as a remedy to the two evils viz., of the very unsatisfactory milk-supply and of the untimely slaughter of young cows and she-buffaloes, the creation of large dairy farms in suitable rural-areas, where a large number of cows could be kept without much expense in healthy surroundings and whence a plentiful supply of cheap pasteurised milk can be brought into the city for the benefit of the cityman.

To show the enormity of the cattle loss incurred by India through the "cow-feeding" system, the writer observes that, whereas within the last fifteen years, the average export of cows and she-buffaloes to other countries has not exceeded 1000 head per year, within the same period the "cow-feeding system" in our four largest cities has sent not less than 250,000 young cows and female buffaloes to the slaughter-house: and in order to check this inordinate drain of India's resources, the writer appeals to the rich Indian Merchants of Calcutta who support the "Go-rakshanasalas" to come to the aid of the country and create soundly organised and properly equipped dairy farms, whereby "they would not only prevent the slaughter of numerous young cows annually, but provide the citizens of Calcutta with cheap, clean and pure milk, and at the same time earn for themselves a handsome dividend on their money."

Y. R. R.

VETERINARY CONFERENCE.

We acknowledge with thanks the receipt of a copy of the Proceedings of the Madras Veterinary Graduates' Conference held at Madras during the last week in December 1921. We congratulate the Veterinary Graduates on the spirit of co-operation and mutual help that has prompted them to form an association, which augurs well for the development of Veterinary Science in this country. The chairman of the Reception Committee, Mr. A. M. Richards and the President of the conference, Mr. V. P. Subrahmanya Mudaliar need no introduction to many in the Agricultural Department.

One of the resolutions passed favouring an extension of the duration of the veterinary course to four years and an affiliation of the College to the University has come none too soon. In the face of the proposal brought up and adopted regarding the formation of an Indian Cattle Board at the recent conference of the Board of Agriculture at Pusa, we are not quite sanguine whether the local Government would favourably view the resolution passed at the Veterinary conference that "all operations connected with the raising of Live stock be transferred to the Civil Veterinary Department."

The prayer that failed students might be allowed to appear for more than two chances is legitimate and would, we hope, be sanctioned so that cattle interests may not suffer. The President made a grateful reference to the pioneers of Veterinary work in Madras, such as Col. Gunn and Col. Mills. We fear the omission of Dr. J. D. Holmes of Muktesar, whose work here and in the Bacteriological laboratory at Muktesar has conferred untold blessings on India, is an oversight. Mr. Mudaliar's plea on behalf of the Veterinarian that he is indispensable for successful agriculture is not mere rhetoric, but his demand for a Central Institute of Research is in our humble opinion a little too ambitious in the present state of public finance.

We commend for perusal to our readers, the practical and instructive papers read:— "Skin Diseases of Animals," "Bovine Castration" and "Stomach Tube in Practice" and would particularly invite them to note what Mr. Swaminathan says as regards "Bovine Castration," as it is of great interest to all practical Agriculturists.

V. M. A.

An Opportunity for Enterprising Agriculturists.

Venkatapuram Irrigation Project. In the village of Venkatapuram, Kurnool District there was a small tank with an ayacut of about 60 acres. The village is situated in a sparsely inhabited portion of the Kurnool District, where the danger of famine is greatest. Owing to the poverty of the soil and the lack of resident cultivators, only half of the tank ayacut was actually under occupation and much of that was in fact left waste.

The Public Works Department framed a scheme for improving this irrigation source so as to command an ayacut of 1,700 acres. The tank was enlarged, fitted with a bund over 3000 ft. long and 43 feet high, and filled by constructing a masonry anicut 202 feet in length across the Dhone Vagu, the water being led thence through a supply channel of about 5,000 feet in length to the tank. In view of the risk of famine in the Kurnool District, the Government in 1906 sanctioned the scheme as a famine protective work. The total cost of the work at its completion in 1918 amounted to Rs. 3,85,000. The gross revenue ultimately to be expected is Rs. 11,000, which will give a return of a little over 2½% on the outlay. As yet only about 100 acres of the full ayacut of 1,700 acres is under irrigation.

Of the 1,700 acres of the ayacut less than 1,000 acres are held on permanent tenure. About 400 acres are cultivated without patta in good years, while the remainder is left waste, as is also much of the Patta and Inam land and especially that which is held by the absentee landlords. There are 4 villages or hamlets

within a reasonable distance of the tank's ayacut, but these villages or hamlets only contain some 900 souls. This labour force is not enough to cultivate the tank ayacut, much less to reclaim it. Further, the villagers are wretchedly poor. Manure is scarce and much of the land is barren. To bring new land under wet cultivation usually means heavy work and considerable outlay. Here it is said that it will be 3 years before the land can repay the money laid out on it. An outsider by name Jayaram Nayudu has got 15 acres of land of which 5 are under wet cultivation. He is an educated man with some capital; he is living in a tent on his land and is putting money into it by bringing manure from the nearest town, Dhone, in the hope that in the long run he will be able to recoup his outlay.

In order to induce the ryots to extend irrigation, Government have directed that as an experimental measure the rates of water cess for wet and dry crops raised on lands commanded by the project be reduced to Rs. 4-3-0 and Rs. 2-1-0 respectively for a period of 5 years.

The Collector has also been directed to form compact blocks of land at the disposal of Government for grant to outsiders.

(From the Publicity Bureau.)

Would it be too much to expect enterprising wetland men to try this venture?
Editor.

Notes and Extracts.

In the death of Dr. H. P. Armsby, of Pennsylvania, United States of America, which occurred in October last, Agricultural Research has suffered an irreparable loss. He was a leader of thought of world-wide reputation and one of the foremost exponents in the field of Animal Nutrition. His "Manual of Cattle Feeding" and "Laws of Animal Nutrition" are standard text books with which most Agricultural Students will be familiar.

(From Experiment Station Record).

M. R. R.

The late Mr. F. R. Hemingway I. C. S.

Madras Presidency has lost an able and sympathetic officer in Mr. F. R. Hemingway, B. A., I. C. S., who died in England on January 3, 1922. Officers of the Agricultural Department—especially those of our Institute—would specially regret his demise as he was known, as Collector of Coimbatore, to take very great interest in Agricultural questions and Agricultural shows and was a familiar figure in many of our Conferences. He was brought into closer touch with the Department when he was appointed as Registrar of Co-operative Societies, in which capacity he did a great deal of good to the ryots. For a full measure of his work in the Co-operative Department the reader is referred to the January number of the Madras Bulletin of Co-operation.

Sugar production is largely a question of human labour, says the Louisiana Sugar Planter, January 7, 1922. In the modern world, it would seem that through the customary trade channels the raw products are conveyed to localities, where there is a sufficient supply of competent labour and sufficient capital. England has the money and the people who carry on the work, while Hawaii far out in the Pacific ocean, with a very favourable climate, has for many years been importing labour from all parts of the world, (—Portuguese, Chinese, Japanese—coming from distances thousands of miles away) to produce a staple that must return over similar routes to secure its consumption. This indicates the impossibility of increase in total production in Hawaii in spite of the phenomenal acre yield.

V. M. A.

Rural depopulation. Sir Robert Greig of the Board of Agriculture for Scotland in a recent lecture on "Rural depopulation" said that rural depopulation was a worldwide phenomenon. It was contemporaneous with the expansion of industrialism. The population of Scotland in 1801 was 1,600,000 and today it was 4,700,000. In spite of this increase, in four counties the population was actually smaller than it was in 1801. The number of persons engaged in Agriculture had actually declined in forty

years by 55,000 or over 20 per cent and the number of farm servants in thirty years by 40,000 or nearly 30 per cent. In England the decline in numbers was greater; the main reasons were low wages, decrease of cultivation, greater use of labour-saving machinery, inability to obtain land as small farms or holdings, want of housing, bad housing and bad hours, unsuitability of education of rural schools and absence of facilities for recreation.

Since 1912, when the Board of Scientific Agriculture was formed 17,400 applications for land had been received. Of these 9,700 were withdrawn and 100 rejected leaving 13,600. Excluding applications for enlargement of existing holdings there were slightly over 9000 for landless people. Assuming every one was the head of a family of five, about 45,000 would be placed on the land. As many were already in country villages, only a very small number would be added to the rural people. In 1912 there were 1700 fewer small holdings and the number of larger economic holdings had increased. In his opinion the people left for towns because they did not like to live in the country in isolation. He thought the problem was more psychological than economic and the most helpful method of directing the force to social ends was to change our cities and modify our country so as to sublimate their primary instinct and utilize it for the good of the country.

(The Scottish Farmer, May 1921.) V. M. A.

COTTON RYOTS CONFERENCE AT KOILPATTI.

A Conference of ryots from the black cotton soil tracts of Koilpatti Taluq was held on the evening of the 28th February at Koilpatti with Mr. R. Appasami Nayudu, M. L. C. in the Chair. Mr. R. C. Broadfoot, Deputy Director of Agriculture and Mr. K. Gopalakrishnaraju, Assistant Director of Agriculture also attended the Conference. Bonuses were awarded to cotton-seed Unions which grew improved strains of cotton. It might be mentioned here that there are 13 seed unions in the taluk, of which some have taken improved iron ploughs instead of money as prizes.

Mr. Broadfoot welcomed the members of seed unions and other ryots in a short speech. Then Mr. Gopalakrishnaraju gave an account of the work of the seed unions and suggested ways and means for the better working of the seed unions.

The President in the course of his concluding speech explained to the ryots the work of the Agricultural Department and exhorted them to take increased interest in the work of that department. He then complimented the department on the good work done regarding cotton and hoped that similar improvements would be taken on hand regarding paddy, sugar-cane and other crops in that tract.

The District staff of the Agricultural Department were then "At Home" to the ryots and seed union members, after which the whole gathering were taken to the blacksoil farm, where improved agricultural implements were being worked. The working and the uses of those implements were explained to the ryots. Early in the night, there was an exhibition of magic lantern slides, picturing various crops and agricultural practices including the working of the improved implements. The gathering were then entertained at a Tamil drama enacted by some ryots.

Extracted from the "Hindu"—March 8.

The Travancore Durbar contemplate opening an Agricultural Middle School in Travancore during the current year.

Estate News.

Scout Drama, December 1921.

We regret very much to state that we are in great part responsible for the absence of a full statement of acknowledgments in the Note found under Estate News of our January Issue. The services of the many ladies and gentlemen resident on the estate—without whose selfless and enthusiastic help the performance would not have proved the splendid success it was—certainly deserved to have been fully acknowledged and we crave pardon for the omission, which was due partly to the knowledge that the helping hands of our colony would

never stand on such a formality and partly to want of space in a small Journal like ours.

Editor.

Estate Scouts.

The Estate troop of Boy-Scouts has of late been receiving training in the principles of First Aid through the kindness of Dr. Kalimi Sahib, L. M. P., Sub-Assistant Surgeon, of the Lawley Road Dispensary, Coimbatore.

Estate Health.

We regret to state that there has been an unprecedented outbreak of small-pox and chicken-pox on the Estate this year, as we hear, also in many other parts of this Presidency. Chicken-pox affected even adults, whereas small-pox has taken a toll of several children on the Estate.

Officers' Mess.

At a general body meeting of the club held on the 3rd March, with the President, Mr. C. Tadulinga Mudaliar, and at a later stage with R. W. Davies Esq., L. C. S., in the chair, the draft rules submitted by the working committee for the management of the Officers' mess started in October last were considered and passed with certain alterations.

We are glad to state that the mess has thus been placed on a stable basis now. The club manages it with a contractor, who supplies meals and tiffins to order to the club members and to the residents on the estate at certain fixed rates and is responsible to the working committee. The opening of the mess has supplied a long-felt want and visitors to the Institute may now feel relieved to note that, by writing to the Officers' mess, Lawley Road, Coimbatore, they may have the assurance of making themselves comfortable during their stay here. They must however make their own arrangements for accommodation in the guest house or elsewhere.

A new Breeding Bull.

Lovers of Farm animals will be glad to learn that the Farm herd has been re-inforced by the addition of a cross-bred Ayrshire—Sindhi Bull—a very fine animal—for breeding purposes. It was obtained

from the Military Dairy Farm, Wellington, and is available for covering to the cow-owners in the neighbourhood.

We beg to announce on the authority of the Secretary, Madras Agricultural Students' Union, that the resolution regarding the inequality in the initial pay of the L. Ag's. in the Agricultural and Scientific Sections, which was framed at the last general body meeting, has been forwarded to the Director of Agriculture through the President.

Hand-book on Kitchen-gardening.

Messrs. Unnikrishna Menon Dip. Ari. and M. R. Subramania Aiyar B.A., B.T., of the Educational Department are now here on deputation, engaged in the preparation in collaboration of a hand-book on "Kitchen-gardening" to suit the conditions of the Coimbatore District, for the help of teachers of Elementary Schools in giving instruction to pupils in school gardening.

Students' Corner.

Colours for Games.

It is a pleasure to note that the following members have obtained colours and badges in the games noted below this year, which has been an exceptionally good one in as much as the two cups and the shield have all been won by the College for the first time in the annals of this College.

Hockey.

1. K. S. Ramanna Rai.
2. K. Srinivasan.
3. Arumugam.
4. Balaraj.
5. S. N. Venkatraman.
6. M. R. Balakrishnan.

Foot-Ball.

1. Bashyam.
2. Arumugam.
3. N. Narayana Iyer.
4. Anthony.
5. Balaraj.
6. S. N. Venkatraman.
7. Seshadri.
8. Sivaraman.
9. Doraiswamy.
10. M. R. Balakrishnan.

Cricket.

1. U. Vittal Rao.
2. K. S. Ramanna Rai.
3. K. K. Hegde.
4. S. N. Venkatraman.
5. J. S. Doraiswami.
6. K. B. Ponuappa.

(Sd.) K. S. Ramanna Rai,

Games Secretary, 21-3-1922.

Send-off to Mr. A. K. Subramania Aiyar, L. M. E.

The students of the various classes severally arranged Tea-parties and a moonlight dinner to bid farewell to Mr. A. K. Subramania Aiyar on the eve of his departure to Ranchi. He had been connected with the teaching of Engineering in the College since 1914,—except for a period of two years when he was in the Pumping and Boring Section. He was of a jovial disposition and was popular with the students. He goes to Ranchi as a Circle Officer, Dept. of Industries, under the Govt. of Bihar and Orissa, and we wish him a prosperous and useful career.

Departmental Notes.

Separation of Research and Teaching in the Chemical Section.

We are led to understand that a formal separation of teaching and research has been effected in the department of Chemistry at the Agricultural College and Research Institute, Coimbatore. Dr. R. V. Norris, the Government Agricultural Chemist will direct Research work and attend to routine analyses, while Rao Sahib M. R. Ramaswami Sivan Ayl. will be in charge of teaching, being designated the Government Lecturing Chemist—a position similar to that of the Government Lecturing Botanist. The staff of Dr. Norris is at present composed of Messrs. B. V. Nath and K. S. Viswanatham, in the Madras Agricultural Service and Messrs. P. A. Raghunathaswami Aiyangar, T. Lakshmana Rao, T. S. Ramasubramaniam, C. V. Ramaswami Aiyar, S. Kasinatha Aiyar, and K. Govindan Nair—Assistants, while that of the Government Lecturing Chemist includes one officer in the Madras Agricultural Service (not yet filled) and Messrs H. Shiva Rao and M. Rajagopalan—Assistants. We believe that, though formally separated, the two sections will work in unison, Dr. Norris and his staff undertaking to give special lectures on Research work in progress, while Rao Sahib Sivan and his staff will carry on such research as will not interfere with their all important teaching duties, which, owing to the new B. Sc. classes, are likely to take up a good deal of their time.

Appointments:—

Mr. C. Vijayaraghavachari, Assistant to the Millets Specialist on probation in the IV grade in the Scientific Section.

Leave:—

Mr. S. Subrahmanya Ayyar Agricultural Demonstrator, combined leave for one year from the 21st February 1922, made up of privilege leave for six months and furlough on medical certificate on average salary for six months.

Mr. R. G. Mal, Agricultural Demonstrator, Virudupatti, privilege leave for one month from or after 3-4-1922 to be relieved by Mr. A. Muthayya Nattan, Agricultural Demonstrator.

Mr. T. K. Balaji Rao, Assistant in Economic Botany, privilege leave for two months from 1-4-1922: Mr. A. Chidambaram Pillai to remain at Aduthurai in his absence.

Mr. V. Achutham Pantulu, Assistant Agricultural Demonstrator, furlough on half average pay for six weeks in continuation of combined leave; furlough further extended by ten days.

Mr. T. Lakshminipathi Rao, Assistant Agricultural Demonstrator, privilege leave for two months from or after 1st March 1922.

Mr. C. S. Namasivayam Pillai, privilege leave for 14 days from 25-2-1922.

Mr. S. P. Fernando, Asst. Farm Manager, extension of privilege leave up to 16-3-1922.

Mr. M. V. Baghavudu Naidu, Agr. Demonstrator, privilege leave for four months extended by combined leave for three months.

Mr. M. P. Gourisankara Ayyar, Assistant to the Govt. Sugarcane Expert, privilege leave for two months from 19-4-22 with permission to prefix the Easter Holidays.

Building Fund.

The following donations to the Building Fund of the M. A. S. Union are acknowledged with thanks:—

	Rs.	A.	P.
Dr. R. V. Norris	25	0	0
Mr. V. Subbanachar	25	0	0
Mr. D. Ananda Rao	25	0	0
Mr. C. Tadulingam Mudaliar	25	0	0
Total amount received	100	0	0

We are glad to report that the scheme of housing the Union in a Building of its own is rapidly taking shape and as ready cash will be needed to start work before long, all those gentlemen who have subscribed are requested to be so good as to send remittances early. Such of our members as have not yet subscribed are invited to help the cause of the Union with their mite.

The Working Committee.

THE JOURNAL OF The Madras Agricultural Students' Union.

Vol. X.

April 1922.

No. 4.

Editorial Notes.

Agriculture in the Budget Session—Madras Legislative Council, March 1922.

It is a matter for congratulation for the Madras Agricultural Department that it has been, on the whole, quite generously treated in the grant of the demands made during the recent Budget Session of the Madras Legislative Council, held in March 1922. The demand made for a provision of 14.82 lakhs of rupees in the Budget allotments for the year 1922—23 has been passed, less Rs. 2400 for the duty allowances for the Personal Assistants to the Director of Agriculture at Madras. We are sorry that these two very hard-worked officers have been disallowed their duty allowances of Rs. 100 a month—which is, in fact, really needed by them to compensate for the high cost of living at Madras as compared with the mofussil.

The Budget speech made by Sir Charles Todhunter was much enlivened by his reference in questions of finance to the authority of the great king-maker—Kautilya or Chanakya—who flourished in the 3rd century B. C., and it is a matter of pride for Indians to find the worth of one of their great compatriots of old recognised.

even in such advanced times as ours : and we are unconsciously reminded, in this connection, of the account of "Agriculture in the times of the Mauryas" culled from the same source—the "Arthashastra of Kautilya"—which appeared in the pages of this Journal recently.

We are glad to note that the Finance Member, in spite of the great financial stringency under which our Government is at present labouring, showed a kind regard for "expanding departments" like those of Industries and Agriculture and warned the Council that a retrenchment can be made only at the risk of inaugurating a thorough set-back.

In these days of Industrialism, there is sometimes noticeable a tendency to belittle the importance of Agriculture, but it is undeniable that, if the world was taught a lesson during the great war, it was about the supreme value of Agriculture in the internal economics of a country. Agriculture is the basis of most industries and is the only occupation that makes a country self-contained. The avowed object of the Agricultural Department viz., that of "making two blades of grass grow where one grew before" is after all the only tangible way of increasing the prosperity of a country—especially in a land like India, where Agriculture is the main stay of the people.

Though the Council ultimately passed the demand almost intact, the Agricultural Department, especially as regards its work and policy, formed a subject of much animated discussion during the session, and reductions of varying amounts were moved in several instances, more with the view of eliciting a declaration of policy than of cutting slices out of the budget. The criticisms were varied in character. Firstly, a general consensus of opinion was observable that there was a greater need of demonstration of approved methods to the ryots than of continuing to spend money on experiments. There was also a general demand for the organisation of more wide-spread agricultural education of a lower

standard. A useful suggestion was also made as to the formation of local advisory committees of Agriculturists whom the Assistant Directors were to consult in all matters pertaining to Agricultural improvement. A question was also raised as to why the Agricultural College had not attracted the right sort of students—viz., the sons of the landed class.

While demanding the expansion of demonstration to the ryots, some of the members expressed the view that the other branches of the department might safely be closed and it was even declared that the department had merely "indulged in and, in fact, lived on experiments." On the whole, the research work at the Agricultural College—especially of particular sections thereof—was dealt with rather a little roughly. In this connection, we are rather reminded of the remark made by Mr. Milligan, Agricultural Adviser to the Government of India, in his address to the Pusa Board Meeting to the effect that "the Technical departments had an element of danger to face under a popular government in the fact that the average layman took little interest in Research work and was in fact impatient with it." It is of course, rather hard to impress on him the numerous difficulties with which research—especially in Agricultural Science—is beset and the slowness with which practical and useful results accrue. To think of throwing Research work overboard in order to strengthen propaganda work is like killing the golden goose to secure the store of her golden eggs. Unless there are results—of proved and tested merit—obtained, by the experimenter, after a continued effort through a series of years, the propagandist will find he has neither a mission to fulfil, nor a gospel to carry. We are rather pained that there should have been an indiscriminate attack on Research work and Experts in general. We take this opportunity to put up our humble and earnest appeal to the honourable representatives of the people that instead of attacking the members of this department in the Council, they might visit the Agricultural College and District

Farms as often as they could find leisure and convenience to do so, make enquiries as to the work that is being turned out and offer their suggestions as to the improvements they might think of, or as to any fresh line of research they might deem profitable. The Experts will—we are sure—always welcome such a discussion and value their advice.

In conclusion, we beg to state that we cannot sufficiently express our heartfelt thanks, on behalf of the department, to the Honourable the Minister of Development—Rao Bahadur K. Venkata Reddi Naidu Garu—for his kind and even “jealous” defence of our department against the numerous criticisms aimed at it in the Council; and we would appeal to the officers of this department to see that such mistakes of commission or omission as have been pointed out by the Honourable the Members of the Legislative Council are removed as far as it lies in the power of each individual.

Presentation of Certificates of Proficiency in Agriculture.

The presentation of certificates to the successful students of the year took place at 5 P. M. on Tuesday the 11th April, the Director, Mr. H. C. Sampson C. I. E., presiding. The Principal Mr. Wood, pointed out in his introductory speech, that this year's results showed that it was quite possible for a diligent student with a special aptitude for practical work to get through the course even in spite of some deficiency in theoretical knowledge. He expressed an abiding faith in the future of this institution, whose aim he declared had always been to work honestly and genuinely and not for mere show. He referred in feeling terms to his impending departure from this institution with which he had been associated for a long time. Mr. Sampson, after presenting the certificates and medals to the successful candidates amidst cheers, addressed the gathering on the value of the instruction given at the College and emphasized the importance at the present day of applying the

knowledge gained to the improvement of Agriculture, especially in the production of better crops. He expressed his regret at the fact that some of the Alumni as had not entered the Department had been idling away their time and allowing their knowledge to rust.

V. Satakopan won the Clogstoun Prize and was easily the very best student of his class and it is gratifying to note that he broke all previous records in the marks secured. It would be a pity if a student of such a calibre were to be denied the benefit of undergoing the higher course, owing to the recent changes in the curriculum. T. B. Anderson—son of Rev. Anderson of Danishpet, Salem, was second and won the Dewan Bahadur R. Raghunatha Rao Gold Medal for Proficiency in Practical Agriculture.

R. C. Wood Esq., M. A.—Principal, Agricultural College.

Our President, Mr. R. C. Wood, we regret to announce, has once again been lost to us. He was relieved by Dr. R. V. Norris as Principal, and he left Coimbatore on the 16th on his way to Tanganyika Territory in East Africa, where he has accepted the post of Cotton Expert to the Empire Cotton Growing Corporation. He goes there under an agreement to serve for two years in the first instance, but, both at a social gathering of the Students' Club and at a farewell party arranged by his staff on the eve of his departure, Mr. Wood, in replying to speeches wishing him goodbye, spoke as if he were leaving India for good. We sincerely wish that in the interests of India, he would return to this country, after his two years' sojourn in Africa, and give us and the ryot population of Madras, the benefit of his added experience.

Mr. Wood came out to India in 1905 and has put in service in various capacities in the Agricultural Department, as Superintendent of Farms, as Dep. Director of Agriculture, as Principal of the Agricultural College and, on two occasions, as Officiating Director of Agriculture. As Principal, he has been connected with this college for nearly twelve years and it is needless to say

that he made his mark as such, both as a disciplinarian and as an officer of boundless energy. A man of generous impulses, he was uniformly kind and courteous in his dealings with the members of the Estate. We wish him *bon voyage* and success in his new sphere of life.

The Planters' Chronicle.

We are glad to notice that Coimbatore can now boast of being the place of publication of yet a third journal—the Planters' Chronicle—in addition to the Forest College Magazine and our own humble monthly periodical. "The Planters Chronicle"—which is the official organ of the United Planters' Association of South India—the head-quarters of which is Coimbatore at present—used to be printed at Bangalore till April 1st., from which date the periodical has begun to be printed and published at the Electric Printing Works, Coimbatore. The change from the usual small type in the body of the Journal to a clearer and larger type will, we believe, be appreciated by the subscribers.

Ramasastrulu—Munagala Prize, Dec. 1922.

The attention of the readers is invited to a notice, published elsewhere in this issue, detailing the conditions of award of the prize this year; and we sincerely trust that the prize—which will be a Gold Medal—will evoke keen competition.

Lessons in Nature Study.

4

Water plants—(Contd).

P. S. JIVANNA RAO.

Eichhornia speciosa (Water Hyacinth). The following illustrates a type of an advanced lesson that may be given to the senior pupils.

i. *Hyacinth*. In Greek mythology Hyacinthus was a beautiful boy beloved of the God Apollo and was killed accidentally by him with his disc. Out of his blood rose the handsome flower which has immortalised his name. This Hyacinth, however, sprang on land and has given rise to various other names e. g. Starch Hyacinth, Grape Hyacinth, Wild Hyacinth, Cape Hyacinth etc. The true Hyacinth is *Hyacinthus orientalis* belonging to the Lily family, whereas the Water Hyacinth belongs to quite a different family—Pontederiaceae.

ii. *Habit*. The plant inhabits sluggish fresh-water streams, lakes ponds, ditches, and old wells, occurring either as a free floater or rooted in the mud like a swamp plant. The absence of root hairs is characteristic of water plants and must be contrasted with the land plants, the pupils being shown the hairs in the seedlings of radish or mustard, if they are not already acquainted with the fact. The roots with several rootlets may be drawn by the pupils showing the root pockets which could be detached easily. The rooting of the plant and the formation of suckers may be demonstrated. The several types of leaves should be drawn with their sheathing out-growths. The leaf stalks are full of air and the swellings (bladders) are not formed in plants rooted in mud. Note the variations in the leaf shape.

iii. *Floral structure*. About 15-20 flowers are arranged at the top of a long erect stalk. The older flowers are below and the younger above, but all of them open in the mornings between 8 and 9 A. M. and close in the night at about 10 P. M. The colour of the flowers is best described as mauve or lilac. The flower should be carefully examined by the pupils with the help of the hand lens with reference to the number of parts and their relative position and a description made e. g.

Sepals } These are six in number united below into a green tube, but
Petals. } free above. The outer three are the sepals and the inner, the petals. One of the petals has a yellow patch on a blue background.

Stamens. Six, three large and three small, the latter found at the throat of the tube. The anthers open above.

Pistil. The ovary is 3-celled. Style long, ending in a stigma which is conspicuous.

The flower is adapted for the visit of insects (bees) which are attracted by the yellow spot on the upper petal and may get dusted with pollen on their abdominal side. All the floral parts must be drawn separately, as also the entire flower. Draw the pupil's attention to the bending of the flowering shoot as if to mature and sow the seeds in water. It begins at about 10 P. M. just at the closing of the flowers and is complete after a week.

iv. *A study in symmetry.* A flower is said to be symmetrical when it can be divided into two halves by one or more lines passing through the centre. Owing to the special colouration of the upper petal and the grouping of the stamens on the lower side, the flower can be divided into two exact halves only in one plane. This constitutes zygomorphic or bilateral symmetry and differentiates the flower from that of the true Hyacinth, belonging to the family of Lilies, where the flowers are regular and the symmetry is radial, i.e., they could be divided into two halves by more than two lines passing through the centre.

v. *A bad weed.* The plant is a very serious pest in all the countries where it has been introduced and attempts are being made to put it to some use so as to lessen the cost of eradication. Its chief value is as a source of potash for manure and it has been found that it is practically unfit for fodder, rope making, paper manufacture and similar purposes.

Monochoria. More a marsh plant than a true aquatic, this weed is sure to be found in neglected paddy lands either near water courses or in the fields themselves. The leaves are long-petioled and the lamina in *M. Vaginalis* resembles that of the betel leaf, whence the Tamil name. The flowers are blue and attractive and the number of parts is the same as in Water Hyacinth with which the plant must be compared in its various characters.

The bending of the inflorescence must be noted and also the blue colouration of the roots, which is a conspicuous feature in Water Hyacinth also.

Pistia stratiotes. This aquatic is fairly common in this Presidency and occurs in ponds, ditches and other stagnant waters of some depth. The leaves are fleshy and sessile and arranged into a compact rosette. The basal portion is somewhat swollen and, as it contains air, serves as a floating apparatus. The leaf surface is prevented from being wetted by the presence of numerous small hairs. The plant is a free floater and the roots rarely reach the bottom. The reproduction is by means of runners which are produced in large numbers, each runner ultimately ending in a new plant and in this way forming a complete covering on the water, which is on this account said to be kept "fresh and cool."

The leaves are said to show sleep movements moving upwards during nights.

Lemna. The Duckweeds (Veppampasi in Tamil) are the smallest among flowering plants and occur in masses forming a conspicuous feature of tanks and ponds where water stagnates without movement for a long time. They thrive even in the dirtiest water where other flowering plants cannot live and it has been found that, if introduced in water with a foul smell, they will purify it until it becomes a fit habitation for small aquatic animals. This is believed to be due to the special need of the plant for certain soluble products of organic decomposition.

The plant is stemless and the 'leaf' itself represents a combination of both stem and leaf, for which reason it is called a 'frond.' It multiplies very rapidly by vegetative means and flowers are inconspicuous. There are two species of *Lemna* (1) *L. minor* having a single root with smaller fronds and (2) *L. polyrrhiza* with larger fronds which are purplish beneath and has several roots for each frond. *Wolffia* is another genus belonging to the same family. It is entirely without roots and the fronds are extremely small. Specimens may sometimes be obtained from cement tanks and cisterns of gardens where water has been allowed to remain for a long time.

Limnophyton. A somewhat rare weed occurring in pools and tanks under marsh conditions, a greater portion of the plant appearing completely above water. The leaves appear from a distance

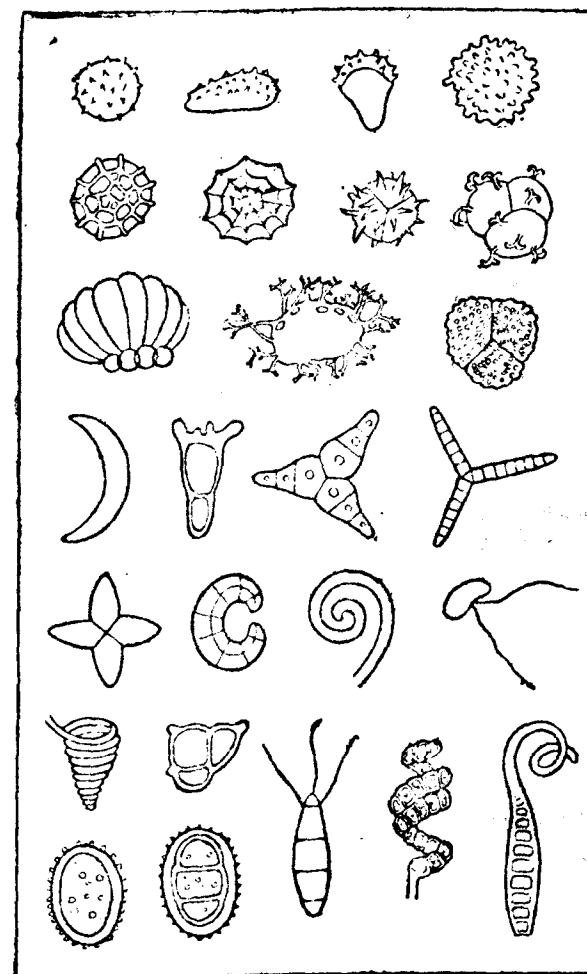
like those of *Colocasia*, but are smaller and semi-circular, the basal lobes being finely tailed. The flowers are either male or perfect and are arranged in whorls on a branched axis which is very conspicuous.

Dispersal of Fungi.

BY C. S. GOPALASWAMI RAO.

The mildew disease of grapes, the "Mahali" disease or "Koleroga" of arecanut, the cholam smut and the wheat rust are some examples of serious diseases of crops of which reports are often received from cultivators and with which many of our readers are possibly familiar. In the suddenness of their appearance and the quickness with which they increase and spread, they resemble infectious epidemics like small-pox or rinderpest and strike terror into the mind of the ryot. He is at a loss to explain what the cause of these diseases is and how they are able to spread with such rapidity, and generally attributes them either to an "ill wind" or to a curse of the Almighty.

The real cause of diseases of this class is a low organism known as a Fungus—of which the common mushroom is a familiar example. The fungus belongs to the plant kingdom and is in essence a plant. Like plants, it increases vegetatively by branching, which culminates in the production of seeds known as spores. Just as plants can usually be propagated by cuttings, the fungi can be reproduced from bits of the mycelium or their vegetative body. Unlike the true plants which are capable of deriving their nourishment from the salts dissolved in the soil-water and from the air, fungi are degenerate plants which are incapable of such an independent existence; they can subsist only on decaying organic substances, being then known as saprophytes, or may be actual parasites in the living tissues of animals or plants. They are therefore unable to spread from place to place of their own accord in their vegetative phase, but man, with his usual policy of meddlesomeness with the laws of



Different Forms of Spores of Fungi

(Highly magnified)

(Reproduced by kind permission from a diagram belonging to Government Mycologist's Office).

Nature, has in many ways helped the spread of injurious Fungi even in their vegetative phase, often to the great detriment of his own interests. He has collected innumerable kinds of plants, tubers, bulbs and seedlings from the ends of the earth, either to satisfy his tastes or to promote his interests, but has at the same time unconsciously introduced along with them various unknown diseases of a serious nature. Sometimes he has personally proved the active agent in the spread of diseases, as has been actually demonstrated in the case of the Bud-rot of the Palmyrah, where it is the knife of the toddy-tapper, as he goes from tree to tree using the same knife on diseased and healthy ones alike, that carries the hyphae and causes the spread of the disease.

It is however, chiefly by means of the spores—its minute seeds—that the fungus secures its spread. Just as most plants ultimately produce flowers and seeds thereby perpetuating their race, all fungi eventually produce their “fruit bodies”, whence the extremely small spores are set free. Each species of fungus has its own peculiar form of fructifications and its own kind of spores, but all the spores agree in being of microscopic size and in being light. The appended figure (p. 116) will give the reader an idea of the variety of fantastic shapes taken by spores of Fungi—in each case fitting them for easy dispersal. In the group of rust fungi, the spores exhibit fine processes which enable them to anchor themselves on any object they may come across in their voyage through the air. Similarly, the spores of the Erisyphae have long appendages with hooked ends. Some of the mildew fungi possess a string of spores on erect hyphae, whereby the spores are scattered in all directions at the slightest disturbance.

In the aquatic family of Pythiaceae, spores are produced in a sac known as a “Sporangium” from which the spores—which possess two “flagella”—emerge and swim about when placed in a watery medium. The much-dreaded “Mahali” disease of the West Coast is an example of a fungus of this nature. The disease spreads only in the time of the South West monsoon, when as the heavy down-pour of rain splashes between the Areca leaves, the swimming spores

Birds form another agency whereby dispersal is helped. The migration of birds is a very well-known phenomenon and some are known to breed in summer in Siberia and to travel as far south as Australia and New Zealand in winter. Though it is still open to doubt whether birds can carry fungus spores for appreciably long distances and spread diseases in distant countries, the fact remains that they can do so where distances are short.

Insects are another class which function as important agents in the spread of fungi. In fact the fungi make use of the services of insects, attracting them by catering to their varied fancies. Some are enticed by bright colours, others are attracted by the possession of strong odours, while yet others by sweet secretions. An instance of the last class is furnished by the sugary diseases of cholam (*Sphacelia sorghi*) and other grasses, wherein the fungus so acts on the grain as to cause the exudation of a sort of honey-coloured sweet liquid containing multitudes of spores. In some fungi all the three devices are found combined.

Quadrupeds also have their share in the dispersal of spores. They feed on grass attacked by fungi and on certain kinds of fungi, such as "truffles", and cast out their spores, which pass unaffected through their alimentary canal with their droppings and thus aid in their dispersal. By actual feeding experiments, it has been found that the oospores of *Sclerospora* on sorghum (leaf-shredding disease) pass along with dung unharmed by the digestive juices of calves. Goats, mice, rats, toads and slugs have been found to function similarly in the case of other certain fungi.

It will thus be apparent that fungi have evolved wonderful methods of securing the distribution of their spores and the intelligent ryot will therefore understand the importance of clean and careful cultivation, which by itself is often able to ward off an outbreak. When diseases do break out, the Mycological section of the Agricultural Department will, on application, be able to demonstrate effective remedial measures in most cases. "Prevention is better than cure" and "a stitch in time saves nine" are wonderful old

maxims with as much force today as ever, and the ryot would be tangibly benefited if he is guided by these words of wisdom, at least as far as fungus diseases are concerned.

Bacteria and the Farmer.*

BY K. ADINARAYANA RAO, L. Ag.

Agricultural science may very well be termed the "Science of Sciences" since almost every branch of science has contributed its part in the development of its various phases. Bacteriology is one of the most recent to offer its aid to the advancement of Agriculture, but is by no means the least important. This science is, in fact, one of the youngest of all and owes its present development to the rapid strides made during the last century in the knowledge of the laws of Optics and the consequent perfection of the compound microscope, as also to the formulation of laboratory methods in recent years.

The microscope is indispensable in a study of Bacteriology, for this science deals with living organisms which are so minute that hundreds of them may easily be accommodated within the compass of the head of a pin. They cannot therefore be detected unless they are subjected to the highest magnification of a powerful microscope.

The minuteness in size of these bacteria is, however, compensated for by the tremendous powers of rapid multiplication they possess. To quote a concrete example, a single individual of the Cholera bacillus will, if introduced into a suitable medium, rejoice in a progeny of 1600 trillions in one day, which explains how it is that persons attacked by cholera succumb so rapidly to its effects.

The study of the micro-organisms had its origin in attempts at the investigation of diseases affecting man and lower animals, and for a long time Bacteriology was identified with the science of Pathology. Of course such a narrow view is, we all now know, erroneous.

*Being the gist of a paper read at a meeting of the Students' Association in March 1922.

The first great scientist to show that micro-organisms fulfilled other functions than that of causing diseases, was the illustrious Pasteur. His many-sided activities in the field of micro-biology have been productive of so much good to humanity that his name has been immortalised by the creation, all over the world, of numerous Pasteur Institutes devoted to the service of suffering humanity.

Since the year 1860, when Pasteur first established the agency of micro-organisms in the souring of milk, great advancement in our knowledge of the functions of Bacteria in nature has been effected. Discoveries of the various ways by which bacteria benefit the agriculturist and the manufacturer have been made, and, as investigations proceed, further advances in our knowledge will prove to be of practical importance.

Now let us consider how Bacteria function in Nature. Taking first the bacteria inhabiting the soil, there are some which cause the disintegration of rocks, and others which decompose organic matter and set up fermentation, whereby ammonia is produced therefrom. Next we have certain kinds which build up nitrites and nitrates from ammonia, and others which do the beneficial task of fixing the free atmospheric Nitrogen.

In the maintenance of soil-fertility, the farmer unconsciously depends largely on micro-organisms. To quote Dr. Russell, "we now know that the farm-yard manure and the green-manure put into the soil are not really agents of fertility, but only raw materials out of which fertility is manufactured. The work is done by myriads of living creatures in the soil, which are too small to be seen by the naked eye, and only incompletely revealed even by powerful microscopes."

Nitrogen, as is well known to all agriculturists, is an essential constituent of plants. It is true it occurs in enormous quantities in the atmosphere, but, in its free state, it cannot be utilised by plants, nor can the highly complex nitrogenous compounds of which farm-yard manure, bone meal and oil cakes are composed, be of any greater use for plants directly. It is in reality the soil bacteria that

break up these highly complex compounds into simpler ones—such as are actually assimilable by plants. It is again bacteria that can fix nitrogen directly from the air and to a certain extent keep up soil fertility at an irreducible minimum. So convinced have many bacteriologists become of the importance of these organisms that they have tried to place them on the market in pure culture to inoculate soils with. If this should prove successful and practicable, the present methods of agriculture may easily become revolutionised.

The secret of the Leguminosae lies in their ability of attracting nitrogen-fixing bacteria and utilising them, and in my opinion it is not impossible to induce other plants than legumes to take to the methods of the legumes; and in fact certain plants are already known which are associated with similar nitrogen-fixing bacteria. In view of the increasing crop-production and the consequent demand for more and more of plant-food, the mechanism of nitrogen-fixation has become one of the most vital problems of agricultural research and its investigation opens a great vista of possibilities in the line of Plant-nutrition.

On the Industrial side, instances of the utilisation of bacterial activities are numerous. The fermentation industries, such as the production of industrial alcohol and the manufacture of vinegar, the retting of jute and hemp, the curing of tobacco and ginger, the art of tanning, the purification of sewage are all problems involving a knowledge of Bacteriology. A training in this science is essential also in the dairying industry, which by the introduction of pure cultures has been revolutionised as a business proposition, as also in the commercial manufacture of preserved foods, drinks and fruits.

The Pathological aspect of Bacteriology has received the greatest attention of all and great strides have been made in its development. Bacterial diseases such as Typhoid fever, Diphtheria, Anthrax, Tetanus and Pneumonia and protozoal diseases like Malaria, syphilis and sleeping sickness, have been thoroughly investigated and the knowledge thus gained applied to their prevent

tion and cure. Anti-toxic and anti-bacterial sera and vaccines have been brought into use in fighting disease and death, and it is not improbable that further discoveries still lie ahead of us.

On the agricultural side, there are numerous diseases of plants, such as the potato and poppy rots, the tobacco wilt and the citrus canker, caused by bacteria, which require the services of a trained Bacteriologist: and even in our every day life, a general knowledge of the nature and action of bacteria and of disinfectants in the cure and prevention of diseases, and of the importance of general cleanliness at all times, will be extremely useful and will, in many cases, be of help to ward off disease.

In short, it may be remarked that the practical farmer consciously or unconsciously comes in contact with innumerable micro-organisms of the harmful as well as the useful kinds, every moment of his life. A knowledge of the functions and nature of these bacteria will be of great service to him in his daily life and in view of the importance of soil bacteria in agriculture, it will not be too much to anticipate that the successful farmer of tomorrow will be the one who makes most use of these micro-organisms.

Insects as carriers of Disease.

(Continued)

P. SUSAINATHAN, F. E. S.

As already stated, the much-dreaded Bubonic plague is transmitted from rat to rat and from rat to man by the Rat-flea, generally

of the species, *Pulex cheopis*, (Figure 4). The agency of the flea in this

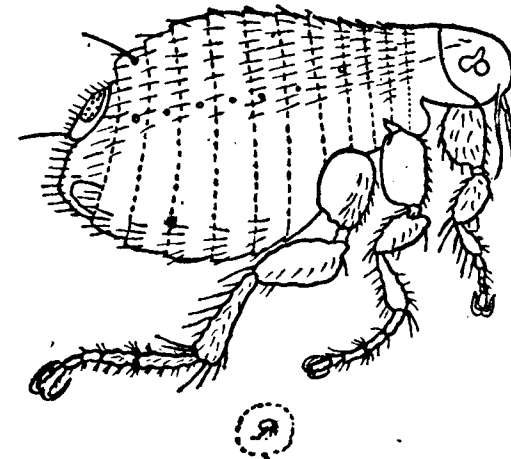


Figure 4.

The Plague Flea, *Xenopsylla cheopis*. The small figure shows the natural size. (From Fletcher's S. S. I. I.)

connection was first established by Mons. P. L. Simond, a Frenchman, and was later on elaborated by Lamb and Liston. The plague is primarily a disease of the rat population and before plague breaks out in a place, the rats usually die of the disease. When the rats are dead, the fleas leave their bodies and in their search for nutriment bite man, who then becomes infected with *Bacillus pestis* sucked up by the flea from the stricken rat. In addition to rats and man, most rodents such as rabbits, squirrels and guinea-pigs are liable to infection.

Never a favourite at any time, the flea has become an insect of dreaded notoriety, since its agency in plague transmission became known. The presence of the flea is always to be associated with want of cleanliness. The eggs are laid in dirty clothes, in birds' nests or in dusty corners. After a few days, a tiny wormlike larva is formed within the egg and emerges by piercing the eggshell with a sharp needle-shaped horn. This grub feeds on dusty accumulations of nutritive matter, such as minute clots of blood excreted by the adult fleas. The grub soon loses its horn and grows

fat and stout. When full-grown it turns milky white and spins a fine silken cocoon for itself in a nook. The usual metamorphosis takes place and the pupa gives birth to the familiar, but elusive and annoying flea.

Cleanliness, it must be affirmed, is a great preventive of an increase of this pest. Pure Pyrethrum (Keating's) powder kills fleas outright. It can safely be applied to furniture, bed-clothes, etc. The powder, which is an ideal insecticide, is manufactured from the petals of one of the Compositae.

In the case of Typhus—a dangerous species of continued fever characterised by a great depression of spirits, a dull weariness and a fluttering pulse—a fever which is virulent in its symptoms and terrible while it lasts, and often brings about the black death—the carrier is again an insect—the clothes-louse (Figure 5)—*Pediculus*

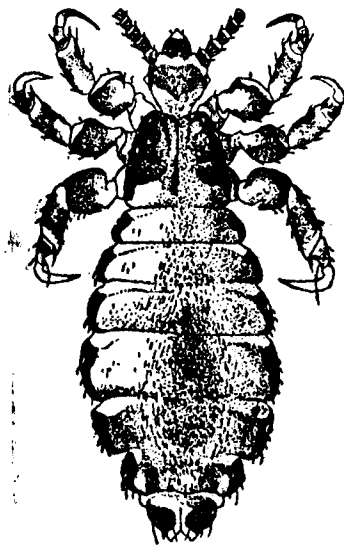


Figure 5.

The clothes louse. *Pediculus vestimenti*. The smaller figure within the dotted circle shows the natural size. (From Fletcher)

vestimenti—a near blood-relation of the head-louse.

Rheumatic Dengue Fever is caused by a germ—a *Spirochaete*—injected into the blood by the common mosquito—*Culex fatigans*, (Figure 6), while *Filariasis* of which the most common form is

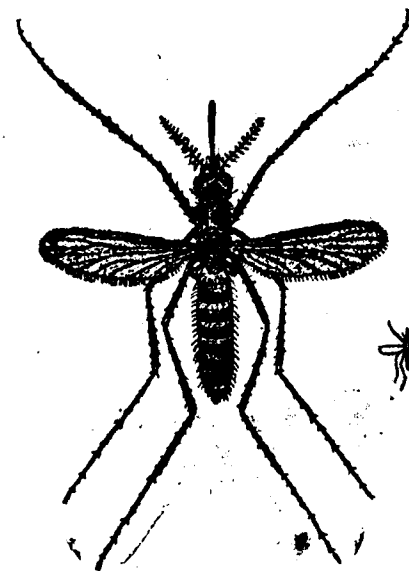


Figure 6.

Culex fatigans—a common household mosquito. The smaller figure shows the natural size. (From Fletcher.)

Elephantiasis—the pitiable victims of which may be seen in numbers in most of the coastal districts—is caused by a *Filaria*—a minute species of roundworm living in the blood of infected persons. The carriers of this worm are two mosquitoes—*Culex fatigans* and *Myzomyia* (*Anopheles*) *rossii*. When introduced into the blood by a mosquito, the parasite begins to invade the lymphatic glands; and in many cases these distend and a subcutaneous hypertrophy of tissues follows, resulting in most frightful and hideous malformations of the body, particularly of the legs and arms. A single Elephantiasis leg may weigh as much as 200 lbs.

Again, a black, white spotted mosquito, a day-flying species, (Figure 7) *Stegomyia fasciata*,—is the carrier of the germ of the terrible Yellow Fever of Tropical Africa and America. The *Stegomyia* is a common household mosquito in India and there is nothing to prevent this scourge becoming established in India, if by a chance either an infected mosquito or a person suffering from yellow fever gets entry into any of the seaport towns. The greatest vigilance is therefore called for in all our main seaports in order to ward off this terrible menace.

Vibrio cholerae, the pathogenic organism of cholera, is also carried casually by our common domestic flies (Figure 8). Of course, in this case, it must be understood that the fly is not the only carrier of the microbe, infected food and water also being greatly accountable. The fly feeding upon such food-stuffs carries the germs on its body and passes them on to us, mostly at meal time. We could never be over-cautious in exterminating this household pest. Attention to cleanliness again, especially in the vicinity of our homesteads,



Figure 7.

The spotted Mosquito *Stegomyia fasciata* the dotted figure shows the natural size. (From Fletcher.)

does much to check this pest radically, for by the prompt removal and destruction of all vegetable and animal refuse, flies are prevented from breeding. This is rather difficult especially in places where co-operation and a consideration of public welfare is wanting. Failing to meet the enemy in the field, it would be proper to grapple with him at home. Numerous are the methods suggested for the extermination of the housefly. By the use of formalin, the common housefly could be killed in numbers, two table-spoonfuls of a 40%

formalin being mixed with a pint of milk and water and exposed in shallow dishes. The pathogenic organisms of typhoid fever, dysentery and diarrhoea, tuberculosis, and several other serious diseases are also known to be carried by the housefly.

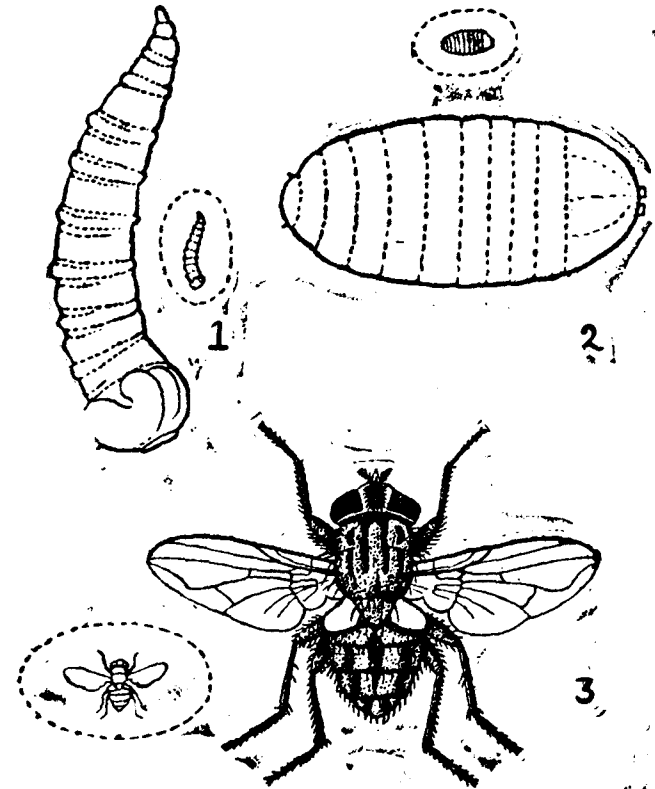


Figure 8.

One of the House-flies *Musca domestica* 1. Maggot. 2. Pupa. 3. Fly. The figures within dotted circles indicate the natural sizes. (From Fletcher.)

Further, *Septicaemia*, or blood-poisoning owing to absorption of putrid matter into the system, Anthrax and other diseases are mostly carried by contact through lesions, in which bugs, various carrion-feeding insects, fleas, and biting flies play a prominent part.

It has now been proved beyond doubt that the bed-bug plays an important role in the dissemination of the germs of *Kala-azar* and also that the Tsetse Fly of Africa definitely spreads the dreadful sleeping sickness.

So much for man; domestic animals are in no way free from diseases, which those insects that, constantly haunt them, carry from individual to individual. The organism *Anaplasma marginale* which is the cause of the so-called bovine gall-sickness is carried from animal to animal by ticks. *Stomoxys* or the stable fly is well known as the carrier of the microbe which causes the equine Infectious Anaemia, one of the commonest of horse diseases in North America and Europe. *Haemaphysalis leachi*, an acarine, through lesions introduces *Piroplasma canis*, which causes the malignant jaundice in the dog. Ovine heartwater is transmitted from fold to fold by a cattle tick *Amblyomma hebraeum*.

Several species of *Tabanus*, *Stomoxys* and *Hamatopota* flies carry the microbe *Trypanosoma brucei* which produces the African Surra of the horse. The tsetse fly *Glossina palpalis* and other species of the genus *Glossina* are the carriers of a *Trypanosome* which causes the "Nagana" of the domestic animals, which is one of the most virulent of diseases of the lower animals. Fortunately this disease is confined to Central and Southern Africa.

Examples might be multiplied, for they are numerous, but it is clear that the pathogenic organisms of a great majority of diseases in man and the lower animals are carried directly by insects. Hence it is that great importance is to be attached to insects, not only as pests of agriculture, but also as pests which affect man's very health and life.

Reviews.

"Some aspects of Dairying" by Mr. D. Ananda Rao, B. Sc.

Recently articles have appeared in the Daily Press of Madras regarding the question of milk supply and the public seem to have

awakened at last to the necessity of devising measures for child preservation to secure national welfare. The publication under review is, therefore, very opportune. It embodies results which have been tested for over 10 years at the Coimbatore Agricultural College. The first part of the Bulletin deals with the dairy farm and equipment, while the second sets forth the intricate subject of management. We are told that the chief foods which cows in milk get are fodder-cholam, fodder-maize and guinea-grass, while what dry cows receive are cholam, tenai or ragi straw, supplemented by what the herd can pick up on about thirty acres of what is by courtesy called 'grazing land' and from harvested fields. The dairy is primarily intended for the instruction of students and their training.

Cows of the Kangayam, Nellore and local breeds with a few cross breeds and buffaloes make up the herd, which is maintained partly by rearing and partly by purchase. A few breeding bulls form a useful addition to the herd. They serve the farm cows and satisfy the calls made by cow-owners for a nominal fee.

Breeding is undertaken here with the double purpose of obtaining draught bullocks and producing a milking strain of cattle. It is specially necessary in a country like India, where oxen have not been replaced by horses or power machinery on the farm, that both the purposes should be kept in mind, but it is doubtful whether the two aims can be successfully secured in one and the same breed.

When on the point of breeding, the author lays emphasis on the usefulness of maintaining records of the history of each bull or cow, or the pedigree register as he calls it, from which the details of parentage of every animal are known. A point which would ordinarily escape attention is the reference made in the bulletin to the desirability of keeping the dry cows and the calves, which have ceased to suckle, in separate areas with facilities for

grazing and exercise. Lands away from towns should in the writer's opinion be preferred, as this arrangement tends to keep down the cost of upkeep and maintain the animals in perfect health. Under the heading "Rearing of calves" Mr. Ananda Rao suggests that calves should be "weaned at birth" that is, should never be allowed to suckle but be handfed from birth and that the food in the early stages should be their own mothers' milk, given at blood heat, the calf being taught to feed from the bucket.

The College dairy purchases every morning 400 lbs. of milk from the surrounding villages in small lots ranging from 2 to 20 lbs. The question of disposal of large quantities of skim milk left over daily after the separation of cream is one of the factors that deter people from taking up dairying. Mr. Ananda Rao solves this problem by advising the dairyman to curdle the skim milk and produce therefrom *casein* which when pressed, dried and powdered forms a product useful in making paints and varnishes. This is certainly an unexplored field for a business-man in this country.

The cost of milk and butter per pound are such variable items that the author cautiously leaves them alone and confines himself to factors which affect the production of milk and the making of butter. The appendices are very useful. There are a few repetitions which but serve to emphasise the points laid down. The information about the several breeds comprising the herd is instructive and the simple and unvarnished narration of various details, from the feeding of cattle to the sale of butter and the balancing of accounts, bespeaks the patience of the author and the care taken in collecting facts and presenting them in an acceptable manner.

V. M. A.

Co-operative Conference. The tenth Provincial Co-operative Conference was held in the Wesley College Hall, Royapettah, on the 26th

and the 27th December 1921. Mr. C. R. Reddy, M. A., who was to have presided unfortunately fell ill, but the conference had the fortune of securing at short notice, the able services of Rao Bahadur S. S. Talmaki of Bombay in his place. The conference was well attended and Dr. S. Swaminathan welcomed the delegates on behalf of the Reception Committee.

The President, in the course of his speech, referred to the importance of co-operation in connection with Agriculture. "Co-operators" he said, "will have to concentrate their attention on a very important department of the movement—i.e. *joint sale of produce* on behalf of the members—and the sooner they do so the better for the movement. If co-operative credit has helped our agriculturists to improve the quality or quantity of their produce, that improvement will, in the long run have little effect on their economic condition, if what they have gained in the production of their crop is lost in effecting its sale." He mentioned the great importance of diverting the middleman's profits to the pocket of the producer.

He then dwelt on the question of *finding out secondary occupations for our Agriculturists* by developing or introducing suitable cottage industries. He was of opinion that such industries would materially improve the economic condition of the rural population, by providing useful occupation for the women-folk during their leisure hours and to the men when they had no field work to do. These, moreover, would stand them in good stead in seasons of famine or scarcity.

He also commented on the necessity of a close *co-ordination between the co-operative and the Agricultural Departments* and instanced the case in the Bombay Presidency, where they had established joint Boards of Agriculture and Co-operation—one for each of the six provinces into which Bombay Presidency is divided. Each Board consisted of two officials and four non-officials, two of whom represented the co-operative movements and two, agriculture. The Boards acted partly in an advisory capacity and partly controlled certain portions of Govt. grants set apart for agricultural improvement. They further had the authority to call for any information or data required from the two departments and their recommendations were bound to be considered

by the Director and Registrar of the departments of Agriculture and Co-operation respectively. These Boards further controlled the policy of small committees of co-operators and Agriculturists formed in the villages and thus were able to serve as useful channels by which Agricultural improvements could filter down to the ryots. A resolution was later on passed at the Conference recommending the trial of these boards in Madras. The scheme is certainly worth a trial in our Presidency.

From the Madras Bulletin of Co-operation December, 1921.

Y. R. R.

The influence of Atmospheric conditions upon the Germination of Indian Barley—W. Youngman, Memoir Dept. Agric. Ind. Bot. Sre. Vol. XI. 6 1921.

Barley produced in India is exported to the United Kingdom mostly from the ports of Calcutta, Bombay and Karachi. In 1913, it was found that as far as malting qualities were concerned shipments made early in the year were satisfactory, whereas 10—20% of the grains out of the later consignments failed to germinate. Investigation showed that this was due to the high atmospheric humidity prevailing over a wide area of North-East India from July to September. Unless extra-ordinary storage precautions are taken, Barley for malting or any other use involving its germination should not therefore be exported from Calcutta after May. As such high humidity is absent in North-West India, the germinative capacity may be kept unimpaired by transporting all the grains to Bombay or Karachi, wherefrom they may be sent abroad. In any case the grains should not be delayed long in the sea board area, especially in view of the fact that they may be affected by humidity on the sea when the voyage is long.

The investigation is of considerable practical importance, for as one of the tables in the paper shows, Calcutta has ceased to export any large quantity of barley since 1913 and most of the exports go via Bombay and Karachi.

P. S. J.

Notes and Extracts.

Separate preservation of liquid cattle manure. In the usual methods of preservation of cattle manure, the dung and urine of animals are mixed together and stored. During the storage, fermentation occurs and according to the conditions of storage more or less of nitrogen loss occurs in farm-yard manure.

The prevention of the loss of nitrogen has been engaging the attention of Chemists and Bacteriologists for a long time and till now no easy and practical solution of the problem has been possible. It is not the prevention of loss of nitrogen that is a difficult task, but the devising of a simple method suitable to the conditions of the poor ryot, who cannot be expected to put in either extra cost or extra labour for this purpose.

Mr. N. V. Joshi of Pusa has been investigating this problem for some years. In a paper read at the recent Madras Sessions of the Indian Science Congress, he showed that if urine were preserved separately under anaerobic conditions there was practically no loss of nitrogen. He, therefore, advocated a separate storage of urine. There was a hot discussion on the practicability of the suggestion and district agricultural officers of this as well as other provinces did not consider it workable.

As the subject is one of great importance, we abstract the following notes from a leaflet of the Board of Agric. & Fisheries of England, in the hope that those interested or so inclined will be stimulated to work the economic aspect of Mr. Joshi's suggestion under Indian conditions.

"By the use of simple appliances and by care, liquid manure which contains all the important plant foods in a soluble form can be kept without losing much of its manurial value. An average sample, undiluted, should contain up to .2% of nitrogen and .46% of potash, and a thousand gallons are equal in value, roughly speaking, to about 3 cwt. of Kainit and 100 lbs. of sulphate of

ammonia. At pre-war rates, the value would be about 4s 6d. per ton (224 gallons)—at present rates considerably more. Irish experiments have proved that liquid manure applied at the rate of 16 tons per acre to hay land, gives better results than the same weight of farmyard manure, or than 1 cwt. nitrate of soda, 2 cwt. superphosphate and 2 cwt. Kainit. Fertilizers and feeding stuffs are still expensive, and every effort should be made to save money on the former by using the manurial residues of the latter to their fullest extent. The liquid manure should, therefore, certainly not be allowed to run to waste. This applies not only to the urine, but also to the drainage from dungsteeds, yards etc."

The reasons usually advanced against a more extended use of liquid manure are that it is objectionable to handle, that its storage is insanitary, that it burns vegetation etc., but when a proper tank is built and a suitable carriage, with a wooden barrel to carry the liquid and distribute it on the field is provided, it is in no way objectionable or inconvenient to deal with. Probably the true reason for its neglect is that its value has not been sufficiently appreciated and its treatment not sufficiently understood.

