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In agricultural countries on the other hand, owing to the very magnitude of the task and the elusive nature of the principles that guide the peasants in their avocation, methods are necessarily to vary. Unlike in olden days agricultural nations need today to exercise more vigilance and become more circumspect because of the multitudinous ways in which the interests of the cultivator would suffer.

One means of gauging the situation in which the agriculturist is placed is to know with a fair degree of accuracy what the production is in a particular year and teach him how to help himself. This is a duty which should devolve both on the government and the public and each should contribute its share in securing the desired end. Unfortunately in India the usefulness of this method of ascertaining the actual production is not generally well understood and the actuals and estimates of production differ considerably and it would seem necessary to educate village panchayats to perceive the necessity and usefulness of trials in ryots' fields so that the real situation may be known. Otherwise the gulf that exists between the peasant and the educated public is not likely to be bridged and the dense mass of ignorance that clouds the intellect of the urbanite in regard to the conditions under which the ryot lives is likely to continue and attempts made to capture his votes may not carry the experimenter very far.

The ryot suspects that any cropcutting trial made in his field will result in additional assessment but often forgets that all the elaborate process of conducting such trials is not necessary if the Government made up their mind to raise taxation. He should realise that any additional information obtained will only strengthen his cause rather than add to his burdens The rural worker is the only individual at present who can help the ryot in this respect. May the country look up to him to undertake this noble task.

Old Friends and New. The peasant is by nature individualistic. He relies on his own brawns and brain to help himself. The training he receives at the hands of Mother Nature makes him stolid and impervious to the impressions which quickly upset less hardened souls or distort or narrow their vision. With the progress of science and a clearer understanding and fuller realiza- tion [illegible] and their effects in a particular set of condi- [illegible] in results becomes patent. Since the

historic period there have not been wanting writers and public men who have in their own day found fault with the peasants' methods and suggested ways some of which perhaps he first spurned but later took up when he obtained better knowledge and conditions permitted. Amongst many instances one is furnished by the history of the introduction of Bell's reaping machine in England. The use of insecticides and fungicides is another case in point. Several examples are available from Indian sources also.

There are cases again, though not perhaps a very large number, where the farmer's view has turned out to becorrect and and others have had to recast their methods and discover to their chargin and dismay that what has been and is being done by him is not all wrong:but only baffles them in all attempts at reconstruction or dissolution.

Thus each has to learn and unlearn; teach and be taught in turn. So long as this process continues in Nature friends old and new must certainly exchange their positions and profit by such exchange to the lasting good of the race.

A 'Trite Method.—Every public man in this country has deplored the present condition of overindebtedness of the Indian ryot and several measures undertaken in this behalf have not proved efficacious. It was fondly hoped that the Co-operative movement would solve many a rural problem. Though it has done much good in several directions it has certainly tended to lower the rate of interest generally—the burden of indebtedness of fhe Madras cultivator remains as heavy as ever before, and the very original and bold suggesfion which Dr. K. Kunhikannan who knows the ryots' conditions intimately has put forth in the article "Co-operative farming" is well worth a trial. The method is simple and easily understandable to the uncanny ryot and with a right man to launch and work the scheme it should prove a success. Will the Registrar of Co-operative Societies who in collaboration with the Labour Commissioner is interested in the introduction of co-operative societies for the Kallar Community examine this question and give it a trial?

An Woeful Neglect.—In his contribution appearing in this issue, Captain Guthrie has drawn pointed attention to the avoidable loss that is annually accruing to the owners of cattle in this province by their persistent attitude towards the question of branding of animals.

Whatever conditions may have operated in this direction in the past there is no gainsaying that today the Madras ryot stands to lose a good deal if he is unmindful or ignorant of any factor, however small it be, that reduces his already dwindling income and we therefore heartily commend suggestions coming from an expert and wellwisher of the type of Captain Guthrie and we can assure our readers that Captain Guthrie is not a wobbling opport unist but one who is consistent and knows what he speaks about.

The Planters of Southern India.—It is refreshing to note that the United Planters of Southern India in their 36th annual meeting held at Bangalore during the month adopted certain resolutions which evince real sympathies with the aspirations of Indians and bring the planters nearer the progressiive politicians than ever before.

