

*Jonna*¹ (*Cholam*) per acre are sown broadcast, and the seed is raked up with a special iron implement of the type of pick-axe designed for the purpose. At this time any unburnt bushes and those that come up later on from the stumps, which might still appear green are removed and the areas are left to themselves. With the break of the Monsoon the seeds germinate and with the help of the light showers received thereafter the crops progress slowly.

Practically no after-cultivation is done except the cutting of bushes which might shoot up soon after the break of the Monsoon.

The *korra* crop gets ready by about the end of August when it is harvested. *Ganti* (*Cumbu*) and *Jonna* (*Cholam*) ripen off almost simultaneously about the end of November or beginning of December.

The yield is generally 80 to 100 *kunchams* or 600 to 800 lbs. per acre of the three grains (50 per cent *korra*, 30 per cent *ganti* and 20 per cent *jonna*) in ordinary seasons when the rainfall is normal. It is stated by the cultivators that the yield of *Ganti* and *Jonna* on the *podu* lands are sometimes better than in the plains. *Ganti* cultivated on the hill slopes has a larger ear-head compared with that in the plains, which is a short duration one with shorter ear-heads and coarser grain.

In the plains the *podus* are leased out at Rs 1-8-0 to Rs 2 per acre, but the general understanding is that any man that cultivates a *podu* individually should pay Rs 6 to Rs 8 per *podu* irrespective of its extent. If two people jointly do the same, they should pay double the amount. Each *podu* gets its turn once in ten years—that is, a *podu* cultivated this year will not be fit for cultivation for another nine years; by which time the stumps will grow up and the vegetation would become thick.

The average cost of clearance and other operations works out at Rs 13 to Rs 15 per acre; while the value of the yield will be about Rs 25 to Rs 30 leaving a margin of about Rs 12 to Rs 15; but as most of the operations are done by the cultivators themselves, the cost of cultivation is not much felt. The actual cash expenditure incurred by the ryot (including the assessment) will be about Rs 6 to 8 per acre, this being mostly necessary to cut the shrubs and to rake up the seed after sowing.

¹ *Andropogon Sorghum*.

CLEAN MILK

By P. D. KARUNAKAR, M.Sc.,

Government Agricultural Bacteriologist

A single drop of milk may contain on an average about a lakh of bacteria, as sold by vendors in the Coimbatore town. Milk is a very good medium for the growth and multiplication of almost all kinds of bacteria, good, bad and indifferent. Some bacteria such as those that produce curds, cheese etc., are beneficial and useful; there are a great many different kinds of bacteria which may be termed indifferent as they are not useful in any particular manner and at the same time do no harm in any way by their presence and growth in milk. But there is the third class which is positively harmful. Bacteria producing tuberculosis, diphtheria, typhoid, cholera, etc., grow luxuriantly in milk once they find their way in. A noted dairy scientist, Dr. Orla Jensen, claims that in parts of Europe, repeated epidemics of typhoid and cholera have been caused by infected milk. In a hot country like India especially, where milk remains at a high temperature, the bacteria tend to develop most marvellously, a single individual dividing into two within twenty minutes. Hence the need for clean milk containing as few bacteria as possible and no harmful bacteria at all. Even while in the udder, milk contains a few organisms mostly of the beneficial and indifferent kinds except in cases where the cow itself is diseased. The large numbers obtained in milk samples are most often due to outside contamination, e.g. from air and water, unclean vessels and the unclean person of the milker. Therefore, if outside contamination is limited to the minimum, it will be possible to obtain milk which would contain very few organisms indeed. Thus the Government Dairy at Coimbatore by virtue of its being clean, is able to produce milk which contains only about one thousand bacteria in a drop, whereas milk produced by vendors contain about a hundred thousand bacteria in the same quantity.

Cleanliness should be the watchword for every dairyman. The cattle-shed should be thoroughly cleaned and washed before milking. Prior to milking, the bodies of animals should be washed as also the exposed portions of the milkers' body, hands and feet. Great care should be bestowed on the utensils used for milking since it is there that the greatest amount of contamination occurs. The utensils should be thoroughly scrubbed, rinsed in boiling water and drained. If they are to be used in the afternoon they may be kept out in the sun, mouth downwards, to dry. If they are to be used for the morning milking and in the case of a small dairy where only one or two cans are used, they may be kept overnight on the hot fire-place where they will quickly dry. Rinsing the cans the next morning with a little boiling water will remove any ash or dirt, that might have found its way in. It should be also mentioned that any addition of water to dilute the milk is not only bad ethics but also a positively harmful practice as it is possible to introduce through the medium of one ounce of dirty water many millions of bacteria of the worst type.

The consumer should, as soon as the milk is bought, place it on fire and bring it to a boil at least three times, continuously stirring it all the

time to prevent the formation of the 'blanket' of albumin. The milk should now be cooled rapidly in several changes of water in a basin, and the vessel should be covered over with a damp muslin cloth to prevent any dirt falling and flies getting into the milk. Setting the milk vessel in a basin of cool water throughout the day, will keep the milk at a much lower temperature than that of the room and thereby prevent it from getting 'sour.'

A visit to the Government Dairy at Coimbatore to study the different processes the milk undergoes, will be invaluable to any dairyman.

A PLEA FOR THE INCLUSION OF AGRICULTURE IN THE SCHOOL CURRICULUM

By R. SWAMI RAO, L. AC.,

District Agricultural Officer, Vellore.

My plea for the introduction of Agriculture into our schools is based on a realization of the imperfections of the present system of education, a subject of frequent comment in the press and on the platform.

The system of education imparted in our country is imperfect in many ways. Nearly 80 per cent. of the population in India live by agriculture and yet we do not find schools in which Agriculture is taught as a compulsory subject. In Japan, a country which has moulded its destiny in the course of the last 50 years by a change in its educational policy, Agricultural schools are to be found in thousands, whereas here they can be counted on one's fingers' ends.

Firstly, in a national system of education due regard must be given to the feelings and sentiments of the people for whom the education is intended. Paulson says, 'The ideal of true national education would not be equal education of all, but, rather, a maximum of individual development corresponding to the infinite variety of tasks, of powers, and of gifts produced by the creative forces of Nature, and the basis of a homogeneous education of the whole people, forming part in its turn, of the universal education of the mankind conceived as an organic whole. And the ideal of a national educational system would be an organization giving every single individual a chance to attain to a maximum of personal culture and social efficiency, according to the natural gifts and the strength of his will.'

Secondly, a too early specialization is insisted upon in the present system of education. This has led to a training of the mind in water-tight compartments and the modern educational product, like the *Kupastha Mandukam*, proverbial 'frog in the well', is entirely oblivious of what is taking place outside his particular sphere. Prof. P. C. Ray, in his address to the University students of Calcutta, deprecated in emphatic terms the meagre knowledge of general subjects possessed by the present-day educated man. No wonder, therefore, if a History student does not know how rain is caused or a Science graduate 'who Queen Elizabeth was'. To quote Sir P. C. Ray's words, 'Something of everything should be offered,

some part of all kinds, of intellectual sustenance in which the minds of men have grown and rejoiced. That should be the ideal. Nothing of varied stimulus should be withheld. So only will the young mind discover its aptitude.' In my humble opinion specialization should begin in the University course and not in the High school.

Thirdly, the present system of education has divorced us from hereditary professions. In the words of Wynne Sayer, 'Education should aim at producing a future race, each one better than his father at the family job and not necessarily a renegade from its ancestral profession. The present education is given totally irrespective of the parentage and of the future of the individuals.' The University graduate, if he be the son of a *purohit* thinks it *infra dig* to hold *dharba* in his hands and to conduct religious ceremonies, or if he happens to be the son of a grocer, he feels his pride is wounded if he is called on to measure out rice or if he be a farmer's son he considers it beneath his dignity to hold the plough and cultivate his lands in the way his father did.

Lastly, the system of education imparted is non-vocational. By vocational education is meant an education, the acquisition of which enables an individual to earn his livelihood. In other words it is that which helps him to earn his bread so as at least to keep his body and soul together. The struggle to eke out one's existence has become so acute at the present day especially in the case of the English-educated classes—the products of modern education—that I wish to speak at length on this aspect of education, viz., its 'Bread and Butter Value'.