There are two points to be remembered. First that the more liquid manure is kept from the air, the better does it keep its value. The second point is that no solid manure should accompany the liquid into the tank as it tends to set up fermentation and this occasions loss.

To prevent "burning" dilution with water may be necessary before application and perhaps under Indian conditions it is best applied along with irrigation water. The rate of application will depend both on the strength of the liquid and the number of applications to be given in a season. If it be borne in mind that 100 gallons of average undiluted liquid manure contain nitrogen equivalent to 100 lbs. of sulphate of ammonia it will be easy to regulate the amount.

B. V. N.

Bud-rot of Palmyrah.

Bud-rot of Palmyrah was first noticed and worked out by Dr. Butler in India and pronounced to be due to a fungus *Phytophthora palmivora*. Butler. In 1912, Bud-rot in Coconuts was noticed by Johnston in West Indies and reported to be due to *Bacillus coli* and the latter was for a time suspected to be the causatory organism of the bud-rot in coconut, when first it was noted in Malabar. Later on, however, Dr. Shaw and Mr. Sundararaman showed that it was likewise due to *Phytophthora*. Even in the West Indies, a later worker, Mr. Ashby, has proved that the primary infection is due to *Phytophthora palmivora*, which "first breaks into the healthy tissue and thus opens the way for *Bacillus coli* which actually causes the rot and putrefaction of the central core." Einking has also shown that a species of *Phytophthora* is the primary infective agency in the Philippines too.

Dr. Carment—Government Mycologist, Fiji, confirms the above experience, since he reports the presence of *Phytophthora* in a culture made from a case of Bud-rot in Coconuts found at Tavuni, Fiji.

(Agricultural Circular, October—December 1921, Fiji Department of Agriculture.)
Y. R. R.

Bud-rot of Palmyrah is reported by Mr. P. C. Kar of the Bengal Dept. of Agric. to have broken out in the Hooghly and Burdwan districts of Bengal. From enquiries made he elicited the information that the disease had been in existence for the last 5 or 6 years and had damaged hundreds of trees.

(Bengal Agricultural Journal, December 1921).

Y. R. R.

Regarding Bud-rot of Palmyrah in Burdwan, Mr. S. Sundararaman Government Mycologist, Coimbatore,—informs us "Palmyrah Bud-rot is prevalent not only in Madras Presidency but also in certain Districts of Bengal. The existence of this disease in Bengal was first detected by me during my Railway journey to Pusa in July, 1921, and was brought to the notice of the Imperial Mycologist, Pusa, who started enquiries and found that it was the same fungus as that of the Bud-rot

of Palmyrahs of Godavari and Kistna. Operations for the eradication of this disease in that area in Bengal are in progress on the lines adopted in Madras. A Revenue Inspector has been deputed by the Madras Government to survey the coastal areas in Ganjam and Vizagapatam, to see if there is a continuous spread."

How to make tarpaulins.

The material for a tarpaulin should be hemp canvas or cotton duck, not lighter than 16 oz. The sheet should have the seams double stitched, and not less than eight stitches to the inch; the eyelet holes for tie-ropes to be brass eyelets or galvanised iron rings sewn in. Pure boiled linseed-oil, with a little paste dryers added, will make a thoroughly waterproof sheet. If black dressing is required add vegetable black to the oil and dryers; if yellow, add yellow ochre, and if brown, add Indian red and a little vegetable black. If time is no object in drying add a little fish oil, and this will make the tarpaulin very soft and pliable and increase its durability. In order to produce a satisfactory tarpaulin it is absolutely necessary that the dressing should be carefully applied. The sheet to be dressed should be thoroughly stretched on an even floor while being treated. For the purpose of applying the dressing a rather stiff brush is required. The dressing must be well worked into the canvas, especially at the seams, and equally distributed over the sheet, so that none of it remains on the surface in patches. When one side has been coated the sheet must be hung up and allowed to remain suspended till thoroughly dry. It will then be ready for coating on the other side, and when this has been done hang up as before. When the sheet is again taken down the first side coated must get another coating, and this should be sufficient to make it thoroughly waterproof. When the sheet is drying it should be exposed to free currents of air; dry air is specially desirable, but the sun's direct rays must be carefully excluded. The sheet thus finished should be allowed to hang till thoroughly seasoned.

From the Ind. Scientific Agriculturist, January, 1922.

Utilization of rice hulls.

Nearly one third of the rice crop consists of hulls, which is now treated more or less as refuse. In Germany a method is said to have been discovered by which this material could be utilised. From a thousand lbs. of these hulls, about 750 lbs. of cellulose suitable for paper making is said to be produced by this process. Secondly by dry distillation of the hulls, every one thousand lbs. will yield about 400 lbs. of coke filter, useful for sugar refining and other purposes.

T. S. V.

Yet another source of sugar.

It has been recently found that from the Jerusalem artichoke, a substance known as 'inulin' which is 60% greater in sweetness than sugar syrup can be obtained. The extract is made from the tubers of the plant. The plant is said to be most prolific being considered a pest in certain parts of the United States of America.

The discovery is perhaps too good to prove a commercial success, but the growers of cane should have their eyes open.

(From the Modern Review, April 1922). T. S. V.

Allied Debts in the United States of America:—

France	owes nearly 2851 million dollars.
Great Britain	4166 " "
Italy	1647 " "

The above are chiefly in respect of advances under various Liberty Bond Acts. There is an additional obligation from France of 400 million dollars on account of sale to the French Government of surplus war materials and Belgium owes 27½ millions on the same account.

Mysore Economic Journal, February 1922.

Agricultural Income of the Madras Presidency.

	Area in Acres.	1919—1920 Rs.
Cereals and Pulses.	27,872,519	173,68,20,100
Sugar.	173,243	9,30,86,900

Condiments and spices.	772,063	30,58,40,200
Fruits and vegetables.	1,113,685	20,92,44,100
Minor food crops	33,694	67,38,800
Drugs and narcotics.	466,214	14,37,22,900
Fibres.	2,509,726	10,92,87,000
Oil seeds.	2,685,105	20,29,89,700
Dyes.	102,926	52,16,700
Miscellaneous non-food crops.	153,770	76,88,500
Live stock including (number)		
Cows	5,700,110	27,60,18,900
Buffaloes.	2,561,193	
Wool-live.	2,223,700	

Rs. 3,09,66,53,000

From the Publicity Bureau.

To show how economic conditions vary in the several islands composing the British West Indies and how they must transcend natural conditions under extreme circumstances, the Agricultural News for January '21, 1922 compares as follows:—

Certain prominent features of Barbadoes and British Honduras.

	No. of people per sq. mile.	Value of one sq. mile of land	Natural fertility.
Barbadoes ...	1,100	£ 32,000	Poor
British Honduras...	4.5	600	High.

V. M. A.

At the second meeting of the Indian Central Cotton Committee held at Bombay on January 8th and 9th, 1922, a number of Agricultural problems brought up by the Provincial Agricultural Departments were discussed. The need was expressed for further developing plant breeding work on cottons of the American type in Bombay and for investigating the physiology of the cotton plant in Gujerat. The Madras Department drew attention to the importance of Botanical Research on *Gossypium herbaceum* and study of different cottons in respect of their susceptibility and immunity to disease. Central

Provinces desired to train Indian Honours graduates in cotton research methods. Punjab wished to concentrate its attention on research to ensure better yields and more uniform staple in Punjab American cotton.

Indian Trade Journal, March 9th, 1922. V. M. A.

"Verbal contracts are probably more general in connection with agriculture than with any other departments of trade or industry. The Inverness wool fair is one of the most significant evidence of confidence in trade the modern world can boast. In its palmy days it would be difficult to estimate the amount of capital involved in the transactions concluded during the day of wool fair. In every case the goods contracted for were sold on character. The lambs or the wool were not on exhibition, and year in and year out they were purchased on the seller's testimony as to their relative merit as compared with the products of the same farm in the preceeding year. Such a thing as repudiation of a contract made at the wool fair is unknown in history. If the buyer was nipped by a falling market he took his gruel-ling and said nothing about it. If the market rose the seller never winced; he delivered the stock at the price contracted for."

(Extract from The Scottish Farmer—March 4, 1922.)

Such verbal contracts are not unknown in our country. In the Ceded Districts the purchase of cattle—generally young stock from the professional cattle dealers of Nellore, who go on their year's round for disposal of their stock, is always based on the verbal contract system. Payment is made in three yearly instalments. Every year when the dealer comes on his yearly errand, he is paid his amount and fresh contracts if needed are made. This has been in vogue for many years. There has been so much mutual confidence that breaches of contracts are yet to be heard of in these parts. The evolution of the verbal contract system, which is so very identical in these two diametrically opposite places, is a positive proof of the statement that similar institutions are evolved under similar circumstances irrespective of differences of race and country.

R. S. R.

Estate News.

Officers' Club.

Send-off to R. W. Davies Esq. I. C. S.

On Saturday the 22nd April 1922, the members of the club arranged a Tea-party in honour of Mr. R. W. Davies I. C. S. who was on the eve of his departure on transfer from Coimbatore. Mr. Davies was a member of the Officers' Club while he was a resident on the estate for a time, and continued to be member and attended all the meetings even after he moved on to Coimbatore town. A group photograph was taken and after refreshments, Rao Sahib M. R. Ramaswami Sivan and Mr. T. V. Ramakrishna Ayyar on behalf of the members, expressed regret that the club was losing his company so soon and wished him God-speed wherever he might happen to be transferred. Mr. Davies, rising amidst cheers, expressed his thanks to the members for their kind words and making a few felicitous references in appreciation of the club, declared that he would always have a warm corner of his heart for the club wherever he might be. The happy function came to a close with three hearty cheers to the guest of the evening proposed by Mr. C. Tadulingam and lustily responded to by the members. [We now understand he is posted to Nellore].

Obituary.

We regret to record the loss by death recently of two of the members of the club; on each occasion, the club was closed for the day as a token of the sense of bereavement of the members. Mr. Nagaswami Ayyar was one of its oldest members, who stuck to the club through thick and thin, and was a familiar figure at the cards table. His memory will ever be green among the older members on account of the refreshing butter-milk drinks he used to provide during the hot days of summer. He passed away on the 20th March of an acute attack of tuberculosis.

The late Mr. M. R. Sundara Ayyar B. A., was an Extra-Assistant Conservator of Forests deputed for service at the Coimbatore Forest College as an Instructor. He had a distinguished career as a student at the Imperial Forest College at Dehra Dun. He was of a cheerful disposition and of courteous manners and was, we hear, very much liked both by the College staff and the students. He had a sudden stroke of paralysis in January last which confined him to bed. Though there were at first signs of improvement, a sudden collapse due to heart failure cut short a very promising career at almost its commencement. He was very young barely 33 years at the time of his death.

He leaves behind a young widow and three boys.

Students' Corner.

Cricket match with the Forest College.

The above match was played on our grounds on the 20th at 2-30 P. M. Our College on winning the toss elected to bat. The first wicket fell with 26 runs on the board, Venkataraman scoring 22. Our College scored in all 108 runs. Siva Rao, who entered first, played a steady and faultless game and was top scorer with 32 runs. The visitors had a good fielding side.

The visitors on entering played a hitting-out game. Mr. Wilson scored 29 runs. With four wickets down, the score was 80 and the Forest College had apparently a merry time of it and the game was all but lost for our College. The situation was happily saved by the timely bowling of Mr. Wood, whose well-pitched leg-breaks soon saw the dismissal of the other side for 106 runs. Mr. Wood captured five wickets for the small score of 8 runs. Our College was thus winners of the match by two runs.

The "Cecil Wood" Tennis Tournament.

The tournament came off in the middle of last month. Entries however were not many, being 14 as against 20 last year. When lots were drawn, it was found that the best part of the game was crowded into one round, many of the matches in which were well contested. Venkataraman beat Doraiswamy Ayyangar (6-4, 7-5) after a fair struggle, in which the latter played a beautiful and stylish game. Rangabrahma Rao also put up a tough fight with the winner (3-6, 6-2, 6-4). R. B. Rao played a game of ideas, placed neatly and executed some wonderful cross shots. Rangaswamy Ayyangar came to the finals rather easily; the only match of contest being with Balakrishnan who was not however in his usual form (6-2, 4-6, 6-1).

The semi-finals were played between Sudarsanam and Venkataraman (6-2, 6-4). In the second set when the former was leading with 5-1, the latter scored three games continuously by good and determined rushing at the net. In the finals Sudarsanam beat Rangasamy clean (6-1, 6-0), the game being finished off in 15 minutes.

This is the second year Sudarsanam wins the cup. He played a game decidedly superior to that of the others. He was strong all round, both in the base line and at the net, and exhibited some very beautiful cross shots, very nicely judged placings, over which he had full command, and an occasional stinging and hard drive. He was undoubtedly the best player of the season.

The cup and medals to the winner and the runner up were presented by Mrs. Ramaswamy Sivan.

On the 24th March at 7 P. M. Mr. S. Sundararama Ayyar, Government Mycologist, gave an instructive lantern lecture to the students on the Fungus Diseases of Important Crops accompanied by an exhibition of numerous lantern slides illustrating diseased plants and appropriate remedial measures.

Mr. K. Adinarayana Rao, Assistant to the Government Bacteriologist read a paper on "Bacteria and the Farmer" on the 13th March before a meeting of the Students' Association, enlarging on the importance of the role of Bacteria in Nature. The paper appears elsewhere in this journal in extenso.

The final examinations for the certificate course were held early in April; Messrs : Broadfoot, Rama Reddi and Rangachariar were some of the examiners. Out of 22 candidates 19 passed out successfully—a list of whom is given below.

- | | |
|-------------------------|----------------------------|
| 1. Anderson T. B. | 10. Rajagopala Ayyar N. R. |
| 2. Balasundaram P. | 11. Raja Rathnam S. |
| 3. Chinniah T. J. | 12. Ramamurti. |
| 4. Hegde K. K. | 13. Sadagopan V. |
| 5. Jagannadhan T. S. M. | 14. Sadasiva Reddi J. M. |
| 6. Krishnaswami Rao. | 15. Srinivasan U. L. |
| 7. Kunhi Raman Nambiar. | 16. Venkatachalam K. M. |
| 8. Pallama Raju. | 17. Venkateshwara Rao S. |
| 9. Narayanan N. | 18. Sathyanarayanan. |
| | 19. Zachariah P. |

Mr. McRae came as an outside examiner for the Diploma Course.

The other classes finished their examinations on 11-4-1922. On the same day the College convocation was held, and Certificates, of Proficiency were presented to the successful candidates after which the students dispersed for the summer vacation.

The annual meeting of the Agricultural College Students' Club was this year associated with a social gathering and was celebrated with great *clat*. Almost all the officers of the College and Institute responded to the invitation and Messrs. M. E. Couchman of the Board of Revenue and J. J. Cotton, District Judge, also graced the occasion.

Numerous indoor games had been provided in which many of the guests took part: refreshments and tea were served on a liberal scale; while in addition the party was enlivened by music. The Secretary of the club, then gave an interesting account of the year's progress. It was evident that the literary side of their activities had not been conspicuous, but on the sporting side they had won the a remarkable and unique distinction by securing all the trophies of the year at Coimbatore for Hockey, Cricket and Football. In the course of his report the Secretary thanked the President and the Officers for the active part taken by them in games and the help given them in achieving such a roaring success, and further took the opportunity of wishing Mr. Wood good-bye on the eve of his departure to Africa. On behalf of the officers and himself, Mr. Wood thanked the Secretary for the kind words expressed by him and concluded with words of sound advice to the students.

Departmental Notes.

Mr. E. Cecil Wood of the Madras Agri. Department—permitted to take employment under the Empire Cotton Growing Corporation, as Cotton Expert, Tanganyika Territory.

Dr. R. V. Norris Govt. Agri. Chemist to officiate as Principal in addition to his own duties.

Mr. D. G. Munro—Assistant to the Principal, Professor of Agri. and Superintendent, Central Farm, to officiate as Superintendent, Central Farm.

Mr. K. T. Alwa, Assistant Director IV circle, to be Assistant Director in charge of VIII circle until further orders.

Mr. K. Krishnamurthi Rao, Assistant Sugarcane Expert, privilege leave for one month and 29 days in continuation of Easter holidays, with permission to suffix holidays on June 17 and 18.

Mr. S. Sundararama Aiyar—Government Mycologist, privilege leave for one month from or after May 1st.

Mr. T. V. Rajagopala Acharyar, Assistant Professor of Agriculture, privilege leave for three months from 19th April '22 in continuation of Easter Holidays.

Rao Sahib M. R. Ramaswami Sivan, Govt. Lecturing Chemist leave on average pay for 1 month from 1-5-1922, but later cancelled.

Mr. O. Narayana Ayyar, Assistant Director of Agri. VIII circle privilege leave for a month from or after 2-5-1922.

Appointments:—

Mr. V. Muthuswami Ayyar, to officiate as Farm Office Manager.

Mr. M. P. Sankaran Nambiar, to act as Farm Manager, Taliparamba.

Mr. C. M. John, to be assistant in Economic Botany on Rs. 100-5-150 on probation.

Transfer:—

Mr. M. A. Balakrishna Ayyar, Manager, Koilpatti, transferred to Sugarcane Breeding Station Coimbatore, vice Mr. W. Raghavacharya on leave or until further orders.

Leave:—

Mr. J. V. Ramaaswami Ayyar, Assistant in Chemistry, privilege leave for 2 months from or after 1st May 1922.

Mr. V. Muthuswami Ayyar, Teaching Assistant, privilege leave for 22 days from 19-5-1922.

Mr. G. K. Subramania Ayyar, Assistant Agri. Demonstrator VIII circle, one month's leave on average salary, from 1-6-1922.

Mr. T. V. Narayana Rao, Farm Officer Manager, privilege leave for 1 month from 19th April with permission to prefix the Easter holidays.

Mr. P. S. Jeevaana Rao, Assistant to the Lecturing Botanist, privilege leave for two months from 19th April 1922 with permission to prefix the Easter holidays.

Mr. K. Cheriyan Jacob, Assistant in Botany, privilege leave for two months from 19-4-1922.

Mr. C. V. Seshacharya, extension of furlough on medical certificate for one month and 13 days on full pay and furlough on half pay for 17 days in continuation thereof.

Mr. M. U. Vellodi, Teaching Assistant, privilege leave for six weeks from the 19th April 1922 with permission to prefix Easter holidays.

Mr. N. Muniyappa Pillai, Veterinary Assistant, privilege leave for 12 days from the 19th to 30th April 1922 (both days inclusive) with permission to avail of 2 days Easter 17th and 18th April 1922.

Mr. T. S. Ramasubramanyayyar, Assistant in Chemistry, privilege leave for one month in continuation of the Easter holidays.

Mr. P. N. Krishna Ayyar, Assistant in Entomology, privilege leave for a month in continuation of Easter Holidays.

Mr. W. Raghava Acharya, Farm Manager, Sugarcane Breeding Station, Coimbatore, leave on average pay for 2 months from or after 15th May 1922.

Mr. M. Govindan Nair, Assistant in Chemistry, privilege leave for one month, in continuation of Easter Holidays but cancelled subsequently.

Mr. K. K. Raghavan, Farm Manager, Taliparamba, privilege leave for one month from 24th April 1922.

Mr. S. R. Srinivasa Ayyangar, Agricultural Demonstrator, Walajah, privilege leave from 14th to 28th March 1922 both days inclusive.

Mr. G. Sitharama Sastri, Assistant Agricultural Demonstrator, privilege leave for one month from 1-4-1922 and an extension of leave on average pay for a month and a half in continuation.

Mr. P. L. Narasimham, Assistant Farm Manager, Samalkot, privilege leave for 12 days with effect from 19-4-'22 with permission to prefix Easter holidays.

Mr. R. Narasimham, Sub-Assistant in Mycology, privilege leave for one month from 19th April 1922.

Mr. K. M. Thomas, Assistant in Mycology, privilege leave for 15 days from 19-5-1922 with permission to prefix the Easter Holidays.

Resignations :—

Resignation of Mr. M. Ramachandra Nayadu, Assistant Agri. Demonstrator, VIII circle, accepted with effect from 19-4-1922.

WANTED.

It is proposed to introduce "Agriculture as an optional for V Form from July and a small agricultural farm will also be attached to the school. Applications are invited from Diplomates or others qualified to teach Agriculture. Applicants are requested to state their general educational qualifications and the minimum salary they will be pleased to accept.

C. N. SITARAMA SASTRI, B. A., L. T.,
Head Master, S. V. G. K. High School,
Punadipadu.
Kankipadu post, Kistna District.

Building Fund.

We are glad to announce that Mr. P. V. Isaac M. Sc., now under training in London has written to the Secretary M. A. S. Union as follows, ".....Please put me down for a *first instalment* of Rs. 50, towards the Building Fund. I am returning in June and I shall send you the money as soon as I am back in India... .." We trust more of our members will follow in the same generous spirit.

We are glad to be able to state that plans of the site applied for and of the proposed Union Building have been sent up to the Director of Agriculture in response to a call for the same. We trust that before long building work may be taken in hand and beg, therefore, to reiterate the request made in the March number of this journal that all those gentlemen who have subscribed would be so good as to send remittances early. Those that have not yet subscribed are invited to help the Union with their mite.

The Working Committee.



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POONA,
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INDIA.

The Ramasastrulu—Munagala Prize 1922.

In accordance with the resolution of the Working Committee dated 24—4—22, competitors are invited for the above prize, the conditions of award being as follows:—

1. The prize shall be called the Ramasastrulu—Munagala Prize and will be awarded for the first time in December 1922.
 2. The prize will be in the form of a medal and will be awarded to the member of the Union who submits the best account, of original research or enquiry, carried out by him, on any agricultural subject.
 3. The subject-matter shall not exceed in length twelve foolscap pages type-written on one side.
 4. Intending competitors should notify the Secretary of the Madras Agricultural Students' Union not later than the 1st October 1922 the subject of the paper which they propose to submit, and the paper should be sent in so as to reach the Secretary Madras Agricultural Students' Union, not later than the 1st November 1922, with a covering letter showing full name and address of the sender. The author's name should not be shown on the paper which should be entered under a nom-de-plume.
 5. Four type written copies of the essays should be sent in.
 6. The name of the successful competitor will be announced and the prize awarded at the time of the Conference in December 1922.
 7. The Union reserves to itself the right of publishing all or any of the papers.
 8. All references in the paper to published books, reports, or papers by other workers must be acknowledged.
- Any further particulars may be obtained from the Secretary, Madras Agricultural Students' Union, Lawley Road Post Office, Coimbatore.

B. VISWANATH,
General Secretary.

THE JOURNAL OF The Madras Agricultural Students' Union.

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May 1922.

No. 5.

Editorial Notes.

Our Union.

The time and the place and the exact circumstances under which Our Union originated are perhaps yet green in the memory of some of the older members. It was on the forenoon of the 14th July 1910, on the occasion of the celebration of the First College Day by the Students' Club, that this association was called into existence at a meeting of Agricultural Students—past and present. Since that day, the Union has been progressing steadily, though slowly, pursuing the objects which it was intended to fulfil; it has been expanding year by year in an orderly way and, we fervidly hope, that it will continue to do so for a long time to come.

The objects with which it was started were firstly to create and foster an *esprit-de-corps* among its members, secondly to facilitate an exchange of opinions and experiences in agricultural matters, thirdly to act as far as possible as a bureau for procuring employment to the members and fourthly to protect and to promote their interests, and in order to attain these objects it was decided that the Union should undertake the celebration of the College Day annually, and in addition hold an Agricultural Conference in continuation thereof, wherein papers of agricultural interest could be read. Further a corrected list of addresses of the members was to be maintained and finally a journal was to be conducted as an organ of the Union. All the above various objects

of this association have always been kept in view and been fulfilled as far as practicable. We cannot sufficiently appraise the value of the institution of the College Day and Conference, in affording opportunities for members to meet each other and exchange experiences, nor can we over-estimate the usefulness of the Journal in enabling the association to keep in touch with the members scattered throughout the Presidency.

It may, however, not be without advantage to take exact stock of the work accomplished up to the present, so as to gather an idea of the limitations under which it labours. For instance, though we would earnestly wish our readers would believe that the Union is deeply solicitous of the welfare of its members and is anxious to protect and promote their interests, we are afraid the scope of the Union for such a task is rather very much limited; and it is needless to state that the spirit and the constitution of our Union are such as would not allow of its adopting the tactics of associations of the nature of Labour-Unions. Again though the Journal is fondly believed to be the accredited link between students past and present and members in and out of headquarters, yet to our regret one has to admit that the Journal does not receive the patronage of many of the members of this Union. Further more, if we except the activities of the Journal and the occasional stimulus given to members by the institution of prizes for Essays, the Union cannot, we fear, own to any tangible piece of work turned out—in aid of agriculture—during the interval between one conference and another. We are tempted to ask should such a state of affairs be allowed to continue? Can we not remedy it?

As early as July 1911, the late Rao Bahadur J. Dharmaranga-Raju, in his inaugural address to the 1st Agricultural Conference, said "This sacred duty (to the government and the country) can be performed by supplementing the work of Government by independent enquiries on the same lines as those pursued by Government, and by spreading to the people the information concerning

experimental work gathered by Agricultural Experts of Government. These, if done in an organised manner, would very much hasten the objects of the Agricultural Department. One of the purposes of this Union is, therefore, to collect from its members scattered throughout the Presidency, all available agricultural information and to place it on record in the office of the Union.—" We are of opinion that our Union would be doing substantial work and be actively helping the cause of Indian Agriculture, if it would work on lines indicated above.

In this connection we would instance the work turned out by a sister Association in Mysore—the Mysore Agricultural and Experimental Union. This association came into existence as an outcome of the desire of several young men, who, in the words of Dr. Coleman in his opening speech of the fourth annual meeting—"felt that there should be a closer bond of union between the Agricultural Department on the one side and educated agriculturists on the other. They aimed specially to gain the co-operation of men trained in agriculture in our (Hebbal) school and elsewhere and had returned to the land." The membership to this association would appear to be drawn largely from those who had had agricultural training and from educated agriculturists. As to one of the objects of this Union, Dr. Coleman states that, owing to the varied conditions of soil and climate in Mysore, it was necessary that the experiments tried in the State Experimental Farms should be tested in as many localities and under as many different conditions as possible. While the Union had within its province all questions connected with the improvement of Agriculture, it had as its special function the carrying out of tests in co-operation with the Department of Agriculture. This is a phase of work which, we would wish, our Union might usefully endeavour to undertake. This would, of course, involve our admitting into our fold a large number of educated and interested agriculturists who may be expected to understand the improvements suggested by the

Department and to undertake to help it by conducting the tests on their own lands. It is regrettable that the ryot,—and even the educated agriculturist,—often views with some slight suspicion and distrust the motives of officials of our Department, even though their functions are admittedly beneficial. We are confident, however, that, by seeking their co-operation through a private body like that of our Union, and by actively associating them with the aims and work of this department, it would be possible to remove such a taint of suspicion.

We venture to think that such a policy, while enabling the Union to enlist the active sympathies of the practical agriculturist for the department, would also make it possible for the Union to spread the improvements suggested by the Department: and we are hopeful that under these conditions, it would be improbable that the Department would meet with such ill-informed criticisms, as it has of late, in the Legislative Council.

Of course, our members will naturally be diffident about admitting among themselves a class of men who cannot by any stretch of imagination be considered as “Old Boys”, as thereby they run the danger of being easily swamped and the Union, of losing its essential character as an “Old Boys” association. But, we are of opinion that it would not be impossible to devise ways and means to preserve this character and safeguard the Old Boys’ interests and at the same time to introduce this new element which is so essential for its further expansion. It might even be possible to keep this phase of the Union quite separate from its ordinary functions. In making these suggestions, we venture to hope that we will be able to set our members a-thinking on this aspect of our Union and trust that they would have the effect of eliciting criticism from them.

Monthly Digest of the Operations of the Agricultural Dept.

Since January 1922, the Publicity Bureau has begun to circulate copies of a consolidated monthly report concerning work done

during the month by the various sections of the Agricultural Department. The report is written in a popular style and deals with all items of interest which the public might desire to know and we hope it would interest the public and prove popular. Such a report is specially to be welcomed in view of the strictures—unfortunately due to imperfect information—the department was subjected to, during the recent budget debates of the Madras Legislative Council.

The Director of Agriculture and the Legislative Council.

We observe it to be rather a strange circumstance that, while in many other Provinces the Director of Agriculture is a member of the Provincial Legislature, in Madras he is not taken to represent the Department at the Council. It appears to be an anomaly, especially when one finds the heads of similar sister departments—the Department of Public Instruction and the Department of Industries, for instance—represented in the Councils. In view of the severe criticisms passed on the Department recently, we would very much wish that the Government would also nominate the head of the Agricultural Department as a Member, so that he may be present there to give active help and supply correct information to the Honourable the Minister for Development in his task of answering such criticisms.

Obituary.

We regret very much to report the loss by death of one of our members, Mr. C. Arulanandam Pillai, in February this year. He passed out of this College in 1916, taking the Proficiency Certificate in Agriculture. He joined the Department forthwith and served with much credit as assistant Farm Manager and Agricultural Demonstrator in the IV Circle. He was transferred to the section of the Cotton Specialist early in 1921, but had to take leave on account of ill-health and we are very sorry to hear that his illness ultimately culminated in his decease. We hear he was an able district officer and the department can ill afford to lose him.

Lime cultivation at Kadayam.

BY P. KANNAPPA PILLAI.

General. Kadayam is a village in the Tinnevely District situated midway between Ambasamudram and Courtalam and is noted for lime cultivation. There are a number of gardens which vary in extent from half to one acre and which are reported to be very profitable. In addition to limes, other fruit trees such as mangos, papayas and pomegranates are also grown, as also are roses. Lime trees do not thrive well in Courtalam which is close to the ghats even though it enjoys a cool climate. Possibly the strong monsoon winds near the ghats prove detrimental to the healthy growth of these plants and a considerable shedding of flowers has been observed which accounts for the trees not bearing well. Kadayam, being situated about fifteen miles from Courtalam, is not subject to the heavy winds of the ghats, while it is in possession of a mild climate and receives light showers at convenient intervals, being benefited by both the South West and North East monsoons. The fruit growers in this village are agriculturists owning both wet and garden lands and fruit growing is only a part of their occupation.

Soil. The soil is a red loam about a foot deep, below which there is a sub-stratum of fine gravel. This gravelly sub-soil is considered best suited for the growth of the lime tree. It facilitates good drainage, and favours a lateral spreading of the root system.

Seed and Seedlings. Well-developed seeds from good mature fallen fruits are dibbled in pots. It is the experience of gardeners that seeds which have been allowed to dry do not germinate well. When the seedlings are about a year old they are planted three feet apart in a nursery plot adjoining a well. In two years the seedlings attain a height of about two and a half feet and the main stems are about the thickness of a finger. At this stage the seedlings are fit for retransplantation. Generally the seedlings are planted in the months of September and October when the monsoon sets in. The price of the seedlings varies with age and one-year-old seedlings are charged a

rupee each. The space generally allowed between the plants is about 20 feet either way.

Preparation of the ground for planting. The plots close to the village are preferred, as they command efficient supervision. The plots selected are roughly levelled. Pits four feet square and four feet deep are dug at distances about 20 feet apart either way. This spacing is however found insufficient; for when there is strong wind, the branches of the trees rub against one another causing a considerable shedding of flowers and young fruits. Experienced gardeners are of opinion that a spacing of 25 to 30 feet is necessary between the plants.

After-cultivation. This is chiefly hoeing with mammutty at intervals. The gardener takes special care to keep the soil always loose and not to allow weeds to grow.

Irrigation. Lime requires not less than two waterings a week. A mhote driven by a pair of cattle irrigates about 25 trees a day. The tract has the advantage of both the monsoons. For practical purposes the garden will need to be irrigated only for seven months during the year.

Manuring. Much attention is paid in manuring the trees carefully and systematically. The trees are manured twice a year about the time when the monsoons are about to set in. They are manured first in June with 2 or 3 head-loads of Kolinji leaf per tree, (a head load costing 8 annas) and for a second time in September with four basketfuls of sheep dung. The cost of sheep dung (each basketful equals 15 M. M.) per tree is Rs 1—8—0.

Harvest. Generally the lime trees begin to yield when about five years old. They begin to flower three weeks after manuring. As both the monsoons favour the tract, the trees are in bearing throughout the year. The heavy season, however, is March to May. The annual sale proceeds of 30 lime trees have in some instances amounted even to Rs. 1,200/-. There are also exceptional cases in which an individual tree has yielded over Rs. 55/- worth of fruits. The average yield of a tree is never less than 2500 fruits a year. The average price of the fruits is a Rupee per hundred.

An attempt is made to detail below the *actual cost of running an average garden* so as to ascertain whether lime cultivation is really a profitable business.

1. The plants are generally 20 feet apart. A half-acre plot will contain 50 trees and a well.

2. Two irrigations are reported to be necessary during a week, and the crop stands in need of watering during 7 months in a year. The total number of irrigations is therefore $2 \times 4 \times 7 = 56$.

3. One pair of cattle can irrigate 25 trees a day and therefore two pairs are necessary to irrigate the plot once. The total number of pairs required to irrigate the crop during the year is $2 \times 4 \times 7 \times 2 = 112$.

4. The average hire of cattle for a day is Rs. 1-8-0 which includes the wages of a cooly also.

5. Hence the actual irrigation charges on 50 trees amount to Rs. $1-8-0 \times 112 =$ Rs. 168/-

6. A boy on Rs. 7 a month is necessary throughout the year to help in irrigating the crop, in collecting and marketing the produce and in other miscellaneous kinds of work.

Particulars.	Expen- diture.	Receipts.
	Rs. A. P.	Rs. A. P.
1. Annual irrigation and cooly charges on a tree—Rs. 168 plus Rs. 84 i. e. Rs. 252/50	5 0 0	
Manuring:—Cost of kolinji leaf applied per tree	1 0 0	
Cost of sheep-dung per tree	1 0 0	
Details of investment:—		
Half an acre of land @ Rs. 250 per acre	125 0 0	
Cost of digging a well with mhote fittings, buildings, cistern and main channels	533 5 0	
Cost of 50 seedlings a-year-old	50 0 0	

	Rs. A. P.	Rs. A. P.
Cost of rough levelling and planting the seedlings	25 0 0	
Cost of maintaining the plantation during the subsequent four years	600 0 0	
Total Rs.	1333 5 4	

Interest per tree on the capital of Rs. 1333-5-4 invested at 6% per annum (bearing in 5th year) 8 0 0
The average yield of a tree is 2500 fruits and the average rate is Re. 1 for every 100 fruits. Therefore the cost of 2500 fruits at Re. 1/- for every 100 is

	25 0 0
	15 0 0
Profit per tree	10 0 0

Therefore the annual net profit from a tree is Rs. 10/- It may be assured that the profit will not in any way be less than the figures given above.

Lime fruits and roses are supplied on contract to towns like Tinnevely, Quilon and Tuticorin, but the total demand does not always rise in proportion to the increased production so that the market is sometimes glutted, leading to a reduction in the profits.

Coconut Topes.

REGULAR CULTIVATION ENSURES INCREASED YIELD.

BY M. GOVINDA KIDAVU.

The provision of sufficient soil moisture is, as every ryot knows, one of the essential requirements for a growing crop. While it may be possible to supply this need by irrigation, it is obvious that this procedure involves a certain amount of expense: and it is clearly much cheaper to take greater advantage of the natural rainfall. Moisture is lost from the soil in two ways. Firstly by direct evaporation from the deeper layers by capillary attraction and secondly by transpiration by

way of leaves of weeds. Loss of soil moisture in these two ways can be remedied, by hoeing the soil surface and thus preserving the soil-mulch and at the same time destroying the weeds. A preparation of the ground before the rains will at the same time help the rainwater to soak into the ground and prevent loss by drainage.

Coconut trees require an enormous quantity of water to enable them to maintain a good growth. It has been found out that as much as 2,250 gallons (22,500 lbs.) of water would be required for transpiration alone per tree per year. In Malabar intercultivation of a sort is given in coconut gardens; in some localities the operation is done very carefully, while in other places it is attended to only in a perfunctory way. Watering is seldom done except perhaps in parts bordering on Coimbatore, even then only when they are very young. In South Kanara, on the contrary, which enjoys the same amount of rain-fall if not more, and where coconut cultivation is comparatively of recent introduction, no cultivation of any sort is given to the gardens, but the trees are copiously watered in the hot weather for about six months.

On the Government Coconut Station at Kasargod, culture experiments were started in 1917 to study the effects of intercultivation and to find out whether watering could be completely done away with. One plot was left as it was without cultivation of any sort, while all the surrounding plots were properly cultivated. Every year they were ploughed twice with the monsoon plough, once in the beginning of South West Monsoon and the other just towards the close of North East monsoon. This latter was intended more to facilitate subsequent operations.

In addition to the above main and deep ploughings, the whole area was worked with shovel cultivator or Guntakah three or four times, according to the nature of the conditions of the soil at the time of operation; shovel cultivator was worked if it was hard and weedy, otherwise Guntakah was passed over. The operation was repeated so that the surface was always kept loose and free of weeds. The corners and bases of coconut trees were carefully dug over with mamotty. None of the trees—even the annually planted seedlings

—was watered on the Farm. The result of the experiments was as shown below:—

Average yield per tree.

Year.	II-Cultivated.	III-Uncultivated.	IV-Cultivated.
1918	17.59 nuts.	17.52 nuts.	22.94 nuts.
1919	34.56 nuts.	16.13 nuts.	30.01 nuts.
1920	37.50 nuts.	10.15 nuts.	51.31 nuts.

The condition of the trees in the uncultivated plots is as expected very unsatisfactory, except perhaps in the case of those bordering on the cultivated plots and whose roots were partly benefited by the operations done in them, whereas all the trees in the test plots are in a flourishing condition. Before the acquisition of the garden, it had never been dug or ploughed, but the trees had been copiously watered even though most of them were over 20 years old. The net extra income due to the cultivation works out at Rs. 55/- per acre, reckoning at the rate of 60 trees to an acre, whereas the average number per acre in the district is more than 100.

Lessons in Nature Study.

5

Water plants—(Contd.).

P. S. JIVANNA RAO.

Aponogeton monostachyon. A common plant of wide occurrence growing in tanks and ponds and more generally in shallow water. There is a tuberous root-stock sunk in mud and of the several leaves the lower are submerged and the upper ones are floating. The latter are of an oblong shape with considerable variations in size and the leaf stalks also vary much in length according to the depth of water. The flowers are small and pink (rarely white) and crowded into spikes which are raised conspicuously above the surface of water. There are two sepals and six stamens and the ovary is composed of three parts.

The root stock is said to be edible. .

Potamogeton indicus. This aquatic presents a striking appearance on account of its branched leafy shoots which float on water sometimes covering a wide area. Most of the leaves are floating and a few are submerged with blades longer than the stalks. The shape of the floating leaf varies from oblong to elliptic lanceolate and at the base of each leaf there is an extra outgrowth, the stipule. The spikes are dense-flowered and appear completely above water.

Cyperus. The plants included in the Cyperus family (Cyperaceæ) are generally known by the name of sedges to distinguish them from grasses and some species or other are sure to be found in marshy areas. Very few of them are truly aquatic, but as there are several which cover wide areas of marsh land a knowledge of them will be very desirable. Some of the species are economically useful as they yield material for the manufacture of mats in certain parts of the Presidency, e. g. Tinnevely, Vellore.

The following special features may be noted about the plants:—

i. A perennating underground system of rhizomes which is responsible for the gregarious habit of the plants.

ii. Leaves narrow and linear.

iii. Flowering axis angular.

vi. Flowers small and inconspicuous crowded so as to form short spikes a large number of which are to be found on a branched axis surrounded by leaves at the top of the flowering shoot.

An interesting line of work will be to form a systematic collection of all the sedges that are found in the locality not only in the marshes but also in paddy lands, dry grounds and waste places and also to draw pupils' attention to such of the plants as are known to be useful.

Panicum interruptum.—

Hygrophiza aristata.— These two plants belong to the order of grasses (Gramineae) and there are a few other members of the family which are typically aquatic in habit or live under marsh conditions. Among these are *Panicum stagninum* and *Leersia hexandra*. In all of them the pupils should know the exact habit of the

plant and the principal features of the grasses as they could be made out in the specimen e. g. the alternate simple leaves with sheathing leaf bases and free lamina, the ligule present at the collar, the roughness of the leaves due to silica and the arrangement of the flower-containing parts viz., spikelets on the flowering axis. Note the erect or creeping nature of the stems and their rooting at the nodes.

Marsilea. Readers of Tamil literature may probably know the interesting passage-at-arms that is said to have taken place between the renowned Auvai and Ottakuthan in which the latter presented for solution by the former a riddle* the substance of which is "A single post it has, a four leaved tent." Auvai, the poetess, scorned it with delight and mentioned the name of the plant which is Aarai in Tamil. This little story points to the possible antiquity of the plant on the Indian soil.

This plant is a very common weed found either submerged or emerged in paddy lands, in the slow moving water of channels or on the edges of tanks and lakes. The slender stem creeps in the mud beneath and bears leaves at the nodes and roots on the lower side both at nodes and inter-nodes. The leaf stalks are long sometimes reaching even 2—3 feet in response to the depth of water and bear 4-lobed lamina which either float or stand erect above water. The leaves are said to sleep at night.

Unlike the plants previously noted Marsilea is a flowerless plant (cryptogam) and belongs to the family of Water Ferns. It spreads vegetatively by means of underground stems and in the dry season produces small bean-shaped bodies known as 'sporocarps'. These contain minute spores which on liberation from the sacs which contain them germinate and give rise to special bodies by the union of which fresh plants are formed. As the process is complicated the exact details need not be described.

The plant is sometimes a bad weed when occurring in paddy lands and channels and its eradication is rendered difficult owing to its persistent underground system.

* ஒரு காலடி நால்குழைப்பந்தலடி.

Azolla. Like *Marsilea* this is also a genus of plants belonging to the family of Water Ferns and is of wide distribution in South India. It is a free floating aquatic of dull appearance and may be seen covering wide areas in tanks and ponds sometimes so densely that the water is scarcely visible. Leaves are small and lobed and the roots hang freely in the water from underneath. Small fruit-like bodies (sporocarps) of a reddish colour are to be seen on the lower surface and these contain spores which germinate and give rise to the male and female elements by the union of which new individuals are produced.

The presence of *Azolla* in tanks is said to prevent mosquitoes laying eggs in water and also the larvae from coming to the surface for breathing.

Chara. This aquatic is familiar under the name of 'Sangilipasi' and occurs in tanks and ponds attached to the bottom and forming a dense mass of vegetation. The plants are rough and brittle due to an abundant deposit of silica on them and it is said that their presence makes the water sweet.

The stems are joined and cylindrical and branches arise in whorls from each node. Bright red bodies containing the germs of the plant may be seen in the axils of the branches and these make them very conspicuous in water.

The plant multiplies rapidly by vegetative means and is considered a noxious weed wherever it occurs.

Spirogyra. A common inhabitant of fresh water belonging to the group of plants known as the 'algae.' It forms floating green masses in ponds and shallow water and may be recognised by its sliminess and dark green appearance. It consists of extremely thin and delicate filaments which will show beautiful structures under the microscope.

(To be continued.)

Reviews. .

Pusa Bulletin No. 125—Cawnpore American Cotton II—by B. C. Burt, M. B. E., B. Sc., Secretary Ind. Central Cotton Committee.

In this bulletin, the author sets forth the results that have been obtained since the publication of Bulletin No. 88, wherein certain definite conclusions had been reached as to the prospects of Cawnpore American Cotton in the canal districts of the Central Circle. He summarises his present results as follows:—"By pure line selection with the necessary precautions against cross-fertilisation, a pure race has been isolated from the mixed acclimatised Exotic, known as Cawnpore American cotton. This yields well, has a staple of $1\frac{1}{16}$ " to $1\frac{1}{8}$ " and is suitable for spinning 25's warps and 30's wefts in Cawnpore and up to 36's in Lancashire. Over, 1,100 acres of this selection were grown by cultivators in 1920 and sufficient seed is now available to replace the original Cawnpore—American entirely. An independent market unguined American cotton (*hapas*) has been established in Cawnpur.

Y. R. R.

Journal of the Mysore Agricultural and Experimental Union, December 1921.

The December number, which reached us about the middle of last month, maintains its usual high tone and proves to be full of interest. Besides the Editorial comments and various interesting extracts, it contains an account of the proceedings of the Fourth Annual Meeting of the Mysore Agricultural and Experimental Union. The opening speech of the President, Dr. L. C. Coleman, is highly instructive and the defence he has put up on behalf of the Mysore Agricultural Department against criticisms levelled at it in the Mysore Representative Assembly and in the Mysore Legislative Council, is armed with convincing figures, and ought, we are sure, to set at rest the doubts of the unbelievers. Though each Province and State in India has its own peculiar problems to solve and moreover has a very varying individual record of *fait accompli*, yet we

are sure the general line of defence taken by Dr. Coleman will apply with almost equal force to the criticisms made in the various provinces. The issue also includes papers read by various members at the meeting and it must be noted that most of them deal with the actual results of experiments undertaken by them on their own lands. There is besides an article on the Insect Pests of Mysore.

We note that with the beginning of the IV Volume, the journal will have changed hands. From January 1922, the journal, which has passed three difficult years of infancy in the safe hands of Mr. Yegnanarayana Ayyar, will pass over to the fostering care of a large Editorial Board with Dr. Narasimha Ayyangar, B. A., Ph. D. as Chairman. We wish the Journal a long and prosperous life.

Notes and Extracts.

Fall in value of crops. The total value of *Farm Crops* has been dropping in the United States of America since 1919 owing to the general fall in prices of farm products.

The total value for 1921 was 5,676 millions.

1920 9,075 „

1919 13,689

Agricultural Review, January 1922.

V. M. A.

The aim of teaching in agriculture must be practical. There must be a practical ring about it, instruction tempered by demonstration with life in it to keep attention fixed on it. Slavishly imitating town teaching is like serving pap with a hatchet, calculated rather to frighten the child than to feed it.

H. Wolff.

R. S. R.

Poison gas against rats. Hawaii contemplates starting a poison gas offensive against rats in that island. The Hawaiian planters are said to have looked up their books and found to their dismay that in certain of their plantations as much as one tenth of the cane

grown is damaged by these rodents. Hence the campaign. The gas would be of the kind that was used by the American army in Europe recently. We wish the cane planters all success and trust that no breach of 'international' law is involved in the contemplated operations.

T. S. V.

The Hon. John Dymond. The Honourable John Dymond, Editor of the Louisiana Planter and Sugar manufacturer from the time of its inception, passed away on 5th March 1922 as a result of a severe cold due to exhaustion leading to pneumonia. This is a great loss to the sugar cane World and a void has been created in it not easily to be filled in. He was the first man in the sugar world to weigh the sugar cane received at the mill, as a basis for a comprehensive system of cost determination, this latter developing into the scientific chemical control now practised at modern sugar factories everywhere.

(The Louisiana planter—March 11—1922.).

R. S. Rao.

Importance of irrigation. That water is the limiting factor in production of crops is well known to all agriculturists, The importance of irrigation in increased crop production especially in laterite soils has been worked out by the Bengal Agricultural Department and the results are favourable as shown under :—

Crop.	Irrigated.	Unirrigated.	Difference in yield.
	Mds—Seers.	Mds—Seers.	Mds—Seers.
Wheat Irrigated	20—38	11—27	9—11
Barely thrice	26— 8	23—15	2—32
Pusa 12	24— 0	16— 0	8— 0
Wheat. „ 4	15— 0	10— 0	5— 0
Local.	15— 0	13— 0	2— 0
Potatoes.	156—14	94—1	62—13

(The Bengal Agricultural Journal December 1921.)

R. S. Rao.

Water power in the British Empire. The water Power Committee of the conjoint Board of Scientific Societies notes with satisfaction that the Government of India have been given instructions for a course of lectures in the major Engineering Colleges in Madras, Bombay, Bengal and the United Provinces by an expert in hydroelectric Engineering and says "The Development of Indian water power would appear to offer a most promising field to British manufacturers and one in which some initial sacrifice would be amply repaid"

	Hydraulic Horse power		Per cent.
	available.	developed.	developed.
Europe	47,300,000	8,450,000	18.0
United States of America	32,000,000	65,00,000	23.3
British Empire	60,000,000	3,000,000	5.0

(Mysore Economic Journal, February 1922).

V. M. A.

Seed Testing Station. A New Seed Testing Station was opened in Ipswich, England, on 17th February 1922. The building cost £45,000 and with its six floors has a floor capacity of 38,000 sq. ft. The building has been erected from the accumulated twenty years savings of the East Anglia Farmers' Association. One noticeable feature is the provision of the dark room, specially constructed so as not to affect the colour and growth of seeds.

From the Scottish Farmer, February 25, 1922.

V. M. A.

Farming business. The building up of a farm business is the hardest and most precarious undertaking in the world to day. No other business on earth can stand the handicaps which confront the farmer. The American farmer (in fact the farmer of any country) to day is the most burdened, perplexed and overworked member of society.

The work of the farm is a combination of many different arts and operations that require endless fitting and readjustment to meet

continually varied conditions. Neither the theory nor the practice of agriculture can be reduced to the simple system or prescribed routine of an industrial operation.

Farming is facilitated by modern implements in the sense that fewer men are required, but running complicated machines and keeping them in repair is harder and more exacting work than the old hand labour. Certainly the conditions and comforts of farm life have not improved in proportion to the use of machinery.

The chief social effect of labour saving inventions is that most people find ways to return from the work of production and live in idleness or engage in non productive urban activities.

(O. E. Cook,—Journal of Heredity).

R. S. Rao.

Proposed Cotton Cess. The Government of India seem to have approved the recommendations of the Indian Central Cotton Committee in regard to the levy of cotton cess, which, briefly were:—

1. To levy a cess of 4 as. per bale of 400 lbs. on all cotton as well as on exports for a period of 5 years.
2. To devote the proceeds of the cess exclusively towards the expenses of the Central Cotton Committee to meet the cost of technological and agricultural research on cotton.

The estimate of initial expenditure involved in the appointment of a technologist with a suitable laboratory and apparatus was Rs. 3½ lakhs together with a recurring grant of Rs. 1 lakh. In addition the annual budget of the Cotton Committee itself, apart from research work, was estimated at about a lakh of rupees.

The average annual exports of Cotton during the 5 years ending 1920—21 were slightly over 3 million bales of 400 lbs each, so that a cess at the rate of 4 as. per bale on exports alone would yield a revenue of about Rs. 5 lakhs, which would be sufficient to meet the cost of the Technologist and his laboratory as well as the operations of the Committee. If the cess were levied on all cotton, including mill consumption, it will be reduced to a rate sufficient to provide the funds required.

The Committee of the Bombay Chamber of Commerce in response to an enquiry express their agreement with the views of the Government, and suggest that the simplest method of collecting the cess would be at the mills and at the ports. They, further, opine that the proposed cess will not be prejudicial to the cultivator in as much as the whole of it would be paid by the consumer, though theoretically the incidence of the cess should be evenly divided between the cultivator and the consumer and each would have to pay 0·005 annas per pound.

(The Indian Trade Journal April 6—1922.)

Panama Disease of Bananas or Banana Wilt. This disease is reported to be a serious disease of Bananas in Central America and part of the West Indies. It is reported to be caused by a fungus (*Fusarium Cubense*) the spores of which occur in the soil, and enter the plant through the roots into the bulb, and thence spread through the plant. The banana plant infested by this fungus begins to wilt suddenly, the leaves droop, fold down and dry up quickly. In case, when a wedge is cut out of the stem a foot above the base, yellow, red or brown streaks are noticeable, one may be sure that the Panama disease is present. The new unfolded leaf at the top will be found black and rotting. It is an insidious disease and remedial measures are very difficult, as it enters through the roots. It has been the cause of immense loss to Banana growers. In British Honduras 6000 acres planted to bananas were wiped out before the first crop was reaped and in Central America many thousands of pounds loss was occasioned. One should therefore beware of its introduction into India.

(From the Journal of Jamaica Agricultural Society, Dec. 1921.)

Y. R. R.

A remedy against mosquitos. Experiments conducted in France have shown that mosquitos prefer rabbits to human beings when both are available. As a result of the discovery it is said that in localities where mosquitos are common the inhabitants keep rabbits along with poultry to offer the necessary counter-attraction and it is said, with successful results.

It is to be hoped that rabbits in turn will not harbour any destructive virus, which may lead to the development of a serious malady in mankind.

(From the Modern Review, April 1922).

T. S. V.

Cattle and Malaria. Medical opinion is veering round to the position that cattle play an increasing part in the prevention of malaria. It is observed that in Algeria, it is easiest to catch adult mosquitos in the pig-stye in day time and that in Batavia certain species actually prefer to feed on bullocks rather than on man.

Would this explain the provision of Cattle stalls in the entrance of dwellings especially in malarial areas of Bengal or Orissa?

V. M. A.

Cattle and malaria. In connection with the question of the role of cattle in the prevention of Malaria, Mons. Roubaud observes that in certain districts of France, a particular malaria-carrying mosquito—*Anopheles maculipennis*—has of recent years been noticed to transfer its attentions from man to cattle consequent on an increase of the latter in numbers, and in such areas he states malaria has diminished considerably or even disappeared. According to this author, wherever the proportion of mosquitos to cattle is greater, the mosquitos are known, though evidently much against their will, to bite Man and thereby give rise to a certain amount of malaria. He further seeks to prove that this mosquito has by the influence of natural selection gradually developed larger number of teeth in their maxillae, so as to fit them for attacking the tougher skin of cattle.

In India too, Mr. A. B. Fry in discussing this question in the Indian Medical Gazette, Calcutta, January, 1922, regards that the low percentage of malarial infection among the population of Bengal is really due to the greater attraction the cowsheds seem to possess for the Anophelines than the sleeping apartments of man. According to Ross's Formula, the chief factor that influences a malaria epidemic is the proportion of the mosquitos that succeed in

biting man and this factor is certainly controlled by the presence of cattle; and Mr. Fry believes that the presence of cattle may act as a two-fold weapon and attract mosquitos even while it protects human beings outside the actual cattle zone.

(From, the Rev. App. Entomology—Vol. X, Ser B, Pt. 3—
March 1822).
Y. R. R.

Hints for making an agricultural enquiry. All information regarding local practices of a tract is got by observation and enquiry. Enquiry is carried out by a set of questions and a great deal of care should be exercised in framing these questions. The principal points to be borne in mind are set out by Mr. M. A. Hopkins in his article on 'The outline for a study of the cost of Milk Production' in the Journal of Dairy Science Vol. V No. I 1922. Though they were raised in reference to an enquiry with Dairy farmers, they will apply equally well and may be used as a guidance with advantage by all officers engaged in agricultural enquiry.

1. The questions must be so clear as to be proof against misunderstanding or confusion on the part of the Dairymen.
2. They must be so formulated that there will be no possibility of their antagonising the farmer.
3. The questions must be in the *farmers' vernacular* and *free from Scientific abstractions*.
4. The questionnaire should cover every factor of the business that could possibly influence the facts which are being sought.
5. At the same time, the questionnaire should not be so long as to tire the farmer before he has discussed all the important factors.
6. Where it is possible, checkquestions should be incorporated in the questionnaire in order to verify important points. The man who is collecting the data must always be able to supplement the farmers' answers with observation. They must be able to use tact and diplomacy in questioning further on points where farmer's answers appear to depart from facts.

R. S. R.

Food value of Eggs and Milk. In the March number of the Journal of Agriculture Victoria, we find a paper by Professor Dryden on the above subject quoted verbatim. The writer avers "The Egg has only one real competitor in the world among essential foods for human beings, and that is milk. The lowly cow and the humble hen carry the burden of the world as far as it relates to the physical well-being of the races." Speaking of the races of humanity, he thinks that the reason why "the peoples of Europe and America are the largest in the world, have the lowest death-rate, the longest span of life and the lowest infant mortality, and further have become the great masters of the forces of nature," is because of a difference of diet. They have been making greater use of milk and eggs than the races of the Orient.

He further remarks "Chemical analysis has failed to give us a correct understanding of the nutritive needs of animals as well as of human beings. The value of a food has been judged largely, if not wholly, by its protein content and often by its heat units as determined by Chemical analysis. The newer nutrition clearly proves that chemical feed formulas have had their day. For instance Dr. McCollum proved by experiments on young rats and pigs, that when fed on wheat alone, or with a mixture of corn, wheat, oats, peas, barley, rye—or with the addition of vegetable oils such as those of almond, peanut, and cotton seed they did not make growth, while normal growth was obtained when butter fat or yolk fat was added." From further experiments it would appear that they did not live when fed on a ration of purified protein, carbohydrates, fats and mineral salts: and that "the substance in Butterfat responsible for growth is as yet an undefined Chemical substance—called "fat-soluble A." There is yet another substance—called "Water-soluble B"—which is present in yolk fats and butterfats and in various seed plants, and without which purified yolk and butter fats do not produce growth.

The great value of milk and eggs would—he concludes—be explained by the fact that these two essential substances are found abundantly only in these two foods.
Y. R. R.

Milk from Rice. In view of the great difficulty nowadays of obtaining pure cow's milk and also of its prohibitive price, attempts appear to have been made to get milk from other sources or to find a substitute possessing similar properties. In this connection the Rice Journal (Beaumont, Texas) relates "the discovery by two American experts of the art of extracting from the rice plant a liquid not only equal but actually superior to ordinary milk. The natural chemistry of the process by which this new milk is produced is thus described. "In the rice plant the sun's heat performs the work directly and in a most perfect manner requiring more time than the cow to complete the process of making its milk. The result is the rice kernel which is nothing more than a concentrated crystallised milk which in turn may, by a natural process, be turned into the flowing liquid form." These two experts after elaborate experiments in the extensive rice areas of California have produced an excellent rice milk with a fat content of 7%. Proposals are said to be afoot to start a big factory in San Francisco to produce this new food, which will not only be cheaper but richer, while its vitamin content will be greater. The importance of the rice industry is much enhanced by this discovery and the rice milk is likely to become the basis of a number of nutritious foods—news worth noting by the rice growers of India.

(The Statesman quoted in the "Indian Scout" Vol. IV, No. 9, March 1922).

C. S. G.

Commercial utilization of Cotton Stalks. The usual method in India is to utilise the cotton stalks as fuel, but the practice is objectionable as it helps in some cases to shelter some of the cotton pests during the off season. Various methods have been tried in Egypt and America and lately in the Imperial Institute, London, to make use of it in other ways. Firstly, the bark yields a fibre of a character somewhat resembling Bengal Jute, but the experiments prove that the cost of extraction is greater than the price obtainable for the product. Secondly manufacture of paper-pulp is another way of utilising the cotton stalks.

Earlier attempts in the United States did not promise success, but more recently improvements have, we hear, been effected. At the Imperial Institute, trials made with cotton stalks received from the Punjab and the Central Provinces, have shown that with the caustic soda process these Indian stalks can yield paper-pulp of fair quality, which can be bleached to a pale cream tint. The yield of pulp is however, rather low. As a practical proposition, however, further investigations are deemed necessary, as for instance, as to the question of the transport of such a bulky material to the factories. Thirdly by destructive distillation, a soft charcoal which, however, could not compare with lamp-black or carbon-black, a fair quality of wood naphtha which would find a ready sale in India, and acetic acid (the yield being rather low) and a thin tar are obtainable. Further trials are needed to find whether it would pay on a commercial scale.

(From the Mysore Economic Journal Jan. 1922)
Y. R. R.

Purity and virtue in Sugar. A recent issue of the West India committee Circular seeks to maintain that *perfect purity* in cane sugar is *not a virtue* but a disability. The public, it is stated, are often misled by the idea of "whiteness" and what it implies. The objection to "plantation sugar" is not that it is not white, but that the colour does not keep and that after sometime it becomes darker. The cause of this discolouration according to the journal, is the presence of a small quantity of cane juice products and is the very factor that gives it its great dietetic superiority over "refined sugar." "The snowy lustre of American granulated sugar, or the clear, translucent depth of a well-made British cube appeals to a mental idea of purity in the consumer. "Though the execution of these sugars may be faultless" says the journal "and their tone excellent, yet they lack the dietetic soul, the soul of the cane juice which the plantation sugars possess."

In support of this argument, the paper cites the well-known instances of the inferiority of the food value of *polished rice*, bread made of *white flour*, pure *white butter* and pure *white cheese*.

A solution of this question is of undoubted importance but belongs to the difficult domain of *Physiological Chemistry*. Nevertheless, the argument that applies to plantation sugar will, we believe, apply with double force to the cruder forms of India such as "gur" or jaggery and "unrefined" sugars on which the poor millions of India mainly depend.

(From "the Agricultural News"—Feb. 4—1922.)

Y. R. R.

Provincial Board of Agriculture. The Board of Agricultural Department in Bengal. This has been reconstructed on a more popular and representative basis. Both officials and non-officials (7 in number) form the members of the Board. The officials with the Director of Agriculture as president (ex-officio) are the Deputy Directors, the Agricultural Experts and the Special officers for Agricultural Education.

The non-official members will hold office for a period of two years.

The duties of the Board will be mainly advisory; they will advise the Government on matters referred to them for opinion or on any other matter which the President may consider suitable for discussion. There will be regular quarterly meetings of the Board to which visitors may be invited. The President is also empowered to convene meetings to be held at other times when he considers it necessary to do so. There will also be an annual general meeting which will be held on such date and at such place as the President may decide and to which the Department of Industries and the Co-operative and Veterinary departments will send representatives. The Director of Agriculture is empowered to invite other officials interested in Agriculture, large landowners, representative agriculturists, representatives of allied trades and others interested in rural development selected so as to represent the agricultural interest of every district in the Presidency.

The Board as constituted at present is a comprehensive one embracing the agricultural interest of the whole presidency, and includes among the non-official members one M. L. C. and one M. L. A.

We wish the formation of a similar Board will take place in our Presidency so that the work of the Department may be brought home to or guided by responsible non-official bodies.

(From The Indian Trade Journal, April, 20, 1922.)

Empire Cotton Growing Association. The following extract from the report of the Administrative Council, adopted at the first general meeting of the Empire Cotton Growing Corporation held at London on 8th February 1922, describing the prospects of cotton growing in different parts of the Empire, will be of interest to our readers:—

India. The Indian Cotton Committee has recommended (a) legislation to control the transport in certain areas of loose cotton and cotton seed in order to lessen the chances of mixing up varieties and (b) the compulsory imposition of a small cess on all cotton used in the country or exported, the receipts to be devoted to the development of cotton production. The two proposals are under consideration by the Government of India, and, as the proposal regarding the compulsory cess will be strongly supported by the provinces, its passage into law is extremely probable.