That an influential body like the Planters have come out of their seclusion and desire to take interest in questions affecting the body politic shows to what extent the leaven of Montford reforms has permeated for good even the most secluded classes in this country.

Notwithstanding their disagreement with the recommendations of the Linlithgow Commission in regard to the export of tax on oilcakes, oilseeds bones and fish their approval of the report is commendable.

Indian Hides and Skins. *

By

Captain A. Guthrie,

Principal, Leather Trade Institute, Madras.

One of the most noticeable features of modern industrial development is the great care that is taken to place valuable by-products on the market to the best advantage of the manufacturer.

In India one very valuable by-product of agriculture that the agriculturalist as a rule takes no interest in is the hides and skins of animals that have died from disease or accident.

In the leather trade the skins of larger domestic animals, for example, cattle and buffalos are known as hides whilst those of smaller ones e. g., goat and sheep are called skins. Under the old Indian village system I understand that the death of any domestic animal automatically caused a change in ownership from the original owner to the village scavanger, this being one of the latter's perquisites for the duties performed by him. On this account there was no direct inducement to the owner of livestock to improve the quality of or to prevent damage to the hides and skins of his animals.

Some years ago in speaking to the Society I pointed out the great economic loss to the country due to the branding of cattle. As I am interested in leather manufacture, I naturally looked at this subject from the Leather Manufacturer's point of view and showed how a badly branded hide was worth several rupees less than the unbranded one and thus proved to my own satisfaction that branding, except when done to cure lameness etc., was an economic loss to country. During the discussion that followed a large landowner put his point of view before the meeting, which showed that the conclusion I had arrived at, was in some cases at any rate far from being correct. He pointed out that after all the value of a hide is only a small proportion of the value of a living animal suitable for draught or for milk production. He went on to state that some of the village scavengers, whose income depends chiefly on hides from dead animals were not beyond increasing their income by the judicious use of poison. Naturally

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* Paper read at the M. A. S. U. Conference in July 1928.

an animal with a valuable hide was more likely to fall a victim than one whose hide was of less value. He was quite sure that in his case at any rate very heavy branding had a wonderful effect in reducing the deaths of his valuable animals from causes other than old age and accident.

In the case of certain other damages to hides, I do not think there is any doubt that the interest of the breeder and the tanner are identical, especially in the case of damages due to the hides by insects. I will only give a passing reference to the damage done by the warble fly which in many parts of the world does immense damage not only to the hide but also to the animal either by reduction of milk production or by slowing down the rate of growth. It has been definitely shown that it is possible and practicable to get rid of warble entirely by carefully removing the larva from the back of all cattle. In Denmark where anti-warble laws have been passed the number of badly warbled hides has been reduced from 35 to under 15% in the course of two years. Now practically all the warbled hides in that country come from one province where the law has not yet been enforced. In the case of a fairly large island off the coast of Ireland, where the fly was prevalent it has entirely disappeared since an anti-warble campaign was undertaken. We are fortunately, I believe, entirely free from this pest in South India, although it is quite common in some parts of Northern India. Many South Indian animals suffer greatly from various types of biting insects. Of these ticks are one of the most common. This insect does not damage the hide as visibly as does the warble but nevertheless a badly ticked hide has almost always to be classed amongst the poor selections as it is usually very poor in substance and in what is known in the leather trade as "life". That ticks not only irritate animals but cause them to give much less milk or to be able to do much less work has been proved often and I think you will agree with me when I show you a photograph of the same animal when covered with ticks and after two months' treatment by which it was kept free from this insect. There was no difference in the food given to the animal. These photographs are taken from Bulletin 498 published officially by the United States Department of Agriculture. The weight of the animal originally was 730 lb, but afterwards 1015 lb.

It is also undoubted that ticks carry many cattle diseases and that at times many cattle are lost on this account.

I think you will agree with me that any action taken to keep down or entirely get rid of tick would be of very great value to owners of stock as well as the leather manufacturers who finally get the hides or skins.

Even under the old village system of indirect payment the cattle owner does obtain a certain proportion of the value of the hides in the form of labour and I therefore thought when approched by your Secretary that a short paper on Indian Hides and Skins might be of interest to your Society. I am persuaded that anything that can be done to improve the character and quality of Indian Hides and Skins will in the long run benefit India and the Indian owner of cattle.