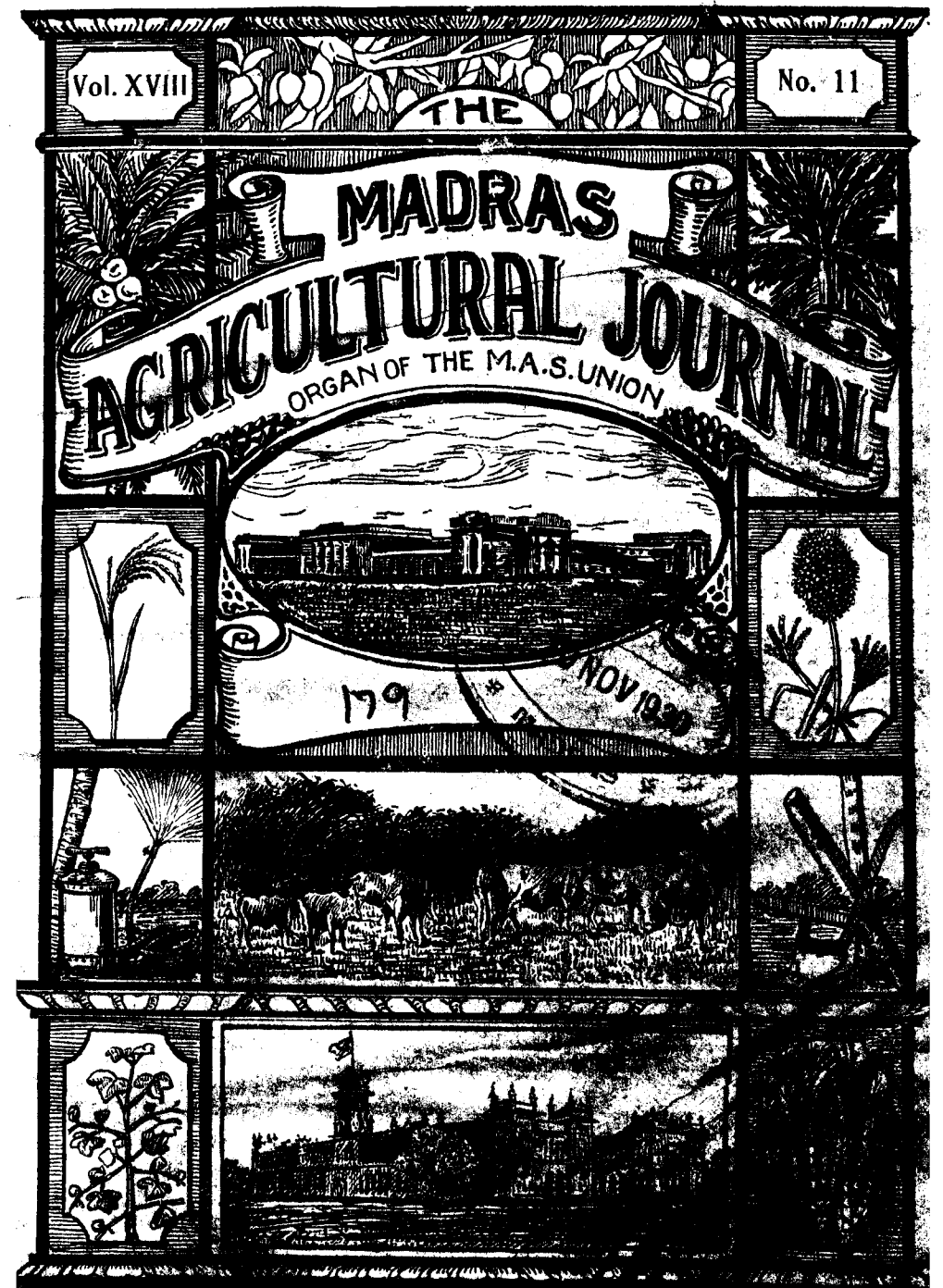
The 'Bread and Butter' aim of education is considered to be very short-sighted as it engenders and fosters a spirit of exclusiveness and selfishness in the individual and makes him look askance at any scheme of liberal education which has no practical value. Of course, earning one's bread is not the be-all and end-all of one's existence. The highest ideal of life is an earnest striving towards God-head by aiming at spiritual perfection. But unfortunately we have not reached a stage of perfection when he can hope to hold communion with God on empty stomachs.

We are living in a work-a-day world. We want food, the stomach is the most insurmountable damper of all enthusiasm and energy, which form the motive power for any kind of activity—intellectual, scientific or physical. Every one is aware of the story of the belly and the members of the body. If the belly is kept empty, other members of the body cannot work. Even the brain refuses to work in the ultimate stages. Starvation is, as is well known, one of the strategies of warfare; if you cut off supplies to your enemy and make him starve, he comes down on his knees and surrenders unconditionally. All this serves to show us the importance of food and why we cannot afford to ignore it. I shall return to it presently on its relation to agriculture.

The most modern conception of education is to make man socially efficient. According to Bagley, that person is considered to be socially efficient who does not act as a drag upon society and is able to pull his own weight. If we apply this rule to the present-day educated man, we find him different. We see him socially inefficient as he is not able to earn his livelihood there being no demand for the wares at his command. We observe him helplessly depending upon some relations, often on his father-in-law. Things are, however, slowly changing. The charm of a graduate

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as a son-in-law is gradually waning. Many graduates are figuring largely in professions for which they were not trained. Even in Bellary, one of the backward districts, a shop is being run by graduates. I do not mention this in disparaging terms. I only want to bring the situation of helplessness to the forefront. It may be argued out that this situation is the outcome of a new angle of vision formed owing to a change in the axis of public opinion. But every year, universities are manufacturing numbers of educated men to swell the ranks of the unemployed. 'Many are bred unto law but yet law is not bread into them'. The same is true of many other professions.

The present state of affairs with respect to the teaching profession in India conforms to a description of the state of affairs in England during 1916 given by Sir J. D. Hall.

'The national prosperity depends on the skill of its people, its varied development and not on the super-literary education of a minority. And any education which does not go deep enough to improve the man's chances of making a living to the good of his country is of no use. A highly educated class for whose labour there is no demand, can only be parasitic on the country which educates it'.

It is clear from the above that the present-day system of education is leading to unemployment.

We have so far seen how the present system of education is not national in character, how it has divorced us from our ancestral professions, how by too early specialization it has made us deficient in that general knowledge so needed for our proper conduct in life and lastly now it has given rise to the problem of unemployment among the educated classes. The cry everywhere is how to find out a solution for this unemployment problem. 'There is room for a boy in the business of his father or relative'. I know many will oppose this view. I am only voicing the opinion of many of the distinguished educationists who do not belong to our country. Mr. R. Statham of the Madras Educational Department told the Royapuram Medical School Students in his address that the son of a shoemaker in his country was not ashamed to follow the profession of his father. I drop the matter at that. That is only a partial solution.

Some changes in the curriculum of the schools may also solve the problem of unemployment. Too early specialization must be given up and subjects must be as varied as possible. Vocational subjects must be introduced and I should insist on agriculture being made a compulsory vocational subject. Agriculture must be given a prominent place in the school curriculum.

Here I must tell you something about Agriculture and the importance of its study. By 'Agriculture' is meant literally the cultivation of land. In the cultivation of land is involved a knowledge of several sciences, like Physics, Chemistry, Bacteriology, Botany, Entomology, Geology and their application. It solves the problem of unemployment. Many eminent men have given expression to such an opinion. The Rt. Hon'ble Mr. V. S. Srinivasa Sastri made a statement to this effect two years back at Coimbatore in the following words: 'Unemployment could best be remedied by the multiplication of industries and crops thus laying pressure on agriculture and land'. It is Agriculture that supplies food. According to Sir Oliver

Lodge, the food question is not a war-time difficulty alone, the neglect of scientific agriculture and consequently an insufficiency of production from the soil is a handicap on the whole output of the nation. He further says that 'no industry is so profitable or yields such abundant returns in proportion to labour expended as agriculture; for the work is done by natural forces, all that man has to do is to supply the conditions and give the powers of Nature free scope. It is very different from manufacture, where every rivet has to be hammered into its place and every minute finish attended to by labour and design. In growing crops the main work and all the design is carried out for us by Nature.'

In the study of agriculture is included not only the study of the sciences involved in the proper cultivation of land and the raising of a proper crop, but also the study of those dealing with animal husbandry; dairying; poultry-keeping, and stock-raising, all of which form subsidiary industries to agriculture. In my humble opinion, the subject of dairying becomes a practical proposition for teaching, if only the authorities would undertake to maintain dairy herds in all such institutions as have hostels attached to them. The students can be taught how to milk, how to make butter and above all how they can get pure hygienic milk to ensure good health. The good health of the students and savings in doctors' bills, must be taken as a set-off against loss in the transaction, should any occur.

Countries which have included Agriculture in their school curriculum as an important subject of study, have enormously improved their agriculture and the crop-producing power of their land. Japan, Germany, Denmark, The Philippines, the United States of America, and Finland may be cited as examples. In Japan, Agricultural Schools can be counted in thousands. 'The Madras ryot is almost entirely dependent on ancestral knowledge and this is defective precisely in the case of his less fertile areas. He is also an isolated worker; the ryots are merely congeries of units each working his own fields in his own customary way and without the mutual support of his fellows in association and it is now accepted as axiomatic in modern land administration and economics that the isolated peasant with the isolated holding is *per se* hopeless; it can neither act nor be acted upon. Now this was, before 1870, just the case with Japan; education was at a low ebb for the masses, special agricultural education there was none, associations in the modern sense there were none; the vast development on both these lines are as recent as they are successful'. Should we not copy the example of this country and derive similar benefits by working on similar lines?

In Finland, Agriculture is taught even in Primary schools. Sir Frank Fox says, 'the system of agricultural education in Finland is thorough. It begins in the primary schools and is continued up to the Folk High schools which are a development of the Scandinavian institutions of the same type'. Education has been largely responsible for the improvement of agriculture in Germany. In a note prepared by T. H. Middleton on the 'recent development of German Agriculture', the following statement is found which emphasizes the importance of agricultural education. The passage runs thus:—'The chief factor in developing the use of artificial manures in Germany, however, was unquestionably a well-organized system of technical education; investigations at the research stations established the precise uses of these manures; trustworthy advice was supplied by institutions, by peripatetic instructors, by technical leaflets and by agricultural newspapers and the most backward farmer brought his methods into line with authority'.

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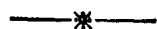
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I believe I have quoted sufficient authority to support and justify the proposal for the introduction of Agriculture into our schools.

Thanks to the resolution of Government of India of 1913, thanks to the movement towards attaching increasing importance to sense education and motor education, and thanks also to the kindergarten system of Froebel, we find many schools provided with school gardens. The importance of a school garden cannot be over-estimated. It introduces among other things, an agricultural atmosphere into the school. It serves as a beauty spot in the school. It provides also a means of meeting some of the necessities of a boarding-house. Above all, it inculcates in pupils' minds the dignity of labour. In the words of Charles G. Leland it is only 'by making hand-work a part of every child's education that we shall destroy the vulgar prejudice against work as being itself vulgar'. He further says that 'perhaps half the real suffering in Europe and America is the result of the effort to appear genteel'. The same is to a great extent true of our country also.

Let not people imagine for a moment that the study of agriculture does not lend to intellectual development; agriculture need not by any means be taken to mean lack of culture. The growing of a successful crop involves many intellectual processes. The grower has to study the field and then select a suitable manure for the production of a healthy plant. He has to get information about plant diseases and learn how to combat them. In fact Pothanna, one of the greatest of Andhra poets, composed his verses on *Ramayana* while doing farming operations at Vontimitta.