British West Indies. There is much difficulty in disposing of the crop of Sea Island Cotton owing to fall in prices and lack of demand. The Imperial Commission for Agriculture suggested a system of advances to growers to ensure cultivation for next year. A considerable rise in prices, however, occurred after the above decision, so that the cotton growers will be able to dispense with the aid offered to them.

Tanganyika. (Formerly German East Africa). The prospects seem to be considerable. The Empire cotton Growing Corporation arranged with the Governor of the Province and the Treasury to undertake the responsibility for the repayment of a sum of £100,000 to be advanced as a grant-in-aid for the purchase of cotton from the growers. The present crop is estimated at 7,500 bales. Based on the report of the possibility of the Territory from Major Hastings Horne of the Colonial Civil Service and a note submitted by the Director, the Empire Cotton Growing Corporation applied to the Government of India for the loan, for two years, of an officer of considerable distinction both as an expert in cotton growing and in general administration, to advance the nascent industry on proper lines and to avoid initial mistake. Our readers need not be told that the officer selected

is no other than our Principal, Mr. R. Cecil Wood, who is already on his way to Tanganyika.

Nigeria. Sir Hector Duff of the Colonial office has submitted an account showing the opportunity for growing cotton and the difficulties likely to be experienced and discussing the principles to be followed in all efforts to encourage cotton growing by the natives. The matter awaits the decision of the Governor and the Colonial office.

Nyasaland. The Empire Cotton Growing Committee received a request from the Governor of Nyasaland asking for an expert to advise the Agricultural Department in its work on cotton last season. The Committee were fortunate in securing the services of Mr. Sampson who was then the senior Deputy Director of Agriculture in Madras. Mr. Sampson was able to make only a very short tour in the Protectorate when he was recalled to Madras to take up the duties of the Head of the Department here. Short as the tour was, his report is said to be of extreme interest, and, as would be expected from an officer of Mr. Sampson's specialised experience, the subject was treated from a technical standpoint. The Cotton Growing Committee have accepted his recommendations on administrative matters and as to the experience and qualifications necessary in the staff who are to work in the tropics. With regard to the provision of a highly trained staff, an advance has already been made by the institution of several studentships.

The Sudan. An eventful feature of the year was the development of irrigation, but the work of the Empire Cotton Growing Committee in this country, however, is extremely difficult as it is inextricably connected with the Egyptian political situation, and the Sudan question is left as a legacy to the successors of the present Committee.

(From the Indian Trade Journal, 20th April). M. R. R.

The Empire Cotton Growing Association affords a brilliant example of what can be achieved by the co-operation of

a number of cotton merchants; and it is gratifying to see that the Corporation is indebted to Madras for the supply of two of its experts—Messrs. Sampson and Wood—who have acquired most of their experience in Cotton growing and in administration during their long service in the Presidency. (Editor.)

Prices of Chilean Nitrate of Soda. The Chilean Nitrate Producers' Association telegraphs to the following effect regarding the selling prices fixed by them for nitrate of soda for 1922—23.

From July 1st 1922 the price of ordinary nitrate free alongside Chilean ports will be 18s. 6d. per 100 kilos (220·4 lbs.) which is £ 9. 8s. per ton of 2240 lbs. From July 16th 18s. 9d. August 1st 19s. 0d, August 16th 19s. 3d, September 1st 19s. 6, September 16th 19s. 9, October 1st £ 1, October 16th £ 1 0s. 3d, November 1st £ 1. 0s. 4d, November 16th £ 1. 0s. 6d, 1st December 1922 to 30th April 1923 the price will be £ 1 0s. 8d, equal to 9s. 6d, per Spanish quintal or as nearly as possible £ 10. 10s, per ton of 2240 lbs. For May 1923 the price will be 19s. 9d, per 100 kilos and for June 18s. 6d.

Refined nitrate (96%) will be priced 9d. per 100 kilos higher.

Estate News.

Hill Recess. The following Heads of Sections, viz., Messrs. F. R. Parnell, G. R. Hilson, R. D. Anestead and Rao Sahib M. R. Ramaswami Sivan are now on the Nilgiri Hills, engaged in the preparation of reports etc. As per sanction of the Director of Agriculture, Heads of sections can stay at their own cost on the Hills for a period not exceeding a month and a half attending to office work.

Mr. B. C. Burt, M. C. E. B. Sc. Mr. Burt, Secretary, Indian Central Cotton Committee, after attending a meeting of the Committee in Madras, paid a visit to Coimbatore early in May, and made a short stay here.

Visit of the Minister of Development. Rai Bahadur K. Venkata Reddi Nayudu Garu, Minister of Development, paid a short visit to the Agricultural College on the forenoon of Monday the 1st May. He was accompanied by Mr. Vellingiri Goundar, M. L. C. and other gentlemen, and inspected the various sections spending a short time in each. It is expected that he would visit the College again in June and spend a longer time in each section.

Conference of officers of the Agricultural and Co-operative Departments, Southern Districts. On the 10th May was held an inter-departmental conference made up of officers of the Agricultural and Co-operative Departments, including the Director of Agriculture, the Registrar of Co-operative Societies, Deputy Directors and Assistant Directors of Agriculture and officers of the Co-operative Department, South Division. We are led to understand that questions affecting both the departments in common were discussed. We hear a similar Conference will be held sometime later among the officers of the Northern Division.

Ramachandra Water lift. A specimen of this lift is being installed on the Farm for purposes of demonstration and Mr. Ramachandra Aiyar—the patentee of the “Ramachandra” Water Lift—was here for about a week supervising its erection.

Relief in the Quarters Question. Recently there has been some relief in the vexed question of quarters for the members of the Estate, owing to the understanding that some new C's and ‘Inters’ will be soon ready for occupation. An allocation of quarters has been made by the College Board recently with the aim of satisfying the demands as equitably as possible.

Departmental Notes.

A New Farm Sanctioned:—

The Government have sanctioned the opening of a farm in the Guntur District on a portion of the Lam and Gorantla reserves measuring 300 acres and have accepted the proposal to finance the station during 1922-23 from provision made in the budget for the Bantanahal and Sirvel farms which will be closed. The crops which will receive special study are “Cocanada” cotton and tobacco.

Appointments, Transfers & Reversions:—

Mr. W. Arokiaswami Pillai, Assistant Curator, to officiate as Curator during the absence of Mr. Butcher on leave.

Mr. M. Mangesha Rao, from III grade permanent and II grade S. P. T. to II grade permanent (provisional).

Mr. M. Kunhambu Nambiar, from IV grade permanent and III grade S. P. T. to III grade permanent (provisional).

Mr. M. Viraraghava Rao, from V grade permanent and IV grade S. P. T. to IV grade permanent (provisional).

Bao Sahib A. Rama Rao, from III grade permanent and II grade S. P. T. to II grade permanent (provisional).

Mr. W. Raghava Charya, from IV grade permanent and III grade S. P. T. to III grade permanent (provisional).

Mr. Swami Rao, from V grade permanent and IV grade S. P. T. to IV grade permanent (provisional).

Mr. C. V. Seshacharya, from IV grade permanent and III grade S. P. T. to III grade permanent (provisional).

Mr. L. V. Narasinha Acharya, from V grade permanent and IV grade S. P. T. to IV grade permanent (provisional).

Mr. R. Swami Rao, Teaching Assistant, to II Circle as Farm Manager, in charge of the newly sanctioned agricultural station, Guntur, to be relieved forthwith.

Mr. S. Narayana Ayya, on return from leave which expires on 25th May, to the Agricultural College, Coimbatore, as Teaching Assistant.

Mr. G. Rajagopal Mal from district work VI circle to the charge of Koilpatti agricultural station.

Mr. K. Narayana Ayyangar, Farm Manager, Koilpatti, to the Central Farm, Coimbatore.

Mr. V. G. Dhanakoti Raju, Farm Manager, Central Farm, on the expiry of the leave to be Farm Manager of the newly sanctioned agricultural station, Guntur.

Mr. R. Swami Rao on relief by Mr. V. G. Dhanakoti Raju, to III Circle.

Mr. K. E. Viswam Ayyar, transfer from II circle to IV circle as Assistant Agricultural Demonstrator.

Mr. K. P. Sankunni Menon, reversion to his permanent appointment in the lower division, V grade, with effect from 1-5-1922.

Mr. Bhairy Siva Rao is transferred from the I circle to the IV circle for district work in Chittoor.

Leave :—

Mr. Roger Thomas, Deputy Director of Agriculture, Madras, (now on deputation under Mesopotamia Government) leave on average pay for 9 months with effect from date of relief.

Mr. C. Sundararama Ayyar, Assistant Lecturer in Agricultural Engineering, privilege leave for one month and a half from or after 20-4-1922.

Rao Sahib Y. Ramachandra Rao, Assistant Entomologist, privilege leave for one month from 3-5-1922.

Mr. Saadat-ulla-khan, Probationary Deputy Director of Agriculture, Madras, extension of leave on half average pay for three weeks in continuation of the leave already granted.

Mr. V. G. Dhanakoti Raju, Farm Manager, privilege leave for two months from or after 15th June 1922.

Mr. L. S. Natesa Ayyar, Assistant Farm Manager, privilege leave for one month from or after 15th May 1922.

Mr. M. K. Nambiyar, Agricultural Demonstrator, Tellicherry, privilege leave for 3 weeks from 1-5-1922.

Mr. S. Narayana Ayyar, Farm Manager, extension of privilege leave for one month on half average pay.

Mr. M. Viraragha Rao, Farm Manager, privilege leave for 15 days from 15th May 1922.

Mr. S. R. Srinivasa Ayyangar, Agricultural Demonstrator, privilege leave for one month with effect from 11-5-1922.

Mr. T. K. Balaji Rao, Assistant in Botany, extension of privilege leave for a week.

Mr. P. Vishnuomayajulu, Assistant in Mycology, privilege leave for one month from 5-6-1922.

Mr. A. K. Ganesha Ayyar, Assistant Agricultural Demonstrator privilege leave on average pay for two months from or after 10-6-1922.

Mr. A. Kondayya Sarma, extension of leave on average pay for one month and 15 days.

Mr. V. Chidambaram Pillai, Assistant Agricultural Demonstrator, leave on average pay for four months from or after 22-5-1922.

Mr. V. Narasimhanurti, privilege leave for one month from 15-5-1922.

Mr. P. M. Appaswamy Pillai, Assistant Agricultural Demonstrator, Jalarpet, privilege leave for one month from 10-5-1922.

Mr. T. Lakshmiopathi Rao, Assistant Agricultural Demonstrator, extension of privilege leave for 26 days.

Mr. C. V. Sankaranarayana Ayyar, Sub Assistant in Botany, privilege leave for 15 days from 22-5-1922.

Mr. P. Doraiswami Mudaliar, second artist, privilege leave for one month from 5-5-1922.

Mr. S. Dharmalinga Mudaliar, Assistant in Botany, privilege leave for two months from or after 20th May 1922.

Mr. P. S. Srinivasa Ayyar, Assistant Agricultural Demonstrator, privilege leave for three months from the date of relief.

Mr. T. S. Ramasubrahmanya Ayyar, extension of privilege leave by two months.

Mr. K. Sankaranarayana Ayyar, Assistant to the Lecturer in Engineering, privilege leave from 29-4-1922 to 12-5-1922.

Mr. K. Raghavachari, Agricultural Demonstrator, privilege leave for 15 days from 15-5-1922.

Mr. K. T. Bhandary, privilege leave for 15 days from 25th May 1922.

Mr. P. N. Krishna Iyer's leave on average pay for one month is extended by another month.

The Ramasastrulu—Munagala Prize 1922.

In accordance with the resolution of the Working Committee dated 24—4—22, competitors are invited for the above prize, the conditions of award being as follows:—

1. The prize shall be called the Ramasastrulu—Munagala Prize and will be awarded for the first time in December 1922.
 2. The prize will be in the form of a medal and will be awarded to the member of the Union who submits the best account, of original research or enquiry, carried out by him, on any agricultural subject.
 3. The subject-matter shall not exceed in length twelve foolscap pages type-written on one side.
 4. Intending competitors should notify the Secretary of the Madras Agricultural Students' Union not later than the 1st October 1922 the subject of the paper which they propose to submit and the paper should be sent in so as to reach the Secretary, Madras Agricultural Students' Union, not later than the 1st November 1922, with a covering letter showing full name and address of the sender. The author's name should not be shown on the paper which should be entered under a nom-de-plume.
 5. Four type written copies of the essays should be sent in.
 6. The name of the successful competitor will be announced and the prize awarded at the time of the Conference in December 1922.
 7. The Union reserves to itself the right of publishing all or any of the papers.
 8. All references in the paper to published books, reports, or papers by other workers must be acknowledged.
- Any further particulars may be obtained from the Secretary, Madras Agricultural Students' Union, Lawley Road Post Office, Coimbatore.

B. VISWANATH,
General Secretary, M. A. S. U.

Dated 24th April 1922.

THE JOURNAL OF **The Madras Agricultural Students' Union.**

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Editorial Notes.

Their Excellencies at the Agricultural College.

The main building of the Coimbatore Agricultural College and Research Institute—a handsome specimen of the Indo-Saracenic style of architecture—was begun early in 1906 and completed in 1909. The foundation stone was laid on the 24th September 1906 by H. E. Sir Arthur Lawley—then Governor of Madras—who himself, three years later, opened it on the 14th July 1909. At the time of the opening of the Institute, the building had been designed to include, besides the Lecture Rooms and the Students' Chemical Laboratory, the Research laboratories of the Botanist, the Chemist, the Mycologist and the Entomologist. Since that time, the institution has undergone a steady though slow expansion and at the time of writing no less than eight expert officers—each requiring separate laboratory accommodation—have been added, leading to a heavy congestion of staff and thereby affecting the efficiency of the Teaching as well as of the Research Section. It was with a view to

remedy this situation that proposals for providing a new building for teaching were made and, with the sanction of the Government, work was commenced in April 1921. At the invitation of the authorities, His Excellency kindly visited the Agricultural College on the 30th June 1922 in order to lay the foundation stone of the New Building.

A temporary pavilion had been erected by the Department of Public Works—under whose supervision the building is rapidly rising—for the function and tastefully decorated with palms and festoons and with numerous flags and buntings, while a Union Jack floated gracefully at the top. A handsome arch of welcome had been erected to greet H. E. the Governor at the entrance to the path leading to the Shamiana. It is gratifying to record that the weather which had been very inclement the previous three days and had threatened to make things very uncomfortable, cleared up on the morning of the 30th, and a fine but cool day contributed to the complete success of the function. After finishing the inspection of the large herd of pedigree cattle attached to the College Dairy, His Excellency visited the office of the Cotton Expert and inspected the very interesting work turned out there. At about 12 noon, Their Excellencies motored to the Pavilion and were greeted at the entrance by the Guard of Honour furnished by the troop of the Estate Boy Scouts. After being introduced to some of the distinguished guests, Their Excellencies were garlanded and a splendid flower bouquet was presented to Her Excellency.

Among the distinguished visitors were Messrs. the Hon. Rai Bahadur K. V. Reddi Naidu Garu, Development

Minister, the Hon. the Rajah of Panagal—Minister for Local Self-Government, Mr. Braidwood, Collector of Coimbatore, Rai Bahadur T. A. Ramalingam Chettiar, M. L. C., Vellingiri Gounder M. L. C., C. V. Venkataramana Iyengar M. L. C., V. Sambandam Mudaliar M. L. A., Kumara Zamindar of Uttukuli etc. etc.

Mr. H. C. Sampson, C. I. E., Director of Agriculture, in welcoming Their Excellencies to the Agricultural College on behalf of the Departments of Public Works and Agriculture, referred to the adverse criticisms the Agricultural Department had received both in the press and in the Legislative Council and declared that India was a poor country and that in order to make her prosperous it was essential that research should continue both at the Institute and on the district Farms, so that well-tried improvements that might result therefrom might be demonstrated to the actual farmer. He further showed, by giving statistics, the sheer impossibility of turning out any tangible work while the department continued to be so undermanned as it was at present, there being only one demonstrator for an area of every one million acres. He instanced the cases of the creation of the Tirupur cotton market and the definite improvements in cotton effected in the southern districts as evidences of the value of demonstration. (The full speech is given elsewhere in extenso).

The Minister for Development supported in eloquent language the claims made by Mr. Sampson as to the quality and quantity of work turned out by the Department and declared that the Madras Agricultural Department as well

as the Coimbatore Research Institute could stand comparison with any in India and perhaps also in other parts of the world. He then appealed to His Excellency that he might, in view of the great interest he always took in Agricultural affairs in general and in the uplift of the ryot in special, be kind enough to allow his christian name of "Freeman" being associated with the new buildings.

Rising amidst applause, His Excellency thanked the Director of Agriculture for the warmth of the welcome accorded to him and said he was indeed very glad to think that one of his names was going to be associated with the building. Referring to the criticisms levelled against the department, H. E. declared that he could safely assert that no public department, no public man, could or indeed should expect to be free from critics whether helpful or destructive of their labours. While speaking in terms of eulogy of the work turned out by the department, he declared that he felt that it was unduly inclined to hide its light under a bushel and that it was sadly wanting in self-advertisement. As one of the forms of advertisement he suggested the organisation of a larger number of Agricultural Shows and Exhibitions where the work of the Department could be brought to the notice of the ryot.

At the request of the Superintending Engineer—Mr. P. Hawkins—His Excellency, amidst loud cheers, placed the foundation stone in position and declared that the stone had been well and truly laid, adding humourously that while it was apparent that the stone was being laid at a much later stage than usual, he was glad that from the height of the walls around there was no fear that this stone would prove to be

one of those grim spectres, often met with by Governors, that had never borne the burdens they were intended to carry.

Their Excellencies and party then went round the new buildings and on return had lunch with the Officers of the Indian Agricultural Service.

Poultry Show—Ootacamund.

The Poultry Show was held as usual at Ootacamund on the 27th May in the Flower Show week. There was a large number of interesting exhibits from various places in the neighbourhood and the show proved to be of much educative value. It was attended by Their Excellencies and other distinguished visitors. The Agricultural Department was represented by Messrs. Littlewood, Munro, Saadat-Ullah Khan and Muniappa Pillai (Veterinary Assistant). Poultry, Eggs and Butter sent up as exhibits from the Central Farm met with record success. The Poultry were awarded one first and four second Prizes (all silver medals), one of the cocks winning a silver cup as a special Prize. First Prizes were awarded also for Butter Samples and Eggs.

It is also interesting to record that exhibits (not entered for competition) of Poultry and Eggs sent to the Tirupur Cattle and Pony Show won much approbation. Both at Ooty and Tirupur, the white Leghorn Eggs exhibited sold at Rs. 3 a dozen and a keen demand has developed for the white Leghorns and their Eggs.

The Tirupur Cattle and Pony Show.

The Cattle and Pony Show was held at Tirupur on the 10th, 11th, and the 12th June 1922 and was accompanied

as usual by an exhibition of Agricultural and Industrial products. The show was crowded with spectators and there was quite a large variety of exhibits. M. R. Ry. Vellingiri Gounder Avl. M. L. C. and M. R. Ry. Alagiriswami Reddiar Avl. of Dalavaipatnam exhibited agricultural produce and fruits. The Zamindar of Kattuputhur, Trichinopoly District, brought his cattle for exhibition, as also several others, but the best types of Kangayam cattle and ponies exhibited were those of the Pattagar of Palayakottai. Prizes were awarded to many of the exhibitors though the Pattagar was as usual the recipient of the majority of them. Mr. F. Ware. I. V. S., F. R. C. V. S. Chief Superintendent, C. V. Dept. with two others judged the ponies, while Messrs. Littlewood and Munro similarly acted as Judges for the cattle and the agricultural produce respectively. The Agricultural Department was represented at the Exhibition by the Agricultural, Mycological, Entomological and Sericultural Sections—the exhibits of each section being kept in a separate stall. The exhibits as well as the lantern lectures held during the evenings attracted crowds of ryots and were appreciated by them. The Show was opened by Mr. H. L. Braidwood I. C. S., Collector, and the prizes were distributed by the Hon'ble Rai Bahadur K. Venkata Reddi Naidu Garu—Minister for Development who referred in his speech to the valuable work done by the Madras Civil Veterinary Department and declared that within the last two or three years about 50% of the cattle mortality had been reduced, credit for which he said was due to every member of the Department.

Speech by Mr. H. C. Sampson, C. I. E., Director of Agriculture.

YOUR EXCELLENCY, LADY WILLINGDON, LADIES, HON'BLE MINISTERS AND GENTLEMEN,—

It is my privilege this day, on behalf of the Agricultural Department, to welcome you to the Agricultural College Estate, and along with Mr. Hawkins, the Superintending Engineer who represents the Public Works Department, to welcome you to this ceremony of laying the foundation stone of this new college—a ceremony the result of which will, I trust, build the structure of agricultural education on the foundations which have already been laid.

This department has perhaps received more than its fair share of criticism both in the press and in the Legislative Council during this last year and especially during the recent budget debate. We are told by some that the reason is that people do not fully realize what work the department is doing and that we should advertise ourselves more. There may be something in this, but the very fact that this mass of criticism has been levelled against us may be taken as a compliment in that it shows that our work has not only aroused interest but has created a demand for the expansion of our activities, while suggestions for development from even the most bitter of our critics ask for more facilities for demonstration work, thus realizing that we have something which is worth demonstrating. Other suggestions, which have often been coupled with such criticism, have, in most cases, indicated that the present policy of the department is sound and that the work which the department has done in the past has been appreciated by the agricultural community and their representatives. That this appreciation may not be general, however, is shown by the following example. I remember once, when touring in the Atur taluk of the Salem district, asking the Tahsildar what had been the effect

of the then recent expansion of groundnut cultivation. He bemoaned the fact that it was then almost impossible to buy gingelly oil as groundnuts had taken the place of gingelly, but he admitted that the growers had been able to free themselves from debt and to such an extent that there was hardly a money-lender left in the taluk as no one wanted to borrow money.

Much of this criticism has been levelled against this Agricultural College and Research Institute and I propose to answer this to see whether the foundations on which the structure of agricultural education is to be built have been well and truly laid.

One of the criticisms of the training given at this Agricultural College is that, up to the present, it has been merely to manufacture officials. While I will not go as far as this, I will say that, to a great extent, this is, and must be, the case. The training given, however, is not entirely with this end in view and several of the past students of this College have returned to the land, either as actual farmers or as estate owners.

This was one of the criticisms made in the last budget debate, but the subsequent remarks made by the same gentleman showed that he was in entire agreement with the policy adopted. He emphasized the need for many more subordinate officers for the work of demonstrating agricultural improvements on the lands of the actual farmer. He emphasized the necessity of developing agricultural education to meet the needs of the rising generation of the farming community and he realized the value of research, emphasizing the necessity for postgraduate training in such a way as to avoid the necessity for Indians having to go abroad in order to specialize in separate branches of the subject. All these points indicate the necessity of training men to take up work either as officers in this department or in the Education Department, or in other scientific departments of Government; or, as I hope may happen in the future, for similar work carried out at private expense. In Madras, up to the present, all this work has devolved

on Government and its cost has had to be met from the general revenues of the country. This Presidency is not so fortunate as Bombay in having a benefactor such as the founder of the Sassoon Trust, who has placed the interest from large trust funds at the disposal of the Bombay Agricultural Department for carrying out special lines of agricultural research. A beginning, however, has recently been made as the manager of one school established with the aid of devasthanam trust funds has recently been inquiring whether men are available to take up work as agricultural instructors. But even for this work the general training required is the same as that which fits men to take up appointments in Government service. This institution must therefore be looked upon for a long time to come as a key institution which will train men for service for the development and expansion of agricultural improvement and agricultural education.

So far, however, it has been all that we can do to meet the requirements of a developing department such as this and there is no doubt in my mind that the Agricultural Department should have the first claim on the services of such passed students as desire to enter Government service. India is a poor country. At the present state of her finances any money which she has to invest must be made to earn an adequate return on the investment. Therefore, it is essential that research should continue, both here and on the district agricultural stations, and that the results obtained from this research should be demonstrated to the actual farmer. This will increase his prosperity, which in its turn will increase the prosperity of the country in general, which can then in due course consider how far it can afford to invest money without any immediate return for the education of the future generation of farmers. When this time comes, there will still be the need for continuing the present policy as far as this College is concerned, for teachers will have to be found for agricultural schools, agricultural colleges, rural training schools, etc.

To show how great is the need for district staff for this department at this present time, the following statistics are of interest. The Presidency is divided into eight circles, each in charge of a Deputy Director. The average area under cultivation in each circle is $4\frac{1}{4}$ million acres. The proportion of uncultivated to cultivated area is on an average 60 per cent, which means that the average area of each circle covers some $11\frac{1}{4}$ million acres. At the present time, the number of subordinate officers engaged on demonstration work is 88, which means one such officer for every million acres of area, or for every 3,90,000 acres under cultivation. These figures show that for the work of demonstration alone the staff employed is wholly inadequate if the man behind the plough who pays for this department is to obtain general benefit from it. Is it any wonder, then, that many farmers have never yet been reached by the district staff and do not realize that a department such as this exists? I do not say that they have not benefited by the work of the department. Very many of them have, but they do not realize it. Every grower of cotton in the southern districts, for example, has benefited by the work of this department and if one looks at the weekly reports of the Tiruppur cotton market one realizes how great this benefit has been. The market has practically been made by the work of this department. Uppam, the original cotton of the district, is now quoted at about Rs. 280. "Company" cotton or, as it is called in these reports, Karunganni, which is a strain of Tinnevely cotton improved and introduced by the department into this district, is quoted at about Rs. 345, while the best quality Cambodia cotton which was first introduced into country by the Agricultural Department is quoted at Rs. 380.

This shows not only the value of the work of demonstration, but the urgent necessity that there is of increasing this staff with thoroughly well-trained subordinate officers.

This brings us to another criticism sometimes made against this institution, viz., the limited number of students admitted to

this College and the cost of such training. If such a training is to be efficient, it is essential that it should be thoroughly practical and, in India, in the case of higher agricultural training, this is perhaps more essential than in any other country in the world. The reasons why this is so are several. Firstly, agriculture has always been looked upon as a derogatory occupation by the bulk of the educated classes. I am glad to say that there are signs that this idea may disappear. Secondly, in order to get sufficient education, to benefit by a course in higher agricultural education, a boy at school has to devote much more of his time to study, since he has not only to gain knowledge but has to learn this in a foreign language. Thirdly, the Indian has to think of earning his living at a much earlier age than young men in most other countries; thus his college career is in direct continuation of his schooling. He has thus, as a rule, had little or no opportunity of learning the practice of agriculture before he comes here and a subordinate officer either on an agricultural station or doing demonstration work in the districts is useless unless he has this knowledge. Several Indians who have been to Europe to study agriculture have complained to me that the universities there do not give them training in practical agriculture. The reason is that the majority of the undergraduates at such colleges have had this training before ever they come to the university. Sons of farmers in Europe are made to make themselves useful on the farm when home for their holidays and very often after they have left school they will work on the farm before they decide to go to college. I have only heard of one Indian boy who has ever done this. Usually, the boy at his secondary school thinks it beneath him to do actual farm work. Hence, the aim at this institution has always been to make the training thoroughly practical in every branch of instruction and to effect this it is, and will be, essential to limit the number of students admitted, so that each can have this thorough practical training and can receive the personal attention of the teaching staff. When these students leave this institution and obtain employment,

is it not much preferable, both to the public and private employer, to have efficient men who are worth their salaries, rather than men who are only half trained? It is a natural wish of every member of the staff of this institution that every one who passes through the college course is a credit to it. Hence it has been necessary to limit the number of admissions.

Other criticisms have described the institution as a sinful waste of money and have suggested that money could be much better spent in demonstrating agricultural improvements. The suggestion made, however, shows that the critic does appreciate what the department has done in the past. He realizes that the department has something worth demonstrating and, if he realizes that, he must realize that it is because of this institution, where the whole district staff of the department are trained. He states that farmers are bewildered when they come and see this place, the research laboratories and what is being done there. They don't understand it. I am not ashamed to say that I myself do not understand all that is being done in these laboratories. I am not an expert in any of these lines of scientific research. But I do realize and do appreciate the results of this research and there are a multitude of farmers now in Madras who are appreciating this too, though they may not realize that it is the results of the research done in these laboratories.

In closing, I must apologize to the Public Works Department for taking up time at a function which is rightly theirs, but I am sure they will have already excused me, if they appreciate how vital is the need for this new college, which they are building for us, to the future of agriculture; and when my object has been to welcome your Excellencies once again to the Agricultural College Estate.

Minister's Speech.

THE HON'BLE MR. K. V. REDDI, spoke as follows:—

To those who have no intimate connection with the workings of the Cabinet Government it is not possible to know what all His Excellency has been doing to make Madras a free province, free within the Empire, I mean the British Empire as well as the Indian Empire. When the future historian who gets access not merely to those mysterious things known as Secretariat Confidential files, but also to the private letters which His Excellency has been writing to the higher authorities, to write the history of the working of the Reforms, the nation and the country will know what a great debt of obligation and gratitude this country owes for what His Excellency has been doing for them. I know a bit of it but, Sir, the Cabinet regulations and etiquette do not permit me to disclose it. (Laughter). I hope however that I do not commit any breach of that etiquette if I tell this audience that His Excellency has not lost the slightest opportunity and has in fact been striving hard to find opportunities to do all that lies in his power to obtain freedom to the people of this country.

The warm and helping hand which has always been extended to the Ministry of Agriculture ever since its formation and for the matter of that to the entire Ministry, the love and affection and the whole-hearted sympathy ever bestowed whenever questions connected with the welfare of the Agriculturists of this country are concerned, are only proofs which would induce, impel and compel any one in this country just to symbolise the gratitude which the nation owes towards him, in a form like this. The matter does not stop there. Within the short space of a year and half, Sir, after the Reform Scheme had come into force a good number of officers of the Provincial Service, products of the old Agricultural College at Saidapet, has been raised to the Indian Agricultural Service (cheers), a promotion which they could not

have dreamt of in earlier times. This they owe to the broad sympathy and statesmanship of His Excellency Lord Willingdon.

There is yet another reason, Sir, why we have chosen your Christian name to be given to these splendid buildings. The Indian ryot, the Indian peasant, is not a free man. He is a slave to many. He is a slave to custom. He is a slave to his own traditions. He is a slave to caste and above all he is a slave to the Indian Shylock, the sowcar, and it is left to this institution to free him from these bonds to make a free man of him and to lift him up mentally, socially, spiritually and above all, economically. What better name than His Excellency's Christian name can be chosen for this?

Your Excellency, I may also be permitted to assure you that you will have no occasion at any time to feel disappointed or to feel sorry for having lent your fair name to these great buildings, for I know that this institution will fill not merely a great want, but at the same its work in the uplift of the agriculturists of this country will be enormous. I wanted to draw a comparison between this institution and some other institutions in the country, but my chief adviser, Mr. Sampson, wrote to me to say 'Don't do that.' Minister, as I am, I cannot but follow the advice of the head of the department in this matter. Sir, I must be permitted to say and I hope you will agree with me that this institution with its laboratories, staff equipment and the central farm which you have seen this morning can hold its own against any institution and even claim the very first place in the whole of this country, amongst the institutions of its kind, (loud cheers) and also a very high place indeed in the institutions of other countries. Therefore, Sir, you will not in the least grudge us this little symbol of gratitude of the people of this country and will allow your fair, noble and significant name to be given to this College. (Loud cheers.)

H. E. The Governor's Speech.

Ladies and Gentlemen,—I must first thank you, Mr. Sampson, and the Agricultural Department very sincerely on behalf of Lady Willingdon and myself for the cordial welcome you have given us today and for your address to which I am sure we have all listened with the deepest interest. It is a great pleasure to me to come here and perform this ceremony. I regard it also as a great privilege for I feel that I am helping on a department which has done most invaluable service in the past and is likely, with the help of the new building, to do still greater service in the future. My predecessor, Sir Arthur Lawley, in the years 1906 and 1909, when laying the foundation stone of the Agricultural College and after performing the opening ceremony, did foresee a great future for this department and I think I can truly say that in this year 1922, when I lay the foundation stone of this new building, we have travelled far along the road up which Sir Arthur Lawley was looking. I observe that the building, of which I am to lay the foundation stone and with which I am glad to think one of my names is going to be associated, has already progressed very far beyond the stage at which foundation stones are usually laid. Let me say that I am very glad to see it for two reasons. One is that I need now have no apprehension that in future years I may find here a lonely stone, just that and nothing more. I say this for it is one of the sorrows of Governors to meet from time to time scattered throughout the country grim spectres of their past in the shape of foundation stones which have never borne the burdens they were intended to carry. My second reason is that it gives me an opportunity of congratulating the Public Works Department on the fair building which they are in process of erecting and this I do very sincerely.

The Director has referred to the criticisms which have been levelled against this department during this last year. Let me

console him by the remark that with some experience of public life I can safely assert that no public department, no public man, can or indeed should expect to be free from critics both helpful and destructive of their labours. But I do not think anybody with full knowledge of the facts could really deny that a very great deal of wonderfully useful work has been done by this department in recent years—work which, specially in the matter of research, has been of great value not only to our presidency but to many other parts of India. I say any one with full knowledge of the facts, for I do think that many people have been and still are ignorant of the valuable work of the department and as a proof of this, I would refer you to those very Legislative Council debates of which Mr. Sampson has made mention. It is true that certain Hon'ble members had some hard things to say about waste of public money by the Agricultural department, but I think I may say they quite changed their minds when my Hon'ble colleague here, Mr. Venkata Reddi, enlightened them on the department's activities. Then like the Queen of Sheba they cried "Lo! the half of it had not been told me." Yes, and I must tell you that this was the one criticism in which I had intended to indulge this morning, that the Agricultural Department was unduly modest, unduly inclined to hide its light under a bushel. In a sense your Director has disarmed me by meeting the criticism in advance and he has almost defeated me with that most potent weapon, a bunch of figures which shew the vast number of acres to be dealt with by one official in his department. Figures always frighten me and I give in before their attack.

To every member of the Agricultural Department I say that my sympathies go out to them fully, for I know well how badly more men are wanted for demonstration work and how really short-handed the department is to cope with all the work which could be done. But even so I think that members of the department might cultivate a little more the instinct of self-advertisement. I would ask them to consider whether they have explored all the

avenues of advertisement open to them. It is indisputably true that agriculture in India has benefited to a tremendous extent in recent years by the activities and researches conducted here and it is true that your department has literally put a very great deal of money into the pockets of the ryot. The cotton crop alone, as Mr. Sampson has remarked, is an excellent example of this, but the trouble is that most of the people don't realise it and think it is your duty to make them realise it. When you make a fresh discovery in your researches here, I believe the result is given in your College Journal. But how much farther does it get? Do you send copies to all the daily papers? Perhaps you do this already. Then there is the publicity leaflet and I know the Publicity Bureau would do all they could to help you, but far more important as a means of education is the spoken word and I cannot help thinking that this work might be done by your officials in the districts by making use of their opportunity, with as far as possible the help of local landholders and men of influence, of having a talk with gatherings of ryots and telling them the value of scientific discoveries. The ryot in India is more than any one else the victim of his own traditions and when science clearly shows the path of advance it is our duty to help him to get free from those traditions and adopt more modern and profitable methods.

And here I would like to suggest another form of advertisement which the Agricultural Department should be able to avail themselves of and which I wish to commend to your notice to-day, a form which I know has been tried before but, I think, in only a half-hearted manner. I refer to the organising of annual Agricultural Shows in the various parts of the Presidency. Now I want to say at once that such an organisation cannot be started and carried on wholly or even mainly under Government auspices. It must be established through the enthusiasm and energy of leading agriculturists in each part of the presidency. But through the agricultural department the Government could help in this

way that at each of these shows they could send their experts down to demonstrate and to lecture on such improvements in methods of cultivation or stock raising which might be of advantage to the particular district where any show was being held and thus bring into public notice the activities and usefulness of the department. I am fully alive to the fact that there are difficulties in the way. Such an organisation is of necessity a very democratic institution, for it is only by co-operation between the large land-holder and the smallest farmer that it can possibly succeed. Yes, and the great land-holder must learn not to suffer in his dignity or *izzat* if he and his tenant exhibit in the same class and his tenant wins the first prize. As an old agriculturist myself and one who was an exhibitor of a certain breed of cattle for many years, I can well remember being frequently beaten by my tenants without any ill-effect to myself. But this is, I realise, a very aristocratic country in all such matters and I fully realise the difficulties before us. Still it is because I believe, indeed I know from experience, that such shows are an immense advantage in creating competition in crop-growing and stock-raising and by such competition effecting great improvements in agriculture, that I urge it today and I trust that the desire to improve in the minds of all interested in this great industry may impel them to get over these difficulties. If they do, they can rely to the full on any support advice and assistance that I can give them and the Agricultural Department will by this means have the best possible opportunities of increasing their usefulness throughout the Presidency.

I fear I have indulged in rather a long sermon on the text of "Thou shalt advertise thyself" and you will be getting impatient to see this stone well and truly laid. I must tell you that Mr. Sampson's address has given me the text for yet another sermon and I might keep you here for some length of time to elaborate the text of the dignity of labour, but I will spare you that. I would, however, just say this, that many of the world's greatest

men have dug potatoes in their own garden and tended a pumpkin with their own hand and found no shame in it. The value of practical training in farm work has been well emphasised by Mr. Sampson and I commend his words to the attention of all.

Well, ladies and gentlemen, I see Mr. Hawkins is anxiously waiting to ask me to lay the foundation stone and I will not delay you and him any longer. I would just say in conclusion that it is a great pleasure to meet here the chief officers of the Agricultural Department and to congratulate them personally and very sincerely on the fine work which their department has done in the past. There lies before them, I am confident, a still finer work in the future and I wish them all success in their labours. (loud applause).

Modern Agricultural Research.

In the modern sphere of natural science the most outstanding feature of agricultural research in recent years has been the introduction of physics and mathematics; the former in connection with chemical and physiological problems, the latter in regard to methods of reasoning, including the statistical examination of approximate results. In other words, there has occurred an extension in the breadth of outlook in agricultural science, greater accuracy, and a breaking down of the arbitrary lines of demarcation which formerly existed between the mathematical sciences and biology. The result is that old problems are now being approached from entirely new points of view, and fresh knowledge is being secured which would never have been gained by means of the approximate and conservative methods that were in vogue for so long. How has this come about? It has come through an evolutionary process that has led to the recognition, especially in the United States of America, that the problems of agriculture are so varied and abstruse that they can only be solved by original work on the part of highly trained men in every department of science. And the modern outlook is even wider; for it is recognised that many problems, in fact most,

can only be solved by collaboration between different experts. The modern tendency indeed indicates that there may come a time when students will be trained to attack a problem rather than to gain a degree, for many of the greatest agricultural problems are most inconsiderate, and do not fit in at all well with the curricula of the Universities and Colleges. But it is not intended to imply that education does or should suffer at the expense of specialization. Education and research are inter-dependent. Nevertheless they work differently, for during education the mind stretches in a horizontal direction, understanding the world in a general way and the true relationship and relative proportions of things; in research the mind dives downwards, guided by original methods and ideas into very profound depths. Both kinds of mental activity are essential, not only for the solution of agricultural problems, but also for general agricultural progress.

Perhaps the biggest advances in recent years have been made in connexion with soil science, physiology and genetics. And incidentally the phrase 'soil science' is an interesting indication of the fact that the arbitrary 'subject' boundaries have dissolved. The study of the soil originally was purely chemical chiefly confined to inorganic analysis. Now the study of the soil involves organic chemistry, physical chemistry, bacteriology, physics, and a number of more specialized studies. The soil is regarded as being organically connected with the plant that grows in it, so that investigators working on soil science are constantly brought into touch with plant ecology, and therefore have to collaborate with the botanist. Agricultural science generally is rapidly assuming a status undreamt of fifty years ago, and is fast taking its place beside Engineering (including all branches). Genetics, or plant and animal breeding, demands for its study a knowledge of mathematics; physiology or the study of function, involves chemistry and physics, and, like genetics, is making tremendous advances. Yet the average man in the street still thinks of agricultural science in terms of entomology, which is as yet the least scientific branch of all.

Then there has also been progress and greater precision on the economic side. Agricultural economic problems are being studied

statistically, and improved systems of account keeping on the 'costing' principle are being suggested and employed. Legislation is being utilized to an enormous extent for the control of pests and diseases, and even their eradication (to wit, the pink bollworm campaign in the United States). Again, measures designed to meet the contingency of 'fluctuations' in the world's market for agricultural produce are receiving attention especially in regard to credit facilities; new and permanent markets are being secured by means of fiscal policies. The great advances in agricultural co-operation in recent years are too well known to need description.

Gratifying as all this advancement is, those who are responsible, especially in respect of natural science, expect their work to be generally appreciated and, as far as possible, applied. In the tropics there is a good deal of apathy as regards research. It takes a long time for new ideas to become firmly fixed in the popular mind. That is because the large majority of those who work the land are not educated along the right lines, and have not developed an enquiring and critical outlook in respect of scientific research. Not that the practical agriculturist will not listen. It is quite astonishing how gullible and easily taken in shrewd business men often are when it comes to the results of scientific research. If they were as careless as to what they swallowed in the form of alimentary food they would die of indigestion or poisoning; if they were as careless in their business they would go bankrupt. Yet, again, others are obstinate and dogmatic, refusing to accept ideas that are sound in place of ones for which they have a kind of superstitious affection.

In the tropics we know far more than we can apply; and it is time that the education of the rising planter be taken seriously in hand. It is necessary that he be educated in such a way that he can follow the trend of agricultural research, so that he can ask himself what are the latest ideas concerning his soil or his particular conditions. He should be as open-minded, progressive, anxious and yet as critical in receiving results, as the research worker is in securing them. What the Americans call extension work would help to bridge the gap at present existing, but extension work costs a great

deal of money, and in any case will not suffice in the tropics. Agriculturists in the tropics suffer from isolation, and, under isolation, education is even more necessary than it is under those conditions of closer contact and enlightenment that prevail in the developing countries of the north. Agricultural education in the tropics is almost a research problem in itself, and its solution is largely bound up in agricultural colleges with collateral work amongst societies, and in the secondary and elementary schools.

(From the Agricultural News.)

Reviews.

Annual report of the Department of Agriculture, Bombay, for 1920-21. The report for the year 1920-21 which has just been received, teems as usual with interesting details of the work of the department. There would appear to have been uniform progress in all branches of work. Two important lines of activity deserve special mention and are certainly worthy of emulation. One is a *scheme of fodder storage* to serve as a reserve against years of fodder scarcity. Two different plans were adopted. One was to buy grass when cheap, store in Dutch barns and keep it till it was saleable at a remunerative rate, though it was not to be kept for more than three years. An account of the financial side of the scheme as carried out in Upper Gujarat is promised during the coming year. The second system refers to the storage of shredded "kadbi" in a baled condition. This was started at Kopargaon, Ahmadnagar District after the famine year of 1912, as a result of which large quantities of straw (kadbi) have been made available in recent years of famine. In 1920-21 famine, 3,50,000 lbs. of straw was supplied in Ahmadnagar District.

The control of *famine cattle camps* is the other notable line of activity. Starving cattle are purchased in times of famine and are tended and cared for during the trying periods of scarcity and then resold. At Rahuri camp 1434 animals were purchased at Rs. 20 per head in February. They were sold in June at Rs. 41 each. There was a loss

of Rs. 277 in the transaction and this is attributed to underselling the animals. The cattle were fed mainly on cactus with 2 lbs. of cotton seed to balance the ration and 2 lbs. of grass to keep them from scouring. Though all the animals were sold out at a loss, the experiment serves to elucidate the importance of cactus as a famine food for cattle. "Cactus has no doubt proved its value in times of scarcity but the very laborious nature of work in preparing the cactus is much against its value as a fodder at any other period. Only young animals in fair condition thrive on cactus." The first line of activity is not in vogue in our presidency though the second was undertaken by the Deputy Director of Agriculture, Third Circle, Bellary, during the recent famine which visited the Bellary District. It may be taken up in the Ceded Districts.

The Plant Breeding Expert has been able to select strains from Kolamba rice which will give at least 33 per cent increased outturn. This is a great achievement and certainly redounds to the credit of the expert and the department. A Soil Physicist was appointed in December 1920 for Bombay and work commenced in 1921.

Much attention is being devoted towards cotton. The increased attention paid may be judged by the increase in the staff of the cotton section. One has been sent from Sind to the United States of America for special training and study of the selection and other methods of improvement in vogue there. The staff has also been reinforced by six gazetted officers, five of whom are diplomats in agriculture.

It may not be out of place to note that 18 out of 26 officers engaged in teaching are students who have passed out from the Agricultural Colleges and that out of 369 students who have passed out from the Poona Agricultural College, 38 have taken to private farming.

R. S. Rao.

The Weevil Fauna of South India.

Pusa Bulletin No. 125—1922 by Mr. T. V. Ramakrishna Ayyar, B. A.,
F. E. S., F. Z. S., Price Re. 1-4-0.

We acknowledge receipt from the Agricultural Research Institute, Pusa, of this valuable contribution to our knowledge of some of the

Insect Inhabitants of South India. The bulletin deals with the weevils—a class of beetles which are distinguished by the possession of a distinct snout. This family includes some very serious insect pests and the mention of the Rice weevil of stored Rice, the Red weevil of the Coconut Palm and the cotton stem weevil—all serious pests—is sufficient to indicate its importance. In all 190 species are listed in this paper—of which over 40 are of economic importance. Owing to the absence of sufficient literature and the absence of large reference collections, our knowledge of insects in general of India is in a nebulous condition and publications of the kind under review gather together all that is known of the particular group in India and form an invaluable help to further work. The bulletin is therefore to be welcomed and we would wish that more work of this sort would follow.

Notes and Extracts.

Paper from rubber. Researches which have been going on in London for sometime, point to the strong probability that newspapers will at no great distance of time be printed on paper produced from rubber, instead of on paper made from wood-pulp, as now. The results, says the *Manchester Guardian*, already derived are such that art paper of the kind used in the production of fashion journals and the big illustrated newspapers can be made from rubber. Further experiments are to be made with a view to making newsprint from the same material, and it is on this point, perhaps, that interest in the printing industry will centre. (West India Committee Circular, January 19, 1922.)

Selection of layers among poultry. It is very easy to fix upon the best layers at the end of the laying season. But Mr. Owen John after a few years of experimentation and investigation has been able to pitch upon some important characteristics in the pullet which are generally associated with prospective heavy producers. These characteristics, which are reproduced below, must therefore be of immense help to poultry breeders.

1. The head or skull should be of medium length, inclined to long (not short as usually described). This is pronounced in all cases, particularly, in Leghorns. Moderate length from back to front or base of beak, not snaky, with good depth from crown to underside, and of good width across the top. Beak of moderate length and stout. Eye bright and full, standing well on each side of the head. The shape of the eye is important; the round eye is not so desirable as the oval shape.

2. The neck should be of medium length, inclined to be long, covered with feathers and curving gracefully on to the body. The short neck is an indication of a sluggish disposition, or inactive bird, consequently a poor layer. Length and depth of body are essential, with good width of back, allowing full play for the ovaries, the depth of body, especially towards the posterior of the bird denoting capacity. This should not be confused with a short breast bone which would naturally allow sagging of the abdomen as found in some birds and mistaken for indications of capacity.

3. The pelvic bones are pliable in the good producer, but rigid with no springiness in the indifferent producer. The thickness of bone may be $1/16$ to $5/16$ of an inch. The bone should curve gracefully toward the vent with no evidence of being hooked at the points. $1\frac{1}{2}$ to 2 fingers width between points of pelvic bones and $2\frac{1}{2}$ to 3 fingers width between pelvic bones and joint of breast bone are found in good producers.

4. The abdominal skin must be fine and elastic with no tendency to coarseness. This quality increases with production.

(Journal of the Department of Agriculture, Union of South Africa—April 1922.)

R. S. R.

Molasses for stock feeding. The Ministry of Agriculture and Fisheries in London has issued a leaflet about the value of Molasses as stock food. Molasses is a by-product obtained in the manufacture of sugar from sugarcane, or sugar beet. It has a thick black appearance

with sweetish taste and contains 60 to 70% of sugar. It is a laxative, useful as a conditioner, general appetiser, and improver of the flavour of inferior and unpalatable foods. It is good in itself. Horses may be fed up to 3 lb a day, cows $2\frac{1}{2}$ lbs., bullocks 4 lbs. and sheep $\frac{1}{4}$ or $\frac{1}{2}$ lb. per head per day. When used with straw chaff the molasses should be dissolved in warm water, thrown over the straw, well mixed, and allowed to ferment for several hours before feeding. The measured amount of molasses may be mixed directly with the food or placed in the trough on top of food.

(The Scottish Farmer—April 15th 1922.)

R. S. R.

Important Sugar Development. In the Petree process of treating cane juice the use of filter presses is entirely dispensed with, thus obviating a clumsy and unpleasant operation. Mr. Robert Strang, Manager of Plantation, Uitvlugt, calculated that by its introduction he would save at least \$ 2 per ton in cost of manufacture. This could be done without in any way interfering with the quality of sugar. Much of the labour could be saved.

This remarkable invention will cheapen the cost of sugar in the world's market if it is tried by sugar manufacturers and found fit for universal adoption.

(The Louisiana Planter, page 226 April 8th 1922.)

R. S. R.

City Poverty. "City poverty is a social by-product of Modern Industry. Specialised employment, herding of people in rented quarters, feeding folks on factory cooked, paper packaged food, complete dependence upon wages or salary for a livelihood *with no recourse to farms or villages for partial or temporary relief from unemployment*, living conditions that promote tuberculosis, venereal diseases and other crowd maladies; these and other similar circumstances of city life that spring from modern industry have forced 15 to 20% of our people below the line of adequate permanent self support.

Rural and village communities have no poverty of the sort that burdens Industrial cities. Modern industry has brought forth

modern poverty. Highly specialised industry has stripped the individual of his resources of individuality even to the extent that he no longer prepares his own food or shines his own shoes. His amusements have become passive and commercial. 18,000 people sitting, watching 18 men hired to play base ball is the national game. Naturally under these conditions when life's burdens grow heavy the individual with minor ambition lies down and lets the community lug his load."

(Journal of Industrial and Engineering Chemistry—April 1922.)

R. S. R.

Cure for Leprosy. Derivatives of Chaulmoogra oil—a product from *Taraxtenos Kurzii*—a native tree of Burma, have been successfully used in the treatment of leprosy for the last 20 years and the reports—which deal with many hundreds of cases—show that these drugs will alleviate the great majority of cases of Leprosy, while they will cure completely about 50% of them.

(The Agricultural News—March 4—1922.)

Y. R. R.

Santonin. Santonin is a drug that occurs in the young flower-heads of *Artemisia maritima* and finds an extensive use in medicine as a vermifuge. Prior to the war, practically the whole of the world's supply came from Russian Turkestan, but owing to the unsettled conditions at present prevailing there, supplies are not available and the present price stands at the amazing figure of £ 50 per Kilo. In this connection, the note of Dr. J. L. Simonsen, of the Forest Research Institute, Dehra Dun, in the "Journal of Indian Industries and Labour" on the advisability of starting an industry in Kashmir for the extraction of Santonin from *Artemisia maritima* which is grown plentifully in that state. The only chemicals required, he declares, are lime, hydrochloric acid and alcohol and the method of extraction is simple.

(Agricultural News—March 4—1922.)

Y. R. R.

Manurial value of crushed beetles. In Queensland, the cockchafer beetle is a serious pest of cane. Large numbers of them are handpicked in the flying season. It is reported that experiments have shown that when killed in hot weather and dried rapidly on a rough made oven, and later on reduced to meal they made good poultry food. Guenau reports that, in the case of a manure prepared from the European cockchafer, it was equal to the best manure as regards Phosphoric acid and potash and eight times richer in Nitrogen. One hundred pounds of beetles are equal to 800 of manure." Considering that 22 tons of beetles were collected one year in one district alone, Mr. Jarvis the Entomologist, Gordonsville says that the manurial value of the beetles may be able to defray part of the expense of collecting them.

(From Louisiana Planter, 25 March 1922.)

Y. R. R.

Japan and Rice cultivation. The Formosan Government are, it is understood, extending the area under rice to solve the food problem of Japan. This extension will be brought about by the Kanaga irrigation scheme, by improvement in cultivation and by opening up wild Districts for the cultivation of Rice. The estimated area under Rice (both wet and dry) was 1,240,567 acres in 1921 as abstracted in the Indian Trade Journal of 27 April 1922. The area is expected to be 1,673,720 acres in 1934 as contemplated in the above scheme and will leave a surplus of 2,836,038 bushels of Rice for export to Japan. The food problem has become so acute as to make the authorities abandon the policy of encouraging sugar cultivation at the expense of Rice, a policy inaugurated by the Japanese Capitalists. The International Sugar Journal of 1918 (July issue) stated that the Japanese were bent on making sugar production one of their great enterprises, the stimulus being received by the possibilities of development of the industry in Formosa. It will be interesting to note in this connection that a Tokyo Syndicate with a capital of £600,000 acquired 20,000 acres devoted to coffee and rice for planting sugar cane in the province of Sarakatu in Java. The growing of industrial crops at the expense of

Food crops—especially of the chief staple crop of a country—does not appear to be a far-sighted policy in the agricultural development of a country, as has been testified in the case of Japan.

R. S. R.

Coconuts. From the Times' Trade Supplement it is learnt that the price of 1,000 coconuts as landed at New York from the Pacific Islands comes to 20 pounds. At this rate nuts can be safely bought at Rs. 60 to Rs. 65 per 1,000 at Ceylon and exported to New York. There is a hopeful future for the coconut growers in Ceylon as well as in India. Only some improvements, as noted by the Times Ceylon Correspondent, are needed to make coconut growing one of the soundest investments. The addition to desiccated coconut mills of a newly patented rotary press, an almost acid-free white oil and white Poonac could be turned out in a very short time direct from the raw coconut. About eighty of these presses are now working satisfactorily in Cochin. This kind of press is not known in Ceylon. One other improvement which the Ceylon coconut grower is going to copy from India is the introduction of the manufacture of white copra, common to the Malabar Coast, which realises 3 to 4 pounds more than the local ordinary products.

(The Agricultural News, February 1922.)

R. S. R.

Age of Agriculture. "In a lecture before the Royal Institution Sir Arthur Keith, the eminent Scientist, said that it used to be thought that the art of agriculture dated back to 4,000 B. C., but with the advance in the study of Geology and Anthropology—the history of fossils and the history of human races—science was coming to place agriculture further back to 8,000 or 10,000 years ago in the plains of Mesopotamia and India."

(Scottish Farmer, April 1922.)

R. S. R.

Estate News.

Their Excellencies Lord and Lady Willingdon, visited Coimbatore on the 30th June and had a somewhat crowded programme the whole of the day, being engaged in laying the Foundation stone of the "Child

Welfare Home" at the Municipal Dispensary, the inspection of the Government Training School for Ladies, laying the Foundation stone of the New College Building at the Agricultural College and the Distribution of Prizes at the Forest College. They left by special train for Bangalore in the evening.

Cinema Exhibition. At the Variety Hall, Coimbatore, on the night of the 28th June, the Madras Forest College exhibited to a select gathering of the public, a very interesting series of Cinema Films illustrating up-to-date lumbering operations in the forests of America. A few slides representing similar work as carried on in the Government Forests at Dhoni in S. Malabar were also shown.

It is high time for the Agricultural Department to begin to make use of this powerful auxiliary for propaganda work.

Prize Distribution at the Forest College. At 4 P. M. on the 30th Their Excellencies motored from the Railway Station to preside at the Annual Distribution of prizes at the Forest College. The College Hall, which had recently been enlarged, was thronged with Visitors specially invited for the occasion. The Principal—Mr. C. C. Wilson—read his very interesting account of the progress made by the College during the year and closed it with words of sincere advice to the outgoing students. Her Excellency, Lady Willingdon, then kindly distributed the prizes to the Winners—among whom Mr. K. A. Bhandari and Mr. P. Sitapati Aiyar were specially conspicuous. His Excellency then addressed the students and congratulated the staff and the students on the satisfactory progress made.

The guests were then entertained at Tea where refreshments were liberally provided and the evening came to a happy close with a photograph of Their Excellencies and party.

Transfers. The current month was marked by changes in the *personnel* of the Teaching Staff of the Agricultural section. Mr. R. Swami Rao left in May on transfer to the II circle, while Mr. Budhavidheya Rao left the station on the 28th on promotion as Assistant Director, III Circle. Messrs Abhishekanathan and S. Narayanayyah have taken their places as Teaching Assistants.

Mr. D. Balakrishna Murti. Mr. D. Balakrishna Murti arrived here on the 29th June and assumed charge of the Professorship of Agriculture at the College. Mr. Murti with his long and varied experience of Agricultural conditions in the Presidency will prove, in our opinion, an excellent selection for the Chair of Agriculture here.

Nawab-zadah Saadat-ullah Khan, B. Sc. Bar-at-law, left Coimbatore on the 30th June for work in the VI circle, Madura.

Mr. Krishnamurti Aiyar G. M. V. C. of the Madras Veterinary College was deputed by Government to work at the Laboratory of the Government Entomologist for a month, to learn rearing technique and systematic work in connection with Veterinary Entomology. He stayed on the Estate for about a month in May—June attending to this work and left for Madras in the 3rd week of June. He is to be congratulated on his recent promotion to the Imperial Veterinary Service as Acting Professor of Pathology and Bacteriology at the Veterinary College.

The Officers' Club. There was a farewell entertainment at the club in honour of the departure of two of its old members—Messrs. P. Jagannatha Mudaliar and Budhavidheya Rao. Mr. Mudaliar who is an able Artist goes as Artist at the Madras Veterinary College, while Mr. Rao leaves on promotion to the Madras Agricultural service as Assistant Director of Agriculture, III Circle, Bellary.

Students' Corner.

Mr. F. R. Parnell,—Government Ec. Botanist—assumed charge of the Principalship of the College in addition to his duties from June 1922.

The College re-opened on June 15th. The new proficiency class has been formed and is composed of 28 students. The selected students of the new B. Sc. class have been rather tardy in joining but it is hoped it will be full soon.

Departmental Notes.

Appointments, Transfers, Postings etc.

Mr. D. Balakrishnamurti, Deputy Director of Agriculture, 2nd Circle, to act as Professor of Agriculture at the Agricultural College, Coimbatore.

Mr. K. Gopalakrishna Raju, Assistant Director of Agriculture, to act as Dy. Director of Agriculture, II Circle vice No. 1 above.

Mr. K. T. Alwa, Assistant Director of Agriculture to act as Deputy Director of Agriculture, VII Circle, vice Mr. M. Govindakidava granted leave.

Mr. N. S. Kulandaiyami Pillai, Assistant Director of Agriculture V Circle, Trichinopoly, to act as Deputy Director of Agriculture, V circle, in an existing vacancy.

Mr. C. Narayana Iyer, Assistant Director of Agriculture in charge of VIII Circle to act as Deputy Director of Agriculture, VIII Circle, vice Mr. H. C. Sampson on other duty.

Mr. K. Unnikrishna Menon, Upper Subordinate III grade, to act as Assistant Director of Agriculture, VI Circle Madurai.

Mr. T. Budhavidheya Rao Nayudu, Upper Subordinate III grade, to act as Assistant Director of Agriculture, III Circle Bellary.

Mr. C. V. Seshacharya, Upper Subordinate III grade, to act as Assistant Director of Agriculture V Circle, Trichinopoly.

Mr. W. Baghavacharyar on return from leave to the Anamalai Agricultural Station.

Mr. M. Gopala Chetty, on relief at Anamalai Agricultural Station to the VIII Circle in relief of Mr. P. Abhishekanatham Pillai.

Mr. P. Abhishekanatham Pillai, Agricultural Demonstrator VIII circle to the Agricultural College as teaching Assistant vice No. 7.

Mr. K. Jagannatha Rao, officiating in the V grade to be on probation in that grade from 1st June 1922 in an existing vacancy.

Mr. K. L. Ramakrishna Rao, Lower Subordinate V grade to be Upper Subordinate V grade on probation (provisional) from 1st June 1922 in an existing vacancy.

Mr. V. T. Subbaya Mudaliar, L. Ag., is appointed to officiate as Upper Subordinate, V grade, vice Mr. A. Chinnaiah Pillai on deputation or until further orders, to report to duty to the Farm Manager, Koilpatti, forthwith.

Confirmation :—

Mr. C. V. Sankaranarayana Ayyar, Sub-Assistant to the Government Economic Botanist is confirmed with effect from 16th June 1921.

Leave :—

Mr. M. P. Gouri Sankara Ayyar, Assistant to the Government Sugarcane Expert, extension of privilege leave by one month.

Privilege leave for two months granted to Mr. C. V. Ramaswami Ayyar, Assistant to the Government Agricultural Chemist, is commuted into leave on average pay under rule 81 of Fundamental Rules and extended by 14 days.

Mr. K. P. Sankunni Menon, leave on average pay for 2 months from or after 15th June 1922.

Mr. N. Subramanya Ayyar, privilege leave for one month from or after 1-6-1922.

Mr. G. Jogi Raju, leave on average salary for 9 days from 30th May with permission to prefix holidays on 28th and 29th May 1922.

Mr. K. V. Seshagiri Rao, Assistant Farm Manager, privilege leave for 15 days from or after 13th June 1922.

Mr. T. S. Alwar Ayyangar, Head Artist to G. E. B., privilege leave for one month from 1-6-1922.

Mr. C. Rangaswami Ayyangar, Sub-Assistant to the Government Mycologist, leave on average pay for 3 weeks from 26-6-1922.

Mr. P. N. Krishna Ayyar, extension of the 2 months leave on average pay by 15 days, (and later on by 2 days).

Mr. A. Venkobachari, Assistant Farm Manager Hugari, privilege leave for 5 days from 14-6-1922.

Mr. A. Ramaswami Ayyar, Assistant Agricultural Demonstrator, Kulitalai, leave on full average salary for one month from 16-6-1922.

Mr. M. Raman, Farm Manager, Central Farm, six months' leave on average salary on Medical certificate from date of relief, under Rule 81, Fundam. Rules.

Mr. K. Govindan Nayar, Chemical Assistant, Kasargode, leave on average salary for one month from 3-7-1922.

Abstract of the accounts of the Boy Scouts Drama enacted on 18-12-21.

(as passed by the Executive Committee of the Agricultural
College Boy Scouts Association.)