The collection of hides and skins for export either in the raw or tanned state is a well organised industry, but in addition to this there is a local demand all over India for leather, the chief demand being for leather for well buckets. It is impossible to say how many hides are used annually for this purpose and estimates made by different people vary very greatly. In a paper read a few months ago to the Light Leather Federation in England the number was estimated at one million per annum for the whole of India, whereas Sir Alfred Chatterton writing in 1905 estimated that South India alone used this number. When we consider that over 250 millions of India's population are agriculturists, the first estimate seems exceedingly small and I should think that Chatterton's figures are much nearer the truth. The hides used for well buckets in most parts of India are tanned by village tanners but in South India are often obtained from the larger tanners, who manufacture leather on large scale for export. One of these tanners told me some years ago that he sold over 50,000 tanned hides in the course of the year locally for this purpose.

Anything that can be done to make well bucket leather last longer is of direct interest to agriculture. Oil grease is the most suitable dressing for leather and most users of *kavalais* occasionally give the leather a coat of oil to preserve it. However, few of them know that the oil should be put on the leather whilst it is wet, and that the leather should then be hung to dry in the shade so that the oil dries in as the water dries out. If the leather is first dried and the oil then applied the result is not nearly as beneficial as by the reverse process. Ordinary barktanned leather does not stand high temperature when wet and many kavalai trunks are damaged by being hung to dry in the sun or by being throw

in the wet condition on the hot metal bucket. Dry leather will stand a very much greater temperature than wet. Users of boots should never put them whilst wet in too hot a place. Any heat that the hand cannot comfortably stand will damage wet leather.

The export trade of India in hides and skins has always been divided into two portions. The larger portion is interested in the export of raw hides and skins, the other—chiefly confined to Madras Presidency and neighbouring states—in exporting leather. Mr. C. W. E. Cotton writing in the Hand Book of Commercial Information for India states that before the War " in round figures out of every 160 hides exported only 17 were exported tanned and of every 100 skins only 20". I estimate that from 1923 to 1926 the proportion for each 100 hides was 45 tanned and for skins about 50. Since 1919 the Indian Tanner has had a small amount of protection due to an export duty on raw hides and skins (now reckoned at 5%) but whether he will continue to have this help is very doubtful as last year a proposal to abolish this duty was only beaten by the casting vote of the President of the Legislative Assembly. Whatever be the reason Madras exported last year practically 14,000 tons of tanned hides as against an average of 7,500 tons for the 10 pre-war years and as at that time Madras tanned hides were plastered with a mixture of flour and grease which added from 5 to 10% to their weight I estimate that the actual quantity of leather is just about double the pre-war average. In tanned skins the gain is only 5,500 tons to 6,400 tons or only 16% but considering that practically all the sheep skins available are tanned, and that we cannot as yet manufacture glace goat in India, for which there is a great demand, it is unlikely that the percentage will increase much further. The total value of the leather exported from Madras last year was over 8 crores, which was with the exception of the years during the war and immediately after, when Madras was being called upon to make good the world wastage of leather due to war conditions, by far the largest it has ever been.

At the present time the whole world is suffering from a shortage of leather. In many trades a shortage leads first to higher prices, which then cause a greater production and thus bring back supplies to normal condition. In the leather trade higher prices do not cause greater production as the raw material is a by-product and consequently does not follow the same rules as primary products.

In conclusion I shall show a table giving the average total exports of raw and tanned hides and skins for the years 1923 to 1926 and show in each case the proportion of the trade that is done from the Madras Presidency. From this it will be seen that Madras exports of raw hides and skins are practically negligible except in the case of raw goat. On the other hand exports of leather from Madras amount to about 85% of the total exported from India.

Madras has chiefly two factors to thank for this trade:—(1) the bark of *avaram* shrub which gives a leather extraordinarily easy to dress for many different uses (2) labour that is skilled in tanning processes. *Avaram* bark is still almost exclusively used in tannage of skins but for the tannage of hides, it is now largely supplemented by other less costly tanning materials. During the last few years imports of *Wattle* bark from Africa have increased very quickly and last year reached the large amount of 8,800 tons which is sufficient to tan about 6,000 tons of leather. At the same time the quantity of indigenous bark used is still well above the prewar average and I estimate that over 43,000 tons of indigenous bark was necessary to keep the South Indian Tanneries working as against an average of 39,000 for the 10 prewar years.