Everywhere the importance of agriculture is recognized. The increasing importance given to this by Government is evident, by the appointment of the Royal Commission on Agriculture, whose recommendations are slowly being given effect to.

Ruskin says, 'it is my steady wish that school boys should learn skill in ploughing and seamanship rather than in cricket; and that your ladies should often be sent to help the cook and the housemaid when they could rather be playing tennis'. This remark applies with greater force to our country whose national staple industry is agriculture and Ruskin's wish must be the wish of every educationist who has the good of our country at heart.

Immense potentialities lie hidden in the soil. If the subject of Agriculture is taught from infancy, who knows we may not find another Sir P. C. Ray, another Dr. Sir C. V. Raman, and another Sir J. C. Bose to tackle the problem of land and plant to ensure maximum production with minimum expenditure and in short to grow two blades of grass where only one grew before.

NOTES AND COMMENTS

Lime Juice Cordial

An interesting article in the *Poona Agricultural College Magazine* for September 1930 on the 'Manufacture of lime juice and its economic value' gives details of the equipment for running a small lime juice concern. We understand from the article that with a capital investment of about Rs 350 for dead stock and a working expense of 0-6-8 per bottle manufactured, it is possible to realize for a lime grower a profit of Rs 300 per annum—the working season being only 7 months in the year.

West Indian bottled lime juice placed on the market contains only 4.2 per cent of citric acid, while Bombay fruits contain over 7.5 per cent. In this Presidency there are lime gardens almost in every district and here is a possible avenue for the unemployed for getting an income by the manufacture of a healthy beverage for the masses.

Madras Cotton Crop 1930-31

How several factors affect area of cropping, is borne out amply by the second report of the Department of Agriculture, Madras, on the Cotton Crop, 1930-31. We understand from that report that while the area under cotton crop up to the end of September 1930 shows an increase of 20 per cent. over that on the corresponding date last year, want of rains, fall in price, and preference for *chulam*, *cumbu* and groundnut have brought down a fall in the area in Kistna and Guntur; there has however been an increase in the Deccan, where owing to timely rains, the area has nearly doubled.

A new demand for Groundnut?

In an article appearing in *The Hindu* of 10th September 1930 entitled 'Depression in groundnut trade', the writer draws attention to the abnormal fall in prices in groundnut and attributes it to over-production and the influence of combines abroad. He is of opinion that creating a market outside, should be the first step taken to relieve the situation. We would in this connection refer our readers to our 'Gleanings' column wherein it will appear that two Bengali chemists have succeeded in preparing dye-stuffs from vegetable oils. If this should be proved possible on an industrial scale, there will be yet another use for all oil-seeds and the demand for vegetable oils will increase.

Financing the Cotton Grower

We understand from *The Hindu*, October 12, 1930, that the Government of India have turned down the Cotton Committee's scheme to give financial support to the cotton grower. The Committee gave an elaborate scheme suggesting 'an examination of the methods by which credit could be provided, preferably through banking channels, to strengthen the hands of the cultivator at the time of marketing and to increase the buying capacity of the merchant both in Bombay and in the mofussil till it is earmarked for consumption or export.' The Government rejected the proposal on the

ground that it involves fixation of a minimum price and that it would encourage unfair speculation by inducing cultivator and merchant to hold up stock, against a possible higher price in the future. Government however state that the Imperial Bank of India has been addressed on the subject and has consented to give credit—with due safeguards, to cultivators of the crop.

Yeast for Cows

The main trouble in artificial feeding of children with cows' milk, is that the majority of the infants develop rickets, and investigations have been in progress, to increase the antirachitic properties of cows' milk. It is interesting therefore to learn from *Science*—September 12, 1930, that Dr. Harry Steenbock of the Wisconsin Agricultural Experiment Station, has discovered as the result of dietetic experiments on cows, that irradiated yeast, included in the feed, increased manifold the content of vitamin D, in the milk. Since it is the absence of vitamin D that causes rickets, it should be possible with the present cost of yeast production to give the vitamin D required for normal nutrition, at a very low cost.

Cod liver oil, another article tried in the experiments, was not suitable, as with small amounts no appreciable increase of vitamin D was noted and with large amounts there was a lowering in the secretion of butter fat; besides the cost of cod liver oil was prohibitive.

India Honoured

We understand that Sir T. Vijayaraghavacharya, K. B. E., Vice-President of the Imperial Council of Agricultural Research, has been elected as one of the Vice-Presidents of the General Assembly of International Institute, Rome, to the only place assigned for the British Empire.

Handling and Marketing of Hemp.

The Imperial Council of Agricultural Research, has appointed Mr. T. S. Sabnis, M.Sc., I.A.S., Second Economic Botanist to the Government of the United Provinces as Special Officer to enquire into the conditions under which hemp is marketed and handled in India and in connection with the proposed investigation he is visiting the principal hemp centres in the country. He was at Coimbatore on October 24, 1930.

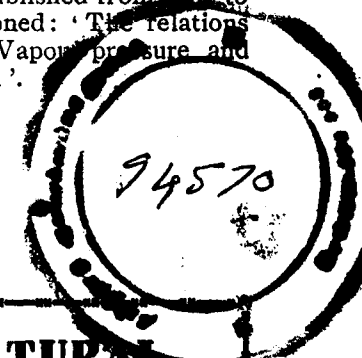
Sugar vs. Jaggery

The September number of the *Poona Agricultural College Magazine*, has an interesting article by Rao Bahadur D. L. Sahasrabudhe, Agricultural Chemist to the Government of Bombay, on consumption of *Gul* (jaggery) and sugar in rural and urban areas. Figures were collected in the City of Poona and in nine villages in the Poona district varying in distance from 9 to 35 miles from Poona. His findings are that only in the case of a few well-to-do families, sugar has displaced jaggery to some extent. Generally, sugar has not displaced jaggery for daily use and that most of the sugar is consumed in tea and coffee. The quantity of sugar used by tea-making population varied from 21.1 to 57.1 pounds per head per annum. Mr. Sahasrabudhe estimates that if a person takes one cup of tea daily he consumes twenty pounds of sugar per year.

New Director for Pusa

We understand from *Nature* (Vol. 126, No. 3179, page 542), that consequent on the report of the Royal Commission that a Director possessing both administrative ability and experience in agricultural research, should be obtained from Great Britain, the India Office has offered the appointment to Dr. Bernard A. Keen, of the Rothamsted Experimental Station, Harpenden, who will leave England on October 7, on a year's leave of absence. Dr. Keen joined the Rothamsted staff in 1913. In 1919, he became head of the Soil Physics Department, and in 1923, he was appointed to the new post of Assistant Director, which he still occupies. In 1924 he was elected a Fellow of University College, London.

Dr. Keen's work on Soil Moisture problems must be familiar to the readers of the *Journal of Agricultural Science* of which he is one of the Editors, and wherein most of his articles have been published from time to time. Amongst his contributions might be mentioned: 'The relations existing between the soil and its water content', 'Vapour pressure and water content of soils' and 'Studies in soil cultivation'.



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SALEM

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The Late Mr. A. M. Richards

We are very sorry to report the death at Jaffna on Saturday, October 18, of Mr. A. M. Richards, formerly Veterinary Assistant, at the Agricultural College. Mr. Richards left us only in November 1928, on long leave prior to retirement and sad to relate, there are still some days left over in the leave period. He has thus been cut off in harness, without living to enjoy his retirement, which many of his friends at the College knew, he intended to spend by taking to private farming in Ceylon.

The late Mr. Richards was an ideal teacher; calm and unruffled, with ever a cheerful smile on his sweet face, he gained not only the respect but the love of all his students. A perfect gentleman in every way, the eloquent and warm tributes paid by many, at his farewell two years ago, amply testify to his immense popularity, to his genial temperament, to his amiable manners and to his sympathetic outlook. He was a true and pious Christian and the affectionate way in which he brought up his children; was an object lesson to many another parent with fewer children and shorter temper. He has entered Heavenly rest; but, to those who had the fortune to learn at his feet, the memory of his perpetual smile will never die.

We understand that at the time of his death, his eldest son, Andrews—who spent some time in our College as a special student—was in England where he has proceeded for prosecuting higher studies. We offer our most heartfelt condolences to Mrs. Richards and to all the members of the bereaved family.



THE LATE MR. A. M. RICHARDS

GLEANINGS

A bottle of Heroism

'All those of us who have in our blind unscientific way admired courage that act of the will by which men become like gods are delighted to hear that it is all a matter of adrenalin—a substance in the blood. Or so a lecturer at Cambridge assures us. The discovery is all the more interesting when we know that adrenalin or the stuff of heroism can be manufactured in a laboratory since it is merely a strong distillation of coal tar. I look forward to the day when heroism will be sold at all chemists in 2 sizes 1s. 6d. and 3s. (insist on the label).—Beachcomber in *The Daily Express*.

Dye-stuffs from Vegetable Oils

Experiments in the manufacture of dyes from fat have been conducted by Razindra N. Sen and Ashutosh Mukerji in the Chemical laboratory of the Presidency College, Calcutta. From castor oil was produced a brown powder which gave an orange tint to wool and silk. Coconut oil was also tried and yielded a brighter orange colour, while olive oil made a brown dye for wools and stained silk in various shades of red. The method used in the manufacture of the new dye was developed by Mr. Sen. It consists in using esters of benzoic, salicylic, and other acids instead of the acids themselves in the process.—*Science*, September 5, 1930.

Iodine and the Tobacco Crop

Investigations by the Bureau of Plant Industry of the U. S. Department of Agriculture, show that a small amount of iodine added to the soil produces a better growth of tobacco and an improvement in its quality. But if the desirable quantity is exceeded, the effects are injurious, manifesting themselves especially in abnormal thickening of the leaf, off colours, poor keeping qualities and unsatisfactory burning.—*Science*, September 5, 1930.