Receipts. Tickets:—

	Rs.	A.	P.	Rs.	A.	P.
41 Special class at Rs. 5 (less Rs. 3) ...	202	0	0			
36½ Reserved at Rs. 3 ...	109	8	0			
38½ First class at Rs. 2 ...	77	0	0			
61 First class concession at Re. 1 ...	61	0	0			
95½ Second class at Re. 1 ...	95	8	0			
35 Second class concession at 8 annas ...	17	8	0			
31 Unnumbered tickets issued at different rates ...	39	8	0			
				602	0	0

Recoveries:—

M. A. Students Union for scenic arrangements ...	30	0	0			
Rao Sahib M. R. R. Sivan for dress for Dhruva ...	14	4	0			
„ T. S. Venkataraman for dress for Vishnu ...	6	11	6			
Sale proceeds of refreshments ...	8	1	0			
				59	0	6
Total ...				661	0	6

Expenditure:—

Stage and Green room expenses (includes hire for scenes, cost of wigs and dress etc.) ...	110	2	6			
Music (for harmonium and tuition) ...	49	7	0			
Furniture (cartage and cooly) ...	8	14	8			
Printing charges (notice tickets and arguments) ...	23	2	0			
Miscellaneous ...	3	1	0			
Total ...				194	11	2

Net proceeds of the Drama (invested
in Coimbatore District Urban
Bank, Fixed Deposit) ...

466 5 4

C. S. Gopalaswami Rao,
Joint Secretary,
Agricultural College Boy Scout Association.

NOTICE.

The addresses of the following members of the Union are wanted. Will members who happen to know the addresses of any of the members kindly communicate to the Secretary Madras Agricultural Students' Union and oblige?

Reg. No.	Date of entry.	Name.
16	11 7 11	G. Krishnan Nayar
24	11 7 11	N. Sivarama Krishnayya
31	11 7 11	P. K. Atchan
40	6 8 11	K. Vaidyanatha Ayyar, Dindigal
43	11 9 11	D. K. Venkatarama Ayyar
48	18 1 12	K. V. Krishnaswami Ayyar
54	25 2 12	R. Venkataramiah, Nellore
55	25 2 12	P. S. Subramania Ayyar, Manamadurai
60	28 3 12	A. S. Pandyan, Tanjore
61	31 12 19	S. Krishna Nayar
68	31 3 12	M. C. George
70	1 4 12	L. Raghupathi Sarma
74	17 5 12	R. Sriramulu, Guntur
79	9 6 12	R. Subrahmanyam
83	4 7 12	R. Rajagopal Naidu

Reg. No.	Date of entry.	Name.
89	7 7 12	K. Palaniyandi Pillai
99	7 7 12	D. B. Sivarama Rao
103	8 7 12	A. R. Chandrasakhara Mudaliar
105	11 7 12	K. P. Sundaram Ayyar
107	21 7 12	B. Adinarayana Chetti
108	21 7 12	T. R. Ranganath
109	21 7 12	V. Vijaya Raghavachari
117	1 8 12	S. Raghava Ayyangar
124	17 2 13	S. Anantharama Sastri
131	12 4 13	V. S. Subramania Sastri
136	15 6 13	C. Ranga Reddi
142	15 6 15	M. Vridhachalam Pillai
143	4 7 13	P. R. Tiruvenkatachari
145	4 7 13	K. Subba Rao
146	4 7 13	R. Jeevandas
147	4 7 13	K. Sundaram Ayyar
155	10 7 12	C. R. Annaswami Ayyar
172	12 7 14	U. Venkatachalam
173	12 7 14	Paul Gopala Krishnan
179	12 7 14	Ahmed Hussain
188	12 7 14	K. Krishnaswami Pillai
192	12 7 14	K. Sankunni Menon (failed student)
196	12 7 14	S. Vedantam Ayyangar
198	12 7 14	S. Subramanyam
199	12 7 14	R. Govinda Ayyangar
200	12 7 14	K. Govinda Poi
203	12 7 14	A. Rajapandia Nadar
204	12 7 14	K. S. Paramanayagam Asari
205	12 7 14	B. K. Parthasarathi
209	12 7 14	K. Ramaswami Goundar
218	12 7 14	Annaswami Tavar of Ukkadi
227	14 8 14	Kochu Govinda Nayar

Reg. No.	Date of entry.	Name.
236	1 7 15	T. S. Sambasiva Ayyar
238	3 7 15	B. V. Narayana Row
239	27 1 13	C. Bhaskara Ayyar
240	15 6 15	S. Venkatanarasimhan
241	15 7 15	A. K. Krishnan
250	20 6 15	Rao Satyanarayana
252	23 6 15	P. R. Gopalakrishna Ayyar
269	24 7 15	C. B. Appayya
271	30 7 15	G. Sivarama Pillai
272	11 5 19	S. Sankara Ayyar
273	23 6 15	P. Kesavanunni Nambiar
282	9 7 16	P. Nallakumar Pillai
289	2 7 16	M. A. Sambasivan
295	2 7 16	C. M. Ranga Reddi
296	2 7 16	M. V. Sitharamaswami
302	2 7 16	V. R. Subramanya Pillai
306	2 7 16	K. Mahabala Rao
310	2 7 16	B. Satyanarayana
341	21 10 17	B. L. Narasimha Ayyar
342	14 11 17	M. R. Krishnan
355	11 8 18	R. Ramachar
357	14 8 18	P. S. Paramesvara Ayyar, Tanjore.
358	18 8 18	M. R. Srinivasa Panikar
360	18 8 18	V. Venkatadri
362	22 10 18	M. K. Reddi
388	28 12 18	G. Alagirisami Reddi
457	3 11 19	J. Narayanamurthi

B. Viswanath,
General Secretary, M. A. S. Union.

(v)

The Ramasastrulu—Munagala Prize 1922.

In accordance with the resolution of the Working Committee dated 24—4—22, competitors are invited for the above prize, the conditions of award being as follows:—

1. The prize shall be called the Ramasastrulu—Munagala Prize and will be awarded for the first time in December 1922.

2. The prize will be in the form of a medal and will be awarded to the member of the Union who submits the best account, of original research or enquiry, carried out by him, on any agricultural subject.

3. The subject-matter shall not exceed in length twelve foolscap pages type-written on one side.

4. Intending competitors should notify the Secretary of the Madras Agricultural Students' Union not later than the 1st October 1922 the subject of the paper which they propose to submit and the paper should be sent in so as to reach the Secretary, Madras Agricultural Students' Union, not later than the 1st November 1922, with a covering letter showing full name and address of the sender. The author's name should not be shown on the paper which should be entered under a nom-de-plume.

5. Four type written copies of the essays should be sent in.

6. The name of the successful competitor will be announced and the prize awarded at the time of the Conference in December 1922.

7. The Union reserves to itself the right of publishing all or any of the papers.

8. All references in the paper to published books, reports, or papers by other workers must be acknowledged.

Any further particulars may be obtained from the Secretary, Madras Agricultural Students' Union, Lawley Road Post Office, Coimbatore.

B. VISWANATH,

General Secretary, M. A. S. U.

Dated 24th April 1922.

THE JOURNAL OF The Madras Agricultural Students' Union.

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July 1922.

No. 7.

Editorial Notes.

We apologise to the readers of the Journal for having taken the liberty of transferring to the end the Editorial comments which always used to appear at the beginning of every number. We may assure our readers that this step is taken not out of the excess of humility of the present Editorial Board, but because of the fact that the Editor's comments cannot, if they are to be up-to-date, go to press early enough and have often contributed to the belated appearance of the Journal. We trust our readers would not take the change amiss.

The Spacing of crops.

BY R. SWAMI RAO.

The spacing of crops is one of the factors which influences crop production. Some advocate a wide spacing, while others plead for a close one. What is productive of the best results is, perhaps, the golden mean—which should be determined experimentally in every case. The cry of the day in all lines of agricultural research is to find out the optimum conditions conducive to a vigorous growth of plants, and the need for the investigation of optimum conditions in increased crop production cannot therefore be too much emphasised.

Wide spacing helps increased crop production in two ways. Firstly there is a saving of seed, secondly there is a better and healthier growth of the crop, which is bound to give an increased yield. Much work has been done regarding the spacing of crops, specially in regard to Paddy, Cotton and Sorghum in this country and elsewhere. In the following pages it is my endeavour to take stock of these and draw some general conclusions which may be of interest to the readers.

Spacing to be given to a crop depends upon many factors viz., nature of soil, nature of climate, season and rainfall, and nature of crop. An attempt is made to discuss these aspects in reference to the work that has been in progress, and in reference to the existing practices of the ryots.

In parts of Gudivada, Kistna District, where facilities exist for the raising of early paddy nurseries by lifting water from spring channels,* Paddy is transplanted so wide that only about 5 or 6 coolies are enough to transplant an acre, whereas in the northern parts of the same district, where the conditions of soil and climate are almost similar, owing to the non-existence of facilities for raising early paddy nurseries, transplanting is delayed and the seedlings are planted closer, 12 coolies being required for an acre. It has been the experience of the ryot also that for rich land, early and wide transplanting gives better results with a long duration Paddy, while for poor soil and a short duration variety close planting is more advantageous.

In places where soil and other conditions are almost identical, the differences in the amount of rainfall and the nature of its distribution often profoundly influence the width of spacing in dry crops, such as cotton and sorghum. The soils in both the Kurnool and Bellary Districts are of the well-known black cotton soil type. The scarcity of the population, the vastness of the area and other economic factors are identical in both the districts, though the big turbans and the knickers of the Bellary ryot will easily distinguish

*Vide article "Paddy Seed Beds in Kistna District" by D. Ananda Rao, in the *Agricultural Journal of India*, Vol. X Part III July '15.

him from his Kurnool brother. The Bellary district receives an annual rainfall of barely 22 inches, whereas Kurnool gets 28 inches. The following table shows the distance in sowing the two important crops of the dry land.

Name of crop.	Distance between rows in inches.	
	Bellary Dist.	Kurnool Dist.
Sorghum	14"	10½"
Cotton	28"	21"

The necessity for sowing at such distances has greatly affected the methods of sowing as well. Drilling is no doubt the rule in both the places. To a Kurnool ryot the use of 'akkadi lota' (a hollowed out bamboo bevelled at one end, with a hopper at the other end for dibbling seed) is not largely known. The sowing of pure cotton (bodapathi) is invariably done with drills without the use of *akkadis*, just as the Sorghum is drilled on the Coimbatore Central Farm. A *Bellary ryot has recourse invariably to sowing by means of *akkadis*. Behind a three-tynd drill, the distance between the tynes being 28", three *akkadis* run in the furrows marked by the tynes and into these seeds are dibbled. To attempt drilling by using a hopper at such distances will not be feasible. More labour is employed for sowing cotton by the Bellary farmer—3 women, 1 boy, and 1 man, whereas a Kurnool ryot employs only one man, and one woman for a three-tynd drill.

There is also difference in the sowing of sorghum. A Kurnool ryot has a 6-tynd drill, the tynes being 10½" apart with one hopper, whereas a Bellary farmer has 6-tynd drill with two hoppers. The former employs 2 coolies and the latter 3 coolies for sowing.

The variations in the sowing of these crops at different distances have also influenced the nature of implements used for interculturing. Metlaguntaka and Rekkala guntaka form the interculturing implements of a Kurnool ryot. The former is a beam to which 3

*He generally makes use of the 6-tynd *korra* (Italian millet) drill, the distance between tynes being 14 inches for sowing cotton. *Akkadis* run behind alternate tynes so that sowing may be done 28 inches apart.

spade-like tynes are attached. This is used to interculture sorghum in early and late stages of its growth and cotton in its early stages. In working this implement the plants bend under the beam as the tynes pass only between the rows. There is therefore a stage at which interculturing is not possible. When cholam plants are about 2 feet high, interculturing is stopped; otherwise they break. The same is the case with cotton, interculturing being stopped when the plants are about $1\frac{1}{2}$ to 2 feet high. Rekkala guntaka is like two miniature guntakas or Dhanthulu fixed on to a beam. This is used to interculture cotton. Each dhanthulu is sufficiently wide to cover the interspace between the rows. Portions unworked by metla guntaka, the tynes of which are only about 4 to 5 inches wide, are covered by working the Rekkala guntaka. The plants pass under the beam between the two dhanthulu. Here also the beam comes in the way of interculturing right through the growth of the crop as is, on the country possible with the Bellary implement.

Here the intercultivating implements are merely guntakas of all sizes. Small guntakas called dhanthulu, each separate in itself, are used for the purpose, 4 or 5 of these being attached to a yoke and each held by a cooly and worked in rows. Here interculturing is done with impunity and with no injury to the crop. As a matter of fact cholam is intercultured by means of these bullock hoes, even when it is 4 or 5 feet high or in shot-blade. Guntaka is used to interculture cotton. Only one guntaka is yoked to a pair and this is worked between rows of cotton at a stage of the crop, when the Kurnool ryot dare not work for fear of injuring the crops with his implements. Of late in the neighbourhood of Nandyal, ryots are using Bellary guntaka for interculturing cotton by taking a loan of them from the Farm. What is the lesson from this long narrative? There is close spacing given to crops in Kurnool. This coupled with the larger quantity of rainfall increases the yield of cotton and sorghum, as compared with Bellary. But in a year of deficient rainfall a Bellary ryot with his wider spacing of crops and with his efficient interculturing implements is able to withstand drought much better than the Kurnool ryot.

One other influence of the variation in the rainfall on the Agricultural practices of these two districts is that the Bellary farmer has recourse to deep ploughing more often than the Kurnool ryot. This is to correct the texture of the soil and make it absorb more moisture. Black cotton soil ploughs are more largely in use in the Bellary District than in Kurnool. In fact every village in the black soil area possesses one. The demand for these has been so great as to give an impetus to their local manufacture at Bellary.* (As a result of this one finds in these parts two kinds of B. C. soil ploughs—Massey's and Bellary). The use of these deep iron ploughs is very rare in the Kurnool District, and the ryots declare there is no need for such deep ploughing, as their fields are not infested with hariali, and as they receive enough rainfall to get a good crop.*

The results of the spacing experiments with cotton conducted at the Madras Farms were as shown below:—

Farm.	Distance between rows.	Yield in pounds of kappas per acre.				
		Un-thinned.	Thinned apart.			
			6"	12"	18"	24"
Koilpatti.	18"	...	505	431	301	...
do.	24"	...	469	431	413	...
do.	24"	...	412	435	345	...
Hagari.	28"	267	...	178	173	166
do.	42"	242	...	196	172	143
Bellary.	42"	207	201	210	197	...
	...	156	123	125	101	...
	...	99	72	61	65	...
	...	110	76	56	49	...
	28"	247	204	200	200	—

The balance of evidence is in favour of closest spacing or it may be called the optimum spacing, at which the best yield is obtained.

*One other argument advanced against the use of deep iron ploughs is that the feet of the cattle become injured by treading over big clods. Nellore and Ongole cattle figure largely in the cultivation here. They are soft-footed by nature. The fear apprehended therefore seems natural and reasonable.

The result of the spacing experiment conducted at the Central Farm showed that the yield from a broadcast crop was better than drilled crops of cotton irrespective of other incidental charges. In the case of the drilled crops it has been found that $1\frac{1}{2}$ feet spacing has given the best yield and this is being adopted on the farm ever since. For Coimbatore conditions $1\frac{1}{2}$ feet is the optimum for cotton drilled.

The experiments at Bellary, Nandyal and Hagari were brought to a close in 1910—11 and at Koilpatti in 1913—14. The truth established so early as 1910—11 finds corroboration now in America, where scientific agriculture has been progressing by leaps and bounds. Experiments on spacing with cotton conducted in Delta Experiment Station, Stonehill, Mississippi, referred to in Agricultural News Vol. XX of 1921 show that hills planted in singles 12" apart gave 93 lbs. of lint per acre, while only 56 lbs. of lint were obtained from hills 28" apart. Further, doubles at the same distances gave increasing yields of 102 lbs. and 71 lbs. per acre respectively. It is explained that if cotton is grown sufficiently thick* in the row the plants put forth only fruiting branches. There is no room for the vegetative branches to grow. Therefore mere plant-growth is restricted and the vitality of the plant goes largely into fruit production, with the result that bolls are put out and mature much earlier and more profusely than when the plants are farther apart. Perhaps these statements will have to be altered with the evolution of improved types of plants, possessing wider branching tendency.

Lessons in Nature Study.

6

Water plants—(Contd.).

P. S. JIVANNA RAO.

Through the Microscope. A great deal may be shown to the senior pupils concerning the inner structure of plants by means of a microscope supplied with lenses marked $\frac{2}{3}$ and $\frac{1}{8}$ in., which magnify about 80

*This is the practice which obtains invariably in the Ceded Districts. No attempt is made to thin the crop after sowing.

and 300 times respectively. It is not necessary that the pupils should be provided with this valuable instrument; it is enough if the teacher, having made the preparations in their presence, allows the boys by turns to see them and get an idea of the inner structure of plants. The effect is indeed wonderful as the pupils' imagination and curiosity are stirred up and a foundation will thereby be laid for possible discoveries by any of them in the still little-explored realms of natural science.

The tools required are a sharp razor, a pair of mounted needles, glass slides 3×1 in., cover slips, and watch glasses or basins, all of which may be obtained at comparatively cheap prices. The instruction must be supplemented by suitable drawings made on the black board.

Material for study may be selected as follows:—*Nymphaea* (stalk), *Water Hyacinth* (root), *Spirogyra* (filaments), *Ottelia* (leaf), *Vallisneria* (leaf), *Bladderwort* (bladders) etc.

1. *Nymphaea*. Take thin sections of the stalk and mount them in water on a glass slide. Examine first by means of the hand lens and then under the low power of the microscope and note (1) the general outline of the section, (2) the large number of cells and their arrangement, (3) the large air cavities which are characteristic of water plants.

The presence of stomata only on the upper surface may be demonstrated by examining under the high power very thin slices removed from both the surfaces by means of the razor.

2. *Water Hyacinth*. Sections may be taken by inserting young roots in pith. Note the broad cortex consisting of cells and the conducting channels forming a core in the centre.

3. *Spirogyra*. Take a very small quantity of this green alga in a watch glass and mount one or two filaments in pure water. Under the high power of the microscope the filaments will appear very attractive on account of the green spiral bands found inside. Each filament consists of a row of cells which are longer than broad and arranged end to end.

4. *Ottelia*. From a healthy leaf remove thin slices by means of the razor and examine them in pure water under the high power. Notice the green disc-shaped bodies which contain the green pigment known as chlorophyll.

Sections of the leaf-stalk will show large air spaces.

5. *Vallisneria*. With a razor take off thin slices from the middle of the upper surface of a vigorously growing leaf. Mount them in pure water and examine under high power. Notice that in each cell there are a large number of green bodies which move round and round the cell. This is because they are carried by the living substance of the cell (protoplasm) which is in a state of movement. The movement is in different directions and when it is dull it may be hastened by rubbing the under surface of the slide so as to warm it a little.

It requires some training of the eye under the microscope to make out the movement and special attention must be paid to the material which must be fresh and should not be removed out of water.

6. *Bladderwort*. The bladders are easily made out with the naked eye but a few of them may be drawn showing their manner of attachment on the axis as they appear under the hand lens. The shape of the bladder, its mouth and the hairs covering it are, however, best seen under the microscope.

Experiments. (1) Evolution of Oxygen by green plants in sunlight:

Fill a narrow glass jar with water and support it inverted into a large glass jar also filled with water and previously charged with Carbon-dioxide which has been prepared separately by means of marble and hydrochloric acid. Place a few vigorous shoots of *Vallisneria* or *Ottelia* in the large jar with the cut ends just allowed to enter the narrow jar without coming to the top and keep the apparatus in moderate sunlight for some time. Note the evolution of bubbles and when sufficient gas has been collected, invert the narrow jar by closing its mouth with a glass plate and introduce a red hot splinter into it. The flaming of the splinter shows that the gas evolved is oxygen.

This fact viz., the giving out of oxygen by green plants constitutes one of the greatest discoveries in the study of plants and the discovery was first made by Priestley in England who called it "dephlogisticated air", that is, air purified by plants imbibing "phlogistic" (or impure) matter. The details of the process were later studied and established by Ingenhous and others and it is a fact of common knowledge now that green plants utilise the carbon-dioxide contained in air (or from water in the case of submerged plants) and by means of the energy obtained from light split this gas and water into their component elements viz., Carbon, Hydrogen and Oxygen and while these unite to form sugar or starch to serve as plant food, oxygen is liberated as shown in the experiment described above. It must be emphasised that the evolution of oxygen is only incidental to the more essential process which is known as photosynthesis or carbon assimilation.

The apparatus in the above experiment may be modified in other ways according to the materials available in the laboratory employing for instance, a funnel and test tube in place of the narrow jar, other suitable plants being *Hydrilla* and *Spirogyra* which give as good results.

2. Remove the above apparatus to shade and note that the evolution of gas either ceases or becomes dull. This shows the necessity of sunlight for green plants which otherwise cannot prepare their food.

3. Use water boiled and cooled instead of water charged with carbon-dioxide and expose to light. Oxygen does not evolve which shows that carbon-dioxide is absolutely necessary for assimilation.

4. Extraction of the green pigment by means of alcohol. Remove one or two shoots of *Hydrilla* from material exposed to sunlight till afternoon and plunge them in very hot or boiling water for a few minutes so as to kill the shoots. Immerse the shoots in a tube containing alcohol and keep it out of flame's reach in very hot or nearly boiling water. The green pigment (chlorophyll) dissolves in alcohol which thereby becomes green and the leaves are bleached.

5. Treat the above bleached leaves with iodine solution and note that they become black showing the presence of starch in them. Shoots

collected in the mornings or not exposed to light will show little or no starch when similarly treated and examined.

6. Leaves of other aquatics may also be tested in the same way and where no starch is found the manufactured food is in the form of sugar.

Other plants.—The following plants also occur in addition to those mentioned in the first part of this article:—

Name.	Nature order.	
Bergia	Elatineae	Marshes
Limnophila	Scrophularineae	Rice fields
Lagarosiphon	Hydrocharitaceae	Fresh water
Blyxa	do	do
Halophila	do	Marine
Sagittaria	Alismaceae	Fresh water
Ruppia	Naiadaceae	Brackish water
Naias	do	do
Cymodacea	do	Marine

(Concluded).

Reviews.

Correlation of Colour Characters in Rice, by G. P. Hector, M. A. B. Sc. *Memoirs Dep. Agr. India—Bot. Series Vol. XI No. 7*. The trend of modern effort at agricultural progress, is distinctly towards specialization on individual crops. Such specialization always starts with the study of inheritance of unit characters, a bundle of which makes up the plant. Some of these unit characters are inherited singly and others go down from generation to generation linked up with one or more of the other sister unit characters. These characters are graphic when they manifest as colour and it is a correlation of these colour characters in our staple crop, Rice, that Mr. Hector attempts in his recently published memoir. This memoir is not a mere academical contribution to the abstract science of Heredity. The economic possibilities of all such work

will be realized when we read, for example, of evidence of relationship between colour in such insignificant but easily visible parts like the ligule and the colour of the all important but enclosed Rice. We have gone through the memoir and note that almost the whole ground and a good bit beyond has been covered at the Paddy Breeding Station here. Such overlapping is inevitable to a somewhat simultaneous start on one and the same crop by many breeders, but with periodical touch with each other, workers in the same field might profitably exchange ideas and avoid duplication in work.

“Rice.”

Studies of Gujarat Cottons, Part I, by Maganlal L. Patel, B. Ag. *Memoirs of the Department of Agriculture in India, Botanical Series Vol. XI, No. 4*. The Memoir under review is a welcome addition to the literature on Indian cottons. Cottons grown in India are so diverse in character and further have split into so many local races, that it has become necessary that each Province should study its own types in detail and work out its own problems independently. In the case of Gujarat cottons especially, the numerous local and commercial names they are known by have always been a source of confusion. In this volume, Herbaceous cotton—the species that is grown over a large area in the tract—is classified into three groups of which the characters of Goghari cotton are described in detail. This variety owing to its adaptability to all soils and to its high ginning quality, finds favour with the ryots and has invaded, as is usually the case, into the regions of long-stapled cotton. The shape and size of the boll, the proportion of the bolls on primary sympodial branches, seed weight and ginning percentage were found to be hereditary characters by the author. After observing that there is no correlation between shape and size of the boll and the ginning percentage, between tallness of habit and yield, between seed weight and yield, the author concludes that a variety that resists the heavy rains of July, possesses the largest number of monopodials at the base and produces the largest number of flowers between November 15th and end of January is best suited for growing in Lower Gujarat.

Exception may be taken to some of his conclusions as they are based on inadequate figures. His statements about correlations of certain characters are not based on the results of a statistical study. For instance he says that "no connexion seems to exist between" the yield and the weight of kappas "whatsoever" and he substantiates it by comparing the yields per plant of two selections for four years. No mention is made about the number of locks per boll or the number of seeds per lock. If these two characters are different in each, the whole statement falls flat. The proper course would have been to study statistically the yield and seed weight of plants of the F_2 generation of a cross between a high yielder and a plant producing high seed weight, both having the same number of locks per boll and number of seeds per lock.

V. R.

Gazette Notification.

Agricultural Pests and Diseases Act 1919.—Cambodia Cotton. The Government have declared that the "Stem Weevil" (*Pemphres affinis*) and the "Pink-boll worm" (*Gelechia gossypiella*) are insect pests in respect of Cambodia Cotton and in order to eradicate these insect pests have directed that all Cambodia plants in the tracts specified below other than immature plants which have not yielded a first picking be pulled completely out of the ground and allowed to wither before the 1st September 1922.

District	Taluk.
Coimbatore.	The whole district excluding Kollegal Taluk.
Salem.	Salem, Omalur, Namakkal and Trichengode Taluks.
Trichinopoly.	Karur, Kulitalai and Musiri Taluks.
Madura.	Dindigul, Palani, Periyakulam Taluks, the portion of Nilakkottai Taluk north of the Vaigai river and Periyar irrigated tract up to the foot of the Sirumalais.

Notes and Extracts.

Supply of fish in Bengal.—With the object of stimulating the cultivation of good edible fish in tanks, the Bengal Fisheries Department supply small fish fry (of 4 kinds of fish) to people who apply for them for rearing them in their tanks.

(From the Indian Tr. Journal, January 22, 1922).

Y. R. R.

Protection of Beet Sugar in England.—The Beet sugar folk of England are endeavouring to obtain Government protection for the industry. They are asking for the remission of excise duty on beet sugar produced in Great Britain till the beet sugar factory at Kelham reaches an annual output of 50,000 tons. This should set the anti-protectionists in India seriously to think.

T. S. V.

Destruction of Water Hyacinth. The Scientific American mentions of a fresh and efficacious means of eradicating this troublesome waterweed. Spraying with live steam on the surfaces of the plants appears to make them wilt soon. By this method large surfaces of channels infested with this plant have been cleared in the United States. Further plants are being devised "to act the steam flush with water" so as to kill the roots and the bulbs.

(From the Bengal Agricultural Journal, quoted in the Modern Review of May.)

C. S. G.

Agricultural Research—An Echo from distant Wales.—Sir Arthur Griffith—Boscawen, Minister of Agriculture, on Saturday 20th May, opened new agricultural Buildings at the University College of Wales, Aberystwith. Agriculture and its success in the future depended, he said, not on Government control, subsidies, and protection, but on *knowledge and science*. There were always fresh secrets of Nature to be revealed by scientific research, and that method

must be pushed further and further. In 1908, the miserable pittance of £13,000 was being spent in this country on Agricultural education and research. At the same time, Canada was spending £800,000, France a million, and America four millions. Now, this country was spending £400,000, and despite the Geddes axe, an extra million had recently been obtained. A large grant was being paid to Aberystwith.

From the Scottish Farmer.—June 3 1922.

Y. R. R.

Hill Exodus for Sugarcane!—"Of interest is the following from the report of work at the Northern Experiment Station at South Johnstone (Innisfail)

In 1913 when it was thought that some varieties including the valuable 'Badila' were showing signs of deteriorating, a number of them were sent up to the Kairi Experiment Station to see if a change to a higher altitude would bring about a rejuvenescence. After 6 years during which none of them showed a trace of disease they were brought down again during the current year and planted at Innisfail. All of them showed a markedly better growth than canes that had not been sent to the hills."

(From the 20th Annual Report of the Bureau of the Sugar Experiment, Station, Queensland.—October 1920).

The Review of Applied Mycology, Vol. I, Part 3 pp. 19.

C. S. G.

Creosote from coconut shells. Coconut shells are found in abundance in the copra-producing areas of India and Ceylon. A large quantity of this is wasted. Four tons of shell produce a ton of charcoal. It is true that the export of the coconut shell charcoal is increasing. But a certain proportion of the shells is used for fuel locally. A small percentage is used for carving work, such as lamps, cups and saucer spoons, etc. Most of the rubber estates use the holeless half for latex collection. Experiments recently made have found out that the shell can yield an invaluable substitute for acetic acid—creosote. It is said

that rubber regulated with this creosote will require no smoking—it need only be dried in the open air, and will yield a pure white material, which stands against climatic changes much better than material treated with acetic acid. A heating chamber, a condenser or cooler, and a distillery—the necessary machinery, which would be worked by five coolies, are estimated to cost about Rs. 12,000. The shell packed inside the heating chamber is heated to a very high temperature from outside and the creosote thus obtained is then dealt with within two other machines. A ton of shell will yield about 150 gallons of creosote at a cost of about Rs. 2 per gallon, a very great saving over acetic acid. The distilling over, the shell will serve as an inexpensive, non-smoking, first rate fuel, for running the many gas engines all over the country, which now consume coal and coke.

(Extracts from Economic Notes—Industrial, Agricultural, Educational and General).
B. V. N.

Cold vulcanization of Rubber. Mr. S. J. Peachey is reported to have patented a new process of vulcanising rubber without the application of heat, wherein it differs from the method generally followed. It is anticipated that this method will have very great industrial possibilities before it, especially in Tropical countries like India, actually producing Rubber but so far found unsuited for the manufacture of Rubber goods by the hot process. The cold process is based on the fact that when rubber is treated alternately with the two gases—Sulphur dioxide and hydrogen sulphide, the gases are absorbed and reacting on the material produce an active form of sulphur, which readily combines with rubber at ordinary air temperature, resulting in thorough vulcanization. This result is attained also in another way. A solution of rubber in Benzol containing hydrogen sulphide is mixed with a solution of sulphur dioxide in Benzol, when the rubber solution gradually gains in viscosity and ultimately sets into a jelly, which after the evaporation of the solvent becomes vulcanised rubber.

This process has been found useful and convenient for tyre repair work, which will be welcome news for motorists.

(From the Planters' Chronicle, April 29, 1922). Y. R. R.

Unbreakable glass. Dr. Horak, manager of the well-known and old-established Kavalir glass factory in Sazava, Bohemia, has succeeded, after thirteen years of research, in producing unbreakable glass. The first tests of the new product were made at the recent glass exhibition at Hradec Kralove, where the inventor demonstrated before an interested public that his glass plates and vessels remain in tact when thrown to the ground from a height of over twelve feet. He roasted meat on a thin glass plate over an open fire at a temperature of 400 degrees centigrade, he melted tin in a glass pot and drove nails into a hard piece of wood with a piece of his new glass. A tiny glass tumbler scarcely a millimeter thick was heated in a stove to such a degree that wood placed into it was immediately charred to ashes. The glass, however, not only stood the heat, but even remained unbroken when plunged into cold water while still in this overheated state. The manufacture of this glass which is known as Silex-glass required special mechanical treatment and new machinery. The carborundum stones used for cutting ordinary glass are of no use in the case of Silex-glass. Even a diamond sometimes fails to cut it. American, Swedish and Czech capitalists have already offered Dr. Horak large sums of money for the utilization of his invention although it is not yet known what particular goods he first intends to produce wholesale.

(Extract from Economic Notes—Industrial, Agricultural, Educational and General).

B. V. N.

A Plague of Mosquitoes. Many places, in India are blessed with Mosquitoes—and with an exuberance of them to boot—as many of us must have learnt at the cost of our sleep, but the following account would appear to beat all records. Mr. George C. Shupree—Federal Game Warden, High Island, Texas, United States of America, wrote on October 29, 1921, as follows. "Old residents say that they never were so bad before, millions and millions of them; so many perched on the automobile that one could not tell there was a glass in the back of the car. They have killed lots of cotton-tail rabbits, and every now and then meadowlarks and other birds are found dead, apparently from

the ravages of the mosquitoes.—A large-boar hog appeared to go crazy on account of their attacks: he ran into the gulf and swam about 1½ miles and was given up.—Sometimes ago a Norther blew them into the gulf; they were drowned and were washed ashore, and for about 75 miles a strip 4 inches wide and 2 inches deep was left along the beach: but notwithstanding this occurrence, their numbers were not diminished."

(From the Entomological News—April 1922).

Y. R. R.

Gingelly crop of 1921—22, Fourth or Final Report. The area sown with Gingelly in 1921—22 is estimated at 786,100 acres. The estimate this year is about 4.5 per cent above last year's actuals. The area in an average year is estimated at 7,12,700 acres.

The increase is general except in the Circars where the sowing rains for the late crop were almost a failure. The increase is greatest in Salem and Coimbatore.

The season was unfavourable in the Circars, Deccan and Carnatic. The seasonal factor for the Presidency works out to 89 per cent of an average crop. On this basis the yield works out to 94,800 tons as against 91,500 tons estimated in the season and crop report for last year.

Pub. Bureau.

Special Wheat Forecast, 1921—22. The total area now reported is 28,635,000 acres as compared with 24,945,000 acres at this time last year or an increase of 15 per cent. As compared with the revised final area (25,821,000 acres) of last year, the present estimate shows an increase of 11 per cent. The total yield is now estimated at 9,515,000 as against 6,778,000 tons estimated at this time last year, or an increase of 40 per cent. The per cent estimate of yield is 42 per cent above the final estimate (6,709,000 tons) of last year.

The general condition of the crop is, on the whole, reported to be good.

(Publicity Bureau).

Cost of living in Madras. Statistics prepared for the Publicity Bureau with regard to prices in Madras in March show an increase in the cost of living over that in July 1914 of 71·77 per cent and in the cost of food alone of 65·49 per cent.

The figures for the preceding months are as follows.

Month.		Cost of living	Food only.
February	1922	70%	63%
January	1922	71%	63%
December	1921	74%	68%
November	1921	76%	79%
October	1921	82%	...
September	1921	79%	...
August	1921	75%	...
July	1921	70%	...

The Cotton Crop of 1921-22—Fifth or final Report. (From the Department of Agriculture, Madras).

The total area sown with cotton in the Madras Presidency in 1921-22 is estimated at 1,795,200 acres. The area finally recorded last year was 2,151,000 acres. The present estimate represents a decrease of 16·5 per cent below this last figure. The area in an average year is estimated at 2,303,800 acres.

Acre yields. That of "Tinnies" is estimated to be above normal, but will not be so high as previously estimated, since dry land winds have continued to prevail. That of Coimbatore Cambodia is above normal and is reported to be of excellent quality and free from damage by "boll worm." That of the Northerns and Westerns and Cocanadas is much below normal. On account of the late sowing season and early advent of the

hot weather the crop has not had time to mature its bolls. Cuddapah is reported to be an exception as the sowing season here was normal.

Total estimate. The estimated yield in bales of 400 lbs lint for the Presidency is 347,000 bales which is 10,900 bales less than that of last year.

It is still too early to estimate the quantity of cotton which will be produced from the "summer" pickings in Coimbatore and the south. The hot weather rains on which these are dependent have not yet commenced.

May 1922. Pub. Bureau.

Sugar production in India. The Indian Trade Journal for May 4th publishes the following information supplied by the Secretary, Sugar Bureau, Pusa.

In India there are at present 18 factories refining raw Sugar, gur or rab. Four of these are situated in the province of Bihar and Orissa, 8 in the United Provinces, 4 in Madras, 1 in Mysore and 1 in Bengal. From enquiries instituted by the Sugar Bureau to ascertain the quantity of gur and raw sugar melted, sugar made, molasses turned out by each of these factories during the working seasons of 1920 and 1921, the following figures were obtained.

	Year 1920. Maunds.	Year 1921. Maunds.
Gur and raw sugar melted	2,212,817	2,471,025
Sugar made	1,211,274	1,324,646
Molasses obtained	723,965	870,704

Pub. Bureau.

Correspondence.

To

The Editor,

M. A. S. Union Journal,

Coimbatore.

Dear Sir,

Will you kindly insert this note in your Journal, so as to elicit criticism on the subject?

Yours truly,
"Jaggery."

13-7-1922.

Jaggery v. s. Refined Sugar.

In the International Sugar Journal for June 1922, there has appeared an interesting article on the "comparative sweetness of refined and direct consumption cane sugar" by J. P. Ogilvie. By direct consumption sugar the author refers to "Demerara yellow crystals," "Colonial-sugars" and other raw sugars in which the sucrose content is about 5% less than in refined sugar, but which have, in addition varying amounts of invert sugar. These further contain very small quantities of non-sugars, are very slightly acid in reaction, and possess the delicious flavour of the cane juice. In the author's opinion these direct consumption sugars are sweeter and more palatable than the refined sugars and he bases his opinion on the following reasons.

1. Refined sugars do not contain any invert sugar, whereas the domestic consumption sugars do. The invert sugar is said to be sweeter than cane sugar in the ratio of 131:100.

2. The very slight acidity and the very small amount of non-sugars intensify the sweetness of domestic consumption sugars.

3. And lastly the delicious aroma of cane juice enhances the sweetness of domestic consumption sugars.

If the domestic consumption sugar should be considered sweeter than refined sugar for the reasons given above, Jaggery, which contains much more invert sugar than the domestic consumption sugars, is certainly much sweeter than refined sugar. In exceptional cases, i.e.,

when cane is grown under saline conditions, the jaggery may not be good, otherwise, when cleanly made, it is a very appetising article of diet. In the words of the Sugar Committee "it is a perfectly wholesome food and there can be no objection to its consumption on hygienic grounds." It is on account of the delicious aroma peculiar to jaggery and of its greater sweetness, even apart from sentimental objections, that jaggery has held the field in India against refined crystal sugar for the last so many centuries.

In these circumstances it is a matter for serious consideration by the Government and the public as to whether it would be advantageous to encourage the manufacture of refined sugar by factory methods instead of attempting to improve the existing methods of jaggery manufacture as regards cleanliness, purity and keeping quality. It should be remembered that jaggery manufacture is a sort of cottage industry neither requiring much outlay nor needing any elaborate plant and that it is more in keeping with the tastes as well as the economic conditions of the bulk of the people in India. Moreover, the greater quantity of jaggery obtainable from the same tonnage of cane is a point that will go against the ultimate success of Factory methods in India.

"Jaggery."

Students' Corner.

Report of the II Class Union, 1921-22.

Under date 12-6-1922, we have received a letter from Mr. K. M. Venkatachalam, Kattumannar Koil via Chidambaram, communicating a detailed report of the activities of the above Union for 1921-22, which, from considerations of space, we regret we are unable to publish in extenso. The Union in question was composed of the students of class II (Proficiency course) of the year, with Mr. T. B. Anderson and Mr. K. M. Venkatachalam—elected President and Secretary respectively, and was formed with the very laudable object of revising and amplifying their class lectures by free discussion in their meetings. In all, thirteen meetings were held during the course of four months and were usually kindly presided over by one of the Lecturers of the College and

the usefulness of these meetings will be indicated by the nature of the subjects discussed, which were as follows: Power on the Farm, Care and upkeep of Farm machinery, Tillage and its implements, Irrigation Manures, Some micro-organisms of the soil, Soil Chemistry, Meteorology, Leaves and plant nutrition, Insects in relation to agriculture, South Indian cattle, and Foods and feeding. We are quite sure these discussions must have had a most beneficial effect in coaching up some of the less advanced members and we are in complete accord with the earnest appeal of Mr. Venkatachalam to the students of the present II, year class to carry on the work started by the previous batch and derive similar benefit.

Editor.

Cricket Match.

The Agricultural College played the first match against the Coimbatore Cricket Club (Gymkhana) in the Father Rony Shield tournament on Saturday the 29th July on Mr. Narasiah's grounds. Play commenced exactly at 11-15 A. M. The Gymkhana won the toss but elected to field. Runs for the College came in, to start with, very slow, entirely due to the excellent length maintained by both Mr. Blake and Mr. Braidwood. The total recorded at the end of the first hour's game was only 30. Then, when the players had become sufficiently acquainted with the bowling, they opened their shoulders and hit out merrily. The scoring was most rapid when Mr. Bhandari partnered Mr. Anstead; the former faced only 7 balls and scored 10 runs. When the total reached 200 we cried halt. Mr. Anstead was unbeaten for his 70 when the innings was declared closed. He played a very stylish and powerful game hitting all round the wicket. Messrs. Shiva Rao and Venkataraman played a faultless game and scored 47 and 33 respectively. Mr. Blake bowled admirably for the Gymkhana throughout the entire innings; he conceded very few runs and bagged most of the wickets.

The Gymkhana in their venture put up a very poor show, for their runs all told totalled 31. The batsman had his equilibrium upset either by Mr. Anstead or by Mr. Doraiswamy, before he could settle down to take liberty with the bowling. The Gymkhana naturally

followed on. The leather was after a time entrusted to other bowlers, several of whom tried to break through the batsman's defence but without effect. When the score was also found rising rapidly, Messrs. Anstead and Doraiswamy resumed charge of the attack and shattered their wickets before their total went above 120.

Estate Notes.

Assistant Warden. Mr. K. T. Bhandari is Assistant Warden in the place of Mr. R. Swami Rao transferred to II Circle.

Quarters on the Estate. Rao Sahib M. R. Ramaswami Sivan occupied Bungalow No. 1, vacated in April by Mr. Wood, on Thursday the 12th instant. Entrance was effected in Orthodox Hindu Style and a large number of the members of the Estate had been invited for the occasion. The A Type vacated by Mr. Sivan was occupied by Mr. G. N. Rangasami Aiyangar. On the 29th instant Mr. D. Balakrishnamurthi—Prof. of Agric.—occupied the New Provincial Type of Bungalow, which had only recently been completed, and celebrated the entrance function in similar orthodox style. The happy function was signalled by the holding of a Bhajana Kirthanam (music) in the evening and a dinner the next day.

The Prov. Bungalow vacated by Mr. Ananda Rao had been occupied in May by Rao Sahib T. S. Venkataraman, so that the houses thus vacated by the above Imperial grade officers are beginning to give some relief in the vexed question of quarters.

Mr. E. Ballard, Govt. Entomologist, left Coimbatore for England on a year's leave, on the 25th July. On the 23rd the Entomological section gave him a Tea at 5 P. M. in the afternoon, in honour of his proposed departure on leave. The party was held at the Insectary and in spite of adverse weather proved a successful function.

Dr. R. V. Norris left Coimbatore on the 26th for the Anamalais and will spend a month and a half there enjoying the Hill Recess.

Officers' club. On the evening of the 31st a conversazione was arranged at the club, when Mr. Fotihdar, an agricultural probationer, deputed by the Kashmir Durbar for training in Paddy work at the Paddy Breeding Station here, gave a very interesting account of the Lovely Valley of Kashmir, laying special stress on the natural resources of the country and the economic conditions, and the customs and manners of her people.

Departmental Notes.

Appointments:—

Mr. E. K. Govindan Nambiar, L. Ag., to officiate as Upper Subordinate V grade; posted to VII Circle.

Mr. K. Vasudeva Rao Nayudu, L. Ag., to officiate as Upper Subordinate V grade; posted to I Circle.

Mr. P. Krishna Rao, L. Ag., to officiate as Upper Subordinate V grade; posted to II Circle.

Mr. A. Ramaswami Ayyar, L. Ag., Lower Subordinate V grade, to officiate as Upper Subordinate, V grade.

Mr. S. Krishna Nayak, L. Ag., to officiate as Upper Subordinate, V grade; posted to VII circle.

Rao Sahib Y. Ramachandra Rao, Economic Assistant to the Government Entomologist, to act as Government Entomologist vice Mr. E. Ballard on leave.

Leave :—

Mr. E. Ballard, Govt. Entomologist, leave on average salary for 8 months and on half average salary for four months from or about the 15th July 1922.

Rao Sahib Y. Ramachandra Rao, Economic Assistant to the Government Entomologist, extension of leave by a week from 22nd to 28th June 1922.

Mr. F. T. T. Newland, Agricultural Engineer, leave on full average salary for three months from date of relief.

Mr. C. Tadulinga Mudaliar, Assistant Govt. Lecturing Botanist, granted leave on average pay for one month from 22nd July 1922.

Mr. T. S. Ramasubrahmanyayyar, Assistant in Chemistry, further extension of leave by one month.

Mr. P. Vishnuomayajulu, Assistant in Mycology, privilege leave for one month commuted into leave on average pay and extended by one month.

Mr. W. Raghavacharya, Farm Manager, extension of leave by five months and nineteen days on medical certificate.

Mr. R. Chokalinga Pillai, Assistant to the Cotton Specialist, leave on average pay for two months and two weeks from 10th October 1922 with permission to suffix the Christmas and New year holidays.

Mr. K. Ramanujacharya, Dairy Manager leave on average pay for two months from date of relief.

Mr. A. G. Ramaswamiayya, Sub-Assistant in Entomology, leave on average pay for three months from or after the 25th July 1922.

Mr. K. Govindan Nayar, Assistant to Govt. Agr. Chemist, extension of leave by one month and eight days.

Mr. J. Srinivasan, Assistant in Mycology, leave on average pay for 9 days from the 8th August 1922.

Mr. V. Narasimhamurthi, Asst. Farm Manager, III Circle, extension of leave on half average pay for 12 days.

Editorial Notes.

The Pest Act Notification for Cotton pests.

The attention of the readers is invited to the change in the date by which the Pest Act Enforcement for the pulling up of Cambodia cotton will be in operation this year. It has been changed from August 1st to September 1st, the extension of one month being given by the Government in order to enable the ryots to gather as much of the second picking as possible, before pulling the plants up. In this connection it would be useful to consider the rationale of the Pest Act Notification. In the pre-Pest-Act days Cambodia used to be kept on the ground for 2 to 3 years continuously and as a result the pests had a continuous supply of

food and increased enormously. By enforcing the destruction of cotton plants by 1st August, the Pest Act provided for a clear period of nearly two months, August—September, during which cotton would be non-existent on the ground so that it acted as a definite check on the free multiplication of the pest; whereas, this year, there would be barely a month of dead season, cotton being usually sown by the end of September. We are not sure whether this short period will have the effect of killing off the bollworm pest in the moth stage. With the additional facilities afforded for an increase in numbers, we are afraid a large percentage of moths would be left over to infect the new crop so as to lead to an increase in the infestation of the first or season picking, which has been admitted on all hands to have shown marked improvement in quality as a result of the Pest Act. In order to counterbalance the evil effect of this extension, it would be of advantage to have the plants pulled up before the due date, and we would appeal to the ryots to grasp the idea underlying the notification and show willing co-operation by acting up to it.

Research Institutes from Private Donations.

June Number of "Parasitology" of current year contains a very interesting account of the foundation of the Molteno Institute for Research in Parasitology at Cambridge. Parasitology is an important branch of Medical Research and deals with various disease-causing micro-organisms of Man and higher animals, such as the parasite organisms causing Malaria, sleeping sickness, elephantiasis etc. Research in Parasitology owed its origin in Cambridge to the munificence of Frederick James Quick. From the proceeds of the Funds deposited by him a Chair of Parasitology was created at Cambridge and a Laboratory fitted up in a portion of the Medical School. Though cramped for space, valuable Research work was carried on here from 1907 to 1919. In order to improve the situation—Prof. Nuttall—the Quick Professor—issued an appeal for help, in response to which a

princely donation of £ 30,000, followed later by an additional £ 6,000, was received from Mr. and Mrs. P. A. Molteno towards the establishment of an up-to-date Institute for Parasitological Research attached to the Cambridge University. Building was begun in May 1920 and the Institute was opened on 28th November 1921.

While in India, one always looks to the Government to organise an Institution of any description, it is indeed striking that such an important Institute as the above should have been constructed purely from private donations. May we appeal to the Merchant Princes and the great Landed Proprietors of South India to wake up to the needs of India and by establishing similar Research Institutes follow the lead of such benefactors as Messrs. Quick and Molteno?

A Doctorate for an Agriculturist.

We are gratified to learn that the degree of Doctor of Laws was conferred at the Edinburgh University Graduation ceremony held this month, on Mr. James W. Mollison, our first Inspector General of Agriculture. Mr. Mollison had his training in the Royal Agricultural College at Cirencester and came out to India, to the Presidency of Bombay, in the early nineties as Superintendent of Farms. He learnt his first lessons in administration at Poona under the capable guidance of Sir James Muir Mackenzie, member of Executive Council, Bombay, and also an M. R. A. C. Profiting by the experience of Professor T. H. Middleton, now Assistant Secretary, Ministry of Agriculture, England, who was then responsible for Agricultural instruction at the Baroda College, he set strenuously to work and gained considerable experience. The soil was suitable. His opportunity came. The Gujarat famine of 1901 brought out the real man in him. His proposals to open a cattle farm at Churodi were eagerly taken up and the cattle of Gujarat were saved. His diligence, his unaffected simplicity of manners and his unshakable trust in his Indian friends and subordinates gained

him much popularity and an early recognition by Government. When Lord Curzon instituted the new Imperial Department of Agriculture, he needed a man worthy of the place and the choice easily fell on Mr. Mollison. His work as I. G. of Agriculture is recent history and covers a period of over 10 years during which he laboured hard. The foundations laid by him in the cause of the development of Agriculture in this country, by way of education in colleges, research and experimental work in farms, and demonstration in ryots' fields, are, we are sure, strong enough to enable the edifice to weather any storm. The Government decorated him with a C. S. I. in 1907 and he retired in 1911 and is enjoying a well earned rest. That one of the most distinguished universities in the West should confer one of the highest degrees in its gift on an humble worker in the field of agriculture shows its catholicity of mind, for which we congratulate the University and Dr. Mollison. We wish that his successors in this field will emulate his example and add substantially to the knowledge of Indian Agriculture which he had epitomised in his "Text book of Indian Agriculture."

NOTICE.

The addresses of the following members of the Union are wanted. Will members who happen to know the addresses of any of these kindly communicate to the Secretary, Madras Agricultural Students' Union and oblige?

Reg. No.	Date of entry.	Name.
16	11 7 11	G. Krishnan Nayar
24	11 7 11	N. Sivarama Krishnayya
31	11 7 11	P. K. Atchan
40	6 8 11	K. Vaidyanatha Ayyar, Dindigal
48	18 1 12	K. V. Krishnaswami Ayyar
54	25 2 12	R. Venkataramiah, Nellore
60	28 3 12	A. S. Pandyan, Tanjore

Reg. No.	Date of entry.	Name.
61	31 12 19	S. Krishna Nayar
70	1 4 12	L. Raghupathi Sarma
74	17 5 12	R. Sriramulu, Guntur
79	9 6 12	R. Subrahmanyam
83	4 7 12	R. Rajagopal Naidu
89	7 7 12	K. Palaniyandi Pillai
99	7 7 12	D. B. Sivarama Rao
102	8 7 12	A. R. Chandrasakhara Mudaliar
105	11 7 12	K. P. Sundaram Ayyar
107	21 7 12	B. Adinarayana Chetti
108	21 7 12	T. R. Ranganath
109	1 8 12	V. Vijaya Raghavachari
117	1 8 12	S. Raghava Ayyangar
124	17 2 13	S. Anantharama Sastri
131	12 4 13	V. S. Subramania Sastri
136	15 6 13	C. Ranga Reddi
142	15 6 15	M. Vridhachalam Pillai
143	4 7 13	P. R. Tiruvengkatachari
145	4 7 13	K. Subba Kao
146	4 7 13	R. Jeevandas
147	4 7 13	K. Sundaram Ayyar
155	10 7 12	C. R. Annaswami Ayyar
172	12 7 14	U. Venkatachalam
179	12 7 14	Ahmed Hussain
188	12 7 14	K. Krishnaswami Pillai
196	12 7 14	S. Vedantum Ayyangar
198	12 7 14	S. Subrahmanyam
199	12 7 14	R. Govinda Ayyangar
200	13 7 14	K. Govinda Poi
203	12 7 14	A. Rajapandia Nadar
204	12 7 14	K. S. Paramanayagam Asari
205	12 7 14	B. K. Parthasarathi

Reg. No.	Date of entry.	Name.
209	12 7 14	K. Ramaswami Goundar
218	12 7 14	Annaswami Tavar of Ukkadi
227	14 8 14	Kochu Govinda Nayar
236	1 7 15	T. S. Sambasiva Ayyar
238	3 7 15	B. V. Narayana Row
239	27 1 13	C. Bhaskara Ayyar
240	15 6 15	S. Venkatanarasimhan
241	15 7 15	A. K. Krishnan
250	20 6 15	Rao Satyanarayana
252	23 6 15	P. R. Gopalakrishna Ayyar
269	24 7 15	C. B. Appayya
272	11 5 19	S. Sankara Ayyar
282	9 7 16	P. Nallakumar Pillai
289	2 7 16	M. A. Sambasivan
295	2 7 16	C. M. Ranga Reddi
296	2 7 16	M. V. Sitharamaswami
302	2 7 16	V. R. Subramanya Pillai
306	2 7 16	K. Mahabala Rao
310	2 7 16	B. Satyanarayana
341	21 10 17	B. L. Narasimha Ayyar
342	14 11 17	M. R. Krishnan
355	11 8 18	R. Ramachar
357	14 8 18	P. S. Paramesvara Ayyar, Tanjore.
358	18 8 18	M. R. Srinivasa Panikar
360	18 8 18	V. Venkatadri
362	22 10 18	M. K. Reddi
388	28 12 18	G. Alagirisami Reddi
457	3 11 19	J. Narayanamurthi

B. Viswanath,
General Secretary, M. A. S. Union.

THE JOURNAL OF The Madras Agricultural Students' Union.

Vol. X. August 1922. No. 8.

Note on Pine-Apple Cultivation.

BY K. K. BAGHAVAN.
Farm Manager, Taliparamba.

In the Taliparamba Government Farm pine-apples are cultivated with great regularity. Methodical cultivation has much improved the quality and size of the fruit. It has also made the plants flower and fruit very systematically. There are two periods when the plants flower. The first is in January—February when most plants are in flower. The second is July when a few plants alone flower. It takes $3\frac{1}{2}$ to 4 months for the fruits to mature and ripen from the time of flowering. Hence the first general harvest is had about the beginning of May and the second in October—November. The fruits obtained in October—November seem to be sweeter and less juicy.

A well-drained gravelly red loam is best suited, even though the crop can be cultivated on other lands as well, under more or less similar conditions.

The plant is propagated by side-suckers planted in rows on slightly raised ridges. Suckers coming out from the sides of plants are better than shoots springing from fruits. The plants from the latter are weak and take a longer time to mature and to bear fruits. The plants bear in $1\frac{1}{2}$ to 2 years and continue to yield fruits till the fifth year, when they deteriorate and give inferior fruits.

It is advantageous to plant the suckers on ridges 4' apart at 2 feet distance. The plants are to be manured individually with a mixture of 10 cartloads of cattle manure, 500 lbs. of ashes and 200 lbs. of fish guano per acre. The addition of fish guano and ashes is very beneficial to the crop, whereby the fruits grow big and are rendered very sweet.

The plants are earthed up after manuring. This earthing up strengthens the plants. The plant dies after bearing fruit and its place is taken by side suckers which in their turn bear fruits and die. It is advisable to keep only one such side sucker growing and remove all the others and plant them separately. Besides this, little has to be done. A few weeds growing here and there will have to be removed.

Of the varieties cultivated on the Farm, the Kew variety is the best. The fruit grows to a very big size and is sweet and practically seedless. A fully developed fruit weighs from about 6 to 8 lbs. Very few side suckers are produced in this variety. The West Indian is superior to the local variety, but numerous side-suckers are developed in this kind. The Mauritius pine-apple—a recent introduction—is very sweet though not as big as the Kew one. Side suckers are also produced in plenty. A fourth variety which has been recently introduced is the Cochín local—a variety still under observation.

This crop does not require any heavy outlay of capital but is capable of yielding good profits. An initial expenditure of Rs. 25/- an acre can easily fetch Rs. 100 a year, the amount of profit depending upon the state of the market.

Some Fruit Diseases and their Remedies.—

Mango.

BY C. S. GOPALASWAMI RAO.

Fruits have usually been regarded in this country, as articles of luxury, only fit for consumption by the rich, but of late they are becoming increasingly recognised as an important article of food and are thus becoming a valuable commodity of trade. Fruit cultivation has therefore prospects of turning out to be a good paying

business proposition, but it must be kept in mind that it is not without its attendant risks—as when the crop fails partially or even entirely. The chief causes for such failures are besides unfavourable soil and weather conditions, the ravages made by insects and fungi. Fungi are very minute plants of a low order reproducing themselves by means of 'spores' or seeds. Unlike other plants they are incapable of living independently by manufacturing their own food. Consequently they depend upon other plants for their nourishment and act as parasites.

So far as fungus diseases of fruits are concerned, the chief aim of the fruit-grower should be, firstly, to prevent the disease from appearing in his plantation and secondly, to check its spread when it has once crept in. These two objects can be attained by maintaining the orchard in a sanitary condition and by adopting some of the preventive measures advocated below. Spraying fruit trees with fungicides in proper time and removal and destruction of diseased trees or parts of trees are, in general, the chief measures to be adopted by the fruit-grower in his campaign against plant diseases. The underlying idea of the above steps is to protect the trees from fungus attack by coating them with an antiseptic and to eradicate all sources of infection by the removal of diseased material.

It is the intention of the writer to give a brief account of the symptoms of some important fruit diseases of this Presidency and their remedies, the aim being that of aiding the fruit-grower in producing a healthy crop. The diseases peculiar to the mango are dealt with in this article.

Diseases of the Mango.

1. *Mildew.* (*Oidium* sp.) This disease appears during the dewy months of December and January when the trees are in full bloom. It takes the form of an ashy-white powdery coating on the flowers, flower-stalks and tender shoots. The flowers do not open properly, but turn black and shed in numbers. This fungus though superficial in its habits sucks the nourishment—cell sap—contained in the blossoms by sending 'haustoria'—small protuberances of its

own—into the flower tissue. The setting of the fruits is prevented and much damage is caused by an attack of this disease.

This malady can be prevented by spraying the flower bunches *before the buds begin to open* with Bordeaux Mixture. This solution is made by mixing copper sulphate and quicklime previously dissolved in equal volumes of water. The usual proportions are 5 lbs. of copper sulphate, 5 lbs. of quicklime and 50 gallons of water.

2. *Sooty Mould*. (*Capnodium Mangiferum* Cke. & Br). The leaves and twigs of mango trees are commonly found covered by a dense black layer on their surface. The black layer is composed of the 'mycelium' and the spores of the fungus. The fungus grows on the sweet liquid secretions of certain plant-lice. By covering the leaf surface with the fungus growth, sunlight which is necessary for plant growth is obstructed and the assimilative surface of the leaf is reduced. The disease does not, however, appear to cause much damage.

The destruction of the plant-lice which are the source of food for the fungus should be aimed at to prevent the disease. These insects are said to be controlled by a spraying of fish-oil soap and tobacco extract. "This is prepared by dissolving 1 lb. of fish-oil soap in 10 gallons of water and adding 1 pint of good tobacco extract."

3. *Blight*. (*Pestalozzia mangiferæ* Butl. and *Gleosporium mangiferæ* Rorer).

The disease caused by the former fungus attacks only the leaves. The affected leaves become discoloured, turning grey and getting rolled in at times. This discolouration begins either from the tip or the margin of the leaves and extends eventually to their whole surface. The leaves drop down at the end. The *Gleosporium* blight affects not only the leaves but also the blossoms and tender twigs; and recently fruits were found attacked by this fungus. At the beginning of the attack the leaves are covered by small black spots which gradually extend. The affected patch falls out forming what are called 'Shot Holes.' A premature fall of the leaves is also caused by this disease. The flowers and the floral branches

turn black and the former drop off. Occasionally the twigs die back. The fruits are at first covered with small black patches which often coalesce together forming a bigger discoloured area. Young fruits when attacked drop from the trees. Well developed fruits, when affected, do not fetch a good price because of the ugly diseased patches on them.

All diseased twigs and leaves should be removed and burnt. A spraying with Bordeaux Mixture of 6:4:50 proportion checks the disease.

4. *Black stem*. (*Rhinocladium Corticolum* Mass). Only the branches of the trees are affected by this disease. Thick black felt-like growth appears on the branches and they are sometimes so numerous that an unsightly appearance is presented. The parasitic nature of the disease is doubtful though it is supposed at present to be harmless.

Cut off completely dead branches and remove the black fungus tissues thoroughly with a piece of cloth dipped in a dilute solution of copper sulphate—1 tola of copper sulphate dissolved in 100 tolas of weight of water.

5. *Red Rust*. (*Cephaleuros virescens* Kunze). Reddish green patches appear on the leaf and the twigs. The affected portion of the leaf becomes dried and shotholes are formed. The stem when attacked gets dried up after some time.

The disease can be checked and prevented by a spraying of .5% solution of Formalin on healthy portions of trees at intervals of twenty days. (Note:—formalin can be had of any chemist and formalin fumes should not be inhaled). Bordeaux Mixture of a weak strength 4:2:50 may be effective though it has not been tried.

6. *Bark Rot*. (*Corticium* sq.) This disease is caused by a pink fungus which attacks the stem and eventually causes the bark to rot. Usually trees growing in damp localities are more susceptible to the disease.

Scrape off diseased portions of the bark, taking care not to leave behind any discoloured tissue. Then paint the cut portion with a 6% copper sulphate solution.

Reviews.

The Coconut-bleeding disease. Pusa, Bulletin No. 127—1922.

We acknowledge receipt of a Pusa Bulletin entitled as above by our Govt. Mycologist, M. R. Ry., S. Sundararaman, M. A. The great value of the coconut tree when alive is evident from the fact that even single trees are considered of sufficient value to be donated at religious functions. It is one of the few trees, which without much attention, gives a more or less uniform annual revenue to the owner. Like every good thing in this world, this tree has many enemies and the bulletin under review describes a serious disease to which the coconut trees are liable. The symptoms, described in very popular language, are further visualized to the reader with the help of telling illustrations and photographs. The Plant Pathologist is often blamed for 'cutting and burning' being his sole remedy, but it is gratifying that in the present case the author has been able to devise a 'surgical operation' to save those trees in which the disease has not made much headway.

Extracts.

Coffee in India 1920—21.

The coffee industry of India is practically confined to Southern India, comprising the Madras Presidency, Coorg and the States of Mysore, Travancore and Cochin.