Exports of Hides and Skins from India.

Class.	Raw. Weight tons.	Raw. Numbers thousands.	Raw. Value Lakhs of Rupees.	Raw. Proportion from Madras.
Buff: hides	4600	460	37	·1%
Cow ,,	23300	4500	260	·001%
Buff: calf.	300	210	3	Nil.
Cow ,,	200	200	3	Nil.
Goat skins.	17700	15000	372	12%
Sheep ,,	450	300	6	22%
	Tanned.			
Buff: hides.	750	160	14	80%
Cow ,,	11100	3300	273	85%
Buff: Calf.	250	350	6·5	90%
Cow ,,	650	1100	24	92%
Goat skins.	2500	6000	160	80%
Sheep ,,	3300	9000	1·88	90%

Co-operative Farming.

By

K. Kunhikannan, M. A., Ph. D.

State Entomologist, Bangalore.

In the brief time allowed to me I should like to impress on this Conference the advisability of starting Co-operative Farming Societies as a means of quickening the pace of agricultural production. We have in India so far been familiar only with one form of cooperation, that of credit and even in this the progress that has been made is but little compared with the ground that remains to be traversed. A new form of cooperation involving a most exacting discipline may not appeal to our ryot population or to the authorities who are concerned in their welfare, but the task has to be attempted without any further delay.

The average size of a holding in India is only 4 acres. In Mysore it is 6½ acres. Even so 500,000 or nearly half the number of holdings are between one and five acres. It is largely this class of holders who find the income from their holdings hardly enough for their livelihood. They get practically no more than a bare return for the labour spent on their farms. There is no question of surplus except perhaps in very fat years and without a surplus no capital can be invested on farm improvements. They are heavily indebted and they can rarely get credit for investment in costly manures. The Agricultural Inspector or demonstrator sells manure usually to those who are richer, who can purchase manure for cash or on credit. But these are a very small fraction and any improvement effected by them will leave unaffected the poor class of ryots to whom investment of capital on their farms is an economic problem, which pursuasion in demonstration will not solve. In Mysore the field trials with improved manures for paddy show that production could be qudrupled in five years. Production has been increased from an average of 300 seers per acre for 27 acres to 1267 seers. But this required the application of manure at the rate of Rs. 22 to 25 per acre. Now 1·5 acres farmer cannot possibly find this money and unless he has it on credit there is very little chance of his using the manure. I think that unless this class is in a position to take the advice of the Argicultural Department the progress of Agriculture must continue to be very slow.

* Paper read at the M. A. S. U. Conference in July, 1928.

To enable them to do so, I would suggest the formation of Farming Cooperative Societies under which the farmers in a locality form into an asssociation and agree to follow the same improved methods of agriculture. Each society will elect a panchayet who will decide what the normal yield of each farm under the society is. In regard to kind of manure, type of seed, and agricultural methods to follow the society will be guided by the Agricultural Department. The members of each society may each take after harvest the normal yield as fixed by the panchayet. The rest should be made over to the society to be stored and sold at the time when prices are high, the amount realised being credited to each member but remaining with the society. All money required for improvements, as improved implements, improved seed, machinery for threshing etc., should be purchased out of this fund. Loans may also be given to members up to 75 per cent of the maximum at their credit in the society.

All improvements recommended by the panchayet shall be binding on each member individually and collectively and failure on the part of any member should involve penalties to be specified by the society in regard to each item of work not done. Generally however the society should rest content with carrying out under their own supervision the operation which a farmer has neglected and charging double the expenditure incurred. Each society should have a paid literate secretary.

This in very rough outline is the scheme of Farming Societies I have in mind. Details will have to be worked out with reference to local conditions, type of crop etc., but I have given enough to show the lines on which the Farming Societies should develop. On the joint security of members of the society, I believe manure companies will readily give credit for the first year of the work of the society. In subsequent years the society will draw on its own funds for the puchases it has to make.