Auto-Irrigating Flower Pots

Flowerpots that water themselves were demonstrated before a large group of Russian and foreign scientists by Professor E. Deatruck of West Virginia University. The device used is known as the auto-irrigator, and is the invention of Professor B. E. Livingston of the Johns Hopkins University. It consists of a cone-shaped vessel of porous porcelain, to the neck of which a glass tube can be attached, leading to a water reservoir. As the plant removes water from the soil, the soil permits water to ooze out through the walls of the cone, maintaining an even state of moisture much more satisfactorily and with much less labor than is the case with the old method of pouring water into the pots from the top. Professor Deatruck showed results from experiments conducted with a battery of 150 four-gallon pots, all equipped with auto-irrigator systems.

Science and Art

If we are to battle with ignorance and suffering, we must be up-to-date in our methods of fight. Science has done more for the emancipation of the masses than the wisdom of the sages. It is erroneous to assume that happiness is enjoyed only by those who are desperately poor. It is idle to pretend that poverty is better than wealth, malnutrition than nutrition, foul air than fresh air. Simplicity is not the same as squalor. Again, we have a tendency to use words without weighing their meanings. Science will help to free us from the tyranny of words by taking us to things themselves. The triumphs of science which have enabled mankind to establish civilization over chaos declare the majesty of the human spirit quite as much as artistic achievements.—Prof. Radhakrishnan, in the Mysore University Convocation address, 1930.

Sulphur as a Fungicide

Sulphur has a blighting and fatal effect on some of the fungi responsible for plant diseases. But to do its work a particle of the solid sulphur itself must come into contact with the thread-like fungus. This has been discovered by Dr. William Goodwin, of South Eastern Agricultural College, Wye, England. His work was designed to settle the disputed question whether sulphur volatilized by heating could also kill fungi; he found that it could not. He also found that the effectiveness of powdered sulphur in washes and sprays is heightened by the presence of an alkali.—*Science Supplement*, August 22, 1930.)

Root Nodules of Legumes

The root bacteria of clover, alfalfa and other legumes, that befriend the plants and through them man and his domestic animals, come at the outset as though they were enemies. They invade the delicate, thin-walled root-hairs in just about the same manner as disease germs, and cause them to curl up as though they were sick. These are among the things that were seen by Dr. H. G. Thornton, of the Rothamsted Experimental Station, England, and Dr. E. F. McCoy, of the University of Wisconsin. Not all the roots of a susceptible plant can be invaded by the bacteria. Alfalfa seedlings were suspended with their roots in a thick 'soup' of nodule bacteria; yet only 4 per cent of the root hairs received bacterial guests. Moreover, the plants seemed to have a considerable degree of resistance to such invasion during their infancy, for no bacteria found their way through the walls of the root-hairs until the seedlings had put forth their first true leaves. This would seem to indicate that a secretion of the roots was active, either in discouraging the bacteria before the leaves appeared, or in encouraging them when the proper time arrived.—*Science Supplement*, August 22, 1930.

Short Courses at County Farm Institutes

There are at present seventeen farm institutes in England and Wales. The primary object of these institutes is to provide instruction in the scientific principles underlying sound farming practice, and they have been specially and extensively equipped for the purpose. The instruction given is closely related to practice; this applies not only to general agriculture, but also to market-gardening, fruit-growing, dairying and poultry-keeping. The subjects dealt with and their order of importance vary somewhat at the

different institutes, but a typical curriculum includes the following :—soils, manures, crops, livestock, feeding stuffs, implements and machinery, veterinary hygiene, surveying and mensuration, farm book-keeping, general agricultural science (biology and chemistry), horticulture, dairying, poultry-keeping, bee-keeping, and fungus and insect pests. Most of the courses start in October, one term being taken before Christmas and one after, but in some cases a full year's course is provided. Facilities are also provided for short courses in special subjects, and most of the institutes provide instruction for women—particularly in such subjects as dairying, horticulture and poultry-keeping.

A certain number of scholarships tenable at the institutes are awarded by the various County Councils to residents within their areas, and the Ministry itself awards scholarships thereat for the sons and daughters of agriculturists.—
The Journal of the Ministry of Agriculture.

CORRESPONDENCE

I

A Suggestion

To

The Editor, 'The Madras Agricultural Journal'.

Sir,

The ryots will be much benefited if you publish exhaustive articles on the following subjects, as a thorough knowledge of them is quite necessary for the uplift of the Indian farmers :

Will you respond to this suggestion ?

- (1) *Forestry*.—Planting and care, maintenance of woodlots, forest products, wood products, scientific harvesting, etc.
- (2) *Fruit growing*.—Laying out, planting, care, harvesting, packing and marketing, fruit storage, preserving and canning, enemies, spraying, etc.
- (3) *Home gardening*.—Vegetable and flower.
- (4) *Horticulture*.—Various methods of plant propaganda, plant breeding, etc.

MANGALORE.

Yours etc.,

P. NARAYANA.

[We commend the letter to all our readers and invite articles on the subjects mentioned. We are not quite sure, if we can tackle 'forestry' with any great success or service, but we are making arrangements, to have articles on the other subjects, as regular features of the Journal, in course of time.—Ed., M.A.J.]

II

Keeping Qualities of Jaggery

The Editor, 'The Madras Agricultural Journal'.

Sir,

I should like to be enlightened on the following points, regarding the manuring of canes on the West Coast :

1. It is said that lime is added because it helps to harden the jaggery.
2. Why is it then that with the addition of as large quantities of lime as they do in Coimbatore the jaggery made on the West Coast becomes soft very soon, especially during the monsoon months even though the Coimbatore jaggery kept side by side does not become so soft. If it is due to the excessive humidity of the atmosphere, both must be affected in the same manner.
3. It is found that the West Coast soils are very deficient in lime. Has this anything to do with the defect noted above, and do you think the addition of lime to the soil will improve matters ?
4. The soils on the West Coast though relatively low in their supply of total potash, the deficiency as regards the available potash is neither extensive nor serious. Yet we find in the old leaflets published by the Department equal quantities of Fish Guano and Ashes are advocated and even now applied as manures for sugarcane. May it be that the softness of the jaggery is due in any way to the large doses of ashes. For the matter of that no crop is grown on the West Coast whether dry or irrigated without its dose of ashes.

SALEM,

September 16, 1930.

Yours etc.,

M. U. VELLODI.

[We have referred the matter to the Government Agricultural Chemist, Coimbatore. He says that the keeping quality of jaggery is likely to be affected by a number of factors

- (1) the methods of storage,
- (2) the amount of 'setting' that has already taken place before the jaggery is exposed to adverse conditions,
- (3) the quality and the composition of the lime used,
- (4) the composition of the juice, and
- (5) the methods of manufacture.

The differential keeping qualities of jaggeries prepared at Coimbatore and in the West Coast may be due to all or some of the factors mentioned above.

From his experience in the investigations on the manufacture of coconut jaggery he thinks there is what is called 'after setting' in jaggery. If after manufacture the jaggery is allowed a short period to 'set' in a drier atmosphere before it is exposed to moist weather the softening will be slower. In the case of Coimbatore jaggery it had set before it came to the West Coast while the jaggery prepared in the West Coast had not such an opportunity and so it is more likely to soften sooner than the Coimbatore jaggery. The lime used in the West Coast being shell-lime from the sea is likely to contain more chlorides than the lime used at Coimbatore. These accumulate in the jaggery as calcium and magnesium chlorides which absorb moisture from the atmosphere with avidity.

In regard to the composition of the juice on the quality of jaggery the presence of phosphates is said to result in a better quality jaggery. Under the West Coast conditions mere application of lime may not do as much good as when applied with phosphates.

Arrangements are in progress at the Agricultural Research Station, Anakapalle, to study the factors that affect the keeping qualities of jaggery.—Ed., M. A. J.]

III

Coconut Slump

To

The Editor, 'The Madras Agricultural Journal'.

Sir,

In response to your request for information on 'the price of coconuts', I should like to mention the following direct causes as given in some recently published journal, the name of which I unfortunately forget just at present:—

With the termination of the great War the great Copra trade with Luxumberg which India had enjoyed for many years came to an end. After the War, a large trade in copra with U.S.A. sprang up. About two years ago, the Government of the United States of America with a view to protect the chief trade of one of their main protectorates—the Phillippine Islands—decided to buy the necessary copra from that country alone and consequently they have introduced a very high tariff on Indian copra. Before the country could recover from this non-preference of Indian copra by Americans, the Government of India on a representation by the Ceylon Government allowed copra to be imported into India from Ceylon where it is produced cheaper than in India. So, due to these two causes the coconut industry of India is doomed for the present.

Yours etc.,

K. CHERIAN JACOB.

COIMBATORE.

NOTES ON BOOKS RECEIVED IN THE LIBRARY

THE SUCROSE CONTENT OF THE CANE EXPRESSED IN TERMS OF THE AIR TEMPERATURE AND SOIL MOISTURE.—By M. Koenig. *A. Inst. P. Department of Agriculture, Mauritius, Bulletin No. 16. Scientific Series of 1930* :

This bulletin is a continuation of a previous one by the same author wherein an attempt was made to give an expression to the total height of cane attained in terms of the weather factors, heat and moisture. In the present paper a further attempt is made to correlate the sucrose content in cane, with the temperature of the atmosphere and the moisture in the soil. With such a mathematical expression, the author claims that it will be possible with sufficient accuracy, to calculate the probable sucrose content of cane, from observations of air temperature and soil moisture. From the industrial point of view, this is very important as a computation of probable tonnage is possible from weather data alone.

[M. R. B.]

THE RESULTS OF A FIVE-YEAR MINERAL FEEDING INVESTIGATION WITH DAIRY CATTLE.—By O. E. Reed and E. F. Haffman. *Technical Bulletin No. 105 of 1930 (Agrl. Expt. Station, Michigan)*.