The number of plantations during the year was 2,942 covering an area of 223,524 acres, as against 2,468 with an area of 230,848 acres reported last year. New land planted amounted to 12,141 acres, while the area abandoned was 38,880 acres. This represents a net increase of 8,261 acres over the revised total area (116,411 acres) under coffee for 1919—20. The total area under cultivation in the year under report was, therefore, 124,672 acres, or an increase of 7 per cent over that of the preceding year. Of the total area under

coffee during 1920—21, 50 per cent was in Mysore, 26 per cent in Coorg, 21 per cent in Madras, and the remaining 3 per cent in Cochin and Travancore.

The total production of cured coffee during the year was 22,486,696 lbs. as compared with 21,325,035 lbs. (revised figure) in the preceding year—the yield per acre of plucked area being 246 lbs (185 lbs) in Travancore, 235 lbs. (217) in Coorg, 210 lbs. (206 lbs.) in Madras, 189 lbs. (178 lbs) in Mysore and 132 lbs (107 lbs) in Cochin, the figures for 1919—20 being shown in brackets. The daily average number of persons employed in the plantations during 1920—21 was returned at 74,945, of whom 50,334 were permanently employed (namely, garden labour 32,598; and outside labour 17,736) and 24,611 temporarily employed (outside labour), as compared with 60,868 persons (28,030 garden and 10,417 outside labour permanently employed and 22,421 temporary outside labour) in 1919—20.

Coffee is imported chiefly from the Straits Settlements and the Kenya Colony (formerly known as the East African Protectorate) and re-exported to Asiatic Turkey and Maskat Territory.

Exports of Indian coffee increased in 1921—22, as compared with the preceding year, by 1,600 cwts to 235,000 cwts. The principal customers of Indian coffee are France and the United Kingdom; the former increased her demands by 94 per cent to 80,900 cwts, while the latter reduced her requirements by 14,000 cwts to 85,300 cwts. With the exception of Australia including New Zealand, which took 1,500 cwts more than in the preceding years, the exports to all other countries decreased. Exports to Asiatic Turkey declined by 15,500 cwts and amounted to 5,500 cwts. Arabia, Bahrein Islands and Ceylon also reduced their takings considerably.

Publicity Bureau.

The Wart disease of Potatoes.

It may be remembered that at the last meeting of the Board of Agriculture at Pusa, the necessity of legislating against the importation of potatoes infected with the *Wart disease* was discussed

and in this connexion the following information abstracted from the Journal of the Department of Agriculture, South Africa, may be useful to agriculturists.

Black Scab or "Wart disease" of potatoes is a disease caused by the action of a fungus *Synchytrium endobioticum* Perc. which attacks the tubers and leads to the formation of large, wrinkled warty excrescences often larger than the tubers themselves. The potato is attacked at the eyes and minute excrescences causing a discolouration at the eyes are the first symptoms, but in the later stages the whole tuber turns into a wrinkled, mis-shapen mass. In badly affected plants the stems show the development of diseased tissues.

The "resting spores" of the fungus are formed in the decaying parts of the tuber and are ultimately released into the soil. These "sporangia" are known to be alive in the soil for *at least 10 years* and, by giving rise to numerous tiny active spores, to infect the growing tissues of healthy plants.

This disease is spread from place to place chiefly by "infected seed" but it is known that diseased material fed to cattle can pass unharmed through the alimentary canal and thus spread the disease.

The origin of this most destructive pest of potatoes is not known with any degree of certainty. It has been known to exist in parts of Great Britain for the last sixty years. Ireland is mostly free, as also the northern counties of Scotland. It is spreading in Germany and is known to occur in Holland, Norway and Sweden. France is said to be free. In America it has been recorded from parts of Pennsylvania and Virginia and in South Africa it has been recently recorded from a part of Natal.

So far, all remedies tried to destroy the spores in infected soil proved of no avail. The only way of fighting the Wart disease would appear to be the use of immune varieties, of which several have been found.

The Wart disease is evidently one which India should beware of introducing from abroad.

Y. R. R.

Notes and Gleanings.

A ryots' Conference. A ryots' conference was held at the village of Mattanur, near Tellicherry during Jamabandy and a number of practical farmers attended it. Means by which they could improve their crops were explained to them and a demonstration of a Meston plough at work was given. This demonstration so much impressed the ryots that the plough used was at once bought and orders were given for six more.

Publicity Bureau.

A question of genetics: Old Parents—Clever Children.—Eminent men are very often the youngest of large families. This is because, when the last child of a big family is born, the parents are much more developed mentally than when the first child arrived. Among the eminent men who were the youngest of their families were Alfred the Great, who was the fifth son; Sir Richard Arkwright, the famous inventor, who was the youngest of thirteen children; Sir Francis Bacon, the great essayist, who was the youngest of a family of eight; and Bismarck, the great German Chancellor, who was also the youngest child of his family. This disposes of the very common statement found in scientific literature to the effect that when a man works hard for years, he gets worn out, and falls into an early grave. The statement is not at all true, writes Mr. C. L. Redfield, in "Human Heredity." Instead of a man becoming worn out and having his vitality sapped, hard work is the thing that increases his power and vitality, and extends the length of his life—"Advocate of India."

'Up-to-date.' Americans are nothing if not up-to-date. Their latest device is an aerial grain sower which travels a few feet above ground and shoots the grain from perforated metal tubes below into ground with sufficient force to ensure of its being buried. The speed of the machine is 80 miles per hour and it can sow as much grain in a seven hour day as 100 men could, working simultaneously.

The Scottish Farmer, June 24, 1922. V. M. A.

Research. Mr. F. Warten Weiler in his presidential address to the Chemical, Metallurgical and Mining Society of South Africa describes Research as follows:—"Research is a tender plant and requires a congenial atmosphere. Inspiration and concentration are its companions. Surroundings, nature of colleagues, past successes, praise, sometimes condemnation, are all forces which circulate its life blood. Research is said to be the occupation of a gentleman. It is a noble calling and should, in theory, be unhampered by financial considerations. The scientist so engaged must have imagination, originality in addition to knowledge, and his mind should be free from all outside worries in order to be receptive of the smallest sign leading to actual discovery. These often hinge on the veriest trifle or accident."

B. V. N.

English Farmers Support Research. The following occurs in a report by Prof. Russel of the Rothamsted Experimental Station.

"The past year has seen most of the British Agricultural Research Stations settling down to post-war conditions, and there has been a significant pronouncement by the Minister of Agriculture emphasising the determination of the Government to pursue the policy of education and research as the most permanent method of improving agriculture and further pointing out that even in these times of financial distress when every item of national expenditure is being closely overhauled, it set aside a further provision of funds for these purposes. This pronouncement was not only accepted without demur by farmers, but was in no way in advance of the attitude taken up by their very comprehensive National Farmers' Union, who consented to forego the promised subsidy for corn on condition that a sum of £ 1,000,000 was set aside for research and education, particular stress being laid on research. Coming as this did from the farmers themselves in a time of financial depression, it affords convincing proof of the progressive spirit now abroad in the country side and of a readiness to co-operate with men of science."

What a difference between England and India?

B. V. N.

Uses of Sunflower Seeds.

1. The kernels of the seeds are edible. They are used largely for human consumption in Russia, where they are eaten in the same way as groundnuts.
2. The seeds are used also for fattening fowls and a diet of this seed is said to increase the laying powers of poultry.
3. In Rhodesia the seeds are at present employed to some extent mixed with other grains as Cattle food.
4. An oil of a superior quality is extracted from this seed. It is said to be sweet, palatable, excellent for table use and culinary purposes, and also for woollen dressing, lighting, and varnish and soap making. For the last mentioned purpose it is said to be superior to most oils.

Thus there appears to be a great future for the sunflower crop though at present it is grown only as an ornamental flower plant.

(From the Rhodesia Agricultural Journal- Vol. 19 No. 3. May 1922).
C. S. G.

How we may increase the Effectiveness of Economic Entomology:—To maintain the entomologist's present position of service and to make the solution of future problems possible, fundamental training for research will have to be insisted upon, and an agreement must be reached as to which are the basic problems of research and which are the most promising methods of attack. Co-operation is also essential not only among the entomologists and between them and other scientific men, but also with public and private agencies and the general public. Conferences and field meetings would seem to be the best means of promoting co-operation for those workers engaged on similar problems.

•Journal of Economic Entomology—XV No. 1 February 1922.

(G. A. Dean).

A world-wide quest for wireworm parasites. F. X. Williams, Field Entomologist with the Hawaiian Sugar Planters' Association was to leave Hawaii in June for an extended trip through Central and South

America and the West Indies in search of parasites for the wireworms, which form a serious pest of cane in certain districts of Hawaii. He returned only recently from the Philippines with various parasites and predators, but none of them seem to be very promising. He will visit Washington, U. S. A. and by consulting the Entomologists there and examining the collection at the National Museum will try to trace the original home of the wireworm pest of Hawaii. In case of success in that endeavour, he will proceed to that locality and search for its specific parasites.

Louisiana Planter, 24th June 1922. Y. R. R.

Fertilisation burns out the soil.—Mr. H. A. Noyes of Millon Institute of Industrial Research, Pittsburg, Pennsylvania, has exposed the fallacy of the above commonly accepted idea. He proves that the water requirement of a plant is decreased by fertilisation when the plant is grown on soils—generally humid ones—which respond to fertilisation. The results of the green house experiments conducted to test the above fact were as shown under:—

Experiment 1.		Experiment 2.	
Soil:—	Silty Loam.	Soil:—	Sandy.
Crop:—	Capsicum Annuum.	Crop:—	Lettuce.
Treatment.	Water requirement per unit of dry matter.	Treatment.	Water per Plant as harvested.
(1) Check	1785	(1) Check	37.9
(2) One application of limestone	1415	(2) 5 Tons dry manure	24.3
(3) Two applications of limestone	1402	(3) N. P. K.	21.9
(4) 3 applications of limestone and phosphorus	1323	(4) 10 Tons dry manure	22.3
(5) Nitrogen fertiliser	1215	(5) Double N. P. K.	16.0
		(6) 10 Tons dry manure, plus N. P. K.	16.1

The above results clearly go to show that with the increase in the application of manure there is a decrease in the water requirement of the plant. It is also clear that the plants are able to make their growth on a smaller amount of water in a fertilised soil than in a non-fertilised one. The study of fertilisation from the basis of water requirement, as indicated by the author, is of great importance.

(The Journal of Industrial and Engineering Chemistry—March 1922).

R. S. Rao.

Yeast from Molasses. According to Dr. Arnstein of Philadelphia, molasses is being profitably used in the manufacture of alcohol, motor-fuel, vinegar, potash and other fertilizers; and also in the production of cattle feed. In his opinion, however, molasses can be most profitably utilised in the manufacture of "compressed yeast" and its by-products.

The "yeast" in question is not the one concerned in the fermentation industries, but another which makes a vigorous growth without producing alcohol. It is usually manufactured from malted grain, but can be produced far more cheaply from molasses. It forms a protein fodder for cattle and can also be used for human consumption. The writer states that Germany was the first to make use of this yeast. During the war, the British blockade shut off imports of as much as 5,000,000 tons of nitrogenous foodstuffs for horses and cattle and to meet this deficiency, this yeast was cultivated on a large scale, under the direction of the Institute of Breeding at Berlin, in large shallow tanks on a medium prepared from the refuse from sugar works mixed with salts, including synthetically-made ammonium salts. The yeast was then pressed and used not only as a fodder but also as human food: and it was believed that this industry would have made Germany self-contained as regards her nitrogenous requirements. There would appear to be 525 plants producing compressed yeast in Germany at the present time.

Besides being used in the manufacture of bread, yeast has been very successfully used as a tonic and as a house remedy. It is used in

cosmetic preparations, in the manufacture of steel rope, and in the manufacture of Ernolite, a non-inflammable celluloid substitute. Yeast is also used as a direct food, and a food improver, on account of its nucleo-protein, lecithin and vitamin content. There is sufficient clinical evidence that yeast has been successfully used in various diseases such as cancer, cholera, diabetes, influenza, diarrhoea, typhoid etc. In the manufacture of baker's yeast, a gallon of molasses will yield $4\frac{1}{2}$ lbs. of compressed yeast and $\frac{1}{2}$ gallon of absolute alcohol. In the case of fodder yeast, very much more diluted molasses is used, and the yield is 8 to 10 lbs. of yeast for every gallon of molasses used.

Louisiana Planter and Sugar Manufacturer.—Feb. 4, '22.

Y. R. R.

Indian Cantharides. Indian Med. Gaz., Calcutta, LVII, No. 3, March 1922, pp. 92—93. B. N. Dutt.

In the drug trade, four kinds of cantharides are used, obtained from *Lytta (Cantharis) vesicatoria*, L. (the European beetle, generally imported from Spain), *Mylabris sida*, F., and *M. phalerata*, Pallas (chiefly Chinese), and *M. chiorii*, F. Blister beetles are found in nearly all the Provinces of India, but chiefly in Gwalior, which supplies the requirements of all the Government Medical Stores Depots. The beetles appear in the fields in July, and can be collected on cloths spread below the plants. They should be shaken off the plants before sunrise, when they are unable to fly, otherwise the collectors are liable to be attacked.

Indian Cantharides is a more powerful vesicant than European, while the Spanish beetle yields on an average 0.7 per cent. of cantharidin, in Indian beetles the percentage varies from 0.7 to 1.92. *Cantharis hirticornis*, from the Murree Hills and Hazara, contains as much as 2.02 per cent. The Indian product ought to fetch higher prices than the others, but at present there are not sufficient supplies even for the home demand. With the spread of knowledge, large

quantities of these beetles will no doubt be collected in the N. W. Frontier Province for exportation; at present they are being wasted for lack of enterprise.

(Rev. App. Ent.)

Y. R. R.

The Kiangsu Bureau of Entomology. The Bureau of Entomology, Kiangsu Province, National Southeastern University College of Agriculture, Nanking, China, has been organized with the following staff: Charles William Woodworth, Director and Chief Entomologist; Goey Park Jung and C. Francis Wu, Entomologists; H. S. Chang, Entomologist and Curator; Huan-quang Fu, Secretary and Editor; Fo-ching Woo, Tsong-ling Tsou, Chi-yeu Wang, We-i Young, Laboratory assistants; M. S. Chang, Pai-han Wang, Clerks.

The Bureau is fitting up a houseboat 48×11 as a floating Laboratory for its field investigations. It will provide living quarters for four Entomologists and four sailors. The canals in this province will make it possible to take this laboratory within easy walking distance of every farm. There will be a motor boat to tow and tend the houseboat.

The Bureau has undertaken the control of the flies and mosquitoes in co-operation with city health department which contributes the funds and the services of twenty police officers. Seventeen students of the South-eastern University also take part in the campaign.

The Bureau has just begun the publication of a semi-monthly Bulletin which will be devoted largely to recording the distribution and injuries done by insect pests in China and each number will contain one or more articles on some phase of Economic Entomology.

(Canadian Entomologist July, 1922.)

Y. R. R.

Nose prints for cattle. The Journal of Dairy Science for May 1922 contains an interesting article on the identification of cattle by means of nose-prints. In registering animals or putting them up for official test or in connection with live-stock insurance, much difficulty is felt in their identification especially when they are of solid colour and do

not have any natural markings. Artificial marks of whatever kind cannot be relied upon as they can be duplicated. Mr. Petersen of the University of Minnesota, after studying the nose-prints of more than 350 animals declares that, so far as his experience goes, nose-prints can be relied upon to afford a means of positive identification, as, according to him, no two animals have an identical pattern and the pattern remains the same throughout life.

Y. R. R.

Some forms of sterility in rice in U. S. A. and their causes.

1. *Alkali injury*.—This is due to an abundance of alkali in the soil which weakens the plants and gives them a stunted and rusty appearance. Some of them fail to produce seed after heading, but these do not remain green.

2. *Drought injury*.—This develops when the plants are heading and the disease is distinguished by the rapid drying and blasted appearance.

3. *Nitre spots*.—A local (Californian) condition causing green plants to be seen at harvest time. They are sterile and straight.

4. Dry hot winds are said to cause considerable sterility of rice in California. The heads have a blasted appearance as if they had been scorched by fire.

5. Poor grassy lands cause sterility, especially when there is not sufficient water to kill the weeds and grass. The glumes in these cases are likely to be stained by invading fungi.

6. *Rotten Neck*.—(Blast—*Piricularia*)—This disease may kill rice heads sufficiently early to prevent their filling normally. The frequent breaking of the ears and the brown discolouration are the chief characters of the disease.

7. *Straight head*.—The panicle of the diseased plants remains erect when mature and is sterile. The leaves of the affected plants appear darker green than the rest. The ears emerge slowly and do not extend as far above as the normal ones. Aborted glumes are very common in such ear-heads. Diseased plants have also a strikingly abnormal root system. Proper aeration of the soil is said to prevent this disease.

The rice growers of India may well be warned of the above forms of damage to rice plant.

(United States of America, Department of Agriculture, Farmers' Bulletin No. 1212.)

(From the Review of Applied Mycology, Vol. I, part 3, page 83).

C. S. G.

Consolidation of holdings. A resolution was passed by the Tryall Hill Branch of Jamaica Agri. Society, asking that several small pieces of land belonging to one owner, although not adjoining one another, might be added together and taxed as one holding, as it worked hardship on the owner to pay the minimum tax on each small piece. On referring the matter to the Government, in reply thereof, it was pointed out that under section 1 of Laws 5 and 6 of 1908, any number of holdings might be added together up to a value of £ 80, and form one property for taxation purposes, but that in order to allow of holdings of any greater total value to be added together an amendment to the Law would have to be made, in which case the amount collectable in each parish would be reduced. Here is a point for advocates of consolidation of holdings in this country.

(Jamaica Agri. Soc's Journal.)

B. V. N.

[Editorial:—Holdings in Madras are assessed by acreage and will not be affected by the above suggestion.]

Estate News.

Prof. R. B. Kulkarni, M. A. LL. B., of Gwalior College, who is touring in the Southern Districts on behalf of the "League of Parents and Teachers" spent a few days on the Estate, delivering lectures on (1) "Child welfare," (2) "Dullness," (3) "Man and his potentialities" and (4) "Our invisible friends." The lectures were well attended—the audience comprising all the students and staff on the Estate. The Director of Agriculture, Mr. Anstead, and the

Principal, Mr. Parnell, also attended some of the lectures. Lectures were illustrated by magic-lantern slides and were highly interesting and educative. Mr. Kulkarni exhibited a very sociable disposition and mingled very freely with the students and staff and we believe has inspired them with high ideals of social service. He was entertained at a dinner party at the Hostel by the students.

Mr. P. V. Isaac, M. Sc., who joined the Agricultural Research Institute, Pusa, as Dipterist, visited Madras, Coimbatore and the Nilgiris in the course of a tour in connexion with his special work. On the 5th August, Saturday, he was entertained by the Officers' Club at an evening party arranged in honour of his return from England, when he had the pleasure of meeting many of his friends after an absence of three years. The function was a very successful one; Mr. T. V. Ramakrishnayyar in apt words welcomed him back to Coimbatore on behalf of the Club, and Mr. Isaac replied suitably thanking the members of the club on the cordial reception accorded to him.

Mr. McRae, M. A., Imperial Mycologist, Pusa, arrived at Coimbatore on the 6th in the course of his tour in South India; he left for the Nilgiris on the 12th instant.

Mr. Milligan, M. A., Agricultural Adviser to the Government of India, spent a few days at Coimbatore engaged chiefly in the inspection of the Cane Breeding Station, Chettipalayam. He also went round the College and visited all the various sections of the Research Institute. He was entertained on the 21st at an evening party arranged in his honour at the Botanic Garden by Rao Sahib T. S. Venkataraman, wherein he had the opportunity of meeting most of the Gazetted staff on the estate.

Vinayaka Chaturthi Day was celebrated in orthodox style by the Hindu members of the colony and there was a procession accompanied by *Bhajana singing*.

There were in connection with *Krishna Jayanti* and on following days learned expositions on various episodes of Srimat Bhagawatham, such as Krishna Janma, Kuchelopakhyanam, Gajendra moksham &c., by Vidwan Sri Rama Sastrigal of Palghat.

On the 29th instant, at night, Rao Sahib M. R. Ramaswami Sivan gave an open-air dinner party in honor of the wedding ceremony of his son Mr. Balakrishnan, to which all the Indian residents of the Estate had been invited without difference of caste, colour or creed.

Students' Corner.

Cricket Matches. Taking advantage of the presence of Mr. R. D. Anstead who had come over here to hand over charge of the office of the Deputy Director of Agriculture, Planting Districts, we got up a game on Sunday, the 13th August, against our old rivals, The Forest College, who, it must be mentioned have this year a strong batting as well as a bowling side. The Foresters very sportingly accepted the challenge, although only the previous day they had played a match against the Stanes High School in connection with the tournament. The game started at 1-30 P. M. precisely. We had the first knock at the wickets and after scoring 133 for 9 wickets declared our innings closed. Messrs: Shiva Rao, Anstead, Ramana Rai and Doraiswamy proved useful and scored 31, 30, 20 and 15 respectively. The Foresters easily reached 130 conceding only 4 wickets before the game stumps were drawn for the day. Messrs: Jayakodi, Hadi Hussain, Krishnan and Wilson were their principal contributors with 33, 29, 28 not out and 21 respectively to their credit.

The second match we played in the cricket tournament was on the 22nd August against the Stanes High School. Our team was without the services of Mr. Anstead, with little doubt the best batsman and bowler on our side. We are indeed very sorry to lose him, but it is comforting to note that he has left us to be at the helm of the Agricultural Department at Madras. Mr. S. N. Venkataraman also had to keep back on account of indifferent health. The school

on winning the toss took up batting. Except W. Bamford who scored 21, none else entered into a double figure, but yet their score rose to 79 due to "Mr. Byes" claiming 13 runs to his share. The College made a disastrous start losing the first 4 wickets for a meagre total of 22 runs. Then on Mr. Vittal Rao entering, a good combination ensued between him and Mr. Bhandari which was responsible for a valuable addition of 50 runs; the former started blocking with a vengeance and the latter who scored 48, the highest, punished mercilessly every ball he faced and narrowly missed once sending the ball over the boundary. Mr. Vittal Rao played a very safe but tediously slow game for his 46, compiled in 2½ hours. Pattathan who entered last snatched 23 runs. Our total reached 174. We thus despatched them by 95 runs.

Tutorship. M. R. Ry., D. Balakrishnamurthi Pantulu Garu has been appointed Tutor, vice Mr. R. D. Anstead transferred, and took charge of his wards with effect from 18th August 1922.

Departmental News.

Coconut Pest at Mangalore.

Nephantis serinopa—the black-headed caterpillar—is a serious pest of coconut known to be found in Ceylon, Cochin, Travancore, Burma, and Indo-China. It had however never been noted in South Kanara till now, but it appears to have made its entry therein about a year ago—most probably through consignments of coconut seedlings from Cochin State. Serious damage was first noticed about January 1922 on trees in the compound of the Railway Station, but the measures advised by the Agricultural Department were not adopted. By June a rapid spread all round from this focus was noticed and an agitation set up—chiefly in the columns of the "Mangalore Mail"—resulted in public meetings of citizens being held and emergent measures being taken. "Cutting and burning" of the infested fronds being the only feasible measure possible, operations were started by the co-ordinated efforts of the Agricultural and Revenue Departments and an elected committee of citizens. Parasites having been

noticed, efforts are being made to utilise them in keeping down the pest. The help of the Pest Act is also being sought to enforce the necessary measures to keep the pest in check.

Correspondence.

Chile is apparently getting troubled over her annual imports of 90,000 tons of sugar from her neighbour Peru; and two concerns have already been formed to fully test the possibilities of sugarcane and beet cultivation within the country. We in India imported last year over 700,000 tons of refined sugar and 50,000 tons of molasses at an aggregate cost of 27 crores of rupees. We just learn that the Sugar Corporations of India Ltd. are being wound up. Also we see no action yet taken as a result of the Indian Sugar Committee's recommendations. Comment is needless.

"One interested in Sugarcane."*

AN OPENING FOR AGRICULTURAL DIPLOMATES.

A scheme for the Indianization of the Military Farms Department.

We have received from the Director of Agriculture a copy of G. O. communicating a letter from the Quarter-Master-General regarding the sanction of the scheme mentioned above and calling for applicants, particularly from Government Institutions and Colleges—Agricultural and Veterinary.

The candidates are required to furnish the usual details regarding their age, caste, qualification, service if any, etc. They are further required to produce a certificate of physical fitness and another from District Magistrate as to their desirability for Govt. service: they are also required to state if they are prepared to proceed to any part of British India, Aden or Burma.

1. Candidates will be entertained on probation for a period not exceeding one year on Rs. 60 and after departmental examination will be taken as Overseers on probation on Rs. 100. After two

years if confirmed they will be placed on a grade of Rs. 100-10 2 160-15/2-250 with efficiency bar at Rs. 150 and Rs. 190.

Overseers will have the charge of valuable cattle and will not only attend to the general work of the cattleyard but also to breeding and rearing.

2. Satisfactory probationers will be confirmed at the end of four years of service.

3. Men specially selected will undergo further examination and if deemed fit will be promoted as managers as vacancies occur. These will start on Rs. 200 (after their sixth year of service) and will be placed on a grade Rs. 200-30/2-500 with efficiency bars at Rs. 290 and Rs. 410.

4. For purposes of leave, pension, and allowances these will be subject to Civil Service Regulations.

Applications will be received and considered by the nearest Assistant Controller of Military Farms.

I Circle	...	Rawalpindi.
II "	...	Kasauli.
III "	...	Poona.

Editor.

Agricultural College Boy Scouts Association.

The Annual Meeting of the Association was held during the month.

The Secretary's report which was full and instructive was read and adopted. We learn that the number of members on the rolls on the last day of the year was 20 and we wish to associate ourselves with the appeal made for greater interest and enlarged membership.

It is gratifying to note that discipline was well maintained, that physical exercise formed almost a daily routine with the scouts and that they spent a few days in camping out in places in the neighbourhood.

Their desire to own a building for themselves prompted them to seek the stage for contributions. A drama was enacted and over Rs. 500 were collected.

The young friends with the laudable object of doing good to the suffering Malabar victims collected rice, clothing and money and sent them to the Relief Committee.

The Ramakrishna Home at Mylapore was also not forgotten, on behalf of which they devoted a special day and collected Rs. 47.

The scouts in addition attended the Scout Rally at Madras on the occasion of the memorable visit of His Royal Highness, the Prince of Wales.

At the meeting, office bearers for the year were elected, and we are glad to learn our Resident Vice-President, Mr. C. Tadulinga Mudaliar, was unanimously elected President. The Executive Committee was enlarged and the present strength is 11 besides the Secretary and President.

The financial statement is shown below:—

Receipts.		Charges.	
	Rs. A. P.		Rs. A. P.
By Subscriptions from members	50 4 0	To books and Journals	19 13 0
By advances from		To Scouting materials	7 8 3
Messrs. Rao Sahibs		To Athletic materials	4 8 0
T. S. Venkataraman		To Investiture expenses	0 14 0
and M. R. Ramaswami Sivan	25 0 0	To advances repaid to Messrs. T. S. Venkataraman and M. R. Ramaswami Sivan	25 0 0
By payments for Scouts' Uniforms	200 4 0	To cost of Scouts' uniforms	217 8 6
By net proceeds of the Drama "Dhruvan"	466 5 4		
By interest on drama Collections	5 5 8	Invested as Fixed deposit in Dt. Urban Bank, Coimbatore	466 5 4
		Cash on hand	5 9 11
	747 3 0		747 3 0

We congratulate the retiring Committee on the splendid work which stands to their credit and hope such members as are out will help the new committee with their experience.

Editorial Notes.

Mr. H. C. Sampson, C. I. E., B. Sc.

Mr. Sampson handed over charge of the office of the Director of Agriculture on the 7th instant and left on leave for one year, four months and sixteen days, (it is understood, preparatory to retirement from the Indian Agricultural Service). He took his B. Sc., in Agriculture went to Transvaal in South Africa and was in charge of Seed and Plant introduction work. Son of a Public Works Department Under Secretary in India, he was attracted to this country and the Government of Sir Arthur Lawley, who had known him personally while Governor of Transvaal, found little difficulty in appointing him Agricultural Expert to the Court of Wards, with control over Pittapuram, Sivagiri, and Kavalappara Farms, to succeed Mr. P. V. Subbiah, a distinguished diplomat of the Saidapet College who had made his mark as an original agricultural investigator in the United Provinces. With the expansion of the local agricultural department, Mr. Sampson was drafted into the regular line as Dy. Director of Agriculture, Southern Division, which then comprised all the Tamil and West Coast Districts. It was during his term of office that the Sub-station at Palur, the four coconut stations in Malabar and Kanara and the Farms at Gudiyatham and Anamalai were opened and the work of cotton improvement and of the popularisation of Ceded Districts implements in Tinnevely, which Mr. C. K. Subba Rao, had started at Koilpatti, were pushed through to very great advantage. A shrewd and practical worker, he noticed the trade depression on the West Coast in '15 and with the object of counter-acting the serious effects thereof,

he brought to the notice of the Government and the South Indian ryot the benefits accruing from the utilization of fish manure which was then being largely exported to the detriment of local agriculture. He was on special duty in connexion with Cattle Survey in the Madras Presidency and his recommendations led the Government to create the post of the Deputy Director of Agriculture for Live Stock and to open the Cattle Farm at Chintaldevi. Mr. Sampson was a familiar figure at the Board of Agriculture Meetings and always expressed strong views as to the economic loss to India occasioned by the export of bones and oil cakes out of the country. He was mainly responsible in passing a resolution at the Poona meeting as to the necessity of conserving the natural manurial deposits for the benefit of this country. A man of few words, but of great firmness of mind, and independence of judgment, he made a strong though sympathetic officer and we believe many men in the Madras Agricultural Department have reasons to be grateful to him. It is unfortunate that domestic reasons should have compelled him to leave India so prematurely and in his departure the department suffers the loss of an experienced officer that knew the Province intimately, at a time when it can ill afford to lose him. We wish him, however, God-speed and every success in his new sphere of activities in Nyassaland, which we understand has the honour of having secured his services.

Mr. R. D. Anstead M. A.

We take this opportunity of congratulating Mr. Anstead till now Deputy Director of Agriculture, Planting Districts, on his being appointed to officiate as Director of Agriculture, in place of Mr. Sampson. It is rather unfortunate that the Madras Agricultural Department should have seen such a frequent change of Directors ever since March 1919. Messrs. Stuart, Wood, and Swamikannu Pillai, Mr. Stuart again, then Messrs. Hilson, Sampson and Anstead, all in the course of a little over three years, are changes enough. Such a rapid succession of personnel precludes

a continuation of policy and acts against the possibility of formulating and guiding the development of the Department along definite lines. We trust and hope that Mr. Anstead will be given opportunities of guiding the activities of the Department sufficiently long to enable him to make his mark as Director.

Vice-Chancellor's Visit.

The Hon'ble Mr. K. Srinivasa Ayyangar, Member of His Excellency's Executive Council and Vice-Chancellor of the Madras University, paid a visit to the College for a few hours on 5th August, when he discussed with the Principal and some Professors, several points relating to the recent affiliation of the College to the University and the feasibility of converting the present certificate course into an Intermediate course in Agriculture, as a preparatory one for B. Sc., Ag., degree.

Agricultural News.

The "last number" of the "Agricultural News"—A Fortnightly Journal—issued by the Imperial Department of Agriculture, West Indies, was published on March 18th, 1922 and it is indeed sad to think that this most useful periodical has by now really ceased to exist. This journal came into existence on April 25, 1902 and had since then been appearing regularly every fortnight, disseminating at a nominal charge reliable information regarding agriculture in West Indies and the Tropics in general. Though intended for the West Indian public in particular, it received a wide circulation throughout the world and it is to be regretted that the world-wide vortex of retrenchment created by the great war everywhere is the actual cause of its stoppage. We are informed that the periodical has hopes of re-incarnating itself again after a few years as the organ of the West Indian Agricultural College to be opened shortly in October this year and we would wish her a speedy rebirth.

The late Mr. Vengail K. Krishnan Nayanar.

We learnt with great sorrow of the sudden and untimely death of Mr. Vengail Kunhi Krishnan Nayanar at Payyanur on 3rd August. The late Mr. Nayanar joined the college in the year 1910 as a student, out of a genuine love for agriculture, at the fairly advanced age of 40 and displayed great enthusiasm in his work, especially in the practical portion of it, putting even many a younger student to shame in ploughing and field operations. On returning from the College after two years, he lost his distinguished brother, the Hon'ble Mr. Vengail Kunhi Raman Nayanar who was an old Saidapet student, and succeeded him as Karnavan (or head) of the Tarwad (family). Mr Krishnan Nayanar, like his brother, was one of the very few students of the Agricultural College, Saidapet or Coimbatore, directly and actively engaged in practical farming after leaving college and he kept himself in close touch with whatever was going on at the College and Research Institute in a number of ways.

He was a prominent member of the Madras Agricultural Students' Union of which he was a Patron and several times Vice-President. He rarely missed any College day all these years and contributed largely to the success of the College Day and Agricultural Conference by reading papers and taking part in discussions. He instituted the Vengail Nayanar cup for the best athletic champion of the year at the College sports and, at one of the Conferences presided over by His Excellency Lord Pentland, he announced an endowment of Rs. 2000 for founding a scholarship for the student of Malabar from the certificate course who showed greatest proficiency in practical agriculture.

He was an Honorary visitor of the college for several years and was probably unique in that character by reason of the large number of visits paid to this institution and by the keenness displayed in his work. As a mark of respect to his memory, the

Principal had the flag hoisted half-mast, as soon as the sad news of his death reached the college. He took an active part in all that pertained to the welfare of Malabar and was highly esteemed both by Government and the public, as he was a *Jenmi* of the right sort, who wielded enormous influence, especially in North Malabar, and but was at the same time full of sympathy and consideration to his numerous tenants. As a member of the District Board of Malabar, as an elected President of the Taluk Board of Chirakkal, and as a prominent member of the Committees and Associations, appointed by Government or organised by the people, he did a lot of good to the country in his unostentatious way. A man of ideas, he largely carried his ideas into practice. His native town of Payyanur is indebted to him for its popular hospital and school. Himself of very simple habits, he was free with his purse for the public good, though ever so careful in his business affairs.

The Madras Agricultural Students' Union especially regrets his untimely death as he was a benefactor of the Union and a co-worker with so many of its members all the time. May his soul rest in peace! We beg to offer our heartfelt condolences to the members of the family.

Departmental Notes.

Appointments and Transfers:—

1. Mr. Rudolph David Anstead, Deputy Director of Agriculture, Planting Districts to act as Director of Agriculture as a temporary measure, vice Mr. H. O. Sampson granted leave or until further orders.
2. Mr. Donald George Munro, Superintendent, Central Farm, to act as Dy. Director of Agriculture, Planting Districts. He will hold additional charge of the office of the Superintendent Central Farm until relieved.
3. Mr. C. L. Berg, Assistant Executive Engineer (under training), Public Works Department to act as Government Agricultural Engineer in the Agri-Department vice Mr. F. T. T. Newland, granted leave or until further orders.

4. Mr. K. Unnikrishna Menon, Acting Assistant Director of Agriculture VI Circle, Madras, to do the duties of the Superintendent, Central Farm, and continue to officiate in the Madras Agricultural Service, to hand over charge in the VI Circle to Mr. Saadat-ul-lah Khan, probationary Dy. Director of Agriculture and join duty at the Central Farm forthwith.

5. Mr. K. T. Alwa, Officiating Deputy Director of Agriculture, VII Circle, to be Assistant Director of Agriculture VI Circle, on relief in the VII Circle by Mr. M. Govinda Kidavu.

6. Mr. A. Ramaswami Ayyar, Officiating Farm Manager, V grade, transferred to the Cotton Breeding Station at Coimbatore.

7. Mr. S. Venkataramana Ayyar, lower subordinate, from V Circle to IV circle to join duty at the Palur Agri. Station expeditiously.

8. Mr. K. Soopi Haji, Assistant Farm Manager, Taliparamba, to Sim's Park, Coonoor.

9. Mr. C. Subba Rao, Assistant Farm Manager, from Chintaldevi to VI Circle.

10. Mr. K. Krishna Rao, a certificate holder to the IV Circle, later posted to Ongole Cattle Farm, Chintaldevi.

11. Mr. C. L. Srinivasa Rao—to the Govt. Agri. Bacteriologist's Section.

12. Mr. N. R. Rajagopalayyar, to the VIII Circle.

13. Mr. P. Sathyanarayana to the II Circle.

14. Mr. S. Rajarathna Mudaliar, to the Govt. Mycologist's section.

15. Mr. P. A. Kunhiraman Nambiar to the VII Circle.

16. Mr. T. J. Chinnayya to Sim's Park, Coonoor.

17. P. Zachariah to the II Circle.

18. M. Ramamurti to the I Circle.

19. M. J. Sadasiva Reddi to the IV Circle.

20. K. Krishna Hegde to the Potato Farm, Nanjanad.

21. J. Samuel Clement Anthony to the V Circle.

22. K. Prasada Rao to the V Circle.

23. Mr. Nagu Narayana Ayyar, certificate holder, appointed lower subordinate V grade, Agri. Section and posted to the Central Farm Coimbatore.

24. Mr. Mantha Suryanarayana, B. Sc., appointed to the temporary post of Assistant, IV Grade, to report himself to the Govt. Agri. Chemist, Coimbatore.

Leave:—

1. Mr. H. C. Sampson, C. I. E., B. Sc., Acting Director of Agriculture combined leave for one year, four months and 16 days from the 7th August 1922.
2. Mr. T. V. Ramakrishna Aiyar, Teaching and Systematic Assistant to the Govt. Entomologist, leave for two months from or after 14th August 1922.
3. Mr. S. R. Venkatakrishna Mudaliar, Assistant Mycologist, leave on average pay for four months and leave on half average pay for four months in continuation thereof from the date of relief.
4. Mr. P. Susainathan, Assistant in Entomology, leave on average pay for three months from 5th September 1922.
5. Mr. K. Ramachandra Ayyar, Farm Mechanic, leave on average salary for one month.
6. Mr. A. Ramaswami Ayyar, Farm Manager, extension of leave by one month.
7. Mr. C. Rangaswami Ayyangar, Sub Assistant in Mycology, extension of leave by four weeks and again by one day.
8. Sankarakumar Pillai, leave on average pay for three weeks from 18th August 1922.
9. Mr. Alwar Ayyangar, Artist to the Govt. Economic Botanist, leave on average pay for 23 days from 28th August.
10. Mr. O. Tadulinga Mudaliar, Assistant Govt. Lecturing Botanist, extension of leave on average pay for two months from the 22nd August 1922.

NOTICE.

The address of the following members of the Union are wanted. Will members who happen to know the addresses of any of these kindly communicate to the Secretary, Madras Agricultural Students' Union and oblige?

Reg. No.	Date of entry.	Name.
16	11 7 11	G. Krishna Nayar
14	11 7 11	N. Sivarama Krishnayya
31	11 7 11	P. K. Atchan
40	6 8 11	K. Vaidyanatha Ayyar, Dindigal.

48	18 1 11	K. V. Krishnaswami Ayyar
54	15 1 11	R. Venkataraniyah, Nellore
60	28 3 12	A. S. Pandyan, Tanjore
61	31 12 19	S. Krishna Nayar
70	1 4 12	L. Raghupathi Sarma
74	17 5 12	R. Sriramulu, Guntur
79	9 6 12	R. Subrahmanyam
83	4 7 12	R. Rajagopal Naidu
89	7 7 12	K. Palaniyandi Pillai
103	8 7 12	A. R. Chandrasekhara Mudaliar
105	11 7 12	K. P. Sundaram Ayyar
107	21 7 12	B. Adinarayana Chetti
108	21 7 12	T. R. Ranganath
109	1 8 12	V. Vijaya Raghavachari
117	1 8 12	S. Raghava Ayyangar
124	17 2 13	S. Anantharama Sastri
131	12 4 13	V. S. Subramania Sastri
136	15 6 13	C. Ranga Reddi
142	15 6 15	M. Vridhachalam Pillai
143	4 7 13	P. R. Tiruvenkatachari
145	4 7 13	K. Subba Kao
146	4 7 13	R. Jeevandas
147	4 7 13	K. Sundaram Ayyar
155	10 7 12	C. R. Annaswami Ayyar
172	12 7 14	U. Venkatachalam
179	12 7 14	Ahmed Hussain
188	12 7 14	K. Krishnaswami Pillai
196	12 7 14	S. Vedantam Ayyangar
198	12 7 14	S. Subramanyam
199	12 7 14	R. Govinda Ayyangar
200	12 7 14	K. Govinda Poi
203	12 7 14	A. Rajapandia Nadar
204	12 7 14	K. S. Paramanayagam Asari

205	12	7	14	B. K. Parthasarathi
209	12	7	14	K. Ramaswami Goundar
218	12	7	14	Aunaswami Tavar of Ukkadi
227	14	8	14	Kochu Govinda Nayar
236	1	7	15	T. S. Sambasiva Ayyar
238	3	7	15	B. V. Narayana Row
239	27	1	13	C. Bhaskara Ayyar
240	15	6	15	S. Venkatanarasimhan
241	15	7	15	A. K. Krishnan
250	20	6	15	Rao Satyanarayana
252	23	6	15	P. R. Gopalakrishna Ayyar
269	24	7	15	C. B. Appayya
272	11	5	19	S. Sankara Ayyar
282	9	7	16	P. Nallakumar Pillai
289	2	7	16	M. A. Sambasivan
295	2	7	16	C. M. Ranga Reddi
296	2	7	16	M. V. Sitharamaswami
302	2	7	16	V. R. Subramanya Pillai
306	2	7	16	K. Mahabala Rao
310	2	7	16	B. Satyanarayana
341	21	10	17	B. L. Narasimha Ayyar
342	14	11	17	M. R. Krishnan
355	11	8	18	R. Ramachar
357	14	8	18	P. S. Paramesvara Ayyar, Tanjore.
358	18	8	18	M. R. Srinivasa Panikar
360	18	8	18	V. Venkatadri
362	22	10	18	M. K. Reddi
388	28	12	18	G. Alagirisami Reddi
457	3	11	19	J. Narayanamurthi

B. Viswanath,
General Secretary, M. A. S. Union.

Is the Journal properly addressed to you?
If not, send in your correct address.

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Vol. X.

September, 1922.

No. 9.

New Names for Old Plants.

P. S. JIVANNA RAO, M. A.

It may not perhaps be generally known to readers of this journal that a Flora of the Presidency of Madras is now in course of preparation in England by Mr. J. S. Gamble, C. I. E., F. R. S., a retired officer of the Indian Forest Department. This work, which is based on material supplied from the Herbarium at Coimbatore, was begun about ten years ago and four parts have already been issued which roughly include about half the number of Natural Orders of Flowering plants.

The Flora will be indispensable to all lovers of plants, as it contains information on several points concerning the distribution of plants in the Presidency, their occurrence at different altitudes, their vernacular names and also details regarding their habit, flowering etc. A careful revision of the genera and natural orders according to the new concepts of Systematic Botany has involved the alteration of scientific names in several cases. This is due either to revival of names which had become obsolete or to plants that were previously considered as belonging to the same species or genera being separated into distinct species in the light of recent knowledge.

Below is given a list of the commoner weeds and other plants that have suffered this alteration in names. It is to be hoped that agriculturists and others interested in plants will, in future, strictly adopt the new names in preference to the old ones.

Old Name.	New Name.	Natural Order	Common Name.	Remarks.
<i>Nymphaea lotus</i>	<i>Nymphaea pubescens</i>	Nymphaeaceae	Water lily	Water plant
<i>Melia azadirachta</i>	<i>Asadirachta indica</i>	Meliaceae	Margosa, Nim	Type
<i>Vitis quadrangularis</i>	<i>Cissus quadrangularis</i>	Vitaceae	Perandai	Oleander
<i>Moringa pterygosperma</i>	<i>Moringa oleifera</i>	Moringaceae	Horse-radish, Drumstick	Tree
<i>Cyanopsis pectinoides</i>	<i>Cyanopsis tetragonoloba</i>	Leguminosae	Cluster-bean	Vegetable & fodder
<i>Tephrosia purpurea</i> & varieties	<i>Tephrosia purpurea</i>	do	Kolinji, Wild Indigo	Wood, Green manure
	<i>T. maxima</i>			
	<i>T. lanceolata</i>			
	<i>T. procumbens</i>			
<i>Cassipouia Bonducella</i>	<i>Cassipouia crista</i>	do	Gajakai	Near coast
<i>Poinciana regia</i>	<i>Delonix regia</i>	do	Gul Mohr	Avenue tree
<i>Cassia obovata</i>	<i>Cassia obtusa</i>	do	do	Substitute for sesna
<i>Pithecolobium Saman</i>	<i>Enterolobium Saman</i>	do	Rain tree	Avenue tree
<i>Eugenia Jamboua</i>	<i>Jamboua vulgaris</i>	Myrtaceae	Rose-apple, Gulab-jamun	Tree
<i>Eugenia Jambolana</i>	<i>Syzygium Jambolanaum</i>	do	Nagamaram	Tree
<i>Ammania Rotala</i>	<i>Rotala verticillaria</i>	Lythraceae	do	Rice fields
<i>Ammania pentandra</i> & varieties	<i>Rotala leptopetala</i>	do	Neermel-neruppa (Tamil)	do
	<i>Rotala densiflora</i>			
	<i>B. illecebroides</i>			
	<i>B. fimbriata</i>			
<i>Ammania rotundifolia</i>	<i>B. rotundifolia</i>	do	do	do
<i>Ammania salicifolia</i>	<i>Ammania baccifera</i> , var. <i>egyptiaca</i>	do	Henna	Hedge plant & in gardens
<i>Lawsonia alba</i>	<i>Lawsonia inermis</i>	do	Kovey	In bushes
<i>Cephaelandra indica</i>	<i>Cordia indica</i>	Cucurbitaceae	do	Sometimes in bushes
<i>Mukia scabrella</i>	<i>Melothria underaspatana</i>	do	do	do
<i>Ceanothus garcinii</i>	<i>Hastanthe Garcini</i>	do	do	do
<i>Trianthema monogyna</i>	<i>Trianthema Portulacastrum</i>	Aizoaceae (Ficoides of old)	Saranai	A bad weed
<i>Trianthema crystallina</i>	<i>T. triquetra</i>	do	do	Weed in waste lands
	<i>T. triquetra</i> var. <i>oblongifolia</i>			
<i>Mollugo hirta</i>	<i>T. triquetra</i> var. <i>oblongifolia</i>	do	do	Weed of sandy soils and waste places
<i>Hydrocotyle asiatica</i>	<i>Mollugo latifolia</i>	Umbelliferae	Indian penny-wort	Weed in paddy lands Val.
<i>Alangium lamarkii</i>	<i>Centella asiatica</i>	do	Alungi	Tree [lati (Tamil)]
<i>Spermacoce himala</i>	<i>Alangium ambrosioides</i>	Alangiaceae (Cornaceae of old)	Nattai-churi	Red soil weed
<i>Vicia articulata</i>	<i>Borreria hispida</i>	Rubiaceae	do	Weed
<i>Blainvillea latifolia</i>	<i>Vicia indica</i>	do	do	In sandy places
<i>Glossocarpia linearifolia</i>	<i>Blainvillea rhomboides</i>	do	do	do
<i>Lactuca Heyneana</i>	<i>Glossocarpia linearifolia</i>	Compositae	do	Common weed in waste lands
	<i>Lactuca runcinata</i>	do	do	do

(To be continued later.)

Extracts.

Only Right Methods of Spraying pay.

Speaking about diseases, the author of this report says, "There is still a disappointing lack of common knowledge amongst growers of the results obtained and often something of a sceptical acceptance of the remedies suggested. This is partly due to the lack of appreciation on the part of the practical man as to the real value of the life-history of a disease. He is apt half-jokingly to upbraid science for telling him all about what the insect or fungus does without suggesting some showy and immediate cure. It is irritating to be told merely to cut out and burn all affected parts, especially when one has been hoping for some newly invented spray that will prove a panacea. But if the grower would only trouble to listen a little more to what the life-history revealed, he might realise that in the end it would have been more practical and more saving of money to hand-pick, or cut out and burn, than to waste thousands of gallons on experimental washing which may be practically and perhaps utterly ineffective."

With reference to spraying the author says "In order to be successful, all the knowledge of the grower and all the intelligence of the operators should be brought into play during spraying operations. Though a great deal of spraying is well done, a very great deal more is badly done, and not only is it sheer waste of time and money, but it brings good remedies into disrepute. This is partly the fault of those people who exist in all industries, and who claim to provide the panacea for all ills. There is no such panacea, nor is there likely to be. Diseases and pests are so diverse in their nature and methods of attack that even if a universal chemical or compound could be found to satisfy all insecticidal and fungicidal requirements, it would prove unsatisfactory. One pest requires the application of the spray as a thin film over the leaf, another needs direct force and actual hitting involving almost a clench. The different times and seasons of attack, the different positions of the enemy, render the quest for a panacea futile. To get good results, the grower must first consider what he is actually spraying for, then, when is the best time to spray for that

purpose, and finally, what is the most suitable method of application. It is here that a knowledge of life-histories is again invaluable to him. There is always a best moment to attack the enemy, if that moment is lost it is sometimes better not to attack it at all. One spraying at the right time is not only more effective as a killing or preventive agent, but is more economical. It will save several partially futile later attempts. There is always a best method of application. The mere adjustment of a nozzle from fine to coarse, or from upwards to downwards may make all the difference. People have been seen to waste gallons of fluid in spraying the upper surface of leaves when both surfaces needed a coating."

Extracted from a report on "Practical Fruit-growing" —Vol. 82 Journal of the Roy. Agri. Soc. of England—1921.

The Planters' Chronicle, Vol. XVII, No. 32, 12th August 1922.
Y. R. R.

Notes and Gleanings.

Weather conditions and plant diseases. That crops are not damaged by fungus diseases to the same extent in a number of years is a fact known to all. In some years the disease appears in an epidemic form and in certain years it is light or does not appear at all. This is well illustrated in the case of the Paddy Blast disease in Tanjore District. It did enormous damage in one year and was practically absent in the succeeding years. One is thus led to believe that there is some relationship existing between the occurrence of plant diseases "especially of wide spread epidemics and meteorological conditions." This aspect of the plant protection problem has been taken up by Germany where a laboratory has been founded for Meteorology and Phenology in Berlin.

The chief aims of this phenological service are (i) to help towards finding out a correlation between plant diseases and weather conditions and (ii) to determine the combined action of soil and climate on the plant. A regular observation of all known pests—at first taking

up only the most wide spread and best known—is to be organised. This may lead to the discovery of a possible connexion between some meteorological phenomena and the severity of the disease. This may surely in its turn lead to some new and more secure methods of controlling the disease. In course of time, as definite standards of information regarding the inter-dependence of plant diseases and climatic conditions may be obtained. This will be of immense use to the plant pathologist.

That the soil has an influence on plant diseases is a well-known fact, especially in regard to those caused by the soil fungi. But with the aid of phenological observations the combined effect of the soil and climate on plant diseases may be found out. For instance, it is said that potatoes grown on a light soil during a rainy and warm summer do very well, while those grown on a heavy soil suffer badly from a 'tuber-rot' under the same weather conditions.

Thus the value of the definite observations of the weather conditions at the time of the out-break and during the progress of a disease is emphasised and good service will be rendered by those interested in plant protection if only they record the weather conditions prevailing at the time of the disease.

(Zeitschr. für Pflanzenkrankh. XXXI. 3—4 P. 81—89 (1921).

From the Review of Applied Mycology, Vol. I Pt. 3, March '22.

The varied uses of molasses. Molasses, when mixed with lime, has the property of forming a compound that is as hard as cement. Very good roads have been built with molasses as a base.

In casting iron or bronze, molasses is the best medium to utilize in the moulding sand to make it plastic.

In Australia, railroad ties are frequently impregnated with molasses in place of creosote for preserving the wood.

A new motor fuel has been developed from molasses as the principal raw material.

Much of the vinegar is made from molasses and almost all the yeast used by bakers.

In Italy, Germany, France and Switzerland and other countries of Europe, millions of gallons of molasses are used annually for making coffee essence, which is a combination of burnt molasses and chickory.

Molasses, in combination with grain, makes an ideal food for cattle and horses. Molasses contains many natural salts, as well as organic matter, which are particularly beneficial to cattle. Farmers will perhaps be interested to know that Clover, the 51 years old horse, has been fed on a mixture of bran, oats and molasses for many years, and some veterinaries attribute the horse's longevity to the constant use of molasses.

Molasses is a natural food. Our bodies require carbohydrates, which have the energy and heat-producing elements. Sugar is the most efficient carbohydrate known, but the excessive use of sugar will impair the health, as we cannot assimilate it in large quantities. On the other hand, the natural sugar in molasses is taken by the body without any undue strain and it can be used in practically any quantity. Bread and molasses is an ideal method of supplying the needs of children. Besides the food value, molasses has other valuable properties that tend to help a growing youngster.

Louisiana Planter, July 1, 1922.

Y. R. R.

Cane diseases in the Philippines. Besides the sugarcane smut, the Fiji disease and the Mosaic disease are recorded.

The Fiji disease was first noted in 1910 in Fiji, but was later found in Australia and New Guinea and it is probable that the latter is the original home of the disease. The disease is indicated by the development of elongated galls resembling eruptions on the leaves and causes a stunting of the stools and the formation of a bunching at the tip of canes. It is believed to be caused by a fungus resembling *Plasmodiophora brassicae* and is transmitted not only by setts but also presumably aorally.

It is a devastating disease capable of causing total loss.

The mosaic disease was first described from Java about 15 or 20 years ago. It is now known from Hawaii, Philippines, Argentine, Fiji, Australia, New Guinea, Cuba, Egypt and Louisiana.

This disease is recognised by the presence of a pattern or mottling of yellow or pale green blotches or streaks distributed throughout the normal green of the leaves.

The disease can be transmitted from plant to plant by insect agency such as plantlice (Aphis) and also by the use of diseased setts. The infectious agent has not yet been discovered though it is certain such an organism exists.

The effect is to lessen the growth of the cane: the cane is killed outright only in very rare cases.

Some canes have been found to be immune to this disease.

(India should beware of introducing these two diseases which are at present non-existent in this country.)

Philippine Agricultural Review 1921. Vol. XIV No. 4.

Y. R. R.

Alcohol from prickly pear. Natural alcoholic fermentation was studied in the untreated pulp of *Opuntia vulgaris* and *Opuntia amygdalacea*. Fermentation was unsatisfactory owing to the developments of several organisms injurious to the process. Boiled pulp or pulp with .03 per cent of potassium metabisulphite added to it and then inoculated with yeast yielded good liquor with high alcohol content. Best results were obtained when the bisulphite was employed and the material utilised in fermentation was ascertained to be glucoside sugar, and not reducing sugar such as is contained in the fruit. Pulp treated with the bisulphite appears to give better produce than boiled pulp, as in the latter case boiling interferes with enzymatic changes of the mature fruit.

(Extracted from Botanical abstracts, Vol. X, 2, 856.) P. S. J.

The value of cheese as a food. Dr. Bishop, a well known New York specialist on diseases of the heart, in a book he has just written, cannot emphasize enough the wonderful power of cheese as an item in the

diet of human beings. It is of the utmost importance, he says, in combating diseases of the heart and preventing a subsequent breakdown of the body. What cheese does not contain for the necessary nourishment of the body is supplied by bread, so that a cheese sandwich represents everything required by the human frame to keep it in health and strength.

Professor Sokol in his book, 'Nutrition,' writes: "One pound of cheese contains as much nourishment as 1½ lbs. of lean meat; and 6 oz of cheese with 24 oz. of bread will supply all the food nutrients required in twenty-four hours by an average grown up individual."

"Although cheese is probably the oldest of the dairy products, and has been a staple food with many races for countless years, the tendency has somehow got about to regard it as suitable for use only in small quantities. Cheese and bread form part of the midday meal of our hardest workers, and they can testify to its power of nourishment and its ability to build up bone and muscle."

Journal of Agriculture, Victoria, July 1922.

Agricultural Research in Great Britain. The Ministry has concentrated research at definite institutions; Rothamsted is concerned with plant nutrition, soil problems, and plant pathology; Cambridge has entrusted to it plant and animal breeding, and animal nutrition; Long Ashton, a branch of the University of Bristol, deals with fruit growing and preserving; plant physiology is dealt with at the research institute attached to the Imperial College of Science; dairying at Reading; animal pathology at the Royal Veterinary College; agricultural zoology at Birmingham; helminthology at the London School of Tropical Medicine; agricultural economics in Oxford; plant breeding, with particular reference to Wales, at Aberystwyth; fruit growing and hops at East Malling; and nursery and market gardening at Cheshnut. Besides these research institutes and stations the Ministry has set up a system of advisory centres from which information in respect of specific subjects is disseminated by advisory officers who also, in many cases, undertake a certain amount of research.

Nature, dated July 15, 1922.

Bran and Pollard. Dr. W. Hargreaves—Director of Chemistry, South Australia—to whom the problem of preventing the adulteration of "Bran" and "Pollard" had been referred, writes in the course of his report as follows—"Both 'bran' and 'pollard' are by-products discarded during the manufacture of flour: and in good samples—usually used as food material for stock and fowls—the food value is much higher than that of flour, for the protein content is higher than 14%, while that of flour is only 7½%. As a rule however commercial 'bran' and 'pollard' are not the pure material, but are prepared from inferior grain generally weevilled and often mouldy: and as they are of such varying composition, it is difficult either to define them or to legislate against adulteration."

He however remarks "If wheat were properly milled there would be no bran and pollard, for the constituents of the wheat grain which are taken out and rejected as bran and pollard during the manufacture of flour are those very ingredients which are most necessary for human consumption. Already there are evidences of a world-wide awakening to the seriousness of the drawbacks of the present methods of milling wheat, and as an illustration it may be mentioned that the largest baking company in the world, the Ward Baking Company of New York, has this year given up the use of white flour entirely and adopted what the company terms "100% whole wheat flour." As this company produces about 100 tons of bread per day, and has about 17,000 distributing agencies, it will be evident it is actuated by no mere fad."

Journal of Agriculture, South Australia, July 1922. Y. R. R.

Chara—a water-weed as mosquito-destroyer. Caballero (A) Nuevos Datos respecto de la Accion de las Chara en las Larvas de los Mosquitos.—Bol. R. Sec. Espanola Hist. Nat., Madrid, xiii, no. 1—2, January—February 1922, pp. 61—64.

It has been shown in previous papers (R. A. E., B. viii, 6r; X, 108) that plants of the genus *Chara* produce some toxic matter that is fatal to mosquito larvae. Further experiments in this connection are here described, and demonstrate that this substance, which is

soluble in water, is not accumulated in the living cells of the alga, but that it is present in water in which *C. fatida* has lived. It is therefore logical to conclude that the poison is an excretion of the plant, water in which *Chara* spp. have lived being as potent a larvicide as the plant itself. The author has made frequent surveys of the malarial district about the mouth of the River Llobregat, and has found more than 300 pieces of water, such as pools, canals drains etc. in which *Chara* spp. are present, and in none of these was any trace of either *Culex* or *Anopheles* found. On the other hand, practically every stretch of water where *Chara* did not occur harboured these mosquitos.

The Review of Applied Entomology, Vol. X. Part 7, pp. 133—148 July 1922.
Y. R. R.

Adhesive from Castor Bean. The committee on Adhesive Research in England has, it appears, just announced that the castor bean after it has been freed from its oil content can be used for the manufacture of a good grade of adhesive which finds use in the preparation of plastics, in dyeing etc.

From the Scientific American, August 1922.
C. S. G.

Efwatakala Grass—Melinis minutiflora. This is a pasture grass found common in Africa from the South of the Sahara to Natal and is extensively cultivated as a pasture grass in South America. It is common in Angola both in the low country and on the plateau lands, but is most common at an elevation of between 2000 feet and 3000 feet above sea level. It is a fine pasture grass liked by cattle, grows well both in moist and in dry areas and forms a thick matting on the ground, but is most remarkable by reason of its insecticidal properties. The leaves are covered with glandular hairs carrying a viscid oil, which is believed to be repellent to insect life. Pasture grounds covered with this grass are always free from the dreaded Tsetse Fly and it is proposed to replace bushy land with pastures of this grass and thus get rid of the Fly. In South America, pastures of this grass are noticed to be free from ticks.

In addition this grass is said to be proof against fires and leaves of this grass placed in wine are reported to prevent fermentation.

Tropical Life, May 1922.

Y. R. R.

Emil Fischer—A Master Chemist.—Mr. E. F. Armsby has reviewed in Nature of 22nd July 1922 the "Life of the eminent German Chemist, Emil Fischer, by Bergmann, and calls the biographical account—a monument to the Master Chemist.

Emil Fischer won his fame chiefly in connection with the synthesis of various inorganic substances, chiefly of the sugars. Sugars were his first love and while doing this work he contracted a chronic illness caused by Phenylhydrazine. He was able to build up glucose by synthesis and also certain complex sugars (disaccharides) but his chief ambition was the synthesis of cane-sugar, which is yet unaccomplished. He is also well-known in connection with his work on Enzymes.

In connection with his greatness, Mr. Armsby says "it is an accepted fact in art and literature that, apart from the vagaries of fashion, only a future generation can properly assess the ultimate fame of Artist or Author.—A future generation alone can decide whether Fischer should not be regarded as the greatest Organic Chemist the world has ever known."

Nature, July 1922.

Y. R. R.

West Indian Agricultural College. The West Indian Agricultural College will be opened in October next, in temporary accommodation which has been acquired at St. Augustine, Trinidad. The College will aim at providing a three years' diploma course in Tropical Agriculture for those desirous of following the business of Tropical planting, and a shorter course for those unable to take the full course; there will also be facilities for research. Sir Francis Watt will combine the duties of the Principal of the College and Commissioner of the Imperial Department of Agriculture, which has been amalgamated with the College.

Nature, 22nd July 1922.

GOVERNMENT OF INDIA NOTIFICATION.

List of Prohibited Importations.

(Abstracted from the Gazette.)

1. No plants shall be imported into India by post with the exception of sugarcane by the Government Sugarcane Expert. None by sea (except fruits and vegetables for consumption, potatoes and sugarcane)—without fumigation at a prescribed port.

2. Importation of potatoes is permitted subject to provisions against the introduction of the warty disease.

3. As regards sugarcane, importation is strictly prohibited from the Fiji Islands, New Guinea, Australia or the Philippine Islands: as to other countries, an official certificate as to freedom from borers, scales, root disease, pine-apple disease, serah, gummosis, Mosaic and Fiji diseases in the country of origin is necessary.