Societies should be formed in the first instance only in regard to wet lands and the crop to be grown cooperatively must be paddy and sugarcane. The first few societies should be started under departmental guidance and have as secretaries men trained in agriculture. As soon as the societies are well established and have begun to work satisfactorily the departmental men should be replaced by intelligent and literate local men. The men so withdrawn should be sent elsewhere to start more societies.

Societies formed on these principles will be the means of spreading improved methods of agriculture faster and more widely than any other agency and what is more important will provide with much needed capital the large class of farmers forming as much as 50 per cent of total ryot population who in the absence of it cannot effect agricultural improvements and will continue as they are now, impoverished, loaded with debts and liable to be thrown on famine relief works the first year the rains fail.

Mungari Cotton Strain 274*.

By

K. L. Ramakrisna Rao.

Introduction :—Mungari cottons form a part of cottons generally known as "Westerns" which is a trade term applied to cottons grown in Bellary District and adjacent Gooty taluk of Anantapur District and Pattikonda taluk of Kurnool District. This cotton, though graded as second class cotton due to shortness of its staple and uncertainty in yield owing to any precariousness of the season, is of no little importance to cotton market as it covers a huge area of nearly 1,150,000 acres. It is grown both on black and red soils, major portion however, being grown on black and loamy soils. It consists mainly of Gossypium Herbaceum but there are traces of Indicums and Neglectums, the latter have, however, spread in recent years with giant strides forming nearly 50 per cent of the bulk crop on red soils. They were first introduced in Adoni somewhere about 1900 but their extensive adoption dates from about 1916—17 and from this date these types were a serious rival to local cottons on red and mixed soils. Further, due to their heavy outturn they gain high commendations from the ryots whose main craving is quantity and not quality. In addition to this they are grown with less rainfall and also on lighter soils than the variety of Gossypium Herbaceums formerly grown. These types have become so prominent, that due to the vagaries of the season they also entered the arena of black soils and the discovery of a type which can compete successfully with these Neglectum varieties was, therefore, an important problem for the Department and to attain this end selection work was started in Mungari (or early cottons) and the strain M. 274 possessing several combinations was evolved.

The object of this paper is to give an account of the work done at the Hagari Experimental Station during the last six years in investigating the characters of various types of Mungari cottons as they occur in the tract and in isolating and developing types which might meet the needs of the grower and spinner alike. It is quite essential in the beginning to have a general idea of characteristics of various constituents of the Mungari local crop before dealing with the methods adopted in isolating the pure strain M. 274.

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* Paper which secured the Ramasastrulu-Munagala Prize.

The local Mungari which is mainly sown on red and light soils during the early season (between 15th and 30th of June) is a mixture of various types. It consists mainly of Neglectum, Indicum and Herbaceum types and their crosses together with a little sprinkling of American Dharwar (Gossypium Hirsutum). White and yellow-flower-Neglectums and their crosses with other types of cotton form nearly 75 per cent. of the local crop and of the remaining, Indicums form 30 per cent., Herbaceums 45 per cent and American Dharwar 5 per cent. Of the Neglectum types, Neglectum Roseum, the white flowered variety, is the one most liked by the cultivators on account of its high yield of kappas and high ginning percentage and it forms nearly 40 per cent of the crop, and the other types of neglectums, Neglectum Malvense and Neglectum Verum form only a small proportion due often to their low ginning percentage. The detailed Botanical descriptions of these Neglectum types is beyond the scope of this paper but their main characters are given here for the purpose of distinguishing one type from the other. Neglectum Malvense, the best of the Neglectum types, from the commercial point of view has broad lobed leaves with yellow flowers, having length of staple varying from 6/8 to 7/8 of an inch, possessing, however, a low ginning outturn of 25 per cent Neglectum Verum which is second in rank is easily distinguishable from its narrow lobed leaves with yellow flowers. The length of its staple is 5/8 to 6/8 of an inch, but its ginning percentage is about 30. Neglectum Roseum, the last and worst of the types from the spinners' point is conspicuous with its white flowers and low length of staple 4/8 to 5/8 of an inch and with ginning percentage as high as 40. The other types in the mixture i.e., Indicums and Herbaceums are common types of the tract. Herbaceums can be easily recognised from their bushy nature having green stem and branches in their early stages with conspicuous black dots. They are also covered with densely spreading hairs. The length of staple is nearly 7/8 of an inch with about 25 to 27 per cent. ginning outturn. Indicums on the other hand are distinct with their reddish tint throughout with bilateral monopodial branches possessing three or occasionally five-lobed leaves. Cotton is scanty, staple silky and long nearly one inch, ginning percentage, however, low, being 23 to 25 per cent.