The appearance of this bulletin at a period when the prevalent idea is for the inclusion of minerals in feeding rations is rather disconcerting. According to the bulletin the results of a five-years' investigation on dairy animals at Michigan indicate that the need for mineral supplements to feeds may be greatly exaggerated. Experiments showed that mineral supplements supplying calcium are not needed even when roughages with low calcium content are used for feeding—liberal milk production being never affected by the want of calcium in the feed.

[M. R. B.]

20 NOV 1930

Farming will never be a success unless the farmer
had more voice in the disposal of
his produce—P. Morrel.

The Madras Agricultural Journal

(ORGAN OF THE M. A. S. UNION)

Vol. XVIII]

NOVEMBER 1930

[No. 11

A NEW GUNTAKA

By N. G. CHARLEY, B.E.,

Research Engineer, Agricultural Research Institute, Coimbatore.

179

Iron and steel are slowly but surely taking the place of wood in the construction of the ryot's tillage implements. The superiority of metal, from the points of view of strength and durability to say nothing of the great variety of forms of vastly superior efficiency which cannot be obtained in wood, can no longer be denied by the most ardent advocates of indigenous wooden implements.

A sure criterion of a good thing is that it is capable of improvement and this may aptly be applied to the *guntaka*—that admirable implement of the Ceded Districts which so ably performs in after-ploughing operations and is so deserving of a wider popularity in other districts of the Presidency. In spite of its good performance it is subject to the inherent defects of an almost entirely wooden construction and the introduction of an all-steel framework with certain refinements in form and facilities for adjustment is capable of investing the implement with a number of distinct improvements. Several steel *guntakas* have already appeared and the cultivator is evincing a keen interest in their performance.

A somewhat new design of implement of this type has recently been produced at Coimbatore and is illustrated in the accompanying sketch. The design incorporates a number of desirable features to which the following notes refer :—

Simplicity of Construction. With the exception of the pole and handle which are of wood and of which the former is usually provided

parts of the rice plant in the system of classification of rices. The distribution of the pigment in different parts of rice plant as sheath, internode, axil, stigma, function of the leaf blade, ligule, auricle, glume and glume tip, etc., is controlled by a number of independent and sometimes linked mendelian factors and hence the classification on the basis of pigment distribution is rendered almost impossible by the innumerable combinations in which new types can occur.

An account of the reproductive characters such as inflorescence, pollination, flower opening and ripening is next given. The mode of flower opening and anthesis described do not materially differ from the observations recorded at Coimbatore. The 'Emergence' of the panicle though subject to fluctuation under different environmental conditions is also determined by mendelian factors. In the determination of the variation of the interval between flowering and ripening of the groups of types in different seasons, it could have been enlightening if the authors had given the method of rightly judging the precise stage of ripening, as this character is so elusive for precision and not so easily marked as 'flowering.' Another difficulty experienced is about the periodically fixed and timely fixed types of rices determined by the authors. The experiment cannot be said to indicate this difference of classification when the maximum range of interval between the first and last sowings is only eighteen days in the case of 'periodically fixed' and eleven days in the case of 'timely fixed.' The characteristic example in our own province of the 'timely fixed' rice is G. E. B. 24 and of the 'periodically fixed' is the Kuruvai of Tanjore, Garikasannavari of Godavari and Thekkam cheera of Malabar.

After dealing with these reproductive characters the authors deal with the size of grain and colour of kernel and base their classification more or less on Kikwa's scheme, employing the length by breadth ratio. Three broad groups 'slender,' 'long,' and 'short' with three minor divisions in each are formed with regard to size and two main groups for white and red colour of rice are formed. Advantage is claimed for this system by the authors, as these characters are not much affected by environments though it is known that extreme conditions do affect the size of grain to an appreciable extent. This scheme is considered by the authors to be of help to traders as it suits their requirements. Puttus and other rices ranging from purple colour of kernel to brown and gold riced varieties do not find a place in their scheme due to the absence of these varieties in the United Provinces. The classification of rice is certainly an intricate problem due to the wide range of characters modified by seasonal and environmental conditions. In any case the classification based on morphological and grain characters is not likely to be of great value apart from its academic interest. It is doubtful whether trade recognizes minor differences in the grain sizes, beyond the three main broad groups, (1) Long and thin, (2) Medium, long and broader and thicker than (1), and (3) Short and round.

Trade has also to recognize the milling properties of the rice which is of course dependent to a large extent on its size and shape. It is due to the doubtful value of such a classification in rice that it had not been attempted at Coimbatore although there are over 400 isolated pure lines that have been grown on the Paddy Breeding Station, Coimbatore, for several years now.

N. P.

by the ryot himself, the construction is entirely of steel and consists of five parts only including the blade. The rear portion of the pole is made to serve as a member of the framework thereby reducing the amount of steelwork and consequently the cost. All joints are effected by bolt and nut of which there are eight in all and the implement may be completely assembled from its seven separate parts in a very few minutes.

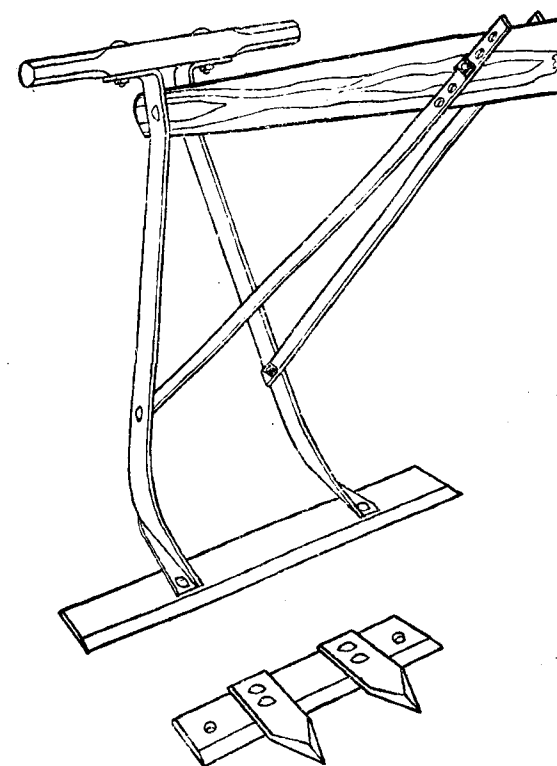
Light weight and portability. It is an old and admirable practice of the ryot to transport his implements on the bullock yoke and in order, also, that he may experience no great difficulty in handling them, weight and portability are factors which must be considered in modern implement design or in any modification of existing forms. These points have received due consideration in the design of this new *guntaka*. The complete implement with pole weighs not more than 60 lbs. and may be handled with ease by one man and conveniently carried on the yoke.

Strength. The triangular disposition of the frame members offers a marked degree of rigidity to the whole structure. The angular section of the feet and the edgewise bending of the broad steel legs behind them amply resist distorting influences under heavy loads and hold the blade firmly to its work.

Good penetration. The straight blade however sharp has very little penetrating power by itself and the addition of weight to this type of implement with a plain straight blade will usually be found essential in any well-set soil. Where the implement is not heavy enough in itself, penetration is assisted by the placing of a stone on the implement, by the driver riding on it or by the exertion of pressure on the handle. The curved blade will penetrate a little more readily but has the objection that it imparts to the implement a tendency to roll and rather detracts from its handling qualities. It does not cut to a uniform depth over its entire length. The application of a pair of points as shown in the sketch is found to overcome this difficulty and causes very satisfactory penetration without any additional weight whatever even in the most difficult soils. No rolling tendency is imparted to the implement by the fitting of the points. In loose and loamy soils where sufficient penetration may be obtained without them, the points may very simply be removed. The points have the effect, incidentally, of breaking up the soil beneath the level of the blade and preventing the formation of a pan where such might otherwise arise through a too frequent working of this type of implement.

Ample clearance over blade. The legs of the *guntaka* are swept some distance backwards and upwards from the blade so that the accumulation on them of haulms and trash, which is inevitable in the lifting of certain crops and in dirty fields, will not immediately obstruct the penetration of the blade. The feet of the legs to which the blade is attached are designed to offer the minimum resistance to the passage of the soil over the blade and are subject to very little wear.

Ability to carry blades of various lengths. The *guntaka* is designed to carry a minimum length of blade of 24" which is a little more than the distance between the outsides of the feet. Any blade length in excess of this may be carried up to about 60 inches assuming the use of $\frac{3}{4}$ " blade. The length of blade will, of course, be chosen to suit the nature of



A NEW GUNTAKA

November 1930]

A New Guntaka

the work and the capacity of the cattle. For the control of weed growth, mulching, and the covering of seed after broadcasting and similar work requiring a penetration of not more than several inches, the longer blades will be employed and the assistance of the points will not usually be required. For the lifting of groundnuts, the eradication of cotton stalks and deep-rooted weeds the short blade will be required, with or without the assistance of the points as the nature and condition of the soil and plant demand.

Reversible plain straight blade. The blades are straight and flat with a bevelled edge and may be simply prepared from a 3" x $\frac{3}{8}$ " flat steel bar. Both edges may be bevelled, preferably on opposite sides of the blade, for the blade is reversible both end for end and side for side. Two holes are provided in the blade for attachment to the feet of the implement and two pairs of additional holes for attachment of the points. The blade is thus free from any forged tangs or rivetted sockets which are necessary appendages to the blades of the country *guntaka* and any steel *guntaka* which has hitherto appeared. This feature must be appreciated in the manufacture of the blade and at times when the blade is due for re-sharpening.

Ease of adjustment and change of blade. The inclination of the blade may be varied over a wide angle for different degrees of penetration by means of the bolt in the pole and the series of holes in the forward ends of the adjusting rods. The blade may be removed or changed in a few moments by the application of the spanner to the two nuts on the underside of the blade. The bolts are round-headed and are set in square holes in the feet of the implement so that they offer the minimum obstruction to the passage of the soil and are proof against turning when the spanner is applied. The slope of the blade affords sufficient protection against wear to the nuts on the underside of the blade. Each point is attached to the blade in a similar fashion by means of two bolts.