4. Rubber plants: importation allowed only if accompanied with certificates of freedom from the fungi—Fomes, Sphaerostilbe, and Fusicladium.

5. Coffee and Hevea rubber plants and seeds—importation prohibited from America except by Madras Agricultural Department.

6. Seeds of Coffee, flax, bersim and cotton not to be imported except under license by post or by sea. Cotton seeds shall not be imported except after fumigation with carbon bisulphide.

Y. R. R.

Final Forecast of the Jute crop, 1922.

Consolidated statement for Bengal, Bihar and Orissa, and Assam.

Area.—The estimated area for the three Provinces is 1,455,806 acres, a decrease of 62,552 acres on last year's figures.

Yield.—It is estimated that the crop will yield 4,236,828 bales of jute, an increase of 171,519 bales on last year's returns.

Remarks.—Last year's estimates for Assam have been revised by the local Department.

The consolidated figures are as follows:

Provinces.	Area in acres.			Yield in bales.		
	1921.	1922.	Difference	1921.	1922.	Difference.
Bengal (including Cochin Behar).	1,329,190	1,318,908	-110,282	3,605,991	3,577,784	-28,207
Bihar & Orissa.	108,868	148,998	+37,730	304,918	391,044	+86,126
Assam.	80,800	80,500	-300	154,400	269,000	+114,600
Total ...	1,518,858	1,548,406	+29,548	4,065,309	4,236,828	+171,519

* Revised.

† Including Nepal.

Estate News.

Ramayana Lantern slides. At 7 p. m. on the 2nd September, Mr. V. S. Arumuga Mudaliar of Bangalore kindly gave a Magic Lantern Exhibition of a series of slides representing various episodes of the Ramayana before a large audience composed mainly of children and ladies of the Estate. It was very interesting and instructive and was greatly appreciated. In addition, slides picturing various places in India and men of religious celebrity past and present were also shown and slides showing their Majesties, the King Emperor and the Queen, brought the show to an end.

Lawley Road Dispensary. Dr. Kalimi, who had been in charge of the Hospital for nearly a year, having, been transferred to Coimbatore Dr. Kunhiraman Nair has taken charge of the Dispensary.

Mr. T. Lakshmana Rao, B. A., Assistant to the Govt. Lecturing Chemist left Coimbatore by Mail on Wednesday the 13th September for Bombay enroute to England. He has taken combined leave for 25 months from September and proposes to undergo a course of training in Chemistry in England. As his departure was quite

sudden, there was no time to arrange a send-off at the club as was the desire of many, but there was just time enough for the Chemical Section to gather together and wish him good-bye. We wish him *bon voyage*, a successful time in England and a happy return to our midst.

Mr. S. R. Vencatakrishna Mudaliar, B. A., Assistant Mycologist has taken leave for eight months from September 14th and has joined the B. Sc. course, as a special student of the College, with the express object of picking up a general knowledge of the principles and practice of Agriculture, which is so important in ensuring success in the application of Science for practical agriculture. We wish him success in his endeavours and hope that the Mycological Section will have the full benefit of this knowledge.

Mr. K. Adinarayana Rao, L. Ag., who, left Coimbatore in April and who was to have proceeded to England as a Scholarship student for working at the problem of Industrial Alcohol, could not proceed to England as the authorities at home could not arrange for his studies and researches in England. We hear he was for some time at Bangalore working at that question at the Tata Institute. We are now informed that his training has been arranged for in England at Birmingham, and that he has already left Indian shores on the same boat as Mr. Lakshman Rao.

Scout Drama. In accordance with the request of some of the prominent citizens of Coimbatore, the Committee of the Agricultural College Boy Scouts' Association decided to put on the boards once again the Tamil Drama "Dhruva." Mr. Vincent, the Proprietor of the "Variety Hall" at Coimbatore, having kindly consented to place the theatre at the disposal of the Boy Scouts free of charge, the play "Dhruva" was staged on Sunday the 3rd September between 6-30 and 8-30 p. m. We are glad to state that in spite of a few unexpected happenings, the presentation proved as great a success as on the first occasion. There was however some change in the

dramatis personae. As far as possible all the bigger boys were replaced by younger ones, mostly drawn from the "Cubs". Thotadri acted as "Dhruva" throughout, T. R. Krishnan as "Narada," Subrahmanyam as "Suruchi," Krishnaswami as "Suneethi," Rangavaradhan as "Maid," Kailasam as "Hangman," Subbaraman as "Maha Vishnu," Raghavan as "Maha Lakshmi," little Naranappa as "Uttaman," Senior Patrol leader, Srinivasalu as "King" and 'cub' Sriramula Nayudu as "Court-fool" and Narasinga Rao, Rangavaradhan, Rajam, Kittu, and Raghavan as "Dancers." While every one acted superbly—considering the age of the boys and various other circumstances,—special mention may be made, without doing injustice to the rest, of the excellent acting of "Dhruva," "Narada" and "Suruchi." The scenic arrangements were also very good, and the scene representing the appearance of "Maha Vishnu," seated on "Garuda", and the Durbar Scene were specially beautiful. The dance of the "Court Dancers", the training of whom was the special work of Mr. B. Viswapath, was splendid and was a notable addition to the first enactment. The thanks of the Ramakrishna Troop is specially due to Miss Janaki Ammal, Proprietor of a local Theatrical Troupe, for the kind loan of curtains and various scenic appurtenances on that day. Thanks are due to the Boy Scouts Associations of Coimbatore for help rendered in various ways to make the enactment a success. Mr. U. K. Wariar of Tiruvilwamala once again was responsible for the musical accompaniment. The Troop is indebted to the enlightened public of Coimbatore for their patronage on the occasion which resulted in a net collection of about Rs. 500. This sum, together with the proceeds of the first play about to Rs. 1,000 and will serve to help the troop to have a building of their own.

The Onam Day. The Malayalee residents of the two sister colleges of Agriculture and Forestry celebrated their national festival at the Students' Club of the Forest College on 4-9-1922 at 6-30 p. m. The refreshments at the Tea-party—which was private—consisted entirely of Malabar preparations and were served in the bungalow of Mr. E. K. Krishnan. The variety entertainment to

which both the staff and the students of the two colleges had been invited, began punctually at the notified hour, after a prayer in Malayalam. The imitation of Mr. Kulkarni by Mr. Anandhan was much appreciated by the audience. With Music during the intervals, three scenes were staged from "Indulekha" in which Mr. M. U. Vellodi showed excellent acting as the "Nambudiri,"—and the entertainment closed with the presentation of the "Moplah" by the same gentleman, which was so true to life both in dress and the enactment that it drew cheers from all quarters. The function finished with a vote of thanks to the visitors by Mr. T. V. Ramakrishna Ayyar.

One notable feature of the celebration was that people of all castes and creeds from Malabar voluntarily took part in it and made the function a success. The balance of collection of Rs. 15 nearly, was voted for the Malabar relief fund.

Students' Corner.

Mr. T. V. Ramakrishna Ayyar having resigned the Wardenship of the Hostel, Rao Sahib M. R. Ry. M. R. Ramaswami Sivan is doing the duties of the Warden with effect from the 8th September 1922.

The Grigg Memorial Sports, Coimbatore. These sports were held in the London Mission Compound on 16th September before an enthusiastic and even an unmanageable crowd of spectators, and were a great success. Judged by the aggregate number of marks, the local London Mission High School won the Senior challenge cup and the Stanes School the Junior cup. G. Srinivasalu of the London Mission High School was the Grigg Medalist of the year: our readers will recognise him as the senior patrol leader of the Ramakrishna Boy Scouts troop of the college. In the open events, our students, Balraj and Doraiswamy Ayyangar won the medals for 100 yards and one mile races respectively, and it is a pity that there were so few entries. All the medals had been executed at Coimbatore and they were very pretty indeed. Mrs. Campbell gave

away the cups and medals. The judges, had at least one knotty point to solve and great credit is due to the Honorary Secretary, Rev. Robertson, for a very successful Sports Day at Coimbatore.

Michaelmas Holidays. The College closed on the afternoon of the 15th instant for Michaelmas. All classes except class II (short course) and B. Sc class III are to reassemble at 12 noon on Monday the 2nd October. B. Sc class III went on tour to the West Coast during the holidays, visiting Udupi, Mangalore, Kasargode, Nileshwar, Taliparamba and Tirur for a study of local Agricultural practices. The Professor of Agriculture, Mr. Balakrishna Murthi, was in charge of the class and was accompanied by Mr. K. T. Bhandari, Agricultural Assistant and by Mr. P. N. Krishnan, Entomological Assistant. This class will re-assemble at 7 A. M. on the 16th October 1922.

Departmental News.

Dr. W. H. Harrison. Imperial Agricultural Chemist, arrived at Coimbatore and stayed 3 days on the Estate in connection with the question of the investigation of the paddy soil gases and visited the Sugarcane Station, after which he left Coimbatore for the Nilgiris.

The Fruit-Moth Pest. An investigation of the moth pest of fruits reported from Mudimuttanagudem, Ellore Taluk, Kistna District, was made by Mr. P. Sasainathan in August. The moth *Ophideres fullonica*—is a fairly large moth with conspicuous orange-coloured under wings. It is possessed of a stout beak armed with a file-like spiny tip with the aid of which it pierces the rind of fruits, such as the Orange, the Mango, and the Pomegranate and sucks the juices. The fruits thus attacked rot and fall down. The proprietor of the orchard reported that he suffered a heavy loss on this account. Various remedial measures were tried, of which two appear to promise much hope. One was to spray the fruits with a dilute solution of Crude oil emulsion, by which means the moths were kept away from sprayed fruits for nearly 10 days. The other was the trial of poisoned molasses to which the moths are attracted. It promises to be efficient, but further improvements are necessary before it can be generally recommended.

Lantern Exhibition at Kollegal. On the 16th and 17th Sept. a Co-operative conference was held at Kollegal, when the Deputy Director of Agriculture, VIII Circle gave a Magic Lantern Exhibition of slides of Agricultural interest to a large gathering of ryots and landholders, accompanying each slide with a lucid explanation of points of interest. The opportunity was also made use of for demonstrating to the ryots assembled the working of the Monsoon Plough, which created a very good impression on the spectators.

Taliparamba Agricultural Middle School.

An agricultural middle school was opened by the Director of Agriculture on 1st June at the Farm at Taliparamba. This is a new venture and quite an experiment with the object of finding out whether there is any real demand for the kind of education which will fit the sons of the landed classes for work either in actual farming, or for managing their estates. One of the great complaints one hears with regard to the higher forms of education is that it estranges boys from the domestic surroundings among which they have been reared and makes them dissatisfied with anything other than a town life. This school has been devised to avoid this criticism, and has, for this reason, been placed actually on a farm. It is designed to accommodate 40 boys and the course of instruction lasts for two years, taking 20 boys in each year. The standard of education for admission is that of the 5th standard of an elementary school, or the corresponding class of a secondary school. A good start has been made and 18 pupils have joined. They are very comfortably housed in large airy rooms and are under the charge of a head master, who is an Agricultural officer of experience, belonging to the same community from which the majority of the boys are drawn. The pupils all do the practical field work themselves and this manual training is bound to assist them in the future when the time comes for them to manage and supervise similar operations on their own lands. In the class rooms much of the teaching is done by demonstration and object lessons and it is made as practical as possible and is applied to the practical work done outside. In addi-

tion to this training in Agriculture they are also taught English, Agricultural Geography and such Mathematics as will be useful to them when they return to their own *farwards*.

We cannot, of course, prophesy about results, but the experiment has been given every possible chance by the Agricultural Department of being a success.

A similar school has been opened at Anakapalle, but so far work there has been carried on under adverse conditions for want of proper buildings and equipment.

Monthly Digest for June '22.

Editorial Notes.

Board of Studies for Agriculture in the Madras University.

A Board of studies for Agriculture has been formed by the Madras University in connection with the B. Sc., Ag., degree, consisting of Dr. Norris (Chairman) and Messrs: R. D. Anstead, F. R. Parnell, P. H. Rama Reddi, Dr. L. C. Coleman and Rai Bahadur K. Rangachariar, of whom the last mentioned alone is at present directly connected with teaching. While no exception can be taken to the individual members constituting the Board at present, it would be desirable to have a large representation of heads of "Teaching Sections." As the maximum strength of each Board of Studies is twelve, we believe the omission can be easily rectified.

Ramasastrulu Munagala Prize, 1922.

The subscribers of this Journal are reminded that the latest date for receiving papers from competitors is the 1st of November and we trust this note will have the effect of rousing up possible competitors so as to enable them to send in papers before it is too late. It is fervently hoped keen competition will be evinced this year.

The Monthly Digest.

The monthly digest which is a combined report detailing the items of work done by the various sections of the Agricultural

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Department is a welcome publication, in view of the criticisms the Agricultural Department was subjected to on various occasions in the Legislative Council. This publication ought to satisfy the natural and rightful desire of the people to be kept informed of what is being done in institutions of this kind designed to be of benefit to the public. It is however curious to notice that it has been reaching the public in two different forms, one of which is a cyclostyle copy which is sometimes illegible and which, we fear, owing to its bulk must cost a good deal of money in these days of paper scarcity; but it has the redeeming feature of reaching the "correspondents" of the Publicity Bureau not very late i. e., in 2 to 3 months. The other form is printed matter in leaflet size; but reaching the public late by several months, when the information conveyed could not possibly be of any immediate interest to the readers. We venture to suggest that the Publicity Bureau would kindly arrange for the publication of the Digest preferably in printed form since it is cheaper as well as more readable, and we would wish that it would not take such a long time in appearing.

Mr. D. T. Chadwick, M. A., I. C. S.

Mr. D. T. Chadwick is vacating the office of Indian Trade Commissioner in London on promotion to be Secretary to the Government of India, Commerce Department. He will be succeeded temporarily by Mr. Frank Noyce, also of the Madras Civil Service. The permanent appointment from February next goes to Mr. H. A. F. Lindsay who has been for some years Director General of Commercial Intelligence in India.

We are sure members of our Union will not have forgotten the genial personality of Mr. Chadwick, while he was Director of Agriculture in Madras, and we are delighted to learn he is coming back to India and beg to offer him a warm welcome back, though his main sphere of work on the heights of Simla may not offer many chances for us to meet him.

Departmental Notes.

Appointments, Transfers etc:—

1. Mr. H. C. Sampson, Deputy Director of Agriculture, to retire from the Indian Agricultural Service with effect from 22nd December 1922.
2. Mr. M. V. Baghavala Naidu, Upper subordinate, to act as Dy. Director of Agriculture, Livestock, in the Indian Agricultural Service, vice Mr. Littlewood granted leave or until further orders.
3. Mr. Saadat-ullah-khan, Probationary Deputy Director of Agriculture to be in charge of the VI Circle, Madura, vice Mr. R. C. Broadfoot on leave or until further orders.
4. Mr. S. Kuppusami Ayyangar from the III Circle to the Central Farm, Coimbatore.
5. Mr. K. Narayana Ayyangar from the Central Farm to the Ongole Cattle Farm, Chintaldevi.
6. Mr. M. Viraraghava Rao, from Cattle Farm, Chintaldevi to the III Circle for employment on district work.
7. Mr. P. Zachariah, appointed as a lower subordinate, cancelled.
8. Mr. Yerramsetti Venkateswara Rao, Nayadu, appointed as a lower subordinate V grade on probation in II Circle, Guntur.
9. S. Pranatarthihara Ayyar, L. Ag., Agricultural Demonstrator, V Circle, Tiruchinopoly, dismissed from Govt. Service.

Leave:—

1. Mr. R. W. Littlewood, Deputy Director of Agriculture, Livestock, leave for six months and twelve days from or after the 1st October 1922.
2. Mr. M. Govinda Kidavu, Acting Deputy Director of Agriculture, VII Circle, an extension of leave for three months from the 10th September 1922.
3. Mr. R. C. Broadfoot, Deputy Director of Agriculture VI Circle leave for nine months.
4. Mr. T. Lakshmana Rao, Assistant in Chemistry leave for 25 months.
5. Mr. L. Sankarakumar Pillai, Agricultural Demonstrator, Perumankallu, unexpired portion of leave cancelled.
6. Mr. G. L. Narasimha Rao, privilege leave for 30 days from 2nd to 21st August 1922.
7. Mr. P. L. Narasimham, Assistant Farm Manager, leave for nine months and 21 days.
8. Mr. K. R. Ramamurti Ayyar, Artist Cotton Specialist's Office, leave on average pay for one month with effect from 14-9-1922.
9. Mr. T. D. Easwara Ayyar, Assistant Farm Manager, Govt. Bot. Gardens, Ootacamund, leave on average pay for 13 days from 18-9-1922 with permission to avail Sunday 1st October.

NOTICE.

The address of the following members of the Union are wanted. Will members who happen to know the addresses of any of these kindly communicate to the Secretary, Madras Agricultural Students' Union and oblige?

Reg. No.	Date of entry.	Name.
16	11 7 11	G. Krishna Nayar
14	11 7 11	N. Sivarama Krishnayya
31	11 7 11	P. K. Atchan
40	6 8 11	K. Vaidyanatha Ayyar, Dindigal.
48	18 1 11	K. V. Krishnaswami Ayyar
54	15 1 11	K. Venkataramiah, Nellore
60	28 3 12	A. S. Pandyan, Tanjore
61	31 12 19	S. Krishna Nayar
70	1 4 12	L. Raghupathi Sarma
74	17 5 12	K. Sriramulu, Guntur
79	9 6 12	K. Subrahmanyam
83	4 7 12	K. Rajagopal Naidu
89	7 7 12	K. Palaniyandi Pillai
103	8 7 12	A. B. Chandrasekhara Mudaliar
105	11 7 12	K. P. Sundaram Ayyar
107	21 7 12	B. Adinarayana Chetti
108	21 7 12	T. R. Ranganath
109	1 8 12	V. Vijaya Raghavachari
117	1 8 12	S. Raghava Ayyangar
124	17 2 13	S. Anantharama Sastri
131	12 4 13	V. S. Subramania Sastri
136	15 6 13	C. Ranga Reddi
142	15 6 15	M. Vridhachalam Pillai
143	4 7 13	P. K. Tiruvengkatachari
145	4 7 13	K. Subba Rao
146	4 7 13	K. Jeevandas

Reg No.	Date entry.	Name.
147	4 7 13	K. Sundaram Ayyar
155	10 7 12	C. R. Annaswami Ayyar
172	12 7 14	U. Venkatachalam
179	12 7 14	Ahmed Hussain
188	12 7 14	K. Krishnaswami Pillai
196	12 7 14	S. Vedantam Ayyangar
198	12 7 14	S. Subramanyam
199	12 7 14	B. Govinda Ayyangar
200	12 7 14	K. Govinda Poi
203	12 7 14	A. Rajapandia Nadar
204	12 7 14	K. S. Paramanayagam Asari
205	12 7 14	B. K. Parthasarathi
209	12 7 14	K. Ramaswami Goundar
218	12 7 14	Annaswami Tavar of Ukkadi
227	14 8 14	Kochu Govinda Nayar
236	1 7 15	T. S. Sambasiva Ayyar
238	3 7 15	B. V. Narayana Row
239	27 1 13	C. Bhaskara Ayyar
240	15 6 15	S. Venkatanarasimhan
241	15 7 15	A. K. Krishnan
250	20 6 15	Rao Satyanarayana
252	23 6 15	P. R. Gopalakrishna Ayyar
269	24 7 15	C. B. Appayya
272	11 5 19	S. Sankara Ayyar
282	9 7 16	P. Nallakumar Pillai
289	2 7 16	M. A. Sambasivan
295	2 7 16	C. M. Ranga Reddi
296	2 7 16	M. V. Sitharamaswami
302	2 7 16	V. R. Subramanya Pillai
306	2 7 16	K. Mahabala Rao
310	2 7 16	B. Satyanarayana
341	21 10 17	B. L. Narasimha Ayyar
342	14 11 17	M. R. Krishnan

Reg. No.	Date of entry.	Name.
355	11 8 18	R. Ramachar
357	14 8 18	P. S. Paramesvara Ayyar, Tanjore.
358	18 8 18	M. R. Srinivasa Paniker
361	18 8 18	V. Venkatadri
362	22 10 18	M. K. Reddi
388	28 12 18	G. Alagirisami Reddi
457	8 11 19	J. Narayansamurthi

B. Viswanath,
General Secretary, M. A. S. Union.

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October 1922.

No. 10.

**Cultivation of the Mauritius variety of Plantains
at Nayudupet, Nellore District.**

V. RATNAJI RAO,
Agricultural Demonstrator—Gudur.

This variety of plantains is not cultivated on a large scale. Only two ryots cultivate this crop in this village, since it involves a good deal of labour and expenditure and is not within the reach of other ryots though it is a paying crop.

Soils.—Good black and red loams and red gravelly soils are most suitable.

Preparation of suckers.—The suckers separated from the mother plant are sunned until they show signs of drooping. All roots and buds of would-be suckers are cut out and the bulbs dipped in a thick solution of cow-dung water. Finely powdered old ashes are then dusted well over them.

Preparatory cultivation.—The land is ploughed well seven or eight times. Pits $1\frac{1}{2}' \times 1\frac{1}{2}' \times 1\frac{1}{2}'$, are dug $1\frac{1}{2}$ yards apart and allowed to dry for about 15 days, after which they are ready.

Season.—Suckers are planted in the months of February—March or August—September. The soil round the stems is either well pressed with the foot or rammed in with a pestle after sprinkling

a little water. This process of firming the soil is repeated on alternate days for one month, and at the same time the intermediate space is ploughed two to three times during the month. Long beds are then formed in such a way that the suckers are within the bunds.

Seed.—About 800 suckers go to an acre.

Manure.—Well-rotten farm-yard manure, at 40 cart-loads an acre is applied evenly to the beds a month after planting.

Irrigation.—A month after the application of the manure the heads of the suckers are cut off and the beds watered. The crop is irrigated once a week later on.

After-cultivation.—The beds are dug with para (mammati) about four times after watering. In the fourth month, trenches 2' x 6' are dug right through in the middle of the beds between the rows of plantains, the earth removed being thrown on the bunds; and the pits are filled in with green leaves—either Vempali, or *Cassia auriculata*,—earth from under prickly-pear bushes, indigo seed or cattle manure and covered over with a layer of earth.

After this operation the crop is irrigated twice a week if there be no rains. When the crop is six months old, the bunds and the trenches are given a good digging and the soil of both mixed well; and the bunds are re-made. After this operation 40 cart loads of well-rotten cattle manure is again applied in the trenches as before and irrigated twice a week.

All suckers are cut out and removed until the fruits ripen. If the field is irrigated after the bunches are removed, numerous suckers spring up and they can be sold for planting. Generally three suckers are allowed. The suckers are sold at an anna each.

Stems, dried leaves and roots are allowed to rot on the field. A good crop of groundnuts may be taken after the plantain crop is removed.

The plantains begin to flower when they are 10 months old, and the bunches ripen in two months.

			Rs.	A.	P.
<i>Cost of cultivation.</i>					
1.	Ploughing 7 times	... " ...	10	8	0
2.	Digging pits (800)	... " ...	12	8	0
3.	Planting suckers	... " ...	4	0	0
4.	Firming the soil round the stems 15 times	... " ...	2	0	0
5.	Cost of suckers (800 @ 1 anna each)	...	50	0	0
6.	Manure—80 cart-loads	... " ...	80	0	0
7.	Preparation of suckers	... " ...	10	0	0
8.	Inter-culture.				
	(a) Ploughing thrice	... " ...	5	0	0
	(b) Forming beds	... " ...	6	0	0
	(c) 4 times digging	... " ...	16	0	0
	(d) Digging trenches	... " ...	10	0	0
	(c) Application of leaves and cost of leaves	... " ...	10	0	0
9.	Irrigations weekly once for two months and 8 irrigations in a month for 8 months, in all 72	... " ...	72	0	0
10.	Removal of suckers, watching and weeding, one man	... " ...	50	0	0
			338	0	0
			or, in round figures, Rs. 340/-		

<i>Yield.</i>			
800 bunches at Re. 1/- each	...	800	0 0
Sale of suckers 1,600 @ 1 anna each		100	0 0
	Total Rs.	900	0 0
Less cost of cultivation	...	340	0 0
Net profit per acre		Rs. 560	0 0

AGRICULTURE—THE OLDEST ART.

Agriculture is the oldest and most wide-spread art the world has known, the application of scientific method to it is very much an affair of yesterday.

A. D. Hall.

Colour of Jaggery or Gur.

K. KRISHNAMURTI RAO.

One of the desirable points in jaggery or gur is its colour. Generally, people pay more for fine golden yellow coloured jaggeries than for dark or reddish coloured ones. It was therefore thought that it might be of interest to our readers if the work on colours of cane juices and molasses done by Zerban and others in America and in a small way by the staff at the Sugar-cane Breeding Station, Coimbatore, be briefly summarised and its bearing on jaggery manufacture—which is peculiar to India—be examined.

Colour of jaggery is due to (A) pigments and colour producing agencies present in the cane itself and (B) colours produced in the course of manufacture.

A. Below is given a brief description of the characteristics of colours and colour producing agencies of sugarcane.

(a) *Chlorophyll*. This is insoluble in cane juice and can therefore be removed with the scum.

(b) *Saccharetin*. The colouring matter of cane fibre which enters the raw juices along with very fine particles of fibrous tissue is known as saccharetin. This is insoluble in acid cane juices and can thus be removed with the scum; but if lime is added, it gets dissolved and a yellow-coloured product is the result, which gives rise to dark-coloured products, during boiling, especially in combination with iron.

The only way of lessening the evil effect of the above factor would be to boil the juice and eliminate as much of the scum as possible, before adding lime.

(c) *Anthocyanins*. These are pigments found in the rind of coloured canes and are soluble in acid cane juices. Anthocyanins belong to the polyphenols and in combination with iron salts give rise to dark-coloured products. But experiments conducted at the Sugar-cane Breeding Station have shown that coloured canes need not necessarily give rise to coloured jaggeries. Hence the presence of these anthocyanins is not of much importance.

(d) *Tannins (Polyphenols)*. There are soluble in cane juices and in combination with iron give very dark coloured products. These are present in larger quantities in the tops of canes than in any of the other parts. It has been found that this is the most important factor of all in influencing the colour of jaggery. Experiments at the Sugarcane Breeding Station and elsewhere have shown that it is the determination of the tannin content of cane juices that can materially help one in forecasting the colour of jaggery obtainable therefrom.

The only practicable way of reducing the harmful action of these is to use copper pans and to top the canes a bit lower than usual.

(e) *Oxydases*. Even in the absence of iron, oxydases present in the tops of canes acting on the polyphenols of cane juices will give a brownish tinge to the juice. The undesirable effect of these can also be minimised by topping the canes low.

B. Colours produced during the course of manufacture mainly depend on the addition or non-addition of lime to juices for purposes of neutralisation and clarification. Lime forms compounds with reducing sugars which, at high temperatures, decompose and give rise to dark-coloured substances. Again sugars in the cane juice, at high temperatures, form coloured products in the presence of neutral salts and other impurities. Thus, it will be seen that the problem of the colour of jaggeries is more complicated when lime is added during manufacture than when clarification is done with Bhindi (*Hibiscus*) juice as in North India.

To conclude, it may be stated that

(1) the opinion generally held that coloured canes give coloured jaggeries is erroneous, as the most important factors for colour production in jaggeries are the tannins (polyphenols) and oxydases present in canes, and

(2) the addition of lime, though essential for obtaining a hard jaggery, is harmful as far as colour is concerned.

O ! Wad some power the giftie gie us
To see oursels as others see us !
It wad frae monie a blunder free us
And foolish notion.

Burna.

A note on the 'Hardinge' Market—Pollachi.

G. K. SUBRAMANIAM.

Assistant Agricultural Demonstrator.

Markets and *shandies* are of great importance both to the Agriculturist who produces crops and to the merchant who makes money by trading in and thus distributing these commodities.

Shandy is a place, where once in a week or a year as the case may be, various articles are brought from different localities and disposed of to people of different places and thereby it serves to form a means of easy distribution of these products to various places. An Agriculturist finds a ready sale at the market for excess of stock and with the money obtained therefrom, he procures some other produce which he may require, at comparatively cheap rates. It is only in shandies that one can find articles of all grades and qualities suited to the varying tastes of purchasers.

The Pollachi market, which is the biggest in this presidency, is held every Thursday. One will be struck with the great stream of carts that continue, all though Wednesday night, to arrive at Pollachi from all directions laden with agricultural produce, and Thursday morning, long before sunrise, will find everybody busy unloading their merchandise at the market place.

The busiest part of the day is from 12 noon to 3 P. M., when most of the transactions are finished. This is also the time when one may expect to find articles of superfine qualities.

Supplies to this market arrive chiefly from Palghat, Cochin Territory, Salem and Coimbatore Districts.

The chief articles that are traded in at this market are:—

1. *Food grains.* Paddy mainly from Palghat and Udamalpet and Pollachi. Cholan from Pollachi, Palladam and Udamalpet taluks. Ragi from the surrounding villages and also from Mysore side. Other cereals also are brought in from the surrounding villages and disposed of.

2. *Pulses.* The main pulses that are traded in are chiefly Field beans, Horse Gram, Red Gram, Black Gram, and Green gram, from Udamalpet and Coimbatore taluks.

3. *Industrial crops.* Groundnut is the special commodity of trade from September to December. This is largely grown round about Pollachi and is readily disposed of to various firms and shipped overseas via Madras and Bombay.

Cotton and cotton seeds also form a main article of trade here. Large quantities of Uppam and Karunganni cotton of the Black soil tract of Udamalpet and Pollachi are brought in and many Agents of foreign firms purchase it for export.

Jaggery and Sugarcane are brought in abundance into the market and exported to Malabar.

4. *Spices.* The chief spices grown in Udamalpet find a ready sale in the hands of Moplah traders who deal specially in this commodity.

5. *Miscellaneous.* Besides these, cart-loads of coconuts and pumpkins from Palghat side pour in even a day earlier into the shandy, and are disposed of without delay.

Betel leaves from Uttukuli have acquired a name in this shandy, and so also have various vegetables and fruits. Lastly we find many agricultural implements and instruments such as Hoes, Share-points, Mamuttis, Sickles etc.

6. *Live stock.* In addition to all the above produce, one finds thousands of head of cattle and sheep being brought from various directions, consisting chiefly of Mysore, Bargur, Kangayam and local breeds.

The following figures recorded in different seasons of the year on six shandy days will give an idea of the magnitude of this big shandy and the quantities of articles brought in and disposed of during the day.

Statement showing the number of cart-loads of each article brought to the market and disposed of during the day.

No.	Name of Article.	Nov. 21.		Nov. 22.		Jan. 22.		Remarks.
		Thursday—10-11-21.		Thursday—17-11-22.		Thursday—5-1-22.		
		Total No. of carts.	Quantity brought in disposed of (in cart load)	Total No. of carts.	Quantity brought in disposed of (in cart load)	Total No. of carts.	Quantity brought in disposed of (in cart load)	
		Groundnut Season.		Groundnut Season.		Pongal Shandy.		
1	Paddy	289	109	216	92	271	92	
2	Cholam	502	341	426	215	396	251	
3	Ragi	208	129	127	31	141	52	
4	Tennai, Cumbu, Varragu, Samai	197	98	145	29	132	39	
5	Grams, A. Bl. Gr. B. H. & Avarai	121	45	91	27	86	41	
6	Spices	44	17	36	15	36	12	
7	Groundnut	892	696	803	701	246	201	
8	Cotton seeds	203	141	162	99	102	81	
9	Jaggery & Sugarcane	96	49	63	24	47	26	mostly sugar-canes are disposed of.
10	Chillies dry and green Onions	69	39	53	33	41	21	
11	Coconut	62	67	59	46	76	76	
12	Cloths etc.	39	8	23	7	39	21	
13	Vegetables	123	85	198	120	133	123	
14	Fruits	13	9	11	8	31	25	
15	Miscellaneous.							
	Pl. leaves, Bottles, Mats, Coir, Basket, Leather, Oil cakes, Stimulants, Stones, & implements etc.	240	131	261	129	257	151	
	Live Stock.							
1	Cattle *	1612	205	1319	115	1312	201	* includes cows & buffaloes etc.
2	Sheep †	947	398	1022	465	1109	573	† mostly for butchering.

Note:— These figures were recorded at the three entrances and the average taken. Figures relating to disposals were recorded in the evenings from place to place and also at noon. The figures representing total No. of carts were also as far as possible compared with the amount collected at the gates by the gate keepers for the most part correct.

Statement showing the number of cart-loads of each article brought to the market and disposed of during the day.

No.	Name of Article.	Jan 22.		July 22		Aug. 23.		Remarks.
		Thursday 12-1-22.		Thursday 27-7-22.		Thursday 17-8-22.		
		Total No. of carts. Pongal Shandy		Total No. of carts. Adinarava Shandy.		Total No. of carts.		
		Quantity brought in (in cart load)	Quantity disposed of (in cart load)	Quantity brought in (in cart load)	Quantity disposed of in cartload	Quantity brought in in cart load	Quantity disposed of in cart load	
1	Paddy	192	75	106	36	91	59	
2	Cholam	315	162	201	98	421	197	
3	Ragi	136	59	142	73	189	72	
4	Tennai, Cumbn, Varragu, Samai	97	22	59	28	121	43	
5	Grams, A Bl. Gr. B. H. Avarai	71	32	86	13	62	20	Samai in greater demand for festival.
6	Spices	32	16	21	7	24	7	
7	Groundnut	—	—	—	—	296	239	
8	Cotton seeds	62	28	125	69	155	121	
9	Jaggery & Sugarcane.	83	52	65	34	75	31	mostly sugarcane.
10	Chillies dry and green Onions	89	47	53	29	52	25	
11	Coconut	101	101	69	69	79	71	
12	Cloths etc.	42	22	33	17	17	5	
13	Vegetables	149	113	92	63	92	63	
14	Fruits	39	81	32	26	22	20	
15	Miscellaneous.							
	Pl. leaves, Bottles, Mats, Coir, Basket, Leather, Oil cakes, Stimulants, Stones, & implements etc.	297	105	379	167	269	172	* Agri. season includes cows & buffaloes in milk. + Animals are brought, mostly for butchering.
	Live Stock.							
1	Cattle *	982	81	1909	279	1028	172	
2	Sheep †	1259	753	1029	519	626	398	

Note 2:— The figures (especially of disposal) are approximately calculated from inspections made at noon and in the evening. Coimbatore, 2nd October, 1922. Sd. G. K. Subramaniam, Asst. Agricultural Demonstrator.

The Fiscal Commission.

There is little doubt that it was the Free Trade policy of England that brought British commerce to the forefront, contributed to her prosperity and raised her to the status of a first-rate maritime power. Colonial Statesmen, however, felt that conditions were different with them and that the Empire tariff policy needed some revision. Murmurs developed into complaints at the time of the Boer war and the Minister for the Colonies, the late Mr. Joseph Chamberlain, paid, after the close of the war a visit to the Colonies, called the Colonial Premiers for a conference in London, wherein there was frank and free discussion on the subject and as a result thereof, submitted his Tariff Reform proposals, which the bulk of England, however, did not accept. The last war brought affairs to a head and the greater participation in it of the Dominions and India forced British statesmen to examine this question afresh. The Government of India appointed a commission last year, with Sir Ibrahim Rahimtoola of Bombay as President and Prof. J. N. Keynes, the Economist, as Vice-President who, however, could not join the Committee. It is regrettable there should have been no representative from among the Agriculturists who number over 80% of the Indian population. The terms of reference were "to examine all interests concerning the Tariff policy of the Government of India, (including the question of adopting the principle of Imperial Preference) and to make recommendations." The Commission toured the Provinces, took down evidence and have now submitted their report. All members are in favour of protection and the creation of a Tariff Board whose functions are only to be advisory. While the minority are for unqualified protection, the majority commit themselves only to 'discriminate' protection. In the case of Imperial Preference, the majority recommend an examination by the Tariff Board of the class or classes of commodities which should be given preference, whereas the minority are against preference in favour of the United Kingdom in the present state of fiscal control, and none of the Committee is in favour of the Dominions, unless Indians are given equal status. The Cotton excise duty is to be abolished. The

majority would admit an unrestricted flow of foreign capital, while the minority consider that companies should be incorporated in India with a Rupee Capital, allowing a reasonable proportion of Indian Directors and offering facilities for training Indian apprentices.

The words 'free trade', or 'protection' cannot act as a charm in themselves; and as far as one can see, it is in the application of the principle advocated and the integrity of the personnel concerned that the prosperity of the country depends. It is feared that a Tariff Board with no statutory powers will turn out to be an irresponsible body and prove a drag upon, if not a burden to, a responsible Commerce Member, while unqualified protection will affect the interests of the Indian cultivator quite adversely. The Indian ryot wants to sell his produce in the dearest market whether at home or abroad, and to buy his necessities, which are but few, at the cheapest. Any manipulation of the Tariff policy which has for its immediate concern the convenience of the consumer, the middleman or the capitalist will be attended with disastrous results. In this connection, one need but instance the state of Rural England in the days of the 'Corn Laws'. Unless the interests of the Agriculturist are sufficiently safeguarded and the currency stabilized, the future of the agricultural industry in India would appear to be gloomy indeed. While there cannot be any objection to infant or struggling industries being helped in their nascent stages, it is comparatively more important to see that the welfare of the poor ryot is not affected, for, to quote an instance, the present system permits of foreign salt to the value of 158 lacs of rupees being dumped into the country, even when the Government has got the sole monopoly of the article, while bran and pollard, which he badly needs, is allowed to be exported to the tune of 110 lacs of rupees.

(Contributed.)

Extracts.

A few notes on Coconuts.

Mr. Wates, Agricultural Instructor, Jamaica, writing about coconuts in the West Indies observes that the general belief that trees

with elongate nuts bear the largest clusters is not borne out by facts and that he has known round-nut varieties bearing as many as 30 nuts in a cluster and 300 nuts in a year. He particularly approves of a variety producing a round nut with small deeply sunken eyes, which is a fine bearer and a good shipper. Dealing with the colour of the nuts, he believes that the green-skinned, thin-husked variety is one of the best. It is a good bearer, upright in growth, holds limbs rigidly at right angles to trunk, drops limbs cleanly and regularly, develops extra stout stems, seems less liable to disease, and stands hurricanes best of all. There is a second variety which is a thin-skinned nut of a very brilliant orange colour, almost red, which one only rarely sees. Trees with very big, thick-husked nuts are not usually heavy bearers.

In planting a nursery a good plan is, in his opinion, to open a trench 3 feet wide by two feet deep, in a place not liable to waterlog, to fill this with the fibre (not husk) of the coconut well trampled down, to set in the coconuts on their sides as they would naturally lie, cover down again with the fibre and if the weather is very dry occasionally to soak the fibre bed with water. In some places a light shade may be necessary. By this method 75% of the nuts were observed to sprout in less than three months. The advantage is that the young roots enter only the fibre and are not damaged on removal to the field. The best time to plant out the young sprouted nuts is when the sprout is between 6 and 12 inches long. There is less shock at that period. 33 feet apart seems to be the satisfactory distance since at that distance the points of leaves just do not touch. On strong alluvial soils, however, a distance of 40 feet would be more satisfactory. Generally it may be observed that any planting distance that allows the branches to interlace does harm, and nothing is gained in return as the trees only bear less and are more liable to disease. Sun and air are the '*sine qua non*' for coconuts; however, on hillsides of poorer soil 33 feet across and 25 or 28 down does very well. As to planting in a deep or a shallow hole, this depends entirely on soil conditions. In clay soil the deep hole idea should be given up. It simply provides small ponds for each coconut to

grow in in rainy season and very many naturally would die of wet feet, and in such cases planting on a mound would be the best thing. On the other hand in very light soils or sands a deep hole would be the wisest plan, but with the average soils a well prepared hole filled again to slightly above the soil level and the nut set down level so that just the eye is free of soil, and well pressed in, is the surest method.

(Jamaica Agricultural Society's Journal Vol. XXVI No. 7.)

K. U. Menon.

Reviews.

"*Tanjore District Co-operative Manure Society Limited, No. 1885 Nidamangalam.*" *Report for 1921—22.* This is the sixth year of the working of the Society and it is reported that there was a slight increase both in the number of members and the amount of paid share capital. The items of work turned out by the society included the purchase of bones, and the preparation and sale of bone-meal and the purchase and distribution of various manures such as Fish guano, mixed manure, castor cake and groundnut cake and, in addition, of various seeds such as Kolinji, Indigo, Paddy and Cotton. Further three Meston ploughs and a triangular harrow have been purchased and kept for being taken out on hire. The box system of preserving cattle manure and the suitability of Cambodia Cotton seeds as cattle food were sought to be demonstrated.

The net profit from the transactions of the society during the year under review amounted to Rs. 427—4—9 and the sum available for distribution as dividend and bonus, to Rs. 267—1—0.

The Society and its energetic Secretary—M. R. Ry. Rao Sahib A. Sethurama Ayyar Ayl.—are to be congratulated on a prosperous year and on a record of useful work turned out.

Helminthosporium Disease of Rice.—Bulletin No. 128, Agricultural Research Institute, Pusa, —1922, by Mr. S. Sundararaman M. A., Govt. Mycologist, Coimbatore.

The Bulletin under review professes to be one of a series of studies of crop-diseases of the Madras Presidency and treats of a disease that sometimes develops on paddy in rainy years. It manifests itself as brownish spots and patches on leaves, leaf-sheaths and glumes, affecting the earheads also in advanced stages. The author has, by inoculations in the laboratory, proved that the fungus *Helminthosporium sp.* is the real causative agent of the disease, but his observations have also shown that it is but a weak parasite not capable of causing serious loss to the crop.

Feeding experiments at the Govt. Cattle Farm, Hissar. Bulletin No. 130 Agricultural Research Institute, Pusa, 1922, by R. Branford, M. R. C. V. S. and E. Sewell, M. C., M. R. C. V. S.,—Punjab. The Bulletin sets forth the results of experiments undertaken at the Govt. Farm, Hissar, to find out the feeding values of various feeds for stock. Of the general conclusions arrived at by them, the following are some of the more important. "*Guar*"—*Cyamopsis tetragonoloba (psoralioides)* proved to be a valuable food, relished by cattle and much cheaper than gram (Cicer). The authors also found Til (gingelly) oil-cake a remarkably cheap and nourishing food both for young stock and working animals; mustard seed-cake was not relished by stock, but proved a good food in a mixed ration in the case of donkeys. "Oats "*Bhoosa*" was found to be about twice as nutritious as Fodder-Jowar. The authors hope to undertake more work on the same lines later on. On our part, we wish similar experiments were undertaken at the Central farm.

Notes and Gleanings.

Species of sweet potato. Besides the ordinary sweet potato—*Ipomaea batatas*—which is now cultivated throughout the world, there are two distinct species which deserve mention: the New Zealand sweet potato—*Ipomaea chrysorrhiza*—and the Chinese sweet potato—*Ipomaea mammosa*. The first of these is known to produce tubers

up to 9½ lbs., in weight. The second is very largely grown in China and parts of United States and is preferred by the Chinese to any other kind.

Rhodesia Agricultural Journal, August 1922.

Y. R. R.

Vulcanised Rubber direct from Latex. Mr. Ashplant—Rubber Mycologist—is to be congratulated on his discovery of a practicable process for transforming latex directly into vulcanised rubber. In spite of want of equipment, investigations were carried on and some excellent samples of fully vulcanised rubber have been turned out. In physical properties, such as elasticity and strength, these samples struck one as superior to the rubber one meets with. As instances of articles turned out may be mentioned rubber sheeting in natural and permanent shades of all kinds, water-proofed fabrics, cheap flooring material, and leather substitutes. The possibilities of this process are enormous, as the cheap production of the following class of goods would revolutionise the rubber industry:—sheeting, steam packing, soles and heels, tiles, mats, corks, erasers, solid rickshaw and cab-tyres, and paving blocks of roads.

Mr. Ashplant also states that he was able to manufacture *ebonite* directly from latex and if the process could lend itself to production on a commercial scale, the possibilities are infinite, as *ebonite* goods are of great value owing to their unbreakability, their attractiveness and their ability to withstand chemical action.

From the Planters' Chronicle, 16th September 1922.

Y. R. R.

Rubber Roadways. In their report for 1921, the Directors of Rubber Roadways Ltd., the Company formed under the auspices of the Rubber Growers' Association to foster the use of rubber roads, state that the portion of the roadway laid in the High Street, Southwark, eighteen months ago, with the improved rubber block, vulcanised on to an expanded metal plate, continues to give satisfactory results. A less expensive method of attachment has been

evolved, and it is intended to proceed with the laying of an experimental area as soon as possible.

The Planters' Chronicle, September 30, 1922.

The Sex of Eggs. Investigation into a means of increasing the proportion of hens to cocks in hatchings was described in a communication by M. Lienhart of the University of Nancy, made to the Academie des Sciences in 1919. Starting from the facts that in the same breed cocks are heavier than hens, that the weight of young male chickens is higher than that of females, and that the same difference is perceptible even in newly-hatched chicks, it occurred to Mr. Lienhart that the eggs from which male birds are developed might also be heavier than those producing females.

Experiments which he then made did appear to show that by selecting for incubating eggs heavier than the average, a larger proportion than usual of male birds was produced. This was the case, however, only when eggs of a single pure breed were used, and it appeared that the result would be more certain if eggs were used from fowls all of the same age and at the height of the laying season.

Further experiments at the Experimental Station of Coligny (France) have given the following results:—

Sitting of 15 eggs,	medium weight, rather light,	8 hens 4 cocks.
" 15 "	" " " heavy,	4 " 7 "
" 15 "	" all heavy	" 4 " 9 "
" 15 "	" light (below average)	9 " 3 "
" 15 "	" (from 5 hens) lightest weight	11 " 2 "

Journal Ministry of Agriculture Vol. XXIX, No. 3.
Y. R. R.

Rubber in Paper-Making. The depression in the rubber market is being offset by new uses for the crude material. One such use is indicated in a recent patent that reduces the cost of rubber-making, simplifies the methods, and gives an improved product. The folding

number of an ordinary fibre was 30; with one-tenth of 1 per cent. of rubber added to this fibre the product had a folding number of 5000 to 6000 and a tensile strength of two or three times the untreated fibre, while a rubber content of three-fourths of 1 per cent raised the folding number to 14,500.

Scientific American, September 1922.

Modern Farm Practice. What has the farmer learned in these fifty years?.....He has learned that the soil is not a sullen, lifeless thing, only useful as a standing place for his crops, but that it is rather to be likened to a farm animal and valued accordingly. Practically all that we know regarding the bacterial life of the soil is a harvest of the last fifty years. The formation of humus in the soil, the solution of plant food from the soil minerals, the conversion of nitrogenous materials into forms which the crop can utilize, and the gathering of free nitrogen from the air—these are the great functions of the soil bacteria. Much remains to be learned of their nature and their needs,.....but what we know already is coming into common farm knowledge and having its effect on farm practice.

Dr. E. H. Jenkins, Connecticut, U. S. A.

The Dairyman's Tripod.—These three *breeding, feeding, and handling*—constitute the dairyman's tripod, on top of which is success, but there will be no top if one leg be missing. "Breeding" includes its handmaidens—testing and culling. "Feeding" embraces its accessories—cultivation, food tastes and values. "Handling" embodies shed design, the art of milking, and everything also that that effects animal comfort and composure.

(Standard Herd Test, Journal of Agriculture, Victoria, Vol XX, part 9). September 1922.

Modern Dietetics. (Vitamins and the choice of food). The old view that a diet was satisfactory, provided that it contained a certain amount of protein and had a sufficient calorie value, has, as is now well known, been modified in two very essential particulars. The quality of the protein is of the first importance; it must supply the

particular amino-acids required by the consumer, and must supply them in the proper amount. Further, there must be present the vitamins, the exact nature and function of which are still unknown, but which are essential for growth and health.

Nature, 9th September 1922.

Death of David Sharp, M. A., M. B., F. R. S., (1840—1922)—David Sharp, the doyen of British Coleopterists and one of the most eminent Entomologists of England passed away on Sunday, the 27th August '22. His name is most familiar to Entomological workers as the author of the masterly treatise on Insects in the Cambridge Natural History Series—a work still unsurpassed whether as to method of presentation or mastery of detail. He was for a very long time the editor of the Zoological Record—a yearly publication of extreme value to systematists: and was in addition, the author of more than 300 papers of entomological interest. Educated for medicine, he was conferred the honorary degree of M. A. at Cambridge in honour of his scientific work and was elected Fellow of the Royal Society in 1890. He leaves behind a widow, a son and five daughters.

Relative sweetness of various sugars. Noel Deerr states that, from certain tests conducted by him some years ago, the relative sweetness of certain sugars was found to be as below:—

Sucrose	...	100
Dextrose	...	60
Levulose	...	120
Invert sugar	...	95,

the method of comparison followed being the dilution of the sucrose levulose and invert sugar solutions to the same sweetness as the dextrose solution.

The following are some of the results obtained by other workers. Water and Beverage Laboratory, Sucrose, 100; dextrose, 50; levulose, 150; and maltose, 60. Pauls' experiments: Sucrose 100; dextrose, 52; levulose; 103; and lactose, 28.

Sale and Skinner in an article in 'the Journal of Industrial and Engineering Chemistry' state that the nett results of their experiments showed that if sucrose be valued at 100, invert sugar is only 85, and thus controvert the common opinion that a nett increase in sweetness is obtained by the conversion of sucrose into invert sugar.

The International Sugar Journal, September 1922.

Phosphatic Fertilisers: E. J. Russell, O. B. E., D Sc., F. R. S. Rothamsted Experimental Station.

Phosphates serve at least five purposes in the soil;—

1. They cause an earlier development of the young plant than would otherwise occur;
2. They bring about a considerable development of fibrous roots;
3. They counteract the rankness of growth which is liable to occur on land richly supplied with nitrogen compounds;
4. They hasten ripening and improve the quality of grain.
5. They increase the feeding value of the ordinary fodder crops.

Journal of the Ministry of Agriculture.—June 1922.

A substitute for Quinine. It appears that a valuable substitute for quinine has been found in "*Vitex peduncularis*"—a plant commonly found in Eastern Bengal and Bihar. An extract of the leaves of the plant of a strength of 2 to 3% is made and used as an antidote for malaria and black fever. The greatest merit of this substitute over quinine lies in the absence of the bitter taste—so characteristic of quinine.

(From the Modern Review, October 1922. C. S. G.)

HOUSEHOLD REMEDIES.

A hot fomentation. A fomentation is used to reduce inflammation. Place a towel in a basin, allowing the ends to extend over the opposite sides of the vessel. Place a piece of flannel upon this and pour

two pints of boiling water, to which two teaspoonfuls of Turpentine have been added, over the flannel. Cover the towel. Carry it to the bedside of the patient and wring it dry by twisting the ends of the towel in opposite directions. Quickly place the flannel on the skin, taking care not to scald the patient. Cover it with a thick pad and bandage. Vaseline or olive oil may be rubbed on the skin before giving fomentation.

An Excellent Gargle. Dissolve one-third teaspoonful of salt in one glass of tepid water. Few persons know the efficacy of salt as a gargle and fewer know the right proportions. Too much salt in the water is irritating.

Jamaica Agri. Soc.'s Journal, 1922.

Estate News.

Dearth of water supply on the Estate: is beginning to be keenly felt of late, owing to the present system of pumping water not proving sufficient to provide water for all the quarters on the estate consequent on the occupation of some of the newly built ones. A better scheme of water supply is under contemplation and proposals for enlarging or replacing the existing pumping plant are, we hear, gone up.

The Officers' Club: held a meeting wherein it was resolved that the Director should be addressed for increasing the present water supply. At a subsequent meeting the existing rates of subscription of the club were, after much discussion, slightly revised.

An Oil Mill. In response to a demand for pure gingelly oil which was unobtainable locally, a country oil mill has been started on the Estate premises by the Fuel Contractor and is, we hear, much appreciated.

Plague regulations. Owing to the outbreak of plague in the town of Coimbatore the usual regulations, designed to prevent the importation of plague into the Estate, are being enforced since the beginning of the month.

Students' Corner.

Hockey matches. The College opened the hockey season this year with a match against the Auxiliary Force on the 9th October. The College team was not fully representative, for many of the regulars were away on tour. Soon after the bully-off, the College pressed and brought off a goal, the final touch to which was given by Balakrishnan. After this early lead, the College was allowed to keep the ball only for short time within their opponents' territory, for the latter soon warmed up to their work and pinned the former to the edge of their striking ring, mainly through the efforts of their centre forward who showed a capacity for doing good stick work. Within the ring he more often than not failed to convert, but in spite of his erratic shooting, he however, managed to equalise. When such was the order of the game, Doraiswamy, one of the College forwards, all on a sudden broke away with the ball and netted it nicely with a well-directed cross shot. The college was not allowed to maintain this lead long, for, the opponents' ubiquitous centre forward, who exhibited clean hockey was again responsible for adding one more which proved to be the final goal scored during the evening. The match thus ended in a draw. Our College defence was not by any means stout; but Ratnavelu, the centre half, played untiringly, was here, there and everywhere, checking the opposite forwards.

The second match played by the College was against our old rivals, the Foresters, who are quite flush with their recent victory over us in cricket, which has won them the right to snatch away the Shield from us and retain it for a year to come. Their hockey team too, in spite of a change in its composition due to several of their seasoned players passing out of the College, will prove a tough proposition for any team competing for the ensuing local tournament.

Once again our College was not fortunate enough to muster its best eleven and its attack, being without the services of Balakrishnan and Venkataramanan, lacked combination and sting. The forwards either individually or collectively were unable to beat the Foresters' second line defence, especially Annappa Bhandari, who proved a

tower of strength to them. The Foresters have a good acquisition in Brand who leads the forward line and who with Hadi Hussain, their famous left, an ex-member of Aligarh College Hockey Team proved dangerous on many occasions. The game from the start up to nearing of half time was confined to the amid-field except for a few stray dashes by either side. Just a few minutes before the whistle went announcing the interval, Brand very judiciously rushed past the backs and drew first blood. The play in the second half was mostly in favour of the Foresters who did all the pressing. Our forwards, however, nothing daunted, made a spurt very near the closing time, which ended in Eggiaswamy equalising with a hard shot.

H. Shiva Rao.

Departmental News.

Dr. W. H. Harrison visited Coimbatore on his way back to Pusa from Kotagiri and made a stay of three days before leaving for Pusa.

Mr. Percival V. Ramiah, M. A., B. Sc., (Edin.) son of Dewan Bahadur W. L. Venkataramaiah of Berhampore has been appointed Assistant Lecturing Chemist in the Madras Agricultural Service.

Mr. A. J. Mascarenhas, B. Ag. (Bombay), son of Rao Sahib E. C. M. Mascarenhas, M. L. C., Mangalore, has been appointed Assistant to the Cotton Specialist and has joined work.

The Sericultural Section.

The Government have ordered the transfer of the Sericultural Section, from the Department of Agriculture to the Department of Industries from 3rd October 1922. The Sericultural Expert will, from that date, be termed Sericultural Assistant to the Textile Expert and will draw a pay of Rs. 425. The Sericultural Section had originally been sanctioned for a term of three years and sanction is now accorded for an extension of one year more. The

Sub-Assistant will continue to be borne on the cadre of the Agricultural Department, but will draw his pay from the Department of Industries. The Agricultural Department will help in an advisory capacity in regard to mulberry cultivation and the control of Insect Pests.

Activities of the Union. At a meeting of the Working Committee held on Tuesday, the 17th instant, with the President, Mr. F. R. Parnell (Principal), in the chair it was resolved to hold the College Day and Conference in December on the 18th, the 19th and 20th, and the general body meeting on the 21st. The members of various committees for reception, entertainment, sports and subscriptions were elected. Judges for the Ramasastrulu Munagala Prize were also nominated. It is proposed, if possible, to invite the Development Minister to preside at the Conference.

G. O. No. 1210—Development—dated 11th September 1922. It has been constantly urged on Government both in the Legislative Council and the Press that the demonstration of improved methods in agriculture should be brought home to the ryots more systematically, effectively and on a larger scale. The subject is closely related both to the organization and strength of the department in its higher and lower ranks on the one hand and the methods adopted by the department for the propaganda and demonstration on the other. Demonstration draws its material from the results of research workers and requires a strong organization of district staff through which it can be carried to the villagers. Several and at times strong criticisms have been levelled against the employment of a large staff of research officers at Coimbatore, but reflection will show the necessity for a close and inseparable connexion between research and demonstration and convince any one that the demonstration to be live, effective and successful requires research staff no less strong or effective than the field staff. Restriction of research and extension of demonstration are ideals which are to some extent inconsistent and incompatible with each other.

2. As regards the methods of propaganda at present adopted by the department for pushing through their improvements, the following is a brief description of what is actually done in the matter at present. New processes, new materials and new implements are tested at the different experimental farms maintained at Government expense. When the Agricultural department is convinced of their value they are sent round to the local agricultural demonstrator who is in charge of a certain number of villages and is in close touch with the actual cultivating ryots in the villages. These demonstrators explain to the cultivators the object of the new material, method or the implement as the case may be and induce the ryots to give them a trial on their lands. The work is undertaken on the ryot's land with his consent and with the labour of his employee, the cost to Government being represented by the supply of seed or manure, etc., and by the time and skill of the demonstrator. A cultivation sheet is maintained by the demonstrator showing a profit and loss account so that the ryot may see exactly the benefits to be obtained from the improvement which is being demonstrated. In this account the ryot himself supplies all the figures relating to the cost of cultivation. Valuable results have ensued from this method of propagating new practices and implements and ryots have come forward in many places to place their lands at the disposal of the department for these demonstrations. The practices have, in many cases, been copied by neighbours and relatives of such ryots. This scheme of demonstration has been now examined in the light of the new scheme of demonstration recently announced in the papers as having been sanctioned by the Government of Bombay. The Madras scheme gives the ryot a direct interest and incentive in the experiments undertaken on his lands and keeps him in touch with the work from the beginning to end and the department familiarises the ryot by actual demonstration with the character and objects of the improved methods and their practical working. Moreover the ryot sees the improvement in question actually take place on his own land, under his own management and handling and this removes the tendency which is apt to exist that what the officials of the agricultural department can do on a Government farm

cannot be done by the ryots themselves on their own land, because of some secret nostrum or some inherent fertility in the farm land. Also it does away to a large extent with that obstacle to success, the idea that Government have some ulterior motive in inducing the ryot to adopt improvement. When the ryot sees the improvement actually carried out on his own land, and, he reaps the monetary gain for such improvement, he realises that there "is not a catch somewhere". For these reasons the Hon'ble the Minister for Development is inclined to the opinion that the Madras method is better suited to this Province and that it is calculated to achieve useful results and that if only a sufficient number of trained demonstrators can be got, results would probably be achieved more quickly than by inauguration of any new scheme of demonstration.

3. The number of demonstrators available is necessarily limited and in order that they may carry out this work efficiently it is necessary to concentrate their efforts on a limited number of localities, since each actual demonstration undertaken takes time and constant supervision, necessitating the constant presence of the demonstrator or frequent visits from him. Despite this, however the concentration of demonstrators is kept as fluid as possible and when touring officers come across places where it is obvious that the activities of a demonstrator are especially needed or would be specially beneficial, such a demonstrator is sent there as soon as he can be spared. Moreover as soon as a new improvement has become popular in any group of villages and it is felt that it is firmly established, the demonstrator can be moved to a fresh group where improvements are unknown with only occasional visits to the first group where success has been obtained. In this way a number of "centres of infection" so to speak are established from which knowledge spreads.

4. The Government however consider that in addition to arduous, patient and very useful work done in the fields by the department, it should also carry on a very wide publicity propaganda with a view to bring its work prominently to the notice of a wider public. The department has no doubt in the past published

many interesting and useful leaflets and bulletins, issued calendars, held occasional conferences with ryots etc. The Government consider the department should itself send to the Press all the publications issued by it and supplied to the Publicity Officer. *The Agricultural College Student's Magazine may also be largely utilized for publishing useful agricultural information.* The practice recently initiated of publishing a monthly account of the department's work should be regularly continued. The question of holding annual conferences with ryots on the festival and religious occasions at two or three centres in each district might also be examined. Co-operative societies of agriculturists should be formed for various purposes such as purchase of machinery, manure, seeds of new strains, and implements, disposal of raw produce, conversion of raw produce into manufactured articles, etc. Conference between officers of the departments engaged in rural amelioration such as Agricultural, Veterinary, Co-operative, Industries, Education, Public Health, etc., should be arranged at suitable intervals and subjects common to two or more discussed and lines of action laid down. Non-officials, who interest themselves in these matters may also be invited to attend such conferences.

5. It is hoped that by these means the demonstration work of the department and its new methods and practices could more widely be made known to agriculturists and, when additional funds and staff become available, more attention could easily be bestowed to extend the field and scope of demonstration. In the meantime they trust the leading publicists and others will evince a little more sympathy with the duties and difficulties of the department and endeavour to help it by bringing its work to the notice of all interested in the betterment of the staple industry of the Presidency.

(By order of the Government, Ministry of Development.)

H. G. Stokes,
Ag. Secretary to Govt.

Editorial Notes.

Indian Science Congress, January 1923.

The tenth session of the Indian Science Congress will be held at Lucknow between the 8th and 13th January 1923. The President of the Congress is Sir Visveswarayya K. C. S. I., while Dr. Kunjan Pillai of Travancore will preside over the Agricultural section. Dr. Kunjan Pillai has sent up requests to the various sections of the Agricultural Department to encourage papers of Agricultural interest being sent up for the Congress, and we sincerely hope there will be an adequate response. It is rather a far cry from Madras to Lucknow, but we trust there will be a fair attendance from Madras.

The College Day and Conference.

The College Day and Conference is likewise approaching near and we trust there will be, as usual, on the occasion a big gathering of "Old boys", this year too. We take this opportunity of requesting officers of the department to come forward with papers of agricultural interest and give the gathering the benefit of their experience. Such papers prove beneficial not only to the readers themselves, but also to the hearers. The reader is enabled to take exact stock of his experience, gather his scattered ideas, arrange and systematize them, while the interested audience is set a-thinking on the matter, and probably can confirm or correct his deductions. The value of such an exchange of ideas and experiences, whether it be in the scientific or the practical side of agriculture, is at present, we are afraid, not sufficiently appraised. The individual worker—in whatever line he may be engaged—is liable, if left to himself, to get into a rut. His range of vision becomes narrow and crooked, and his breadth of outlook is liable to be submerged under a tangle of details. His wits are dulled by an endless devotion to routine, while he gradually becomes so self-centered as to be oblivious of the existence of a wider world. If

such a person attends a conference and tries to profit by it, the benefits are likely to be numerous. He meets with his compeers and often, his betters, and his outlook certainly gets widened. Moreover he gets the leaven of enthusiasm which is the true motive power behind sustained work. There is absolutely little doubt that he returns a better man than he left. For this reason, we hope the department will not cut short expenditure and prevent a fair number from taking part in the Conference. In our opinion, money devoted to this purpose will in the long run prove to be no bad investment, since thereby the officer is enabled to turn out not only better work but also work marked by enthusiasm.