The crosses in the mixture differ from the pure types. They are as a rule more robust in their growth and resemble sometime only one parent and sometime look intermediate of the two parents.

The latter group can be easily distinguished by its appearance and the former requires a trained eye to distinguish it and some times it is impossible to find it out from its mere appearance and it can be known only from the nature of its progeny.

The above short description clearly shows the range of variation in characters among various types in the local crop. Methodical selection work is bound to result in the discovery of a type of fixed crosses suited to this locality. The work was started in 1921—22 at the Hagari Experimental Station with the idea of isolating a Homozygous type to replace the above Heterozygous mixture. The isolation of types by means of single plant cultures was the simple method adopted in evolving suitable types. Five hundred single plants were selected during the first year at random from a local mixed crop sown with seeds obtained from the typical Mungari tract. These plants were selfed against cross fertilisation. The important vegetative characters were studied and regular descriptions and notes on several characters were taken to compare them with their progeny. Kappas was picked from each plant separately and it was examined in the laboratory for lint and seed characters. All the plants looked like crosses and also those whose characters were not up to the standard were given up. There were in fact only 22 plants possessing desirable combinations of characters i. e. high yield, high ginning percentage and long staple which were the qualities aimed at. These 32 single plants were retained for further examination and all the rest were discarded.

Seeds of each of these 22 plants were sown in separate plots in the following season 1922-23 and the individual plants were examined both for field and laboratory characters. The methods of examination were similar to those of the previous season and in addition regular records were maintained for each selection. The results of final tabulation of all characters showed that of the 22 selections only five-viz. 171, 274, 406, 408 and 440-were found to satisfy the required conditions and fit for further trial. Hence one plant from each of 274 and 406 and two from each of the remaining selections were selected and sown in 1923–24. It is during this season that the systematic study of all characters was commenced. The main vegetative characters were observed in the field and the most important of them were (i) the variation in the number of nodes at which first sympodial arises, (ii) first flowering dates and flowering record, (iii) leaf factor, (iv) the average number of locks per boll and (v) presence or absence of glands.

Similarly the important laboratory characters were examined and the variations in the following were noted:—(i) The length of staple, (ii) Lint weight, (iii) Seed weight and (iv) Average number of ovules and seeds per lock.

The results of the third generation proved that of the five types only three viz, 274, 406 and 171 were true to their parent type and the rest were found to split. M. 274 was the most promising and had all desirable combination of characters, their variations being confined to only narrow limits. It was, therefore proposed to sow the seeds of this type on a small plot. The selfed seeds of all plants were accordingly mixed and sown in a separate plot of 60 cents for yield test. Two single plant selections were also made to be sown in separate plots for further confirmation of results.

M. 406 was also isolated but had very low lint weight, though it had longer staple and therefore it was unnecessary to sow its seed on a big plot.

M. 171 and M. 408 were discarded as they were inferior to M. 274.

M. 440, a Heterozygous type, had good combination of characters and with the hope of isolating a type from this three single plants were selected for sowing during the following season.

Thus six plants, two from M. 274, one from M. 406 and three from M. 440 were sown in separate plots during the season 1924—25. The field and labouratory characters were examined as usual. M. 274, M. 406 and also the three plants of M. 440 were found to be true to type. Of the three selections of M. 440, two were below the standard type aimed at and were therefore given up. Five plants in all, three from M. 274, and one from each of M. 406 and M. 440 (the selection retained) were selected and sown in separate plots in 1925—26.