Low cost. The price of the implement without the pole but including one 48" blade, one 24" blade and one pair of 8" points will not exceed Rs. 11 which is not beyond the means of the average cultivator.

MANAGER'S NOTICE

The Managing Committee of the Union beg to thank those subscribers who have been kind enough to furnish them with the names and addresses of people interested in South Indian Agriculture, through the medium of the printed cards sent out with the October number of the 'Madras Agricultural Journal'. They would request other subscribers also to kindly help them in this manner so that they may send out specimen copies to a larger number of Potential subscribers and incidentally be able to improve the scope and usefulness of the Journal.

College News and Notes

Students' Club.—On October 11, 1930, there was a parliamentary debate at the Students' Club, on 'Whether from the man's point of view, academic education for women was necessary.' Mr. Y. V. Narayana, B.A., of the first year moved the proposition that academic education was necessary while Mr. D.T. Dhanapandian, B.A., also of the first year led the opposition. Many students took part in the debate speaking for and against, and the house finally resolved by a majority of 20 to 17 that academic education was necessary for women.

Athletic Activities.—Ill luck as usual dogged us in the Coimbatore Hockey Tournament. Our boys won the first round against the Forest College by 2 goals to love, but were beaten in the semi-finals by the Stanes' team, by 5 goals to 2, after leading by 2 goals to love in the first half. A unique feature however, was that this year's team was entirely manned by students. We congratulate them on this and wish them better luck, in future.

The Officers' Club.—The Annual Club Day was celebrated on October 18, with great *eclat*, as usual.

At Home to Mr. and Mrs. Rama Reddi.—The officers at the Agricultural College and Research Institute, gave a farewell tea on October 31, to Mr. and Mrs. P. H. Rama Reddi on the eve of their departure to Bombay, where Mr. Reddi is to take up the appointment of Deputy Secretary to the Cotton Committee. As President of the Union Mr. Reddi evinced enormous interest in its affairs and was a great pillar of strength in times of need. We wish him all success and prosperity in his new sphere of work.

Ladies' Club.—On the same day, the members of the Ladies' Club entertained Mrs. Rama Reddi, at tea. During her stay at the College, Mrs. Reddi was the President of the Ladies' Club.

Change in the Principalship.—Mr. Rama Reddi handed over charge of Principalship to Mr. R. C. Broadfoot, who was relieved of his duties as Deputy Director of Agriculture, VIII Circle, by Mr. D. G. Munro. Dr. J. S. Patel took over charge from Mr. Munro as Oil Seeds Specialist. Dr. Patel took his B. Sc., in Agriculture at the Cornell University, Ithaca, N. Y., and his M. Sc., in Plant Breeding and Plant Physiology at the same Institute, submitting for the Master's degree a thesis on 'Genetics of Tobacco'. The University of Edinburgh, later conferred on him the degree of Ph. D. (Animal Breeding) for his thesis on 'The biology of the Corpus luteum'; he isolated as well the two hormones of the Corpus luteum.

Exhibition van.—The demonstration van of the Department (Southern Districts) was at the College during the latter part of the month, to renew exhibits. Mr. P. Narayana Nair, B.Sc., Ag., Agricultural Demonstrator, Bhavani, was in charge of the van.

A record Rainfall.—We have had an excessively wet month in October. Heavy rains were general throughout the Presidency, and Trichinopoly and Tanjore had unprecedented precipitation during very short periods.

Coimbatore and the College had their mild share, 'of the opening out of the heavens', but even that mild share was enough to break previous records.

An idea of the downpour can be had from the fact that on the 25th night Kumaraswami tank (the tank south of the Estate) had its southern bund breached causing extensive damage to cultivated crops in the Pallapalyam village. A wide gap of about 50 yards has been left in this bund (which must be familiar to all old students as track for the Cross-country race). We believe this is the first time breaches have occurred in this tank and trust it will be the last.

Visitors.—Col. Olver, Livestock Expert to the Imperial Council of Agricultural Research, visited the Dairy on the 8th. Mr. J. R. Kotawalla, B.Sc., B.Ag., Offg. Imperial Dairy Expert visited the Institute at about the same time. About the middle of the month Dr. M. Mitra, M.Sc., Ph.D., Imperial Mycologist in charge, visited the College and stayed at the Rest House for a few days.

Dr. H. L. Lyon, Plant Pathologist and Expert in Forestry, a visitor who hailed from Hawaii, stayed for a few days at the Imperial Sugarcane Station, where he had come to study the sugarcane crop and to see the sugarcane sorghum hybrids. On the 28th Dr. Lyon spoke on 'The Problems of Hawaii' under the auspices of the Association of Economic Biologists.

Other visitors during the month were Messrs. P. T. Saunders, Director of Veterinary Services and R. W. Littlewood, Deputy Director of Agriculture, Livestock.

We have received the following from the Accountant-General, Madras, with an endorsement by the Director of Agriculture, Madras for publication:—A new Manual entitled *Introduction to Indian Government Accounts and Audit* has been published in substitution for the existing two books entitled *An Introduction to Indian Government Accounts* and *An Introduction to Indian Government Audit*; the new manual is now available for sale with the Manager, Central Publication Branch, Calcutta.

Ed. M.A.J.

PLANTS FOR SALE

A revised catalogue of fruit trees and ornamental plants for sale at the Government Gardens, the Nilgiris, is now available and will be sent on receipt of annas four.

Apply to:—**CURATOR,**
Government Botanic Gardens, Ootacamund

water is therefore necessary for the needs of the plant. The amounts lost under (1) and (2) are much less in arid and semi-arid than in humid conditions, but loss through evaporation is great and is of especial consequence as it competes directly with the crop.

Run off losses vary with the rainfall and its distribution, the slope of the land, the character of the soil and the vegetative covering. In some regions they may amount to as much as 50 per cent of the rainfall, but such losses are inconsiderable in arid tracts. The amount of run off would be greatly reduced by altering the physical condition of the soil so as to enable it to retain as much of the rain water as possible. Good tillage, deep ploughing and the addition of organic matter would thus help to retain the rain water and so reduce run off. The provision of bunds is an effective means of preventing run off. After a heavy shower some of the water held by the bunds may, however, require to be let off to avoid injury to the crop by water-logging. On steep slopes cultivation across the incline and terracing are some of the means adopted to reduce run off.

Losses from percolation result whenever the rainfall entering the soil becomes greater than the capillary capacity of the soil. Besides water some salts which may serve as plant nutrients are apt to be lost through percolation. Such losses depend largely on the amount and distribution of the rainfall and the capacity of the soil to hold water. Percolation is influenced also by evaporation and the presence of a crop. On uncropped land in humid climates percolation losses may amount to 50 per cent of the rainfall. Evaporation and the presence of a crop greatly reduce the percolation losses. Percolation may be controlled by improving the absorptive capacity of the soil by good tillage and the addition of organic matter. In dry climates, however, owing to excessive evaporation, percolation losses are of minor importance.

Loss due to evaporation on uncropped land may amount from 50 per cent of the rainfall in humid regions (the rest being lost by drainage) to cent per cent in arid sections of the country where there is little or no drainage. The rate of loss of water by evaporation may be very materially reduced by drying the surface thoroughly whereby the capillary movement of the soil water near the surface is very much retarded. This naturally occurs if sufficient time occurs between rains. The drying however has to be rapid if evaporation losses are to be reduced effectively. Under favourable climatic or weather conditions, the rate of drying may be so rapid that no supplemental treatment of the soil to hasten the process is necessary. Where the process is likely to be slow, it would be desirable to cultivate the soil after each heavy rain in order to produce a dry surface layer before serious losses from lower depths have occurred. The loosened soil forms what may be termed a soil mulch and serves to reduce evaporation losses considerably.

The effectiveness of the soil mulch in reducing losses due to evaporation seems to depend upon a variety of factors connected with the crop, the climate, the season and the soil. The failure to take these into consideration seems to be responsible for much of the discrepancy observed between the results obtained from laboratory experiments and those conducted under field conditions.

We have seen how climatic and weather conditions as temperature, humidity of the atmosphere or the velocity of the wind might influence the

effectiveness of the soil mulch as a means of conserving moisture. The nature of the crop as to its top growth or the spread of the roots might sometimes be a determining factor. If the top growth is such as, either because of the shade cast or its breaking action on the wind, to retard the drying up of the surface soil inter-cultivation after a heavy rainfall may result in the saving of the soil moisture and so benefit the crop provided, however, it does not cause injury to the roots. In the case of crops with extended root systems, the injury thus caused may outweigh the gain in soil moisture. In such cases inter-cultivation is best limited to the early stages of the crop.

Bare fallowing is often an effective means of adding to the store of water inside the soil and where the annual rainfall is insufficient for the successful raising of a crop, it has been found possible to obtain good crops by fallowing every alternate year or once in three years, the fallowed land being ploughed and harrowed at intervals so that the soil may receive and hold all the rainfall.

A SHORT NOTE ON *PODU* CULTIVATION IN THE GOLUGONDA TALUK

(VIZAGAPATAM DISTRICT)

By P. L. NARASIMHAM,

Assistant Agricultural Demonstrator, Narasapatam.

Cultivation on the hill slopes is generally known as *podu* cultivation and it is largely done in the Agency tracts of this District and also in the plains where the forests are not reserved. Cultivation of these hill slopes is, of course, an evil as the rain water rushing down these deforested slopes, carry a lot of valuable top soil and deposit it in the lower levels of streams and the tanks they feed, or the lands they overflow into. Without giving much heed to this great evil, hill slopes are constantly being given on lease for this kind of cultivation, so much so, that most of the hills owned by private individuals are completely bare and are causing great havoc to the irrigation sources and lands commanded by them since the streams arising from these hills bring with them nothing but sand with their current, thus necessitating the investment of large sums of money at shorter intervals for the repairs of these irrigation sources. The cultivation of these *podu* lands is chiefly in the hands of poor ryots. In the lower slopes of hills in the Agency parts, the hill-men are, of course, obliged to adopt the system as there are no suitable lands for cultivation. But in the plains it is possible to stop the system provided the owners take a general interest and understand the danger of it.