The Functions of the Union.

Since we are now approaching the time when a large number of the members of the Union can meet each other and exchange ideas, may we remind them of a note on the subject of "Our Union" that appeared in the May number of the current year. Though we fondly hope that that particular note—which was purposely aimed at setting our members thinking on the possibilities of expanding "Our Union" and widening its sphere of activities,—has not been written utterly in vain, yet we are disappointed to find that it has not been able to elicit any remark from any of the members. On account of its importance to the future of the Union we venture to suggest that this subject may be discussed at the ensuing General Body Meeting. As it is still not too late to act, may we request the members to devote some small portion of their leisure time to this subject, which concerns the future work and welfare of the Union? We would also invite opinions as to how and how far the journal itself may be improved, not only in the quality and quantity of the matter, and its conduct in general, but also in its financial aspect.

Government's Policy of Agricultural Propaganda.

We invite our readers' attention to a G. O. printed elsewhere, detailing the Policy of the Government of Madras in regard

to the demonstration of improved methods of Agriculture. The publication of a 'new scheme' of agricultural propaganda sanctioned by the Government of Bombay working with the help of the co-operative Department, led the local Government to examine the present position of work in this Presidency with a view to adapt that scheme to Madras conditions. A review of the past work has revealed the utter futility of copying Bombay, while substantial results have been and are being achieved in this Presidency following the present profitable lines of district work. The present occasion has been taken by Government to refute criticisms made in the Legislative council and in the press against this department for which we feel deeply thankful. The Madras Scheme, as the Government observes, gives the ryot a direct interest and incentive in the experiments undertaken on his lands and keeps him in touch with the work from the beginning to the end "and their suggestion that the department should carry on a wide, publicity propaganda" is very opportune.

We note with pleasure and thankfulness the recommendation that this Journal may be largely utilised for publishing useful agricultural information and earnestly trust this suggestion may be given effect to and Our Journal will prove equal to such added responsibility.

The Exploitation of the Film for Agricultural propaganda.

There is absolutely no denial of the fact that the "movies" are one of the most powerful agencies at the present time for capturing the mind of the populace. Whether for good or for evil, the motion picture is a factor of no mean significance in influencing the masses. Whereas the possibilities of utilising it for purposes of educating the public—especially the juvenile section of the same—are infinite, there is little doubt that the great majority of the films one now-a-days witnesses at Cinema Halls cannot be exactly described as edifying. In catering to the morbid taste of the uneducated for sensationalism—in providing visions of hair-breadth

escapes, exploits of unimaginable bravado, or deeds of unthinkable horror—the film is but playing the part of the gladiatorium of the latter days of the Roman Empire. Scenes depicting a robber breaking into a house or the villain of the story forging a document or perhaps engaged in an act of cold-blooded murder—common enough in a good many of the serials of the day—are, it must be admitted, sights that are pernicious in their effects on young and growing minds. It is high time that such sensational serials are either stopped altogether or at least prohibited from being shown to young boys or girls.

If rightly used, however, there is little doubt that Cinema shows will prove to be of immense educative value. It is to be feared that the days of the "Magic lantern" are definitely over. Though still useful and often immensely interesting, the lantern slide pales off before the "Movie film," as the moon before the sun, for while the former at best presents a life-like statue, the latter exhibits the actual—the real man—full of life and full of action. It is unquestionable that, where available, it is the Cinema film that would be far more effective in propaganda work, for whereas the lantern slide stands in need of an explanation, the film is self-explanatory. Where, for instance, it is the aim of the propagandist to introduce an improved variety of plough into a district where it is not known, the magic lantern helps him to show a realistic picture of the plough to the audience, or perhaps a series of pictures serve to convey an idea of how it works. All the same he has to explain by word-pictures how the plough is actually used. If, on the other hand, a film is shown, the ryots have a graphic representation of how it actually works and see for themselves how exactly the plough-share brings the clods up, which way the cattle are turned at the end of the field and how exactly the handle should be held; and are on the whole far better impressed than by half an hour of explanations. This is only one instance out of many, and there is a multitude of subjects awaiting treatment in

this way, and agricultural improvements can be more easily and quickly brought to the notice of the ryots in this manner than by way of leaflets, shows and lectures.

As instances of how far the film has been utilised in agricultural propaganda in other countries, the following extracts may be cited:—"*Apple pests in Pictures*: 'King Apple's Enemies' is a motion picture lately released by the Department of Agriculture. It shows the mobilisation of insects and fungi against the apple kingdom, and shows the spraying and dusting "guns" moving into action, and the repulse of the foe. The film is one of *one hundred and fifty* that are being used throughout the country by Agricultural extension and field workers."

(*Scientific American* September 1922).

"*Locust Film*: The African Films Production Co., Ltd., assisted by the Agricultural Department, were successful in obtaining unique pictures showing the life history of the locust and the methods adopted by the Government to combat the pest. The picture will be shown throughout South Africa and should be of great interest to the Farming community. The magistrates will be advised of the dates on which the picture will be shown in their town, in order that they may warn the farmers and enable them to arrange to be present when it is shown."

(*Journal of the Department of Agricultural South Africa* September 1922.)

In June last, the Forest College authorities were able to demonstrate the possibilities of the film in graphically representing to the public of Coimbatore up-to-date methods of working large forests. If our Department is willing to follow the advice given by His Excellency during the laying of the foundation stone of the New College at Coimbatore and try to advertise itself, there is not a better or more impressive way of doing it than by utilising the "Movy."

There is perhaps a doubt in the minds of the readers as to the feasibility of representing scientific subjects in the motion

picture. It must be admitted that there are considerable difficulties in the process, but persons who have witnessed the Cinema films shown at Madras, this year, in connection with the Indian Science Congress, can be easily convinced that most of those difficulties can be overcome. The scientific motion pictures shown there included one showing the movements of an Amoeba—the most primitive of animals,—under high powers of the microscope and of a Paramœcium or the “Slipper Animalcule”, another picturing the highly interesting process of Cell-division, and another showing the blood corpuscles coursing through the capillaries in the web of a frog's foot and still another, presenting the lifehistory of the hook-worm—in fact all the knowledge of the microscopic world which a Biology Student laboriously but, on the whole, imperfectly gathers, was found to be offered in a very realistic manner to all the public that cared to see them.

Considering the development which the Science of motion-picturing has attained now-a-days, there are few obstacles that cannot be mastered. For the purpose of the Agricultural Department the type of films required can be easily and readily prepared. The progress and growth of a new crop, the advantage of a new method, the lifehistory of a pest, the working of a new machine are all subjects that can be advantageously filmed: and it is our hope that our Department will follow in the wake of similar departments in more advanced countries and bring the South Indian ryot into greater touch with Scientific improvements.

Departmental Notes.

Appointments and Confirmations etc:—

1. Mr. Percival Venkataramayya Garu, appointed as Assistant Lecturing Chemist.

2. „ Mantha Suryanarayana, temporary assistant, IV grade, to officiate as assistant IV grade in the Govt. Agricultural Chemist's Office, in the absence of Mr. T. Lakshmana Rao on leave.

3. Mr. K. Raghava Achariyar, Upper Subordinate, second grade to act as Assistant Director of Agriculture, 4th Circle, Vice Mr. A. V. Tirumuruganatham Pillai on leave or until further orders.

4. Mr. K. T. Alwa, Acting Dy. Director of Agriculture, VII Circle, to act as Dy. Director II Circle from or after 19th December, 1922.

5. Mr. K. Gopalakrishna Raju, Acting Dy. Director of Agriculture, II Circle, on relief by Mr. K. T. Alwa, to be Assistant Director of Agriculture VI Circle, Madura.

6. Mr. T. V. Rajagopalacharya, Assistant Professor of Agriculture, confirmed.

7. „ K. Gopalakrishna Raju, Assistant Director of Agriculture, confirmed.

8. „ M. Mangesha Rao, made permanent in the II grade.

9. „ M. K. Nambiar, do. III grade.

10. „ K. Raghavachariyar, do. III grade.

11. „ M. Viraraghava Rao, do. IV grade.

12. „ R. Swami Rao, do. IV grade.

13. „ K. Jagannadha Rao, appointed upper subordinate V grade, on probation.

14. „ C. V. Seebacharya made permanent in III grade.

15. „ L. Narasimhachariyar do. in IV grade.

16. Vice Mr. K. T. Alwa on other duty as Assistant Director of Agriculture, Mr. V. Muthuswami Ayyar, provisionally substantive from 20th September 1922, in the II grade.

17. Mr. A. Chinnathambi Pillai, provisionally substantive from 20th September 1922, in the III grade.

18. Mr. G. Rajagopal Mal, provisionally substantive from 20th September 1922, in the IV grade.

19. Mr. K. L. Ramakrishna Rao, appointed on probation upper division V grade.

20. „ A. J. Mascarenhas, B. Ag (Bombay) to be Assistant to the Cotton Specialist, V Grade (Rs 85—5—120) on probation.

21. Mr. K. Srinivasacharya appointed to V grade, (Rs. 85—5—120) on probation and posted to V Circle.

22. Mr. V. K. Kuthunni Nambiar, do. do. probation and posted to VII Circle.

23. Mr. S. Viswanatha Ayyar, do. do. probation and posted to VI Circle.

24. Mr. C. Seshagiri Ayyar, do. do.
probation and posted to VIII Circle.
25. Mr. K. Rama Rao, do. do.
probation and posted to III Circle.
26. Mr. Krishnamurti Ayyar do. do.
probation and posted to IV Circle.
27. Mr. G. Sakharana Rao, do. do.
probation and posted to VII Circle.
28. Mr. K. Gurumurti B. Ag. (Poona provisional) appointed to V Grade Rs. 85-5-120 on probation and posted to II Circle, Vice Mr. R. G. Malon other duty.

The following appointments and promotions are ordered with effect from 7th October 1922.

29. Mr. V. K. Subramanya Mudaliar, Upper Subordinate V grade, Agricultural section to be assistant to the Cotton Specialist, V grade, at the Kollpatti Agricultural station.

30. Mr. K. L. Ramakrishna Rao, upper subordinate, V grade, Agricultural section, to be assistant to Cotton Specialist, V grade, at the Hagari Agricultural station.

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|---|---|--|
| 31. Mr. K. Narayana Ayyar | } | officiating in V grade to be on probation in that grade. |
| 32. " V. T. Subbayya Mudaliar | | |
| 33. " A. Ramaswami Ayyar | | |
| 34. " E. K. Govindan Nambiar | | |
| 35. " P. Krishna Rao | | |
| 36. " K. Vasudeva Rao Nayudu | | |
| 37. " S. Krishna Nayak | | |
| 38. " G. Sitarama Sastri L. Ag., Lower subordinate to be Upper subordinate V grade, on probation. | | |

39. Mr. N. Srinivasa Rao L. Ag. do. do.
V grade, on probation.

40. Mr. S. Venkatrama Ayyar do. do.
V grade, on probation.

41. Mr. L. S. Natesan Ayyar, lower subordinate, I grade, to be upper subordinate, V grade.

Leave:—

1. Mr. T. V. Ramakrishna Ayyar, B. A., Teaching & Systematic Assistant Entomologist, extension of leave on average pay for 1 month and 3 weeks.
2. Mr. A. V. Tirumuruganatham Pillai, Assistant Director of Agriculture, Fourth Circle, leave on average pay for six months from the date of relief.

3. Mr. C. Tadulinga Mudaliar, Assistant Government Lecturing Botanist, a further extension of leave on average pay for one month from the 22nd October, 1922.

4. Mr. P. Susainathan, Assistant in Entomology, permission to affix Christmas holidays to his leave for 3 months.

5. Mr. M. Ramaswami Pillai, Sub Assistant to Economic Botanist, leave for 15 days from 12-10-1922.

6. Mr. T. K. Sambamurthi, Sub Assistant in Mycology, leave for 1 month from 9th October.

7. Mr. V. S. Narayanaswami Ayyar, Agricultural Demonstrator, leave for 1 month from 6th October.

8. Mr. K. Ramanujacharya, Dairy Manager, Central Farm, extension of leave by one month and 2 days, i. e. up to 16th October.

9. Mr. L. Sankarakumar, Agricultural Demonstrator, leave for one month from 24-9-1922.

10. Mr. T. Seshachalam Nayudu, Assistant Agricultural Demonstrator, leave on Medical Certificate for 4 months from 13-9-1922.

11. Mr. B. Venkataraman, Assistant Farm Manager, Nandyal, leave for a month from 1-11-22.

12. Mr. P. C. Rangiah Nayudu, Mechanic, Nandyal, leave for one month from 19-8-22.

13. Mr. K. Ramamurti Ayyar, Artist, Cotton Specialist's office, extension of leave for two months.

14. Mr. J. Sundara Rao Bhutgoswamy, Artist to the Entomologist leave for one month from 25-9-1922, and later on extension by one month.

15. Mr. K. L. Ramakrishna Rao, Farm Manager, one month's leave from 19th October 1922.

16. Mr. C. Subba Rao, Assistant Agricultural Demonstrator, Pakala, two months' leave on average pay from 1st October 1922.

17. Mr. J. Sadasiva Reddi, Assistant Agricultural Demonstrator IV Circle, leave for 18 days on half average salary from 9-10-1922.

18. Mr. U. S. Ayyasami Aiyar, Assistant Agricultural Demonstrator, Mayavaram, leave for one month on average salary from 10th November 1922.

Retirement:—

Rao Sahib A. Rama Rao—Retired.

Correspondence.

Notice to Members.

To

The Secretary,

Madras Agricultural Students' Union.

SIR,

We give notice of the following amendments, alterations and additions to the Rules of the Union for discussion at the Business meeting in December next and request their publication in the Journal.

Rule 1. After Coimbatore add "Lawley Road and Code word shall be 'Union' "

Rule 3-iv. To the words 'the Union' add 'which shall be entitled' The Madras Agriculturist, the official organ of the Madras Agricultural Students' Union.'

Rule 4. Delete the words 'and all members shall be life-members.'

Rule 5. For 'three classes' read 'one class.' Omit words 'ordinary members, First class members and Benefactors',

For 'a life' read 'an annual' for 'Rs. Five' read 'Rs. Three' and omit words 'Rs. ten and Rs. Fifty respectively.'

Rule 6. 'of an annual subscription of one rupee in advance and the balance' read 'two-thirds the above rate'

Omit the words 'according to the class.....when leaving the college.'

Rule 8. For the 'Committee' read 'the Council.'

" 9. For 'life' read 'annual' for 'Rs. ten' read 'Rs. three.'

" 10. " '14 members' read '20 members'

" 7 do do 10 do.

" 11. " 7 do do 10 do.

" 12. " 7 do do 10 do.

" 13. " 5 do do 7 do.

"two other members" read "four other members."

After 'four other members' add 'one copy of the journal will be given free to Patrons, associates and members other than Honorary members

and an annual subscription of Rupees four shall be collected from subscribers for less than five copies and of Rs. Three from those subscribing for five copies or more.

Rule 14. For the last word 'Committee' read 'resident members of the Union in a meeting which will be called by the Working Committee.'

Rule 16. After the words 'concerning the college' and before the words 'will be published' insert the words 'a quarterly account of the work of the committee and the council including a statement of receipts and expenditure.'

Rule 17 (a). Omit 'and benefactors.' After the words 'after associates' and before 'and shall be utilised' insert 'and of a sinking fund at 50% on the total net receipts of the Union year.'

Add a note:—'The sinking fund account shall commence from the first quarter after the completion of any building sanctioned.'

Rule 17 (d). After the words 'banks' add 'and shall prepare and publish a draft budget in the issue of the journal of the month missing the one immediately preceding the College day, for discussion and sanction at the Business meeting.'

Rule 15 and 17 (e). to the words 'on the 31st May' add 'or the last day of the month missing the one preceding the college day.'

Rule 12. after the last word 'rest' add 'one third the members shall form the quorum.'

Transitory rule.—Members, benefactors, and associates admitted prior to 1-1-1923 will exercise all the rights and privileges under the old rules, but may be allowed to come under the new rules provided no concession is claimed for their paid-up subscriptions for the membership or benefactorship in whole or in part.

Yours sincerely,

Sd. T. V. Rajagopalacharya (proposer)

" K. T. Bhandary (seconder)

" V. Muthuswami Ayyar, P. Abhishekanatham, Y. Ramachandra Rao, M. U. Vellodi and S. Narayaniah (supporters).

A request to Members.

Members are, perhaps, not unaware that the present condition of the Union is capable of—and indeed calls for—improvement. Owing to the increased prices of paper and cost of printing, and the low subscription of the Journal, it has been, for some years past, working at a loss. Again in connection with the celebration of the College Day, the Union has had, almost every year, to make up substantial deficits. Consequently the Permanent Fund of the Union has been dwindling down. At a meeting of the committee held on the 17th October, these questions were discussed and it was resolved to bring them up before the General Body Meeting for discussion and solution. Members are requested to ponder over the questions of (1) subscriptions and (2) the policy of the Union and the Journal, and come prepared for discussion.

The Working Committee.

Anything Worth Doing Is Worth Doing Well.

"UNION IS STRENGTH"

Malapropism for once apropos

Mrs. Malaprop once hit the right nail on the head.
It was raining in torrents, one Sunday morning,
As she left Church without an umbrella.
"How irrigating this is!" she remarked.

The Rules of the Madras Agricultural Students' Union, Coimbatore.

Revised up to date.

1. *Name of the Association and its Head Quarters:*—The Association shall be called "The Madras Agricultural Students' Union," with head-quarters at the Agricultural College, Coimbatore.

2. *Objects:*—The object of the Union shall be:—

- (i) to encourage an *esprit de corps* among its members.
- (ii) to exchange opinions and experiences in matters agricultural and to make a record of the same.
- (iii) to act, as far as possible, as a bureau for procuring employment to members of the Union.
- (iv) to protect and promote the interests of members.

3. *Objects; how attained:*—The above objects shall be attained by:—

- (i) The annual celebration of a College Day. The date for the celebration shall ordinarily be the 14th of July, which is the date on which the Coimbatore College was opened by His Excellency, the Governor of Madras in 1909.
- (ii) The holding of a Conference in continuation of the College Day at which papers will be read and discussions held on agricultural subjects.
- (iii) The maintenance of a corrected list of addresses of all members of the Union.
- (iv) The conducting of a Journal as an organ of the Union.

4. *Membership; eligibility:*—The following shall be eligible for membership and all members shall be Life Members.

(a) *Student Members:*—

- (i) The Students of the late Madras College of Agriculture, Saidapet.
- (ii) The past students of the Agricultural College, Coimbatore.
- (iii) The present students of the Agricultural College, Coimbatore.

(b) *Officer Members:*—

- (iv) The officers, past and present, of the Agricultural Department.

5. *Classes of Members and Subscription:*—There shall be three classes of members namely, *Ordinary Members, First class Members and Benefactors*, who shall pay a life subscription of Rs. Five, Rs. Ten, and Rs. Fifty respectively.

6. *Special subscription for students under training:*—Students under training will, in order to become members of the Union, pay an annual subscription of one Rupee in advance and the balance, according to the class of membership they choose to join, when leaving College.

7. *Patrons:*—Gentlemen who are interested in the welfare of the Union and contribute a sum of not less than Rs. 100 to the permanent Fund of the Union shall be styled Patrons.

8. *Honorary Members:*—Gentlemen interested in the welfare of the Union may be invited by the Committee to become Honorary Members. Donations will be thankfully received from them.

9. *Associates:*—Gentlemen interested in Agriculture may be admitted as Associates on payment of a Life Subscription of Rupees ten.

10. *The Council*.—The affairs of the Union shall be managed by a Council consisting of a President who shall be the Principal ex-officio and four Vice-Presidents and 14 Members of whom one Vice-President and 7 members shall be resident members. From amongst the last, the General Secretary, the Treasurer and Editor shall be elected.

11. *Election of council*.—All Members of Council shall be elected at the General meeting on the occasion of the College Day. The resident Vice-President and the 7 resident members of Council including the General Secretary, Editor and the Treasurer shall be elected by all the members of the Union including student members. The non-resident members of the Council including the three non-resident Vice Presidents shall be elected by all members excepting the present students, the votes of non-resident members being also obtained.

12. *The Working Committee*.—The resident Vice-President and 7 resident members of the Council shall form a Working Committee with as many student members as there are classes elected by the student members. The Working Committee so formed shall appoint an Assistant Secretary from the student members of the Committee and a Sub-Editor, and a Manager amongst the rest.

13. *The Journal*.—The conduct of the Journal shall be in the hands of an Editorial Board of 5 members consisting of (1) Editor & Publisher (2) Sub-Editor (3) Manager and two other members.

14. *Vacancies*.—Vacancies occurring in the Committee in the interval may be filled by the other members of the Committee.

15. All proposals of amendments to the rules shall be communicated to the General Secretary before the 31st of May every year for being published in that issue of the Journal previous to the Annual General Meeting. All amendments should bear the name of the proposer and the seconder who should both be members of the Union.

16. The annual report of the College Day and the conference, the statement of the financial condition of the Union, the corrected list of addresses of the members of the Union and a brief summary of all other matters of general interest concerning the College will be published in the Journal.

17. The finances of the Union shall consist of the Permanent Fund, College Day and Journal Accounts.

1. The Permanent Fund shall consist of donations from Honorary Members and the Life subscriptions from Patrons and Benefactors, First class and Ordinary members and Associates and shall be utilised for meeting charges of a permanent nature.

2. The College Day Fund shall consist of donations and entrance fees for sports collected on the occasion of the College Day and shall be devoted to meeting the charges consequent on the celebration of the College Day, the running of sports, the holding of the Conference and the meeting of the past and present students.

3. The Journal Fund shall consist of subscriptions for the journal and advertisement receipts and shall be utilised for the running of the journal which shall, as far as possible, be self-supporting.

4. The Working Committee of the Union shall arrange to invest the several funds of the Union in fixed or current deposits in suitable banks.

5. The Accounts of the Union shall be audited by two members of the Union who are not members of the Working Committee and the financial statement together with the balance sheets under each fund as they stand on 31st May every year shall form an essential feature of the Annual Reports, the auditors for the purpose being selected by the General Body.

Is the Journal properly addressed to you?
If not, send in your correct address.

THE JOURNAL
OF
The Madras Agricultural Students' Union.

Vol. X. * November 1922.

Prickly Pear as a Failure.

P. S. JIVANNA RAO, M. A.

Writing about Cotton Dr. Lawrence Balls rightly observes that every crop is more or less a failure. It is desirable to extend this statement to plants in general and consider that weaker side of their life which makes them unfit for certain districts. The prickly pear is a typical instance of a plant which has developed an extraordinary capacity for a xerophytic existence, but is unable to thrive under conditions of heavy precipitation in the atmosphere or of excessive moisture in the soil.

The Report of the Prickly Pear Commission has drawn attention to the rarity or absence of certain species of *Opuntia* in moist regions e. g. parts of North India, Trinidad, Dominica, St. Vincent Islands etc. One can also notice this conspicuous feature in the otherwise exuberant vegetation of the heavily humid districts of the West Coast and also about the foot of the Nilgiris and Pulneys.

It is usual in considering the needs of the plants to pay attention to the root system, which is hidden in the soil and is subject to changes in the physical and chemical conditions, and to the shoot system, exposed above ground to variations in the outer environmental factors. Another aspect of plant life, not so often noticed, relating to reproduction, is not the less important and an investigation into the behaviour

of pollen grains to changes in weather conditions is of utmost importance in finding out the real cause of the failure of flowers to set fruits especially in rainy weather. The common prickly pear, *Opuntia Dillenii*, shows an interesting response to environmental changes in all the above three aspects and a brief account of the same is recorded below:—

1. Cannon studied the response of the root system to changes in the soil aeration and temperature in certain *Opuntias* and came to the conclusion that an insufficient amount of air inhibits branching of roots and that the superficial root habit is due to both favourable temperature and better soil aeration.

2. Under conditions of water-logging a peculiar alteration is visible in the aerial parts of *Opuntia*. A minute examination of the joints shows circular brown spots of various sizes with dark central 'nuclei' which ultimately produce a diseased condition resembling the Zone spot disease described in the Commission's report and is probably a case of 'water sickness' which Sorauer called 'Cork Disease.' In the more advanced stages the joints swell considerably in thickness and develop a very thick layer of cork which not only checks loss of water but also shuts off light from the inner cells and as a consequence further assimilation ceases and the plant practically stops its growth. The contrast is made specially striking in places where portions of cactus vegetation are subject to periodical inundation during the year.

3. Though the prickly pear is prolific to a marked degree, a superficial observation will disclose the fact that a large number of fruits are aborted, either partly or wholly, being considerably smaller and shrivelled in appearance and containing fewer number of fully matured seeds in them and with a large number of ill developed ones. Experimental work is needed to determine how far complete abortion is due to damage by insects, as some of them undoubtedly devour the stigma during the day when the flower is open. But such insect damage does not take place in those which develop a portion of their seeds and turn red and fleshy in contrast to the fully aborted ones which remain yellow and dry. The cause of this partial abortion

seems to lie in (1) sterility of pollen and ovules due to vegetative propagation which goes on more rapidly than propagation by seeds and (2) the behaviour of pollen in wet weather.

1. Sterility of reproductive parts is a necessary concomitant in plants that are vegetatively raised. Such sterility is more easily observed in pollen grains than in ovules and an examination of the pollen of *Opuntia* will show that, whereas the fully matured and strong grains are characterised by abundance of reserve material in the form of starch, the weaker sterile ones are much smaller and their contents are relatively poor. The size of the grains varies from 90 to 130 microns.

2. The pollen grains are extremely sensitive to moisture. When viewed in a drop of water under the microscope they will be seen to burst at once and eject their contents in a remarkable manner owing to their very high capacity for absorption of water (hydration capacity). Such bursting of pollen may be found in cotton, portia (*Thespesia populnea*) and in several of the *Malvaceæ* and other plants. This fact seems to make it clear that where the rainfall is excessive or the atmospheric humidity is very high the flowers may fail to be fertilised effectively and this added to the fact that the roots and shoots are also adversely affected by the same factors seems to compel the plant to flourish best where it is, namely in the most arid regions only. If this view is adopted it explains to a certain extent the failure not only of xerophytes but of certain other types of plants as well in new regions of the globe.

Reference.

- Balls, W. L. 1915. The Development and Properties of Raw Cotton. P. 156.
- Cannon, W. A. 1915. Year Book of the Carnegie Institute of Washington No. 14 p. 64.
- Johnson, D. S. 1913. Fruit Development in the Cactaceæ. Year Book of the Carnegie Institute of Washington. No. 12 p. 86.
- Report of the Prickly Pear Travelling Commission, Queensland 1914. T. H. Johnston and H. Tryon.
- Sorauer, P. 1909 Handbuch der Pflanzenkrankheiten Vol. I p. 428.

Resurrecting A Dead Industry.

BY R. NABASIMMAN

Sub-Assistant to the Government Mycologist.

In January 1919, a grapevine grower from Michaelpatti, a Roman Catholic Village, near Kodaikanal Road, Madura District, came to the Plant disease section of the Agricultural College with a steeltrunk full of rotten grape shoots and complained that all his vines and those of his neighbours were severely attacked by a disease. The specimens were examined and found to be attacked by Mildew. The ryot was told that this disease could be prevented by spraying the vines with Bordeaux mixture (Copper-sulphate and Lime mixture with a suitable adhesive like Resin and Soda), all the ingredients of which are cheap and easily available in bazaars. As the disease had gone much too far, it was too late in the season to do spraying that year.

2. In December 1919, a Mycological Assistant was deputed to survey the whole area and to take up spraying on a field scale. In January 1920, three gardens were sprayed and another three were kept as controls. Very many gardeners of this locality were watching with misgivings the spraying and the effect of spraying. After a month, in February, another spraying was given to the same gardens. As a result of these operations the gardens looked quite healthy and there was no trace of Mildew on any of the vines. The ryots now realised that the disease had been checked and a large number offered to get their vines sprayed. In March 1920, eight more gardens were sprayed, this time at owners' cost. In all 88 vines were sprayed at Government cost and 151, at owners' cost. The crop harvested during the season from 239 vines was worth Rs. 2950, as against Rs. 710 of the previous season. Owing to the heavy cost of chemicals due to the War the cost of spraying at that time worked at 0-11-6 per vine, but at present market rates it comes up to about six annas per vine.

3. In 1921, an Officer was again deputed to continue the spraying work, and 38 gardens were sprayed at ryots' cost. The ryots realised the benefit of spraying and several of them wished to own

sprayers for themselves. Six sprayers were subsequently sold to them.

4. In 1921, spraying work was extended to Panchampatti near Dindigul, Madura District, where 16 gardens were sprayed with equally good results.

Naturally enough, ryots who once gave up vine cultivation because of the uncertainty of a paying crop, are now taking it up with confidence as a business concern for the reason that they now know of a sure and simple remedy which can keep the vines free from disease.

Extracts.

Diet and Nutrition. It is now generally recognised that the various dietetic elements viz., Carbohydrates, fats and proteins are to a great extent interdependent and the effective utilisation of each food-stuff by the human body depends upon the proper balancing of the constituents. These may be likened to the several parts of a rotating wheel and unless the parts be properly balanced, the wheel does not run true. For instance, when carbohydrates are removed from the diet, fats are incompletely oxidised, and similarly the presence of carbohydrates would appear to be essential to the normal course of protein metabolism.

Proteins are the most important of the dietetic elements: Proteins vary, in their nutritive values. It was found that milk, when forming the only source of protein was superior to all other foods. Of the cereals, wheat possessed the highest biological value. One of the essential constituents of proteins from the nutritive standpoint is tryptophane. Casein contains 2%, the proteins of cow's milk whey 1.8 to 2.3%, and the proteins of human milk 3.4 to 6.8% of tryptophane.

The effect of diet on mammary secretion shows that great differences occur in the initial weight and rate of growth in litters of young rats according to the food of the mother. On deficient diets the mother appears to be able to supply certain essential constituents from her own tissues.

In addition to the above, the presence of unidentified accessory factors or *vitamines*, which are assumed on the evidence available, to be definite chemical substances, has been shown to be essential to growth and to maintenance of health. *Vitamines* are primarily of vegetable origin and cannot be synthesised by the animal organism. The latter is entirely dependent on its food for the supply of *vitamines* necessary for its own development and for that of its off-spring in the early stages of growth. *Vitamines* are classified as A, B and C.

The fat-soluble *vitamine* A appears to be essentially a product of photosynthesis in plants. Plants deficient in chlorophyll such as etiolated seedlings, white cabbage, mushrooms etc., are deficient in *vitamines*. If further research confirms the supposition that *vitamin* A owes its origin to the synthetic processes taking place in plants under the influence of light, it is obvious that we have here a fact of fundamental importance from the standpoint of rational diet and nutrition. *Vitamin* A has been shown to be one of the chief factors concerned in promoting normal growth. The growth energy of the young is much greater than that of the adult and demands a larger supply of the growth-promoting factor. In the earliest stages of growth this supply can be derived only from the mother. Thus the fat of mammalian milk is richer in this respect than the depot fat of the body. There is, as it were, a mobilisation of reserves on the part of the mother to meet the needs of her off-spring. Colostrum is richer in *vitamine* A than is normal cow's milk. Summer and winter milk differ appreciably in *vitamin* content, the former being the richer in this constituent owing to the fact that in summer cows are fed largely upon grass. [This is probably the case only in England and other cold countries]. Vegetable oils in general are deficient in this substance, while animal organism is capable of storing up this factor. Cod-liver oil is one of the richest sources of *vitamine* A. This is due to the fact that the ultimate food material of all marine animals is the green marine algae which are endowed with the power of photo-synthesis.

The effect of *vitamin* A on growth is dependent on the presence of a sufficiency of calcium. It is opined that it is the precipitation of

insoluble calcium phosphates during the heating of milk which is responsible for the lowering of its nutritive value. [It is possibly on account of this, that Ayurvedic doctors recommend freshly drawn uncontaminated milk for medicinal purposes.]

The water-soluble factor B is more widely distributed than the fat-soluble A, especially in pulses and in the whole-meal of cereals and moreover appears to be more resistant to heat and oxidation.

Vitamine C is formed during the process of germination of seeds.

(Extracted from an article on "Foods" by G. W. Monier Williams in the 1921 report of the Society of Chemical Industry.) K. K. R.

POULTRY.

Strain and feeding for egg production. Strain and feeding must go hand in hand if eggs are to be produced in satisfactory numbers. No matter, how splendid a laying strain one's hens are, they will not give a satisfactory yield if they are not supplied with the materials from which to manufacture eggs. Without mortar bricks cannot be made; neither can the hen make eggs without the necessary elements. Again, given the proper food and elements, there are many hens that won't lay; or at least lay only a yearly number of eggs that will scarcely pay for the food eaten. They put the food to every purpose except the one it is intended for—to make eggs, and the reason lies in a poor strain—an untrained strain, one would say—a strain not bred to lay.

• Trap-nesting has revolutionised the poultry industry and what 20 to 25 years ago would have been considered impossible has now become quite a recognised fact—viz., that by selection and breeding we have hens that can be relied upon for heavy egg production. Such are the birds, one ought to have; and, at this season, where mongrels still exist, they ought to be eliminated and in their place should be put birds that will give a good profit to their owners over and above paying for their food. Only such are worth having and worth keeping.

The Breed.

Before seeing to the strain one must select the breed or breeds they desire to keep. If eggs are the main object in view, one of the lighter

breeds will be chosen. There are many utility breeds that combine both laying and table qualities, and on the whole these are perhaps the more suitable to many. The cockereis of such are worth selling and worth eating; while the hen, when their laying period is finished, make good pot fowls. Beyond their egg production there is little to be said in favour of the lighter breeds, as for table use they are not much in demand. They have this advantage, however, in that they require less food than their heavier-weight sisters.

Roup—An Autumn Trouble.

Want of pure air and stuffiness in the sleeping quarters, with air probably contaminated from uncleaned dropping boards in many cases, causes this nasty trouble. There is nothing better for keeping the respiratory organs in good order than pure air, and plenty of it. Given a clean dry house, and well ventilated, there is little danger of an outbreak of roup. When it does occur, separate the affected birds from the others, and place them in a comfortable house.

One of the best stimulants to raise the temperature of birds, which is usually found lowered by such troubles, is just ordinary table mustard. It is a very good tonic, and does no harm to the liver. A dessertspoonful to 14 or 15 birds is about the quantity to use. Dissolve it and mix well in the mash.

[The above is an abstract of what an enthusiast contributes to the Scottish Farmer of the 9th September. To suit Indian conditions, a feed which contains a good deal of broken rice, bran and ragi grains (preferably broken) would induce egg production. The fowls must have a good deal of broken seashell grit and green vegetables to be picked up freely. There is a great deal of water in eggs and heavy layers will certainly require a good supply of clean water. Give them a drink of good water in a clean vessel thrice a day and never allow the vessel to get dirty, giving it your personal attention. Try to feed the birds as early in the day as possible. Leghorns are the best layers in India.

K. U. M.

Lead poisoning of Stock.—A. R. Young, M. R. C. V. S., Director of the Live Stock Division, New Zealand.

The poisoning of stock by lead compounds is not an uncommon though unsuspected cause of loss. Instances of tins or paint vessels, which had contained paint or red lead, carelessly left lying about houses are not uncommon, and cattle that gain access to these vessels are easily poisoned. Deaths may occur and pregnant animals may abort.

Symptoms: of acute lead poisoning are as below:—The animal appears dull and listless, and does not appear to have any desire for food; the abdomen is tucked up, and there may be signs of colic. Diarrhoea is usually present, and the faeces very dark in colour. Stiffness or partial paralysis soon sets in, but the most prominent sign is a wild-looking, staring eye not associated with any noticeable excitement. This is due to the unmistakable condition of the retina causing partial or complete blindness, and it is not uncommon to see the animal walk up against an obstacle or into a ditch.

The chronic form is rarely met with in animals, and occurs where only small quantities of the poison are available. In such cases pregnant animals abort, emaciation takes place, and the coat is hard and dry. The abdomen is tucked up, and partial or complete paralysis supervenes. The blue-black line along the gums so characteristic of lead poisoning is developed and death is brought about by general paralysis, specially affecting the heart.

Treatment. Where lead poisoning is suspected a generous dose of Epsom salts should be at once administered. The action of this agent is twofold—it acts by expelling the unabsorbed solids and also, in conjunction with solutions ready for absorption, forms a practically harmless insoluble compound. Flowers of sulphur has been recommended, as also lime-water, and where recovery is slow potassic iodide should be used.

Prevention. Greater care in the disposal of disused vessels which have been used to hold paint or red lead would result in a great saving in stock. The points to be remembered in this connection are that

paint and red lead are articles in common use, that both retain their poisonous properties for many years, and that a very small quantity will cause death within two or three days; further, that if irregular, small quantities only are obtainable, a chronic condition is set up, which in the end may prove more expensive than if the animal had died in the early stages.

The New Zealand Journal of Agriculture, Vol. XXV No. 2.

Y. R. R.

THE BRITISH ASSOCIATION.

Agricultural Section.—The proper position of the Landowner.

Lord Bledisloe, formerly Parliamentary Secretary to the Ministry of Food, delivered his presidential address to the Agricultural Section of the British Association at Hull on Monday 11th September. His subject was "The Proper Position of the Land owner in Relation to the Agricultural Industry."

Lord Bledisloe, in dealing with the English estate system, said that in few cases was it conducted on business lines, and therefore it proved unconvincing to the tenant farmer. In Germany, on the other hand, the typical East Prussian land owners farmed a large part of their own estates, and, realising the importance of the application of science to farming, they sought skilled scientific managers from the German Agricultural Colleges, notably Bonn. *Great as were the advantages of occupying ownership, such a system although capable of wide extension, could not exist in this country to the entire exclusion of that of landlord and tenant.* Nor was it desirable that it should do so. Some of the most skilled, progressive, and influential farmers in Great Britain were and would continue to be, farm tenants. From such men their landlords could learn much. On the other hand where a tenant was obviously an inefficient farmer, the landlord, with the moral backing of his more efficient tenants and of the whole working population, should boldly assume the responsibility of terminating his occupancy.

Lord Bledisloe proceeded to compare agricultural conditions in Continental countries with those in Britain. *In recent years, with the*

distintegration of large British Estates, many farmers had no option but to purchase their holdings, and the purchase was made under the worst possible conditions. The system of land banks on the Continental model would have simplified the process of such transfer, and would have obviated in a large measure its inevitable risks. In Denmark, the landowners had been the pioneers of all new methods and processes in farming, and the farmers in their neighbourhood had followed their example. Though our soil and climate could compare favourably with those of other Continental countries such as Belgium, France, Germany, and Italy, yet the Continental landowner derived, as a rule, a net income of £ 3 to £ 4 per acre, as compared with £ 1 per acre in Britain. Moreover, the Continental landowner, so managed his woodlands that they yielded, generally speaking, an average net profit at least equal to the rental of the agricultural land—often very much more. That England should have 55 per cent of her cultivable land under pasture, as compared with only 18 per cent in Germany was not creditable to us. In Germany, too, game preserving was on a relatively small scale, whereas here the claims of property as such had over-ridden those of industry, which alone could in the last resort justify property, and at the same time enhance its value.

There was a strong political movement in favour of land nationalisation. To the advocates of land nationalisation in the mass the landowner appeared as an industrial parasite, a mere rent-receiver, who "reaps where he has not sown, who gathers where he has not sowed." But if he were to stand out, in the body politic as a producer, trained for his task as such and prepared to accept the position of managing director of the great and, if well organised and directed, potentially profitable industry conducted upon his property, his position as a landowner would be far less vulnerable and his utility to the State indisputable. The agricultural community in Britain to-day above all things needed efficient organisation and the landowner, after due training, should take his proper position both as a leader and chief organiser. The history of Agriculture in the United Kingdom for the last seventy years did not redound to the credit either of landowners or of statesmen. Landowners, who should have given a

lead, had failed to do so. The British agricultural landowner today was on his trial. Unless he justified himself as such, the nationalisation of the land was inevitable. Public opinion would demand his extinction, and Parliament endorse the demand. "Many land owners," he said, "have been for the last two generations mere rent receivers, and have possessed neither the knowledge nor the inclination personally to administer their own estates, still less to cultivate them on commercial lines for their own and the nation's benefit. So far as they have been organised as a class of the community, they have organised not as producers of wealth but as defenders of property, and as such their organisation has in a highly democratic country afforded them, but a small and steadily decreasing measure of security. They have lost their political power because it had no economic basis."

There was probably no worse consequence of the lack of cohesion of organisation, and leadership in British agriculture than the extent and power of the middlemen interest—unparalleled elsewhere in the civilised world—whose parasitic tentacles had slowly yet surely fastened themselves upon the industry, and were sucking out its life's blood to the detriment of producer and consumer alike. Apart from the heavy burden of local and Imperial taxation, the toll levied by the middlemen was the main cause of the poverty stricken condition of the English agricultural labourer. While companies whose sole object and justification are the distribution of British agricultural produce were paying 25% dividends, or issuing bonus shares to their urban shareholders and to those who, "toil not, neither do they spin," the countryside was being slowly denuded of its physically and mentally robust manhood owing to the indigence of the agricultural producer, their emigration was being fostered by statutory enactment, and foreign produce of the same or like description was being sold in increasing quantities in British markets. It was an unedifying spectacle which agricultural solidarity and leadership alone could efface.

(The Scottish Farmer, September, 23, 1922).

POST WAR PROGRESS IN THE FIXATION OF NITROGEN.

(The substance of a paper read by Dr. J. A. Harker F. R. S., before Section B Chemistry of the British Association, Hull 1922).

Cyanamide process. The cyanamide process, though stated by many authorities to be obsolete or at any rate obsolescent, had at the end of the war an aggregate capacity in tons of nitrogen distinctly greater than that of any other method of fixation. It is quite true that since the armistice many of the works erected or enlarged during the war period have been closed. In some cases their situation was unfavourable for post-war commercial operation, and some of those whose output was used as a source of ammonia for munition purposes are unable under present conditions of cost of labour and raw materials, to operate for the commercial manufacture of fertilizer. The largest cyanamide works in the world, capable of producing about 200,000 tons annually and erected during 1918 by the American Government at Alabama, is one of these.

So far as can be ascertained there has been no new development of outstanding importance in the manufacture of cyanamide itself although detailed improvements have been made; but, nevertheless, even in the present difficult conditions cyanamide is still almost certainly the cheapest form of combined nitrogen. In Germany notwithstanding the recent big synthetic ammonia developments, plans are now on foot for an immediate approximate doubling of the capacity of the great cyanamide plants at Presteritz belonging to Messrs. Frank and Cara.

But cyanamide, when made, is at best an unsatisfactory fertilizer for many soils. When in the course of an investigation a few weeks ago, the writer had an analysis made of what was probably a rather old sample of cyanamide, to his surprise he found that the nitrogen content was practically all in the form dicyanodiamide. If such transformation is common, it is no wonder that the action in the soil is sometimes found to be injurious, rather than beneficial. Many efforts have been made within the last few years to find some process by which cyanamide nitrogen can cheaply be transferred

into some other compounds. To transform it into ammonium is a relatively expensive process.

An American Company is now manufacturing from cyanamide for export a concentrated mixed fertilizer in the form of monoammonium phosphate sold under the trade name of Ammophos. This would appear to be a promising material but it is too costly for many applications. But within this last year independent investigators in Sweden and Switzerland, working along parallel lines have succeeded in perfecting processes whereby the action of carbonic acid, free cyanamide is first prepared from a solution of calcium cyanamide and subsequently transformed into urea. In the Swiss form of the process, excess of H_2SO_4 employed in the second stage of the transformation is afterwards used to act upon phosphate rock which is changed into monocalcium phosphate. The final product is a neutral body known in France and Switzerland as Phosphazote having its nitrogen content as urea and its phosphorus in the water soluble form. The cost of its manufacture is stated to be by no means high and unlike cyanamide the substance has no deleterious action on the skin or the bags in which it is packed. It has now been manufactured in Switzerland on a fair scale for about six months the product going mostly to France for vine culture. The relation of the two constituents can be varied within limits, but the usual form in which the fertilizer is sent out contains 11 to 12% of nitrogen as urea and 11 to 12% available phosphate.

H. S. Rao.

Reviews.

Krishika Mitran. It is undeniable that if an up-to-date knowledge of Agricultural improvements is to reach the cultivator, it can only be through the medium of a Vernacular paper. From this point of view, the birth of any new vernacular paper with an Agricultural bias is always to be welcomed and in our opinion there cannot be too many of them in India at the present juncture.

"*Krishika Mitran*" or the "Farmers' Friend" is a Tamil Monthly devoted to Agriculture that hails from Adyar, Madras. It was started in April and during the past six months, it has been supplying its readers with information of importance extracted from various sources and we believe it will exert a wholesome influence on the Tamil ryot. "Why we pay taxes" and the "Rice trade" of September issue are instances of subjects that have received attention and the inclusion of a Calendar for the month following is a feature that will appeal to the rural public. We congratulate the management on the neat get-up and the excellence of the matter and heartily recommend it to the notice of the literate ryots.

Report of a Campaign against *Spodoptera mauritia* in Malabar—by Mr. E. Ballard, B. A., F. E. S., —Pusa Bulletin No. 132 Agricultural Research Institute, Pusa.

The subject matter of this Bulletin concerns one of the most serious pests of paddy viz., the Paddy Swarming Caterpillar. This pest has been reported from most of the paddy areas of Madras and in all cases its appearance is very sudden, without any sort of previous warning whatever. In most cases, the reports are received so late that the devastation is already complete before help can reach the area, and it was thus always found impossible to demonstrate remedial measures against it. The plan of the present campaign was to take up a fairly large and compact area (Malabar being selected) and to be ready and prepared at the expected time throughout the area; whereby it was hoped the section would be able to come to real grips with this ever elusive enemy, the moment it made its appearance. The various parts of the district were previously visited and by a scheme of publicity propaganda aided by lectures and lantern shows the people were educated as to the methods of recognising and tackling the pest when it appeared. But, as Fate would have it, there was no outbreak of the pest during the year '20, except in one solitary locality, where it was promptly checked though information was received late. The Campaign was, however, of use in providing opportunities of gaining experience which would no doubt be of use in future undertakings of the same sort.

Notes and Gleanings.

Stagnant Pools. In countries where there is little running water, the cattle are dependent for their drink upon stagnant pools. These look anything but inviting. The water becomes brown and dirty-looking. Quantities of green and brown vegetation gather on the surface, and one would hesitate, however thirsty, to quench one's thirst in what appears to be a slimy pool. But this floating green mass—really composed of millions of algae, the simplest of vegetable forms—keeps the pool pure. They use up impure matter and convert it into food for themselves, and they also oxygenise the water. Such pools for this reason provide a purer drink than many a running stream, which, though clear, may contain harmful impurities, while its motion does not permit vegetable life to feed upon these impurities.

The Scottish Farmer, September 1922, S. N.

Sodium silicate as an adhesive. Sodium silicate solution can be prepared to meet all the requirements of a good adhesive; they are superior to animal and vegetable adhesives in that they are fire-resisting, do not become rancid, and are vermin-repellent. Silicate adhesives are quite odourless, and produce damp-proof articles, they have a relatively high bond strength, and their setting times can be varied over a wide range. They are ever ready, requiring no heat before or during application, and they give consistent results. The apparatus required for their application to wood, paper etc., is extremely simple.

Journal of the Society of Chemical Industry, Vol. 41, No. 18, September 30, 1922.
H. S. R.

Apparent infertility of the soil around trees. The presence of barren patches or a stunted growth of crops around trees is a point of every day observation. What it is due to is the subject of an article in the Journal of Department of Agriculture, South Africa, by Mr. Williams, Chemist, Cedara. Various explanations usually

offered are (1) the cutting off of light and air by the trees, (2) the depletion of all plant food by the roots, (3) a concentration of mineral salts due to the absorption of soil moisture by the roots, and (4) the toxic secretions of roots of trees.

The writer, however, believes that the true explanation lies solely in the loss of soil moisture due to the heavy needs of trees for transpiration and consequent depletion of the water content of the surface and sub-soils: and seeks to prove it by the results of analyses of various parts of the soils in affected parts.

Y. R. R.

Milk yield of cows. By producing 2,515 gallons of milk in 284 days the British Friesian cow, Brookside Colantha, has broken the British milk production record. A short time before this, a short-horn cow in the herd of Mr. E. R. Debenham of Dorchester, attained an yield of 2,614 gallons of milk in 365 days. A continuous yield of 8 gallons per day is a notable record in British Dairy herds. In the Central Farm the highest yield attained is about 4 gallons (40 lbs. or 10 Madras measures) per day and we hope to be able to see that this is considerably increased by means of systematic selection, breeding and feeding. Giving as they do only 1½ gallons per day, it will be seen how far our cows lag behind, as regards milk-producing capacity.

K. U. M.

Pykara and Avarai Halla Rivers—Generation of Electric Energy. With the previous approval of the Government of India, the Government of Madras have sanctioned the grant, subject to certain conditions, to Messrs. Alfred Dickinson and R. D. Richards on behalf of a syndicate formed of the above mentioned gentlemen and Messrs. Balfour Beatty & Co., Ltd., and the General Electric Co., Ltd., London, of a concession to make use of the water in the Pykara and Avarai Halla rivers in the Nilgiris district for the generation of electric energy for industrial purposes.

Pub. Bureau.

The Danger of using Hydrocyanic Acid for Disinfecting Flour.

It is declared that the treatment of flours with hydrocyanic acid should be prohibited, for, investigations made in the Mans Municipal Laboratory have shown that flour can fix an appreciable amount of this acid. The sample examined, which was of pure wheat flour, contained, 82 mg. of prussic acid per kilogram. This is below the danger limit (118 mg.) fixed by the Higher Council of Public Health of France. It must, however, be remembered that flour in the form of bread is the basis of man's daily food, and that baking does not remove all the prussic acid it contains; hence the presence in flour and other foods of even smaller quantities than the amount permitted by the above Council, constitutes a danger to the consumer.

(Conseil Supérieur d'hygiène de France).

(International Review of the Science and Practice of Agriculture, Year XII No. 10, October 1921.)

Remedy for Rhinoceros Beetle. Sr. C. X. Furtado states—in Boletim de Agricultura, Year II, Nova Goa, 1920—that having once put into a vessel containing water, a few small fish and other refuse with the idea of using them when decomposed as a manure for certain plants in his garden, he found after some days, that the vessel was full of beetles which had been attracted by the smell emitted by the decomposing matter.

(International Review of the Science and Practice of Agriculture, September 1921.)

A method for trapping Rhinoceros Beetles. The Assistant Agricultural Demonstrator, Gudiyattam, reports the following method to be in vogue among owners of coconut gardens of North Arcot District, for trapping the Rhinoceros beetles. These beetles are very destructive especially in young plantations and the ryots place several wide-mouthed "Chatties" (earthen pots) filled with the spent liquor of castor oil in each tope. The liquor soon begins to ferment and emit a strong and offensive smell, and the beetles which are

strongly attracted by this smell appear to fly into the pots and get drowned. The liquor is reported to be renewed once a fortnight, as otherwise it loses the smell and ceases to be attractive.

[Kitchen refuse including rice-water is also used in the North Arcot District in the place of Castor liquor for attracting the beetles; and in this connection the observations of Sr. C. X. Furtado in Goa as to the attraction exercised by decomposing fish etc. kept in a basin of water, appear to confirm the statement.]

The Paddy Crop of 1922-23—First Report. The area sown with paddy up to the end of September 1922 is estimated at 6,643,000 acres. This is 8 per cent below the estimate of 7,231,000 acres made on the corresponding date last year.

Figures by groups of districts are given below in thousands of acres.

Group.	Estimate of area sown up to the end of September.	
	1922	1921
	Acres	Acres.
Circars ...	3,572	3,848
Deccan ...	126	149
Carnatic ...	610	735
Central ...	387	626
South ...	812	773
West Coast and Hills ...	1,136	1,100
Total ...	6,643	7,231

Pub. Bureau.

Sugarcane Crop of 1922-23—Second Report. The area planted with sugarcane up to the end of September 1922 is estimated at 125,800 acres against an estimate of 115,000 acres last year.

The drought which prevailed during July and September necessitated the irrigation of the crops at a heavy cost. Yields are expected to be below the normal, especially in Chittoor where the season was most adverse.

District.	1922.	1921. *
Agency Division	8.0	7.0
Ganjam	5.4	6.0
Vizagapatam	26.0	23.0
Godavari	11.2	12.0
Bellary	9.0	8.3
South Arcot	8.8	7.0
Chittoor	12.6	13.0
Salem	6.1	6.0
Coimbatore	11.4	10.0
Trichinopoly	8.8	7.0
South Kanara	3.4	3.2
Others	15.1	12.5

* In hundreds of acres.

Madras Pub. Bureau.

Cultivation Statement.

Lands registered as dry. The area sown in August 1922 is reported as 2,983,900 acres against 3,764,500 acres last year. The rainfall in July 1922 was generally far below that in July 1921 and hence there is a decrease of about 21 per cent. It is most marked in the Deccan, and Central districts. Anantapur and Coimbatore suffered most, the area falling by about 50 per cent in each.

The area sown from April to August 1922 is reported as 6,859,600 acres, against 8,118,300 acres last year. Sowings were satisfactory in North Arcot owing to early rains; many high-lying lands in Malabar were brought under cultivation owing to the favourable season. The area sown in the Deccan was 35 per cent below last year, the corresponding figure for Anantapur being 50 per cent.

Lands registered as wet. The area sown in August 1922 is reported as 1,108,900 acres against 1,218,000 acres last year. The area in Nellore was only 17 per cent of last year. The area in Godavari, Kistna, and Guntur was above the average.

The area sown from April to August 1922 is reported as 3,041,000 acres, against 3,117,600 acres last year. There has been a reduction in area in Godavari and Nellore while there has been an increase in the South.

Pub. Bureau.

Seasonal condition of the Presidency at present. The South West Monsoon this year was exceptionally favourable on the West Coast and many high-lying lands which are usually left uncultivated were brought under cultivation.

The rainfall in September 1922 was generally below the average. There was practically no rainfall in the month in the Deccan districts, Nellore, Chittoor and Tinnevely.

The rainfall from 1st June to 23rd September 1922 was generally below the average and that of last year except on the West Coast. On an average 70 per cent of the cultivation takes place with the help of this monsoon and its partial failure has affected the progress of agricultural operations generally. The Deccan districts suffered most as the rainfall was seriously in defect the as their dependence on this monsoon is even greater than the average, seven-ninths of the total cultivation taking place with its help. The area reported as sown in the Deccan up to the end of August showed a decrease of 925,700 acres (i. e. 34 per cent) when compared with last year.

The supply in the irrigation sources has been generally insufficient, except in the main deltas.

Dry crops are suffering from drought and are reported to be fading in parts of seven districts.

Paddy and pepper on the West Coast are generally in a good condition.

Elsewhere, the prospects of paddy are fair, except in Viragapatam, the uplands of Godavari and Kistna and the eastern portions of irrigated area in Tinnevely.

Pub. Bureau.

Functions of a University. If a university is to fulfil its obligations to the nation it must provide students of genius with the means and opportunities of obtaining knowledge, all skill requisites to satisfy their intellectual aspirations. A university would flourish as a vigorous seat of learning only if the teachers in the various departments of intellectual activity would regularly contribute their share in the cause of advancement of learning. A university would languish if such contributions be long intermitted and it would die away as a centre of light if research should entirely cease. "A university must be free from external control over the range of subjects of study and methods of teaching and research. We have to keep it equally free from trammels in other directions viz., political fetters from the state, ecclesiastical fetters from religious corporations, civic fetters from the community, and pedantic fetters from what may be called the corporate repressive action of the university itself. A university must have the fullest independence and the amplest powers in working out its intellectual salvation. A university cannot be saved from inevitable decay and destruction if the students allow the pursuit of their studies to be disturbed for a moment.

(Sir Asutosh Mukerjee—Lahore University Convocation Address.)
3rd January 1922.

More about "Efwatakala" Grass. Translated from the *Revista de Agricultura Tropical of San Salvador.*

"A farmer had sown a field of a certain pasture known as *Sorghum halepense*, which grass grew so well that it rapidly spread and soon invaded some coffee plantations, until it was found impossible to eradicate it even by digging out the deeply grown roots. But the farmer knew that the *Gordura* (*Efwatakala*) grass was easily

planted, and that once established, its destructive properties in regard to other plants were very effective, whilst, at the same time, the *Gordura* could be easily destroyed, if necessary, because of its superficial roots. He therefore proceeded to sow some of this grass, and very soon obtained the desired result; the *Gordura* destroyed completely the *Sorghum* and covered the entire ground, and was in turn removed with ease. This ingenious procedure, if rigorously exact, will constitute a biological method of vital importance to planters, enabling them to destroy in this manner, certain tenacious weeds which render land useless for agricultural purposes."

Rubber, coffee, and sisal planters, in particular are well aware of the trouble that *Imperata cylindrica* (Lalang of Malaya and Lusanke of Uganda) gives as plantation weed in various parts of the tropics, being most difficult of eradication and imparting serious injury and often destruction to the crops grown. Where this grass is a troublesome weed, it may therefore be well worth while making a test with the *Efwatakala* grass.

It is a perennial producing heavy crops of nutritious fodder, and is capable of being out at a period when the farmer is assured of fine weather for the work."
Tropical Life 1922.

Ammonium bicarbonate; Employment of—as a fertilizer. The present economic situation in Germany and in particular dearth and scarcity of H_2SO_4 have directed attention to the possibility of replacing ammonium sulphate for fertilizer purposes by ammonium bi-carbonate. A series of field trials carried out in the summer of 1921 with two equivalent quantities of the compounds applied to the rye, oats, potatoes, roots and meadow gave the general result that the bi-carbonate approached the sulphate in value and in some cases equalled it. No serious loss from volatilization seems to have occurred at any rate when the manure was raked or harrowed in. The bi-carbonate does not render the soil acid and in view of recent work on the fertiliser value of carbon dioxide, its content of the latter should be beneficial. The salt can be prepared in a condition suitable for sowing and does not cake. The main difficulty has always been its volatility, but while some loss always

occurs it is believed to be mainly carbon dioxide, a sesquicarbonate being first formed. Packed in second hand casks the salt lost 2.75% of its weight in 30 days. In paper bags treated externally with soluble common-resin the loss in the same period was 0.5%. The material may be advantageously compounded with super-phosphate.

H. S. R.

Steam treatment for killing insects in Railway cars. The Apple Industry in British Columbia has of recent years received a set back on account of the importation from the United States of America and Canada of the Codling Moth through infested apples brought in refrigerator cars. During transit the Codling Moth larvae escaped from the consignments of apples and pupated on the sides of the cars; and wherever the cars travelled, the pest was also conveyed and introduced.

From experiments tried by injecting steam under pressure in the refrigerator cars it was found that subjection to steam at 150° to 190° F. for 15 to 20 minutes had the effect of killing all insect life inside; and that the insulating apparatus of the cars was in no way affected.

[Here is a practical instance of the potentialities for harm for spreading pests and diseases a railway carriage possesses, and it points to the necessity of periodically cleaning and treating railway cars in our country too. One would, especially, wish that the passenger-cars were periodically steamed or fumigated, considering the degree of infestation of the bed bug pest on our Indian Railways.]

From the Canadian Entomologist, September 1922.

Y. R. R.

Students' Corner.

Lectures.

In pursuance of an effort at co-ordinating research with teaching, the students of the various classes were given in the course of

this month, lectures in special subjects such as "Bacteriology" by Mrs. Norris—Agri. Bacteriologist, and "Enzyme Chemistry" and the "Place of Chemistry in Agriculture" by Dr. R. V. Norris. The lectures were, we hear, delivered in a popular manner and were very interesting. We trust more and more of the experts will give the students the benefit of their special studies and researches, and instill into them the germs of a thirst for knowledge.

The Government Sugarcane Expert also gave an exhibition of lantern slides to students in order to illustrate the various phases of the important study of Cane Breeding he is engaged in.

On another occasion, the Government Lect. Botanist gave an Exhibition of Magic lantern slides illustrating a study of Agricultural Botany.

Hockey Tournament. The two opening games in the local annual hockey tournament which commenced on Monday the 30th October were played as usual, on the Police Recruits' School grounds. The Agricultural College met the Stanes School on the one, and the Forest College tried conclusions with the Reserve Police on the other.

The College defeated the school by a small margin of one goal in a total of seven scored in the evening. The Foresters had a tough encounter with the Reserve in the first half, wherein the latter were successful to the extent of leading by an odd goal out of the three. In the second half, the high level of game which the Foresters maintained, coupled with their determination to win, stood them in good stead to turn the table over their opponents. They added during this half three goals to the one already registered and thus won by a comfortable margin of two goals.

On the 1st of November, in the semi-final round, the Agricultural College stood opposed to the Forest College; and the Auxiliary Force, which figured for the first time in the list of competitors, were pitted against the Government College, Coimbatore, which made its appearance again, very sportingly, after a long recess.

The opening exchanges in the game between the Colleges were in favour of the Agricultural College, but nothing tangible resulted

as many chances were let go unconverted. The first half time ended in a pointless draw. In the second half the Foresters outplayed their opponents and shoved the ball thrice into Agricultural College goal and thereby scored a brilliant victory over them.

The match between the Force and the Coimbatore College was anything but interesting. Judging from the way the Force struggled just to manage to pull the match out of the fire by scoring two goals against the one of their opponents, it appeared, as if it would have absolutely no chance against the Foresters—a eleven of no mean order—in the finals; but much to the astonishment of the spectators, the Force exhibited a very superior game from the very commencement and sustained it till the very end, which was instrumental in securing for them, though by a meagre margin of one goal—five against four—a much deserved victory and a greatly coveted cup.

H. S. R.

HOUSEHOLD HINTS.

Grass stains can be eradicated with butter spread over the spots and laid in the sun, or washing with alcohol will remove them. Fruit stains can be taken out with the juice of a ripe tomato. To remove tar stains, saturate the spot with turpentine keeping another cloth underneath the smeared area to absorb the stain. Paint stains though hard and dry, can be done away with by using equal parts of ammonia and turpentine. Saturate the spot three times with the liquid, rubbing it hard, then wash out with warm soap suds.