Besides the single plant selections, the pure seed of M. 274 was sown for yield tests on an area of 2½ acres. The high yield of 1253 lb of kappas per acre during the previous season gave high hopes of this strain and for want of typical soil in this station for this cotton, the seeds of this strain were distributed to different district centres for trial in various types of soil. The crops in all the centres grew well during the early stages but due to the vicissitudes of the season the strain suffered a great

deal and recorded very low yields except in Adoni and Bellary taluks where more than average yields were recorded. The station yields were, however, better i. e, 717 lb per acre, though less than the previous year's average. The results of the study of the character of the strain once again showed the purity of the strain for all the important characters though due to abnormal conditions of weather, certain fluctuations were observed in many of the characters during the season especially in length of staple and lint and seed weights. These fluctuations were but common when quantitative characters are considered and though the observations conclusively proved the purity of the strain, yet another season's trial was considered necessary and single plants were again selected for detailed study during 1926–27. Similar selections were also made in M. 406 and M. 440. In all the five plants, two from M. 274, and one from M. 440 were sown in separate plots during the season 1926–27. The observations recorded during this season further corroborated the results of the previous seasons, thereby establishing the purity of the strain and its undoubted superiority over all the other strains.

During this season comparative trials of this strain with local *mungari* were also tried but the results are not conclusive due to soil variations. The regular trials will be started during the next season on typical soils in district centres.

The above brief history shows how this strain M. 274 came into existence and it is quite essential to describe below its important characters.

1. *First Sympodial*:—This is an important character which is responsible for early and late flowering types in cotton. The fruiting branches coming from the central stalk are in all cottons most productive, flowering first. The limbs and the axilaries prolong the period and their extensive devolpment very often causes the suppression of the fruiting branches in which case the flowering also starts late. Hence a desirable type is one which produces the first sympode at the earliest node possible and this strain is an ideal one in that respect having only three to four monopodials at the bottom. The average for the last five seasons is eight, and the frequency arrays (vide Table I.) will show that this character is the least variable in this strain.

2. *Leaf Factor*:—The shape of leaf is a very important character in classifying cottons and hence detailed study of leaf

was made in our strain. [illegible]
uring the variations in this character [illegible]
mum length of the leaf from the tip of the central lob[illegible]
base of the petiole, minus the distance from the bottom of th
adjoining indentation to the base of the petiole, divided by th
maximum breadth of the central lobe. It is indicated in fact b
the expression *a–b–c* where *a* represents the maximum length c
the central lobe. *b* the radius and *c* the maximum breadth of th
central lobe. Precautions are, however, necessary in case c
measurement as a primary leaf on the main stem differs quc
from the secondary leaf on the branches of the same plant. Th
primary leaves on any one plant vary very little with the excep
ion of the first three and hence to secure uniformity all measure
ments are taken from leaf commencing from the sixth node an
ix leaves were measured for each plant. The average of these
ix leaves was taken as the average for the plant. The frequency
rrays of this character (vide Table II) for strain M. 274
ill show the variations in this character. The fluctuations noted
the frequency arrays of various years are mainly due to en-
ronmental factors and modes of arrays taken separately are
l normal.

3. *The flower character*:—The two important aspects of ese were studied in this strain, (I) The variation in the first wering dates and (II) flowering record.

(I) The appearance of the first flower is mainly dependent on environmental factors and variations in first sympode as eady stated. The first flower appears very early in strain 274 and in normal seasons they appear in about 66 days. e average of the last five seasons below will confirm the tement.

Year.	Average number of days for first flower.
1922—23	95 days.
1923—24	67 days.
1924—25	64 days.
1925—[illegible]	67 days.
1926—27	67 days.

(II) The seasonal distribution of flowers is an important factor in a strain. It is not enough that it produces maximum number of flowers but its distribution should be uniform. The actual flowering in this strain lasts for 16 to 20 weeks approximately i..e. from September to January. The period of flowering is different in different seasons owing to variable weather conditions. The table (vide Table No. III.) shows such variations in this strain, the figures representing average number of flowers perweek. From the curves it is evident that the distribution of flowers in all seasons except 1925—26 is fairly uniform and ideal. The season 1925—26 was an abnormal one. There were frequent showers during the blossom period which were responsible for such fluctuations and also for the prolongation of the flowering period till February i. e. 24 weeks

4. *Boll characters*:—The three chief characters of the boll are its diameter, the length and the number of loculi. The first two characters were determined from four well grown bolls per plant measured with callipers. These characters were also subject to variations like others, not only on different plants but on the same individual and hence utmost care was taken in selectlng the bolls for measurement. The frequency arrays detailed (vide Table IV) show the variations in this character.