Shrubs are cut from the middle of February to the middle of March and spread over the ground for drying till the beginning of May when they are set on fire. The shrubs that burn away deposit a thin layer of ash on the surface.

Just before the advent of the South West Monsoon, a mixture of 1 lb. *Peddaganti*¹ (long duration *Cumbu*) 4 lbs. of *Korra*,² (*Tenai*) and 2 lbs. of

¹ *Pennisetum typhoides*.

² *Setaria italica*.

Weather Review

FOR OCTOBER 1930

Rainfall Data

Division	Station	Actual	Departure from normal	Total since 1st January
Circars	Gopalpore	2.8	- 5.2	41.1
	Vizagapatam	8.4	+ 1.3	38.7
	Cocanada	22.3	+14.5	45.4
Ceded Dists.	Masulipatam	24.3	+16.2	51.6
	Kurnool	4.3	+ 0.8	24.0
	Bellary	11.8	+ 7.9	25.3
	Anantapur	10.6	+ 7.5	26.5
Carnatic	Cuddapah	11.7	+ 6.6	37.6
	Nellore	23.0	+14.6	40.2
	Madras	28.8	+17.1	52.2
	Cuddalore	22.4	+11.4	58.0
Central	Vellore	18.7	+12.4	45.5
	Salem	12.5	+ 5.8	35.8
	Coimbatore Town	16.3	+ 9.8	28.2
	Coimbatore Re- search Inst.	16.0	+10.0	27.9
South	Trichinopoly	27.4	+20.5	47.0
	Negapatam	34.7	+24.3	66.1
	Madura	9.6	+ 1.7	32.2
	Pamban	11.4	+ 2.3	27.9
	Palamcottah	6.5	- 0.4	15.6
West Coast	Trivandrum	18.7	+ 8.2	65.2
	Cochin	20.9	+ 7.7	107.3
	Calicut	14.7	+ 4.5	108.0
	Mangalore	13.8	+ 6.3	137.1
Mysore and	Bangalore	9.6	+ 3.7	36.8
Coorg	Mercara	8.9	+ 0.2	106.9
Hills	Kodaikanal	26.0	+16.4	62.8
	Coonoor	31.1	+17.5	57.6

General summary of weather conditions.

The month was an unusually wet one in South India, there having been continuous and widespread rain from the 8th onwards.

Pressure distribution was of the N. E. Monsoon type from the beginning of the month, with the area of lowest pressure in the S. W. of the Bay. This Low however failed to develop till the 21st. On the next day a depression appeared of the South Coromandel and North Ceylon coasts, and after developing into a storm it moved in a N. W. direction, and lay off Negapatam on the 23rd morning. On the next day it lay over Trichinopoly, and rapidly weakening into a diffuse area of low pressure passed out to sea in the west, and concentrated into a storm again and crossed the coast for the second time near Surat on the 30th.

The storm caused very heavy rain over the south during its passage, the area of heavy rainfall shifting westwards with its movement. Towards the end of the month the weather was again unsettled off the Coromandel coast and heavy rainfall occurred on the North Madras coast, especially between Masulipatam and Cocanada on the 29th and 30th. This Low had

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failed to develop till the end of the month, and on the 30th lay as a diffuse area of low pressure over the centre and south of the Bay.

Rainfall was in very large excess in the zone extending from Cocanada, southwards to Trichinopoly, and lying along the Coast. Deccan and the Malabar coasts were in moderate excess, while the extreme north and south were in defect. The rainfall at some stations in the south was as much as 300-400 per cent in excess of the normal. This month is probably one of the wettest months on record for the greater part of the area.

The chief fall of rain were: Negapatam 16" (23rd), Trichinopoly 12.6" (24th), Coonoor 7.1" (26th), Madras 6.7" (24th), Kodaikanal 5.8" (25th), Cocanada 5.3" (30th) and Coonoor 5.1" (25th).

With the persistent rainy and unsettled weather skies were heavily clouded and humidity high. Temperatures were below normal especially during the passage of the Bay storm inland.

Weather Report for the Research Institute Observatory.

Absolute Maximum in Shade	...	94°·5
Absolute Minimum in Shade	...	67°·0
Mean Maximum in Shade	...	84°·9
Mean Minimum in Shade	...	74°·0
Total Rainfall in month	...	16·03 inches
Mean Rainfall for October	...	5·97 "
Departure from normal	...	10·06 "
Number of rainy days	...	16
Heaviest fall in 24 hours	...	3·43 "
Mean daily wind velocity	...	1·5 M.P.H.
Mean 8·00 hours wind velocity	...	0·6 "
Mean Humidity at 8·00 Hours	...	85·3 per cent.
Total hours of bright sunshine	...	152·4 hours
Mean daily hours of bright sunshine	...	4·98 "

Summary of weather conditions

The weather was unsettled for the greater part of the month and rainfall was very frequent. The Barometer was high and steady almost throughout the month, it fell sharply on the 22nd with the concentration of the low pressure area in the Bay, and recovered on the 29th when the depression had passed away northwards in the Arabian Sea.

Rainfall was very heavy during the month totalling 16·03 inches against a mean of 5·97 for 25 years. The first rainy period was from the 5th till the 16th, and was due to the generally unsettled weather conditions over South India, and the second period was from the 22nd till the 26th during the traverse of the Bay storm over the south of the Peninsula. This month makes a new record for heavy rainfall, having exceeded the previous record of 14·18 inches during July 1924. The heaviest fall in 24 hours occurred on the 25th when the Bay storm was centred as a residual nearest the observatory.

Temperature was high during the first week of the month, the maximum reaching 94·5 on the 5th. Day temperature fell and remained fairly low for the rest of the month with the rainy cloudy weather. Cloud amount was high and the mean hours of bright sunshine were only 4·98 per day.

P.V.R.

B.S.N.

Departmental Notifications

Appointments, transfers, confirmations, etc.—

Seventh Circle.—E. Achyutan Nayar, A. A. D., Palghat, from Palghat to Ponnani. A. P. Balakrishnan Nayar, A. D., Ponnani, to Pilicode as F. M. in charge of No. 1 Coconut station to work under the guidance of the Chief Manager of Coconut stations, Kasargode. P. K. Kannan Nambiyar, A. F. M., from Pilicode No. I Station to No. III Station, Nileshwar.

Consequent on the reversion from foreign service of C. V. Ramaswami Ayyar, Assistant in Chemistry, III Grade, on the forenoon of 9-10-1930, the following reversions are ordered from that date,—From III Grade to IV Grade—G. Ganapathi Ayyar, Assistant to the G. A. C., From IV to V Grade—C. M. John, Assistant to the Oil Seeds Specialist.

Government Entomologist's Section :—C. S. Balasubramanyan appointed as officiating Assistant in V Grade *vice* C. V. Sundaram granted L. A. P. for four months from 24-8-1930.

Leave, etc.—

Second Circle.—The resignation tendered by Mr. B. V. Venkatacharya, A. D., is accepted with effect from 21-6-1930.

First Circle.—M.R.Ry. T. V. Cheriakku, Lower Subordinate on reversion from Foreign service, is posted to the I Circle as Assistant Agricultural Demonstrator. M.R.Ry. M. Ramamurti, Lower Subordinate, V Grade Agricultural Section, is promoted as Upper Subordinate, Agricultural, Section V Grade from 1st August 1930.

Third Circle.—S. Muthuswami, A. D. Kudligi granted L. A. P. for 22 days from 10-10-1930. Mr. P. Nagadhana Naidu, A. A. D., Bellary, granted L. A. P. for 15 days from 9-10-1930.

Fourth Circle.—Mr. A. Balakrishna Ayyar, A. D., Gudiyattam, on relief from Tandarai on 3-9-1930 joined duty at Gudiyattam on 13-9-1930 instead of on 12-9-1930. L. A. P. for 9 days from 4-9-1930.

Sixth Circle.—Mr. P. K. Natesan, A. D., Srivaikuntam, granted L. A. P. for 15 days from 20-10-1930 with permission to prefix the previous Sunday. Mr. A. M. Muthia Nattar, A.D., Dindigal, extension of L.A.P. from 6-10-1930, in continuation of the leave already granted to him.

Seventh Circle.—Mr. G. Skharama Rao A. D. Puttur, granted L.A.P. for 12 days from 2-10-1930 with permission to avail of the holiday on 1-10-1930, granted an extension of leave for 18 days from 14-10-1930. Mr. K. G. Nambiar A. D. Calicut granted L.A.P. for 15 days from 17-10-1930.

Government Agricultural Chemist's Section.—In partial modification of orders already issued, M. Sanyasi Raju, Bacteriology Assistant, granted leave out of India and Ceylon for 2 years from or after 2-10-1930 of which 1 year 8 months and 4 days shall be L.A.P. and 3 months 26 days extraordinary leave without allowances.

Paddy Specialists's Section.—Mr. S. Ramanujam, Assistant, granted L.A.P. for 5 days from 30-9-1930 with permission to avail Sunday, October 5. The probation of Mr. D. Sitaramaswami, Sub-Assistant will cease on 1-11-1930 for not having passed the A.T.A. and he will be reverted to his permanent appointment as fieldman from that date.

Government Mycologist's Section.—Mr. P. Vishnu Somayajulu, Assistant, granted L.A.P. for 10 days from November 1, 1930.

Cotton Specialist's Section.—Mr. R. Sankara Ayyar, Assistant, Koilpatti, granted L.A.P. for 13 days from November 10, 1930, with permission to avail the Sundays on November 9 and 23, 1930. Mr. P. Abraham, Upper Subordinate, V Grade, Science Section, is confirmed with effect from November 1, 1930.