To put an end to ink stains, cover them with lemon juice and salt and place in the sunshine. If the ink is set, it may be necessary to repeat the process several times.

Many heavy stains, such as iodine, can be removed by stretching the garment over a deep bowl and pouring boiling water through the spot.

Mysterious iron-rust stains are caused by bluing. The blue contains iron, and the soda and potash in the soap left in the garment, coming in contact with the blue leaves a rust stain unless the clothing

is well rinsed before dipping in the bluing. See that the blue used contains no iron; as no matter how well the clothes are rinsed, there is danger of these marks. Rust stains, if not removed, ruin the texture of the cloth.

Lemon juice will take rust stains out, but be sure to soak the garment afterwards in a weak solution of household ammonia, if there is danger of damaging the colour.

Jamaica Agricultural Society's Journal, October 1922.

Estate News.

Plague. This fell disease, which took young Sudarsanam away from us in December 1915 and turned the residents out of their quarters on the Estate and kept them out for nearly two months, has re-entered the Estate after an interval of nearly seven years. The first indication was a rat fall in the Farm Buildings about the close of October and the second case of rat fall was in one of the thatched sheds for cattle, three days later. These two rats and several of the live ones killed while dismantling the thatch were after examination by the District Medical and Sanitary Officer declared positive. Ratfalls occurred later on in the carpenters' sheds near the new Building, and also in three of the B Types and in the peons' quarters; of the latter, 3 of the most recent cases have been declared positive. The sincere thanks of the whole Estate is due to Mrs. Norris and Dr. R. V. Norris for prompt bacterial examination of the stricken rats—often even at odd hours. The Estate is now definitely infected and careful preventive measures are being taken including inoculation. With the co-operation of the residents and the College authorities and above all by the mercy of the Almighty, we trust plague will soon disappear and we shall be able to heave a sigh of relief. We are sorry that, on account of this disease the usual College Day and Conference has had to be postponed *sine die* this year.

Anti-plague Inoculation. Although the final word has not yet been said about the efficacy of inoculation, yet it is generally admitted that

the measure confers a certain degree of immunity to the subject inoculated. Through the kindness of Dr. Kunhi Raman Nayar of the Lawley Road Dispensary, the great majority of the Estate Residents including most of the students and also the Farm coolies have undergone inoculation.

Mrs. Anstead. Mrs. Anstead who had been in our midst for over three years left for Madras as the result of the transfer of Mr. Anstead as Director and the occasion was availed of by the Indian Heads of sections resident at Coimbatore, to entertain her at tea in a fitting manner, on the 2nd November '22, on which occasion all the gazetted officers of the Estate were invited.

Departmental News.

Training in Oil Engine Management for Assistant Managers. There were till recently five mechanics from the Industries department attached to the various farms at Anakapalli, Nandyal, Hagari, Anamalai, Palur and Koilpatti, to look after the machinery there. As there was not enough work all the year round for these mechanics, it has been decided to send them back to the Industries Department and draft them for work during particular seasons—ginning mostly. At other times trained coolies will be in charge and to supervise their work, it was considered necessary that the Assistant Farm Managers at those farms should have some special training in running and looking after oil engines etc. The Government Agricultural Engineer has undertaken to give them the necessary training at Coimbatore. The course is to extend over 7 weeks, commencing from 6th November and four Assistant Farm Managers (from Anakapalli, Nandyal, Hagari and Palur) are at present undergoing training and another from Koilpatti is expected to come and join shortly. It would be of great advantage, if it will be possible to provide similar facilities for sons of landowners—that may be so desirous—for getting a training in Oil Engine work.

Special Lectures.

During the month, Dr. R. V. Norris gave a series of lectures lasting an hour each day on four different days, on his special

subject of study "*Enzyme Chemistry*." The lectures were well attended and all sections of the staff of the College, the Research Institute and the Farm were represented. The subject—we believe—will always have a fascination for people, for in most physiological or industrial problems of the present day, that come before the public eye, the ultimate causative agent is generally pointed out as "an Enzyme."

All that is known of "Enzymes,"—their constitution, their ways of action, their classification—were dealt with in a masterly manner, while, in addition, three of the best known enzymes viz., Diastase, Peptase and Zymase were treated in greater detail. As much of the information conveyed was the result of original research work, the personal note in the lecture was in our opinion of very great value, since it will go a great way towards the creation of an atmosphere of research in our institute. We trust there will be more lectures of this character in future.

Correspondence.

Dear Mr. Editor,

Will you or any of our Union Members very kindly furnish particulars to the following:—

1. Whether an ex-student, L. Ag., of the Agricultural College and Research Institute, Coimbatore, is allowed to study for the new B. Sc. course in his alma mater.
2. If so, whether he should take up again all the subjects prescribed for the full B. Sc. course or whether he is exempted and allowed to take up a group only, to specialize himself in it.
3. Whether any concession in the number of terms is given to him or he should study for the full period as a regular B. Sc. student.
4. Whether tuition is given free or is charged, in the latter case, the fee charged may kindly be stated.

Thanking you,

Yours truly,

Enquiring Member.

[In answer to the several questions raised in the letter we would state that:

1. An ex-student L. Ag.² will be allowed to join the new B. Sc. course if he has passed the Intermediate in parts I or II.
2. and 3. He should put in three years and take up all subjects.
4. Tuition fee—Levy of this fee will depend upon whether the student is from a State and information regarding the amount and other conditions can only be ascertained after an application to the Principal.

Concessions, if any, can be granted only by the Senate of the Madras University. *Editor.*]

Editorial Notes.

Scholarships for Agricultural Education.

Apropos the subject of scholarships for agricultural education, opinions are sometimes expressed that the present condition of agriculture in India does not warrant the luxury of such scholarships and that these usually attract the wrong type of men. On the other hand, one of the chief results of the impact of Western ideas on the minds of Indian villagers is the creation of a glamour for town life and the consequent tendency for a migration of labour from the country to the city. Agriculture which is the basic industry of any country has always proved to be unattractive to labour which is lured to the greater attractions of the industrial life of towns.

There is thus a great need for counteracting this tendency and attempts should be made to coax labour back to the land. With this very purpose in view, Governments of more advanced countries than India, such as England and Scotland, have recently been instituting numerous scholarships of various grades to encourage agricultural education. One class of these scholarships is intended

for the sons of labourers and are for short duration courses, while another class caters to students of a slightly higher type. There are in addition two more classes intended for Diploma or Degree students in Agricultural Colleges or in Universities and are tenable for three years. For fuller information the reader is referred to 'Nature', of 12th August 1922 and to the Scottish Farmer of 14th October 1922, page 1249.

We trust in the plenitude of time and with the dawn of better financial conditions, the Development Ministry will find their way to awarding more scholarships for the encouragement of our Basic Industry—viz: Agriculture.

British Agriculture and the Recent Elections.

Lloyd-Georgian Government had, by its amendment of the agricultural act and removal of the embargo on Canadian Store cattle, alienated the sympathies of the British farmer. When the elections came on 11th November, it was therefore a matter of extreme perplexity for candidates of the National Liberal party to stand before rural constituencies and ask for their votes. Mr. Asquith's vague generalities and absence of any specific reference to agriculture could likewise gain no sympathy for his party. The agricultural programme of the Labour party was definite but sweeping. Landlords were to be asked to sacrifice rents rather than farm workers being allowed to accept starvation wages. This party's promise of the establishment of representative councils of agriculture meant only the appointment of salaried officials, which was distasteful to farmers. Mr. Bonar Law's manifesto which promised the country a breathing space, sought to create a tranquil atmosphere and contained a definite reference to agriculture was therefore the least disconcerting. The Prime Minister excepted agriculture from the general policy of leaving things alone. He acknowledged that the greatest of British national industries was in a most serious condition and that it demanded the practical sympathy of Government.

His promise to re-examine the whole problem afresh with a view to securing satisfactory remedies was reassuring. Now that the Conservatives have come into power with a clear majority of 341 out of a total of 615 members, it is to be hoped that British Agriculture will not be left unheeded. In India, Lord Inchcape's Committee for the Central finances and the local Retrenchment Committees for Madras and other provinces are now sitting. We sincerely trust that Mr. Bonar Law's avowed intentions will be borne in mind and the Development departments, allowed to keep pace along with Britain and other countries in their work of rehabilitation, reconstruction and progress.

State Aid to Industries.

In view of the discussions going on in the local Legislative Council on the subject of state aid to Industries, the objects and working of the County Industries Co-operative Society Ltd in the Journal of the Ministry of Agriculture for September 1922 are worth perusal. "The Society will work in close association with the Intelligence Bureau. The need for a wholesale and control trading society has long been felt, as too often *unprotected and unorganised workers have had to accept* whatever prices they could get for their products. This will now be remedied as it is the intention to organise workers in village groups and link them up to a county society so that by combination and production on an economic basis they will be able to hold their own with other trades and industries. This should not only secure them a fair reward for their labour but also a reasonably permanent outlet, with facilities for giving their products a standard and protection by virtue of the registered designs of the Society.

"The objects are to carry on trade as importers, exporters and dealers, both wholesale and retail, of or in any finished or unfinished articles required by workers in rural industries and the sale or hiring of machinery, plant and equipment to workers and the marketing of their productions.

"As the society is co-operative large dividends are not paid, the interest on share capital is fixed and must not exceed 6% per annum. After the provision of a Reserve Fund the balance of profits is disposed of as members think fit. The shares are of the normal value of £ 1 and no individual members can take more than 200 shares." Would the underlying principles of the above society be taken into consideration by the Select Committee to which the State aid to Industries Bill has been referred, and especially the benefits to agriculture, which Mr. Bowman, the writer, describes thus: "The development of Co-operative industries must be a boon to agriculture, benefiting both the farmer and the agricultural worker. The latter during the long winter evenings and also during severe weather when he is prevented from working on land, will be able to supplement his earnings by joining a group of village industry workers. This will tend to stem the tide of migration from the villages to the already over-populated towns and will somewhat mitigate the labour problem of the farmer, while bringing prosperity to the rural districts."

Should we remind our readers that agriculture is our premier industry and about 80% of the population depend upon it? We hope that the scope of the bill will be much enlarged so as to include agricultural industries as well.

Consolidation of Holdings.

"The consolidation of holdings, has been a vexed problem in all countries and the evils arising from fragmentation have been the subject of much controversy in recent years in India. It is therefore a relief to turn to an account in the Madras Bulletin of Co-operation for September 1922 of the working of the Co-operative Consolidation of Holdings Societies, Punjab for 1921, which the genius of Mr. H. Calvert I. C. S. brought into existence with a full knowledge of local conditions.

The repartition is purely voluntary and to infuse the necessary confidence into the ignorant farmer, that no danger impends by

such a repartition, the whole arrangement has been made temporary for four years after which period the land may be appropriated according to the old division. The only condition is that during the four years no member should ask for a redistribution of lands as finally fixed by a two-thirds majority of the general body. The allotments as fixed by them are binding on the member. The principle of the groupings is first discussed in the general body, then the details of the scheme are formulated by the committee and approved, they are again brought before the general body for confirmation. Even after the confirmation a dissatisfied member may take his case for arbitration. The Inspectors of the Co-operative Department, being sons of rural farmers, are at an advantage in persuading the villagers, and nothing is done without a full consent of the members. The societies for the consolidation of holdings are started only in places where co-operative societies are already functioning. The hearty co-operation of the revenue officials has greatly furthered the movement. The Department has wisely resolved not to force the pace, for, a large number of consolidations followed by dissatisfaction of landowners, will create an atmosphere quite unfavourable to their success, whereas a few reallolements with the unanimous consent of the owners got after a full deliberation, trial and experience, will be an asset to the future progress of the scheme. It is the object of the Department that villagers, should themselves, after realising the benefits of consolidations, unanimously decide for repartition. Hence no objection is placed before the members who, during the period of four years, want to change their temporary occupancy right of the new groupings into permanent ownership.

About 69 societies had been started by September 1921 and in 45 villages the repartitions had been effected. The net result has been that 10,906 fields have been consolidated into 2071 fields comprising an area of 65,000.5 Kanals. The average area in Kanals

per field before and after consolidation works to 31 and 6 respectively. Mr. Calvert notes that "the average size of the field before consolidation was three-quarters of an acre and now it is four acres." Though the by-laws require only a temporary repartition, in almost all the villages "the owners of the land have converted it into a permanent one from the very start."

The economic benefits of consolidation, of which, according to Mr. Calvert, it is too early to speak, have not been of a small order. Rents have increased for the new lands, wells have been dug where the larger fragmentations in the old fields made them expensive, canal water is more economically used as the number of channels for the different fields has been lessened, uncultivated fragments have been brought into cultivation, Meston ploughs, which are too big for small fields, are now used; as Mr. Calvert says "the year's work marks a step forward."

It is to be regretted that similar voluntary efforts at consolidation in the Trichinopoly District made at the time of the recent settlement met with a disastrous failure. We suppose it is not yet too late to trace the causes of such failure and devise means of rectifying any defects even at the sacrifice of some little money and time. No degree of discouragement should be so severe as not to spur us on to greater efforts for the realization of our aim.

Dr. M. O. Forster.

We extend a hearty welcome to Dr. M. O. Forster on the assumption of his duties as the Director of the Indian Institute of Science, Bangalore. Under his stewardship, we trust, the Institute will become more popular and draw unto its fold a larger member of young and enthusiastic Indian workers in science. An eminent Chemist like Dr. Forster is a real acquisition to the small band of the much-criticized scientific workers in India and will, we hope, prove to be an inspiration to workers labouring in the same field.

Lord Inchcape and Agri. Research

"In an article on Lord Inchcape's task in the Sunday Times of October 1922, a former finance member of the Government of India, Lord Meston, makes an alarming suggestion. Speaking of things "useful, but not essential" he says "many of the research institutes and the like will come under the shears." The illiberal spirit which inspired our domestic wielders of the axe may thus be carried by one of them to India—a country which, more than any other, perhaps was benefited by the application of science to "useful" purposes. The plant breeders there alone, have literally added millions to the country's wealth; new wheats and cottons yielding 20 to 30 per cent more than the indigenous varieties have already been successfully introduced. It must not be forgotten that, in India, the prosperity of Agriculture is a fundamental element of the solvency of the Government, for there, the State, as owner of the soil, takes one half of the rental value of land. The sum thus raised approaches a moiety of the whole taxation of the country. It is to be hoped that such a suicidal policy as that indicated by Lord Meston will not be advocated by Lord Inchcape, though as a quondam member of the Geddes committee he may be inclined to repeat its mistakes."— Extract from "Current Topics and Events."

"Nature," dated 28-10-22.

We regret to announce that, owing to the unexpected outbreak of plague in the colony, the working committee of the Union was constrained to postpone the holding of the proposed College Day and Conference, 1922, *sine die*. Perhaps, it may be held in July 1923, or as usual only in December 1923. The committee regrets not only a denial of the pleasure of meeting members from the districts, but also the unavoidable postponement of a general discussion of certain points indicated in the October Issue of the

Journal, regarding the welfare of the Union. In the meanwhile, the working committee of 1922 will necessarily enjoy a prolonged existence till such time as a new committee brought into being by the General Body of the Union can relieve them of their duties.

Need of Advertisement.

The enormous power of advertising has been demonstrated over and over again. It is the most effective and economical method of effecting sales. It has been the means of creating an entirely new public demand. Hundreds of commodities are in universal demand to-day, because they are constantly kept before the public by advertising.

Journal of Department of Agriculture, South Africa, Oct. 1922.

Obituary.

We regret to learn of the death of Mr. T. K. Sambamurthi, of typhoid fever on the 13th instant. He was a student of the short course in Agriculture and took the certificate in March 1920, when he was appointed as a sub-assistant in the Mycological section, wherein his work was much appreciated. As a member of the officers' club and of the mess committee, he will be sadly missed. His plainness of living and frankness of speech having endeared him to most of the members, a resolution of sympathy with the members of his family was unanimously passed by the club in a General Body Meeting held on the 24th instant, in which we unhesitatingly join.

Departmental Notes.

Leave:—

1. Mr. F. T. T. Newland, the Government Agricultural Engineer, an extension of leave on average pay for one month from 14-11-1922.
2. Mr. Gopalakrishna Raju, Officiating Deputy Director of Agriculture Second Circle, leave on average pay for four months from date of relief.
3. Mr. C. Tadulinga Mudaliar, Assistant Government Lecturing Botanist, an extension of leave for three months from 22nd November 1922.
4. Mr. Jogi Raju, Farm Manager, privilege leave on average pay for 23 days from 1st December 1922, with permission to avail himself of Christmas Holidays and the New Year's day.
5. Mr. S. Subbiah, Agricultural Demonstrator, leave on average pay for 17 days from 15th to 31st December 1922.
6. Mr. A. Ramaswami Ayyar, Manager, Cotton Breeding Station, leave on average pay for 10 days from 4th December 1922.
7. Mr. P. A. Abhishekanatham Pillai, Teaching Assistant, leave on average pay from 11th December 1922 to 31st January 1923.
8. Mr. S. Ramasami Raju, Sub-Assistant to the Government Lecturing Botanist, extension of leave on average pay for three months in continuation of leave already granted by the Government Lecturing Botanist.
9. Mr. P. S. Vengusami Ayyar, Assistant Agricultural Demonstrator, leave on average pay from 29th October 1922 for 11 days.
10. Mr. T. V. Srinivasachari, Assistant Farm Manager, leave on average pay for four months in continuation of Christmas Holidays.
11. Mr. K. Achyutam Nambiar, Sub-Assistant to the Government Sugarcane Expert, leave on average pay for three months from or after 1st March 1923.
12. Mr. S. Veeravaradha Raju, Assistant Agricultural Demonstrator, leave on average pay for one month from 8th November 1922.
13. Mr. R. Subrahmanya Ayyar, Assistant Agricultural Demonstrator leave on average pay for 15 days from 9-11-1922.
14. Mr. K. Vasudeva Shenoy, Assistant Agricultural Demonstrator, leave on average pay for one month from 21-11-1922 forenoon, instead of 20-11-1922 as already sanctioned.

15. Mr. C. Subba Rao, Assistant Agricultural Demonstrator, leave on average pay for three weeks in continuation of two months already granted from 1-10-1922.

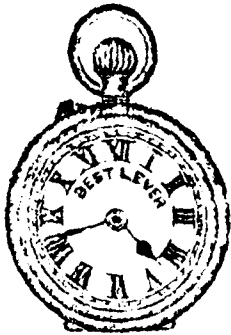
16. Mr. K. Hanumantha Rao, Assistant Farm Manager, leave on average pay for four months from 1st November 1922.

17. Mr. B. Dasappa Malli, Assistant Farm Manager, extension of leave on average pay for one month.

Resignation:—

Mr. A. S. Neelakanta Ayyar, Assistant Farm Manager.

(v)

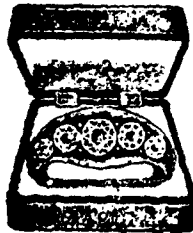


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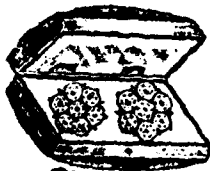
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THE JOURNAL

OF

The Madras Agricultural Students' Union.

Vol. X.

December 1922.

No. 12.

**Presentation of Diplomas to Licenciates in
Agriculture, December 1922.**

The present year marks the close of one of the stages in the evolution which education at the Agricultural College, Coimbatore, has been undergoing since its inception in 1909. By virtue of the affiliation of the College with the Madras University, the old Diploma course covering, in all, a period of three years and a half, has been supplanted by the B. Sc. (in Agriculture) course, and the batch which passed out this year is the last set to receive Diplomas. In the usual course of events, the Diplomas should have been presented to the successful candidates at the time of the College Day and Conference in December, but, as unfortunately the College Day and Conference of the current year had, on account of the outbreak of plague in the colony, to be postponed, a special gathering of the staff and students of the Agri. College and Research Institute was called for in the Big Lecture Hall upstairs, at 2 P. M. on the 15th December 1922, when the Director of Agriculture—Mr. R. D. Anstead—presided. The Principal in a short speech introduced the present batch of Diplomates

and requested the Director to present the Diplomas. Mr. Anstead,—then, addressed the students and in apt words set forth the functions of the Agricultural Dept. and told them what the College expected of them in their future career. [The speeches of the Director and Principal are printed below in extenso.] The Director then presented the diplomas amidst applause to the successful students and shook hands with every one of them on the occasion. The actual medals not being ready, an announcement of the winners of the medals was made, after which the happy function came to a successful close.

Speech of the Principal—Mr. F. R. Parnell.

MR. ANSTEAD, MRS. NORRIS, AND GENTLEMEN,

This is the first occasion of this nature on which I have had the pleasure of officiating as Principal, though I have helped to cheer successful students on many previous occasions.

As this is not the end of the College year, I do not propose to make a long speech giving an account of the happenings since the last presentation of Certificates or Diplomas. There are, however, one or two points to which I should like to refer, before Mr. Anstead, our Director, begins his innings.

This last term has been most unfortunate for us in that plague infection got a firm hold on the Estate. Not only has it been a trial to everyone, to a greater or less degree, but it has also caused the postponement of the College Day celebrations that should have taken place at this time. It was with great regret that the Working Committee of the Union decided on that postponement, but there is no doubt that it was the right thing to do in the circumstances.

Before dismissing the subject of plague I should like to say how pleased I was that practically all of you students came forward so readily for inoculation. To some of you I know it appeared rather a dreadful ordeal, though you can now look back on it as a very small

matter. Some of the staff of the College, I am sorry to say, are still reluctant to follow the good example that you set them.

I come now to the reason for which we are here to-day—the presentation of Diplomas to the successful students in the recent examination. As you all know this year's Diploma class is the last class under the old system though it is only the sixth class that has started with the Certificate Course and worked through to the Diploma. How long the present Degree Course will remain as it is I do not know, but I hope it will have a very much longer life than the Diploma Course. Changes, of course, are necessary in the gradual development of everything, systems of education included. Some of you who are now leaving the College may be proud that you belong to the old Diploma lot; some may feel that a Degree would have been more welcome; all should be well satisfied with the opportunities you have received of gaining a thorough working knowledge of Agriculture,—the great business of India.

Out of a class of 20 students, two failed in Mycology and left the College at the beginning of the year: of the remaining 18 who finished the course all, I am glad to say, have been successful. This is the largest number that has obtained the Diploma in any one year: but I am sorry to say that no first class Diploma has been awarded, though several students obtained a first class in two or three subjects.

Against the lack of a first class Diploma, however, I would put the fact that the class contains some first class sportsmen, including the captains and other redoubtable players of hotkey, cricket and football. You have learnt to play the game in your sports here, and I hope you will continue to play the game in the more serious business of life that you are about to enter. I will not keep you longer to give you good advice as I expect Mr. Anstead will have something to say to you in that line, but I should like to wish you every success in the development of your future lives.

**Address of the Director of Agriculture,—
Mr. R. D. Anstead.**

MR. PARNELL, MRS. NORRIS AND GENTLEMEN,

My first duty is to say how sorry I am that our usual College Day celebration this year has had to be abandoned on account of the unfortunate fact that plague infection has got into the College. I share your disappointment in this, and in the fact that diplomas will not be received at the hands of the Hon'ble Minister whom we hoped to welcome here this year. However, the value of the diplomas which have been worked so hard for by their winners is none the less in that they must be presented by a Director instead of a Minister. We can congratulate ourselves that though the Estate has been infected with plague the casualties have been confined to rats. I should like to take this opportunity of thanking Dr. and Mrs. Norris for the unselfish and public-spirited way in which they have undertaken the unsavory work of examining the rat falls on the Estate, a piece of work not altogether free from personal danger and one which has added materially to our feeling of security. I would also congratulate the Principal on the way in which he has handled this difficult situation and has brought this term to a successful close despite the many difficulties and I am extremely glad to hear that the students have backed him up so loyally and have consented to be inoculated.

Turning now to the diploma course which has just been concluded, I understand that a larger number of students have been successful in passing the examination this year than ever before. There have been no first classes, it is true, but I think that the fact that all those who presented themselves for examination were successful in satisfying the examiners is very satisfactory. It particularly pleases me to find among the successful candidates the leaders and captains in the games. It has been my experience that those who are proficient in athletics are usually to be found holding their own in the scholarship list.

It may be as well to review briefly the history of the educational courses at this College. Up to 1914 there was only one course for all students—a course of three years' duration leading to diploma. In 1914 this course was split into two: a certificate course for two years and an advanced course of a further 18 months, the latter leading to a diploma the selected certificate holders from the lower course. In 1918 the privilege of joining the College and taking the advanced course was extended to those members of the lower subordinate service who were specially recommended by their superior officers as likely to benefit from it.

In 1920 a new B. Sc., course was instituted and dating from that year the two courses held at this College became distinct. The certificate course men were thereby debarred from taking the new degree course. There was some overlapping here and the students admitted for the certificate course in 1919 and who passed out in 1921 were allowed to take the advanced course. It is those students who have successfully passed the examination in this course who are taking their diplomas to-day. In 1922 selected certificate course students and lower subordinates were permitted to take the degree course, and if successful, they will be given a diploma and they will qualify for the upper subordinate service. Thus though the old diploma course ceases this year in its old form, it is still possible to obtain an agricultural diploma.

As is the nature of an Agricultural Department, we have been experimenting. Finality has not yet been reached and I venture to predict still further changes in the educational system at this College before perfection can be reached.

We have seen many changes during the past two years and shall no doubt see many more in the near future. There have been changes in the staff, changes in the policy, changes in the Government, and changes in the country itself, and general outlook of the times is unsettled and disturbed.

But whatever has happened and whatever may happen, I wish you to remember this:—One thing never changes and never can change and that is the individual man's necessity for food and it is

with this that the Agricultural Department is mainly concerned. To my mind the duty of the Agricultural Department is clear and should be firmly held to, and troubles and disorders caused by a changing political situation should not be allowed to divert the Department for one moment from that duty. It is our duty to see that the people of this great country are fed and to do all we can to increase the economic wealth of the country and I would impress upon you that wealth does not necessarily mean money or the possession of money, though unfortunately many people think that it does. The production of wealth means the production in increasing quantities of all that goes to make a country really rich, the production of things which are useful to the inhabitants of the country and especially food. It does not matter how high the price of paddy is in the world's markets, the country which does not grow enough to feed its people is a poor country, since the people cannot eat money and an increase of paper or coin does not mean an increase in wealth. When reduced to first principles, the economic betterment of India means nothing more and nothing less than the betterment of agriculture so that more food can be produced at a reduced cost, and after this, the betterment of industrial crops.

Now, those of you who are entering the Agricultural Department will be directly engaged in this very thing, and to you in no small measure, even in the lower grades of the service, will be entrusted the great duty of bringing home to the ryots the means of growing larger crops on a given area by adopting improvements in cultivation and manuring and planting better strains of seed. To such of you as join the service the way before you is plain.

But what of those who do not join the service? During your studies at this College you have been given new ideas as regards agriculture. You have seen for yourselves improvements in old methods carried out. You have learned the possibilities which lie before scientific agriculture and the use of improved strains and of improved cultural methods. It is your duty to your country to not only apply this

knowledge to your own lands but to share your knowledge with others who have not had your opportunities.

His Excellency the Governor, speaking at Aduturai, the other day said :

"I have often wondered whether the agricultural population, which means a very large percentage of the population of India, really seriously appreciate the work of the Agricultural Department. If they realise how much the Department has done to show them how best to grow rice, cotton, sugarcane, oil-seeds and coconut, how to use manures for different soils and how to get rid of the many pests and diseases which are so prevalent in this country and handicap the farmer so much in growing his crops—if only they would do this, they would certainly get better profits, and more satisfactory results in their agricultural operations. There is a saying in England: 'You can take a horse to the water, but you cannot make him drink.'"

Now, you students of this College can all help to make the horse drink by means of your own example and personal encouragement. College life does not and should not cease with the day you leave this hall. This College has now got enough history behind it to have gathered together a body of men who have taken of its best, who must surely be proud of the College and of whom the College is proud; and we want to hear and to know that such men are taking their part as useful citizens of India, and doing their utmost inside and outside the Government service to lift the load of ignorance from the shoulders of the people and help them to struggle upward to that light which knowledge brings. You owe that at least to your College and your College will watch you in your future careers with jealous eyes and expect much of you. See then that you do not fail her. Those who have spent a great portion of their lives in teaching you will watch you and be proud when you do good work because you are students at this College, and they want to hear from you and share your difficulties as well as your successes, to see you here again as old boys and feel that you are still part and parcel of the College.

We want you to remember that all your lives you will be members of this College, and as members to take an interest in the welfare of the College, to visit it regularly, to spread its teachings, to take an active part in its life and aspirations, *to write for its journal*, and to show that you are live members and not merely memories.

I feel that everyone who goes out from this College into the world has been given a mission to fulfil. In the words of a great Headmaster of a great English School—words which were his last, since he fell dead almost as he pronounced them :

"We must send out workers imbued with the determination to seek and investigate Truth—truth that will make them free—and to take great care that in the search for truth they will never take part in or sympathise with those methods by which the edge of truth is blunted."

Extracts.

British Empire Exhibition.

Great activity prevails at Wembley, where the construction of the British Empire Exhibition is making considerable progress. The Exhibition will occupy 133 acres, and 3,000 workmen are now employed on the buildings. There will be two great British buildings to house all the English Industrial exhibits, one being devoted to machinery. The Dominions Exhibits will be contained in separate pavilions, and there will be one pavilion for each Dominion, while the smaller Crown Colonies and dependencies of the Empire are divided into five groups, according to their geographical position, each group having a separate pavilion. Australia will have a building covering 150,000 sq. feet, while the Commonwealth Government has decided to spend £ 250,000 on its participation in the exhibition. The Indian Government has been allotted 100,000 sq. feet, and proposes to spend £ 167,000. Burma will have 2 acres of site for its exhibits, which will include a complete Burmese village. New Zealand has agreed to a minimum expenditure of £ 60,000, and the

the Government has asked for 40,000 sq. feet of space. Included in its exhibits will be a Maori Museum. South Africa has reserved £ 30,000 to expend. Others of the colonies have applied for space.

"Indian Scientific Agriculturist" November, 1922.
S. N.

International Institute of Agriculture. The idea of an international institution for dealing with agricultural problems originated in the mind of Mr. David Lubin, an American citizen and materialised when through the foresight and large-hearted and munificent contribution of Victor Emmanuel III, King of Italy, this institute was established at Rome in 1905. At the present time practically every nation is represented. The management is entrusted to a General Assembly of Delegates and a permanent Committee. The Assembly as a rule meets every two years and the last meeting which was the sixth from the commencement was held in May this year.

The decisions of the Assembly are carried out by the permanent Committee through four Permanent Commissions, which deal respectively with agricultural legislation, agricultural statistics, science and practice of agriculture, and agricultural economics.

Through a practical limit set to its activities in the shape of finance, the second commission which concerns itself with statistics, specializes on a limited number of cereals, and deals with wheat, ryè, barley, oats, maize and rice in its 'Bulletin' issued monthly and the second and third commissions are responsible for 'reviews' appearing every month.

Sir Thomas Elliott, a former Lieutenant-Governor in India, is the British delegate and also represents India in the Permanent Committee of the Institute, for the maintenance of which this country contributes a very large sum. It would hence be necessary to examine the need for financing an institute which lies far, far away. An international institute can be regarded from two points of view, firstly, as a world necessity functioning as an ideal association of Nations, for the collection and diffusion of statistical information regarding the

production, exports, imports, consumption, stocks and prices of the world's stores of food,—a work, beyond the powers of any individual nation, but in which all are vitally interested.

Secondly, each nation, while it may not fully realise the larger vision, may derive more benefits by being member of an international body, especially with reference to its productions or imports, than not. India being one of the largest producers and exporters cannot afford to live in isolation and look with equanimity on the doings of a body whose existence is a guarantee for a better mutual understanding of the agricultural classes of different countries in the future. Yet it rather pains one to find that agricultural problems concerning India do not receive any adequate attention in the deliberations of the Institute. Is it too early to press for separate representation, considering the large interests this country has at stake in the world's production?

V. M. A.

THE GRADING OF MILK.

New Regulations.

The Milk and Dairies (Amendment) Act, 1922, authorised the Scottish Board of Health to make an Order in regard to licenses for the sale of graded milk. The Board have now issued to producers of higher grade milk and others a memorandum showing the principal conditions under which the statutory Order will be made. Before issuing this order the observations of those interested have been invited.

The Milk and Dairies Act, 1922, contemplates four grades of milk in Scotland, viz :—

1. Certified milk.
2. Grade A (tuberculin tested) milk.
3. Grade A milk.
4. Pasteurised milk.

It is proposed that the administration in regard to all four shall be placed in the hands of Local Authorities under the Public Health (Scotland) Act, 1897.

Certified milk is milk obtained from tuberculin-free cows and bottled at the farm.

Grade A (tuberculin tested) milk is the same as certified milk, except that it is not bottled at the farm.

Grade A milk is milk obtained from herds which have been examined at least three times a year, at the farmer's expense by a veterinary surgeon, but the examination will not include tuberculin tests.

It is not intended to prescribe the use of any particular make of Pasteuriser, but the milk must be retained at a temperature of not less than 145 degrees and not more than 150 degrees Fahr. for at least half an hour, and be immediately cooled to 45 degrees Fahr. This condition, of course, will only apply to milk which is sold under the designation "pasteurised."

Tuberculin tests for the first two grades will be carried out at the expense of the farmer. A score card inspection will be made by the Local Authority in connection with certified milk, and annual fees will be payable in respect of all grades, in order to cover some of the expenses incurred by Local Authorities.

The milk when delivered to the consumer must not contain more than a specified number of bacteria.

North British Agriculturist, November, 1922.

D. G. M.

BRITISH MILKING RECORDS.

The First 3000 Gallon Cow.

Further evidence of the remarkable improvement in British dairy cattle since the inception by the Ministry of Agriculture, of the movement to record the milk yields of cows, is furnished by three recent record-breaking performances standing to the credit of the British Friesian breed.

At midday on Thursday, 26th October, the British Friesian cow, Brookside Colantha, completed her yield of 3000 gallons of milk in less than 365 days. This cow, owned by The Hache Herd

at Findon, Worthing, is the first cow in this country to reach a production of 3000 gallons in less than a year. Sixty-two British cows have annual milk yields in excess of 2000 gallons in one year, and of that number no less than 58 are British Friesians, the breed that has won every open milk championship for three years running at the Dairy Show. In her lifetime Brookside Colantha has had five calves and produced 9530 gallons of milk, equivalent to about 42½ tons, and nearly sixty times her own weight.

The First 2000—Gallon Heifer.

Another record for Britain has been set up by the British Friesian heifer, Chaddesley Glen-Statelty, the property of Longford Farms Ltd., Derby. This remarkable animal has yielded since giving birth to her first calf, 2000 gallons in 358 days, the extraordinary merit of her performance being that she is the first heifer in this country to attain the coveted 2000 gallon production in her initial lactation period yield.

Another record-breaking feat is that accomplished by the Haydon herd of British Friesian cattle belonging to Mrs. Putnam.

In this herd, during the last few days, three cows have reached the 2000 gallon standard of production, namely Beccles Lulu, Saltcote Pel Daisy, and Gorstage Gem. Each month the British Friesian Cattle Society publishes, for the information of its members, a list of heavy milking cows with their yields to date and Mrs. Putnam is the first breeder to have at one time three 2000-Gallon cows in such list. The above figures indicate the great improvements effected in the dairy cows of this country in general and in the British Friesian cattle in particular.

North British Agriculturist, Nov. 2, 1922.

D. G. M.

Notes and Gleanings.

Leaders needed for Labour to benefit from Co-operation. Co-operation can save labour, instil habits of discipline, thrift and organization and redeem it from the clutches of the money-lender and the

trader, but this will be possible only if there are sincere and earnest workers to guide the movement in the early stages. Labour cannot of itself understand the value of co-operation and the need of a steady loyalty to the movement, unless in the initial stages it is persuaded to combine by expert and enthusiastic managers.

Madras Bulletin of Co-operation, August 1922.

The Water Buffalo. Most of us are familiar with the marked liking of the ordinary buffalo for marshy conditions; but few of us have heard of the 'water buffalo.' This is a native of China and is said to be immune to tick fever and tuberculosis. Analysis of the milk is said to have shown 12.5% fat, three times that of dairy cows. The quantity of milk produced is, however, said to be less. It is said to be capable of considerable improvement through selection.

(From the Botanical Abstracts, Vol. X, No. 4)

T. S. V.

Vegetable oil as motor fuel in Belgian Congo. The extremely high cost of transportation of motor spirit into the Interior of the Belgian Congo, largely due to tsetse flies, which make it impracticable to use animals for transporting goods and necessitate the use of native porters, led to the Belgian Colonial Ministry to organize a trial of road tractors using palm oil as fuel. The results of these trials, according to the official United States "commerce reports" have opened up vast prospects for the development of Central Africa and may be summarized as follows:—

Palm oil when used as sole fuel in Semi-Diesel two or four cycle engines, gave full satisfaction. The engines ran normally and the power developed was equal to, if not greater than, that obtained with kerosine. Nothing was noted that suggested possible difficulties in using palm oil in these engines. Starting up, without motor spirit injection, was good, and there was no carbonization. One large firm which holds diamonds and rubber concessions, possesses three tractors that run on palm oil and have ordered two more, very

satisfactory service being rendered by those which have been in operation. These tests would indicate, then, that vegetable oils, which are so abundant and cheap in the tropics, can replace other fuels for semi-diesel engines which are suitable for tractors as well as other vehicles and machinery.

Journal of the Royal Society of Arts, No. 3647, Vol. LXX.

H. S. R.

Record Sugar Yields per acre. Ewa Plantation has set a new Hawaiian record by the production of nearly 118½ tons of cane per acre, from which the yield was 15.31 tons of sugar per acre. It appears that the above plantation was prepared for planting in 1920. It was steam ploughed to a depth of 18 inches, and planted with selected cane of the H. 109 variety, and was irrigated.

Extracted from the Australian Sugar Journal, Page 340, October 6, 1922.

Saltpetre in Bengal. During 1921-22 there were 5 licenced saltpetre refineries in Bengal, one each at Manicktola, Sulkea, Kagargadi, Bahirsura and Baranagar. The quantity of refined saltpetre produced was 4399 Bengal maunds and the quantity of salt educed was 283 maunds and of impure salt left, 244 maunds.

(Indian Trade Journal, November 23, 1922).

The World's Largest Sugar Factory. The World's largest central sugar factory is situated in Cuba. During the campaign which ended in the third week of September 1922, this factory produced 1,046,493 bags or 150,000 tons of sugar—a record production for a single factory in the world, whereas in India the entire production of sugar direct from cane in 1921-22 by 18 factories was only 27,534 tons.

Indian Trade Journal, November 22, 1922.

Tanned Hides Mid-November Quotations.

Mid-November Quotations at Madras for the principal tonnages were as follows:—

	A.	P.	A.	P.
Cocanadas	14	0 to 14	0	
Bengals	14	3	14	6
Vizags	13	6	14	0
Mutuwadas	13	6	13	8
Upcountry	12	0	14	0
Bezwadas	13	9	14	4

Indian Trade Journal, November, 1922.

Scaly legs in Fowls. The treatment for scaly leg is simple and effective and the trouble, if allowed to go on, becomes very disfiguring. It is caused by a parasite that burrows under the scales of the legs, and it is easily known by raised scaly eruptions. Wash the legs of the affected birds with warm water and soap; dry, and dip or saturate in paraffin. This may have to be repeated daily for some days, when the excrescences should disappear. It is soothing and healing to the legs to rub them at this stage with vaseline. Keep the birds warm during treatment on clean dry litter, feed well, and give a tonic either in the mash or drinking water. The trouble is very contagious, and care should be taken when setting broodies to make sure they have no sign of scaly leg, otherwise the whole brood may be affected. A good preventive is to anoint the legs of birds every two months with 1 part camphor oil to 2 parts turpentine.

(Scottish Farmer.) K. U. M.

The Transmission of Plague in the Light of a Recent Occurrence of Plague in Italy—Piccininni—Ann. d' Igiene, Rome, (XXXII, No. 4, April 1922, pp. 264-276.) discusses the salient points connected with a study of an occurrence of Plague from July to September '21 in the province of Naples. The disease was imported by rats on board plague-free steamers arriving from infected ports and was introduced in spite of the most rigorous measures directed towards preventing the landing of rats. Most of the rats normally living in the zones infected with rat plague were immune. Some cases of

human plague were due to infected flour and grain from mills and warehouses infected with rat plague. As regards this last point, experiments show that in artificially infected grain, the plague bacillus can retain its virulence for not more than 14 days at temperatures between 2° and 13° C. (35.6°—55.4° F.)

It follows that prophylactic measures against steamer rats cannot be relied upon, that measures against the rats ashore are very necessary in order that plague amongst them may be discovered and dealt with without delay, and that cereals must not be taken from infected warehouses until 14 days have elapsed after their thorough disinfection. Furthermore, all cereals from plague-infected localities must be the subject of special supervision.

From the Rev. App. Entomology, Oct. 1922.

[The statement regarding the infection of cereals from warehouses infected with rat plague is particularly significant with reference to the out-break of plague this year in the Farm Buildings, where cattle feeds bought from plague-infected godowns in Coimbatore had been stored. *Editor.*]

Manufacture of Industrial Alcohol and Alcoholic motor-fuel in the Philippines. Modern Industry is very largely dependent on motor-fuel; but in many countries like the Philippines and India proper the fuel has to be imported from outside. Even in countries like the United States of America with the vast oil areas, the supplies—at the present enormous rate of consumption—are not, according to Geologists, likely to last for many years. The finding of a substitute for Petrol or gasoline has been engaging the attention of Chemists in many advanced countries; and the only solution to the problem appears to be the utilisation of Alcohol for industrial purposes. Alcohol used alone has been found to be unsuitable for the present type of engines; but mixtures of alcohol and benzol were found to be quite efficient—especially in Germany—during the War. Since, however, Benzol is dependent on the Coal-tar industry—which is non-existent in many countries, further investigation has found that Ether makes a good substitute for Benzol. One of the

mixtures successfully used in Hawaii instead of gasoline, was made up of 55.55% alcohol, 42.78% ether, 1.11% kerosine and 0.56% pyridine. The last named is an alkaline substance intended for counteracting the acid products of combustion. From actual tests this mixture was found not only cheaper but more efficient as a motor-fuel than Petrol, especially on account of diminished chances of fouled plugs. Raw products for the production of alcohol abound in the tropics:—bamboo, cassava, the various palms, wood-waste (saw dust) can all be utilised for the production of alcohol. Molasses, however, is the best waste material from which it can be distilled and ether can be produced from alcohol by certain practicable methods; and with the establishment of suitable plants on a large scale, the production of motor-fuel at rates half as cheap as gasoline will easily become possible, while at the same time such countries will thereby be rendered independent of supplies from outside for the requirements of industry.

Such is the plea put forward by Mr. H. I. Cole, Chemist, Bureau of Science, Manila, for the utilization of the juice of the Nipa Palm (*Nipa fruticans*) and molasses waste for the production of Industrial alcohol and motor-fuel in the Philippines.

The Philippine Journal of Science, July 1922.
Y. R. R.

Chemotropism of Mosquitoes.—New Jersey Agric. Expt. Sta., New Brunswick, Bull. 367, March 1922—23, pp., 1 fig. W. Rudolfs.

The object of these experiments was to investigate the general causes that excite mosquitoes to attack man. Previous work on the effect of colour, light, humidity, odour and temperature, is reviewed. As no "standards" for the behaviour of mosquitoes upon reception of chemical stimuli were known to the author, this has been recorded in terms of activity, particulars of which are given. The work was carried out on *Aedes sollicitans* and *A. cantator* in open salt marsh meadows near the coast of New Jersey, 8—14 freshly caught individuals being used for each experiment. Attractive and "activating" substances were tested again in the open with larger quantities.

The substances are divided into several classes: attractive, activating merely, indifferent and repellent, and the results are summarised by the author as follows:—

Perspiration, blood, urine and sebaceous secretion (human and cow) proved unattractive. Some of their constituents and intermediate decomposition products were decidedly attractive (phenylalanine, hemoglobin). Several amino-acids influenced the activity of mosquitos or induced them to suck. Carbon dioxide and ammonia—ultimate decomposition products of the human body—proved to be strongly activating, inducing the insects to stab and to exhibit "satisfaction" or "pleasure." A combination of carbon dioxide and ammonia with a particular temperature and degree of moisture (such as to reproduce the conditions of the breath) was highly activating. It seems that these stimuli, produced in quantity by the human body, play an important role in the attraction of mosquitos. This explains why a motionless sleeper and animals of great variety, amphibians, reptiles, birds and mammals, are all subject to attack.

Rev. App. Ent. Ser. B. October, 1922.

HOUSEHOLD HINTS.

Use wooden hangers to dry suits, dresses or articles the shape of which you wish to preserve. Hang the wooden hangers on a line in a dry place, but not in the wind. Never hang up woollen articles, dry them flat in a shady place.

Much wear will be saved your sheets, tablecloths and bedspreads by folding them hem to hem, and fastening double to the line. Use plenty of clothes-pins. If these large articles are dried without wringing they will be longer lived as the process of twisting the cloth to remove the water injures it. An unwrung bedspread dries in shape and is far easier to iron.

Stocking feet, stained from the leather lining of shoes, will were better if washed in a tablespoonful of borax to a quart of water.

Borax water is also the best method of preventing white silk and white wool garments from turning yellow.

Any delicate coloured article washed in bran water will come out like new. To make the bran water, put two cups of bran in a thin muslin bag and allow for the swelling of the bran in water. Put this in five quarts of water and simmer on the back of the stove until the water is quite thick. Remove the bran and wash the article. Use no soap, rinse, and iron when almost dry.

Journal of the Jamaica Agri. Society.

Correspondence.

To The Principal,
Agricultural College, Coimbatore.

DEAR SIR,

As an old student of your College I feel I should write and tell you of my whereabouts.

I left India on 16th September 1922 and joined this University on 10th October 1922 as a Research student. My studies are to concentrate on fermentations in general and "power alcohol" in particular. There is a chair for Biochemistry of Fermentation and Brewing in this University and I am therefore posted to work here. The laboratories are up-to-date and the library facilities are good enough. The Professors are extremely kind and many of them are authorities in their respective branches of science.

I shall always look back to my Alma Mater with deep gratitude and affectionate remembrance of the many happy hours I spent there and the ground work I may build must be the result of that early association.

With every good wish for the continued success of my old College and with very kind regards,

I am,
Yours respectfully,
K. Adinarayana Rao.

The University,
Birmingham,
30-11-1922.

[The members of our Union may be interested in reading the above letter to the Principal, Agri. College, Coimbatore, from Mr. K. Adinarayana Rao—till recently Bacteriological Assistant of our Institute. He is now studying at the Birmingham University.—Ed.]

Estate News.

The Plague epidemic in the Colony. The month of December was marked by numerous cases of casualties among rats—most of which occurred in A, B and C quarters to the east of the Playground. Mrs. Norris and Dr. Norris continued to help the estate by making a prompt bacterial examination of the rat casualties, the majority of which were found to be positive and the colony cannot sufficiently thank them both for their willing help in this unsavoury and even risky task. As a result of these rat-falls most of the residents availed themselves of the Christmas Holidays and took their families home. The aspect of the colony, which is never full or lively during Christmas time in any year, was extremely gloomy and deserted and the few that remained looked weighed with anxiety as to where the next rat-fall would occur. Although there is absolutely no doubt that the plague has established itself in the colony, it is a matter for congratulation that so far there has been no human casualty. Wherever rat-casualties were noted, there was prompt evacuation and disinfection and we believe these steps have to a great extent prevented more serious developments.

Visitors during the month. In connection with the examinations of the Diploma Course, the following gentlemen visited the College in the second week of December.

Mr. T. Bainbrigge Fletcher, Imperial Entomologist,
for— Entomology.

Dr. M. K. Venkata Rao, M. A., B. Sc., Ph. D., — Botany.

Rao Bahadur J. Chelvaranga Raju Garu, Retired
Dy. Director of Agriculture. — Agriculture.

Mr. Kailasam Aiyar, G. M. V. C. — Veterinary Science.

The Director of Agriculture—Mr. R. D. Anstead—visited Coimbatore in connection with the presentation of the Diplomas.

Dr. Sampatkumaran M. A., Ph. D., Prof. of Botany, Bangalore.

Dr. K. Kunhikannan M. A., Ph. D., Entomologist, Bangalore.
both University Examiners, visited Coimbatore in order to discuss certain questions with the University Board of studies in connection with the B. Sc. Degree Examinations of March 1923.

Students' Corner.

The Diploma Examinations began on the 7th and were over by the 13th. The results were announced on the 15th and it was happy to note all had passed. The diplomas were presented by the Director of Agriculture on the 15th at 2 P. M. at a special gathering, in the absence, this year, of the usual College Day Festivities. The College was declared closed when the presentation ceremony was over; but the B. Sc., class III students went on tour to the Ceded Districts and Chittoor under the guidance of the Professor of Agriculture. The College reopens on the 16th January.

The following is a list of the successful diplomates and medalists of the year.

List of successful Diplomates for 1922.

- | | |
|--|--------------------------------------|
| 1. Anantharaman, T. G. | 10. Kanthimathinatha Pillai, M. K. |
| 2. Ankaraju, P. | 11. Krishnaswami, K. |
| 3. Atmaramiah, S. | 12. Krishnaswami, C. S. ^a |
| 4. Bhagiratha Padhi. | 13. Ponnappa, K. B. |
| 5. Chinnaswami Naidu, M. | 14. Ramanna Rai, K. S. |
| 6. Doraiswami Ayyangar, C. S. ^a | 15. Rangiah Nayudu, G. |
| 7. Eggiaswami, M. | 16. Sivarajan, A. |
| 8. Gopalaratnam, P. | 17. Swaminathan, M. K. ^c |
| 9. Govindaramayya, R. | 18. Varadachari, S. |

^aD'Silva Medal.

^bRobertson Medal.

^cKeess Medal.

Departmental News.

Indian Milk Records. With regard to Brookside Colantha's record milking performance (p. 395) the following note from the pen of Mr. R. D. Anstead, Director of Agriculture, will be read with much interest.

"At Pusa, the best Ayrshire Montgomery cross-bred cow last year gave 11,839 lbs. of milk in 10 months and is now in calf again and giving 51 lbs. per day. This is equivalent to about 1,243 gallons of milk in 10 months, or about 4 gallons a day.

In the cross-breeding work which has been done at Bangalore—work which is now being transferred to Coimbatore—the best cross-bred cows gave about 780 gallons per lactation, while the average yield of the cross-bred dairy herd this year was only about 610 gallons per lactation or 2.2 gallons per day as compared with Colantha's eight gallons and odd per day. These results though quite good under Indian conditions fall a bit short of Brookside Colantha's remarkable performance. This famous cow has even found a place in the pages of 'Punch' which is probably another record to her credit. That well-known journal published the following verses:—

Queen of the lowing herd,
Of thee I sing;
For thee the sounding word,
The thrilling string.
Colantha! we shall see thee set
In countless dairy shops, a golden statuette.

To thee all mythic kine
To-day must bow,
As Lakshmi the divine,
The cosmic cow,
Hathor of Egypt, and the shade
Of her that Argus watched, to the hapless maid.

The glittering galaxy,
The Milky Way,
Shall take its name from thee
This wondrous day;
And in alliterative sport
Astronomers shall call its light Colantha Court.

What are the myths to us
But bygone dreams,
When more miraculous
Thy glory seems?
For in the circle of a year
Thou gavest to the world three thousand gallons clear!

In vain that daring man
Henry. J. Ford,
Of cars American
The wealthy lord,
Would seek thy well-earned fame to bilk
Framing some base machine to make synthetic milk.

Thy chronicler am I,
And in my rhymes
Daily thou shalt supply
(Four mortal times)
The flood to overfroth the pail,
Exhaustless as the ink that prints The Daily Mail."

R. D. A.

Opening of the Paddy Breeding Station, Aduturai.

On the 8th of December His Excellency the Governor of Madras and the Honourable the Minister of Development came to Aduturai to open the Government Paddy Breeding Station started recently. Invitations for the function had been issued by the Department to all officials and important Mirasdars in the district, most of whom made a ready response.

Just before 10 A. M. His Excellency was met at the Railway Station by the Minister for Development, the Collector of Tanjore and the Director of Agriculture and was conducted to the Farm in cars. Immense crowds lined the roads all through and a number of decorated arches had been put up by the people of Maruthuvakudy village in which lies the Farm. At the Farm, the scenes were full of picturesque

animation. The Farm was a vast expanse of paddy fields presenting a smiling prospect as far as the eye could reach. At the entrance to the Farm a very handsome pavilion had been erected by the Department. As soon as His Excellency and party arrived near the pavilion, Mr. Parnell, the Government Economic Botanist, was introduced to His Excellency, after which the whole party entered the pavilion and took their seats on a dais. The assembly that gathered on the occasion, though not numerically large, contained nearly all the prominent citizens of the District, official and non-official, mirasdars, zamindars and members of the District and Taluk Boards.

The Director of Agriculture opened the proceedings of the meeting by explaining the object of opening the Aduturai Paddy Station and stated it formed an important link between the original research work done in Paddy Breeding at Coimbatore on the one hand and the demonstrator and the ryot on the other. Mr. F. R. Parnell, Government Economic Botanist, then explained the nature of the work carried on at Aduturai and stated that an increase in the yield of grain was the chief consideration at present. His Excellency, Lord Willingdon, in the course of his speech, remarked that he was there to open that Paddy Breeding Station, the object of which was the production of a plant that would give a much larger yield than was obtainable in the Tanjore Delta at present, and after explaining the work that is being done by agricultural experts in South India, expressed his keen interest in the Farm and the great pleasure he felt in opening it and hoped that all agriculturists in the District would take the fullest advantage of the experiments made there.

The Honourable Rai Bahadur K. Venkata Reddi Nayudu, Development Minister, in the course of a short speech proposed a vote of thanks to His Excellency for his kindness in opening the Farm and was followed by Rao Bahadur V. A. Vandayar M. L. C., who also thanked His Excellency for opening the farm for the benefit of the Tanjore District.

An Inspection.

After the speeches were all over, His Excellency and party moved on to inspect the laboratory and the crops growing in the fields.

At the place where the Farm fields actually began a decorated arch-work had been improvised and a silk ribbon tied across. His Excellency cut the silk ribbon with a sickle and declared the Farm open to the public. The party first went into the laboratory where Mr. K. Ramiah, the Assistant Economic Botanist, was introduced to His Excellency by the Director of Agriculture. A few minutes were spent in the laboratory in the examination of samples of the important district varieties of rice and paddy, and the inspection of certain special diagrams and charts exhibited to illustrate the various lines of work carried on in the farm. His Excellency and the party were then taken round the fields by the Government Economic Botanist and explained the different stages of work in progress. A little before 12 o'clock His Excellency left the Farm. Before leaving the station, His Excellency was pleased to record in the farm Visitors' book "I sincerely wish this new Paddy Breeding Farm success in its development."

Pest Act Enforcement against a Coconut Pest at Mangalore.

The Ministry for Development have sanctioned the enforcement of the Agricultural Pests and Diseases Act of 1919, against the "Black-headed caterpillar of coconut"—*Nephantis serinopa*—for a period of one year from 1st January 1923.

Since July 1922, operations have been in progress through the co-operation of the Agricultural and Revenue Departments and the citizens of Mangalore, to check the spread of this pest, but though much of the control work had been finished, there still remained certain refractory garden-owners who would not consent to have their trees treated. The Pest Act has therefore been—though very reluctantly—introduced to coerce such people to take action for the sake of the general good. We trust the opposition will now be removed and the control operations will meet with complete success.

Lantern Shows and Exhibitions.

In response to a call for a greater advertisement of the real worth of the Department, Lantern Shows and Exhibitions are, of late, being arranged, taking advantage of all local festivals and gatherings.

There was a show at Tiruvannamalai in South Arcot.

do. Guruvayur —, — South Malabar.

do. Sriangam —, — Trichinopoly, on account of Vaikunta Ekadasi.

do. Kasergode —, — South Kanara, on the occasion of the Annual Bunt Conference and Exhibition.

Indian Science Congress: Lucknow.

The following officers have presented papers for reading at the Lucknow Session of the Indian Science Congress which meets in January 1923.

Dr. R. V. Norris.

Mr. B. V. Nath.

Rao Sahib T. S. Venkataraman,

Mr. T. V. Ramakrishnayyar.

„ K. Krishnamurti Rao.

„ P. S. Jeevanna Rao.

„ S. Sitharama Pathrudu.

„ D. Balakrishna Murthi

„ K. Unnikrishna Menon.

Rao Sahib Y. Ramachandra Rao.

Of the above, the first six officers will visit Lucknow and attend the Congress. Rai Bahadur K. Rangachari, who is President of the Indian Botanical Society, is unable to attend owing to a domestic calamity.

Editorial Notes.

Cinema as a means of Agricultural Education.

Apropos a note on the need of using the Film for Agricultural Propaganda that appeared sometime ago in this journal, the following passage found under "Current Topics and Events" in Nature of 11th November 1922, may be of interest to our readers and may serve to corroborate our views on the matter and show what is being done in other countries.

"The use of the cinema as a means of Agricultural education among farmers is in contemplation in this country (England) and at least one organization is understood to be preparing a set of films. A recent announcement in *Le Matin* indicates that France may, however, be first in the field. It is stated that the Ministry of Agriculture has submitted to the President of the Republic an order authorising an annual grant of 500,000 francs for the purpose of installing, in agricultural colleges and schools and in the rural communes, cinematographic appliances which would be used for the popularisation of scientific agriculture. There is no question that the cinematograph could serve a highly useful purpose, it is not only more attractive than the lantern slide, but it brings out points that could not otherwise be readily shown. It may be doubted whether the ordinary lantern slide could be dispensed with, however, and the lecturer of the future will probably try to use both films and slides."

Grazing in Forests.

In the 1922) December number of the Madras Forest College Magazine, Mr. Alagiriswami Nayudu, writing about the unsatisfactory character of the several proposals for effectively checking illicit grazing in the Sriharikota Revenue Forest, observes that the lump-sum grazing revenue system introduced during the year bids fair to minimise expenditure, reduce illicit grazing and improve the relationship between the cattle-owners and departmental officers. In these days of retrenchment such schemes are of very great practical value as tending to do away with the 'Kancha system' which has been found unworkable.

"Agricultural Meteorology"—"The Soil"—"Tillage."

Notes on "Agricultural Meteorology," "The soil" and "Tillage" by Mr. R. C. Wood, M. A., have been recently published and are now available for sale at the Government Press, Madras. Mr. Wood has put in service both as a District Officer and as Principal of the College for several years, and his varied experience and intimate acquaintance with local conditions have stood him in good

stead in producing these interesting pamphlets. We are sure that they will be found useful not only by students of agricultural institutions but also by every one interested in land problems. The easy and lucid English in which these notes are presented, the methodical way in which the subject is dealt with and the mass of information contained therein make these booklets of more abiding interest than ordinary publications of a similar nature and reflect great credit on the author.

Madras method of preparing country sugar.

With reference to the interesting articles on "Production of Refined Sugar in India by small establishments" contributed by our talented countryman Mr. Kasanji D. Naik of the Sugar Bureau, Pusa, to the Louisiana Planter and manufacturer, we have much pleasure in stating that certain interesting notes on the preparation of country sugar in South India from the pen of our distinguished member Mr. Balakrishnamurti, made as long ago as 1911 when he was deputed to make a preliminary enquiry into the sugar conditions in Madras, will appear in our next issue.

Ourselves.

We regret very much to find that our journal has, in spite of our best efforts, begun to lag behind the times. We apologise for it and beg to assure our readers that we will do our utmost to observe punctuality, but the present delay is due to the very unhealthy state of Coimbatore owing to the prevalence of plague in an acute form, on which account our Printers—The Literary Sun Press—have been working under a very serious handicap. We trust, however, that conditions will soon alter for the better and we will soon be able to make up for lost time.

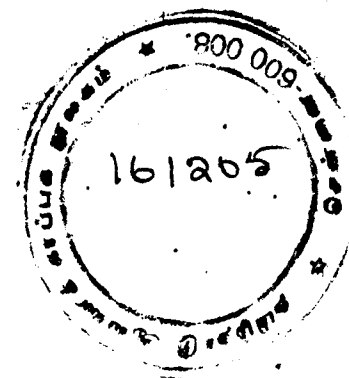
Departmental Notes.

Appointments, Transfers etc.

1. Mr. P. Abhishekanatham Pillai, Teaching Assistant, Agricultural College, transfer to VIII Circle on the expiry of leave on 1-2-23.

Leave:—

1. Mr. T. V. Subrahmanya Ayyar, Assistant in Entomology, leave on average pay for one month in continuation of the ensuing Christmas holidays.
2. Mr. P. N. Krishnan, Assistant in Entomology, leave on average pay for 9 days from 4th, to the 12th January 1923 with permission to prefix Christmas holidays.
3. Mr. M. Suryanarayana, Assistant in Chemistry, leave on average pay for ten days in continuation of the Christmas holidays.
4. Mr. K. T. Bhaudary, Teaching Assistant, Agricultural College, leave on average pay for ten days in continuation of Christmas holidays.
5. Mr. M. U. Vellodi, Teaching Assistant, Agricultural College leave on average pay for eight days with permission to avail Christmas holidays.
6. Mr. T. G. Muthuswami Ayyar, Farm Manager, Paddy Breeding Station Aduturai, leave on average pay for three weeks in continuation of the Christmas holidays.
7. Mr. M. P. Kunnikutti, Agricultural Demonstrator, leave on average pay for four months from or after 16th January 1923.
8. Mr. A. Ramaswami Ayyar, extension of leave on average pay for three days in continuation of ten days' leave already granted.
9. Mr. S. Ramaswami Raju, Sub-Assistant to the Govt. Lecturing Botanist, leave on average pay for one month from 8-11-22.
10. Mr. K. P. Sankunni Menon, Assistant Farm Manager, leave on average pay for three months and 13 days from 6th November 1922.
11. Mr. S. Veeravaradha Raju, Assistant Agricultural Demonstrator, extension of leave on average pay for one week.



(v)

**The Journal of
The Mysore Agricultural & Experimental Union,
BANGALORE.**

**A Quarterly Journal published for the Union by
an Expert Board of Editors.**

**Chief Editor—Dr. B. Narasimha Iyengar, B. A., Ph. D.,
Agricultural Chemist in Mysore.**

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