Curator's Section, Ootacamund.—M.R.Ry. M. Arokiaswami Pillai, Assistant Curator, is granted L.A.P. for four months from November 10, 1930. M.R.Ry. K. K. Hegde, A. F. M., Nanjanad, is transferred to Government Botanic Gardens *vice* No. 1, on leave.

Live Stock Section.—Mr. M. Alagiriswamy, A. F. M., Chintaladevi, granted L.A.P. for two months from September 24, 1930, in continuation of the leave granted to him. M.R.Ry. A. Venkobachari, A. F. M., Chintaladevi, granted extension of L.A.P. on medical certificate for three months and on L.H.P. for one month.

APPENDIX

LIST OF BOOKS, BULLETINS AND OTHER PUBLICATIONS RECEIVED IN THE AGRICULTURAL COLLEGE LIBRARY DURING SEPTEMBER 1930

A. BOOKS

1. <i>A School Garden Handbook</i> ...	By J. C. Driberg	...	1928
2. <i>Rural Science</i> ...	„ F. A. Stockdale and J. C. Driberg.	...	1928
3. <i>Revised form of Village Account</i> ...	„ Madras Government publications.	...	1930
4. <i>North American Cup-fungi</i> ...	„ F. J. Seaver	...	1928
5. <i>Foibles of Insects and Men</i> ...	„ W. M. Wheeler	...	1928
6. <i>Recent Advances in Plant Physiology.</i> ...	„ E. J. Barton-Wright	...	1930
7. <i>Biological Stains</i> ...	„ H. J. Conn. 2nd Edn.	...	1929
8. <i>Principles of Economics</i> ...	„ F. S. Deibler	...	1929
9. <i>Mechanism of Mendelian Heredity</i> ...	„ T. H. Morgan and others.	...	1926
10. <i>Flora of Upper Gangetic Plain, Vol. iii, Pt. 3.</i> ...	„ Dutchie	...	1929
11. <i>Triennial Review of Irrigations in India, 1924-27.</i> ...	„ Central Government publications.	...	1928
12. <i>Contribution toward a monograph of the Adelgine of North America.</i> ...	„ P. A. Annand	...	1928
13. <i>Proportional Representation by Single Transferable Vote.</i> ...	„ K. V. Krishnaswami Aiyar.	...	1930
14. <i>Register showing the distances of the various villages from the Taluk and District Headquarters.</i> ...	„ Madras Government publications.	...	1930
15. <i>Agricultural Education in the United States.</i> ...	„ W. H. Shepardson	...	1929

B. REPORTS—PROCEEDINGS, Etc.

1. Administration Report of the Mysore Agricultural Department for 1927-28.	
2. Annual Report of the Assam Agricultural Department for 1929-30.	
3. Annual Report of the Jamaica Agricultural Department for 1929.	
4. The Seventh Annual Report (1928) of the Cotton Research Board—Ministry of Agricultural, Egypt.	
5. Minutes and Proceedings of the Froghopper Investigation Committee, Trinidad, in 18 pts.	1925-30
6. Statistical Tables relating to Banks in India	... 1928

C. BULLETINS.

7. Improvement of the Coffee Industry in Mysore ...	Mysore Agricultural Department General Series Bulletin No. 13
8. Report of Work on the Coffee Experiment Station, Balehonnur for 1925-30.	Mysore Agricultural Department Coffee Experiment Station Bulletin No. 3
9. Seasonal Periodicity of Coffee Leaf Disease (<i>Hemileia vastatrix</i>).	do. „ 4
10. Report on the cultivation, treatment and prospects of rice in British Guiana.	Empire Marketing Board Publication No. 32.

11. Tsetse-fly in South Africa ... Union of South Africa
Agricultural Department
Bulletin No. 44.
12. The Sucrose content of the cane expressed in terms
of Air temperature and soil moisture. Mauritius Agricultural
Department Scientific
Series Bulletin No. 16.
13. Control of the American leaf disease (*Omphalia*
flavida) on Arabian coffee in Trinidad. *Memoirs of the Imperial*
College of Tropical Agri-
culture, Trinidad, No. 2.
do. " 3.
14. Observations on Cypre in Trinidad with special
reference to Cancer disease.
15. Revision of the Rhipiphoridae (*Coleoptera*) of
North and Central America. *Memoirs of American En-*
tomological Society
No. 6.
16. Control of the Mountain pine beetle in Lodgepole
pine by the use of solar heat. *U.S.A. Agricultural*
Department Tech.
No. 195
17. Relative insecticidal value of commercial grades of
Pyrethrum. do. " 198.
18. Stored grain pests ... U.S.A. Agricultural
Department Farmers'
Bulletin No. 1260
(Revised). do. No. 1472
19. Preventing damage by Termites or white-ants ... do. " 1630
20. Irrigation practices in growing Alfalfa ...
21. Maintenance of Moisture Equilibrium and Nutrition
of plants at and below the wilting percentage ... *Arizona Experiment Station*
Tech. Bulletin No. 28
do. " 30
22. The Base Exchange Property of Organic Matter in
Soils.
23. The climate of Arizona ... *Arizona Experiment Sta-*
tion Tech. Bulletin No. 130
do. " 131
24. Caliche in Arizona ... do. " 132
25. Timberrot in the pepper tree (*Schinus molle*) ... do. *General publica-*
tion.
26. Colour schemes of Cacti ...
27. The Effect of Dusting Sulphur upon the Germin-
ation of the pollen and the set of fruit of the
apple. *Cornell University Agri-*
cultural Experiment Sta-
tion Bulletin No. 498
do. " 500
28. Legumes as a source of available nitrogen in crop
rotations.
29. Some comparisons of methods of fattening western
lambs. *Illinois Agricultural Ex-*
periment Station
Bulletin No. 338
do. " 338
30. Varieties of oats for Illinois ... do. " 340
31. Experiments with Blister canker of Apple Trees ... do. " 341
32. A comparison of the Transpiration rates of Twenty-
one deciduous fruit species.
33. An economic study of crops and Live-stock in the
purchase region of Kentucky. *Kentucky Agricultural*
Experiment Station
Bulletin No. 288
do. " 290
34. Analyses of commercial fertilizers ... do. " 291
35. Calcium Metabolism in the laying Hen. ... do. " 291
36. Systems of Farming for the purchase region of
Kentucky. do. " 291
37. Leaf hopper injury to Clover and Alfalfa ... do. " 291
38. Feeding trials with laying Hens ... do. " 291
39. Commercial Feeds in Kentucky in 1928... do. " 291
40. Keeping qualities of Butter ... *Michigan Agricultural*
Experiment Station Tech
Bulletin No. 10
do. " 101
41. The pathogenicity of the species of the Genus
Brucella for the Fowl. do. " 101
42. The results of a five-year mineral feeding investi-
gation with Dairy cattle. do. " 101
43. Maintaining the productivity of cherry trees ... do. *Special*
Bulletin No. 191

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44. The farm woodlot in Michigan ... *Michigan Agricultural*
Experiment Station Spl.
Bulletin No. 196
do. " 197
 45. Oak tests at the Michigan Experiment Station ... do. *Circular*
do. *Bulletin No. 130*
do. " 131
 46. Cultural methods in the bearing vine-yard ...
 47. The Cherry fruit flies ...
 48. June beetles or white grubs in Michigan ... *Michigan Agricultural*
Experiment Station
Circular Bulletin No. 132
do. " 133
 49. Soft scales injurious to deciduous ornamentals ...
 50. Life history of the Oriental fruit moth in Virginia. *Virginia Agricultural*
Experiment Station
Bulletin No. 270
do. " 271
 51. Stock share renting in Virginia ...
- D. LEAFLETS, CIRCULARS AND MISCELLANEOUS PUBLICATIONS**
52. Potatoes ... *Madras Agricultural*
Department Leaflet
No. 65
 53. How to control the jasmine bug ... do. " 66
 54. Note on turmeric ... do. " 67
 55. School Garden ... do. " 68
 56. No water rate Fasljasti for certain crops ... do. " 69
 57. Broad hints for every day use—III feed your cow ... do. " 70
 58. The Economic side of Agriculture ... *Reprint from the Journal*
of the Madras University.
Ottawa Agricultural
Department Publication
No. 48 (Eastern and B.C.
Editions).
 59. Seasonable hints from the Dominion Experimental
Farms.
 - i. Lowering cost of production—Where do we
start?
 - ii. August an important month for milk pro-
duction.
 - iii. Hot weather care of the milking machine.
 - iv. Changes in the pump and size of farms.
 - v. Cutting hay at the proper time
 - vi. Improvement of pastures by close grazing.
 - vii. Preparing for seed exhibitions...
 - viii. Harvesting the apple crop
 - ix. Shrubs for the Farm home
 - x. Selecting disease-resistant Turnips
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 - xii. The honey crop and how to care for it
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Farms. *Ottawa Agricultural*
Department Publication
No. 48 (Revised).
 - i. Feeding and care of the Dairy Bull
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 - iii. Some factors affecting the yield of Fall Rye.
 - iv. Seed corn production in Manitoba
 - v. The appearance, distribution and control
of Take-all.
 - vi. Waste work with the watering can
 61. A summary of the proceedings of the Conference
on cereals. *The Cyprus Gazette*
No. 2071, *Agricultural*
Supplement No. 25.
 62. Care of the cow at the calving time ... *U.S.A. Agricultural*
Department Leaflet
No. 10 (Revised)
 63. Hints on Coyote and wolf-trapping ... do. " 59
 64. Ensembles for sunny days ... do. " 63
 65. Traps for the Japanese beetle ... do. *Circular No. 130.*
 66. Five years of Research in Industry 1926-30—a
Reading list. *N.Y. National Research*
Council Publication.

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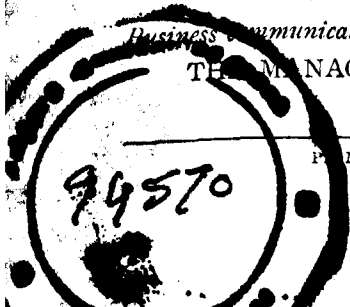
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