The other character viz. average number of loculi per boll was determined by describing about 50 to 80 bolls in each plant. The number of locks per boll varies from three to five in this strain and variation is slight, nearly all the bolls examined contained three locks. The table (vide Table V) shows the variation in this character during the last four seasons.

5. *Seed Weight*:—This is an important character of cottons as it has a bearing on the yield and the ginning perçentage. Samples of 100 seeds were taken from each plant for study in the variation of this character. The variations were wide in this case and causes of this fluctuation are many and it is beyond the scope of this paper to enumerate them. Suffice it to say that weather conditions control this character. The range of variation in this character is seen from the table (Table No. VI) where frequency arrays of five seasons have been given.

6. *Lint Weight*:—The fluctuation in lint weight seems to be proportionately less than that in seed weight. The variability is, however, greater than what has generally been realised but the

frequency arrays (appendix vide table VII) clearly go to prove that the strain with a higher amount of lint weight maintains its relative position in different years.

7. *Lint Length*:—The variation in this character was found out by measuring five combed seeds from each plant. Very slight fluctuations are observed in this case. The frequency arrays of five seasons (vide appendix Table VIII) confirm this fact. The average length of staple is 25 m. m. which is distinctly higher than the ordinary *mungari* local crop (20 m. m.) and its strength is also good. The staple is also uniform and the table (vide appendix Table IX) shows the percentage distribution of various fibres in the strain.

8. *Yield*:—This is the most important of all the characters in cotton and the type of cotton best suited for a tract is greatly determined by the yield and this plays an important part in the isolation of a desirable type. The part which directly yields cotton is the boll and cotton plants vary very widely as.regards their number of bolls. But the variations though intrinsic are greatly controlled by external influences. Individuals enjoying a slight advantage of plant food, moisture or space by virtue of their position bear a greater number of bolls than their neighbours, less favourably located and hence number of bolls is not the limiting factor and yield trials should be made to test this particular character. The following table shows the acre yields of this strain with the ginning percentages for the last three seasons:—

Seasons.	Yield per acre.	Ginning. %
1924—25	1,253 lb.	30·0
1925—26	717 lb.	26·0
1926—27	685 lb.	30·5

The above results are a clear proof of the superiority of the strain over local *Mungari* but to have a final say, spinning qualities of the strain are essential. Hence samples of lint of the strain were submitted to the Director of Technological Laboratory, Indian Central Cotton Committee, Bombay for complete tests. The results of last two seasons are very encouraging. He observes as follows:—

"Comparing sample No 63 (M. 274) with sample No. 64 (Mungari Local) we note that the selection M. 274 spins much better than the local cottons. The upper limit to which M. 274 may be spun as warp yarn with moderate twist is about 20s, while Local Mungari cannot be spun satisfactory above 10s."

Thus we have a strain which yields better, gins higher and possesses a staple which is longer and stronger than the ordinary Mungari Local.

Description of M. 274:—A tall erect plant with two to four well developed monopodials at the bottom and well developed sympodes afterwards, these becoming successively shorter upwards. Generally plants grow to a height of 6 to 8 feet and it is a fixed Neglectum Indicum cross and may be broadly classed under main head Indicum.

Stem:—Tall, robust, simple, tapering gradually from bottom to apex, basal branches long ascending, medial, moderately long, uppermost small. Internodes short, all branches ascending almost acutely (40—60°) to the main stem.

Branches:—Pinkish red (purple) with close very short stellate hairs, mixed with longer, simple pilose hairs. There may be 2 to 4 well developed monopodials and about 30 sympodial branches. The main monopodials, later in the season develop in turn secondary and tertiary branches, monopodes and sympodes.

Leaves:—Simple, alternate, stipules two, one on each side, linear, lanceolar acuminate, hairy at the margin with reddish tint at the terminal point.

Petiole:—(1½ to 2 inches) Sparsingly hairy and coloured just as the branches.

Leaves:—Dark green in colour with a distinct red blotch at the base where it joins petiole, mid-ribs distinct (central one very frequently purple coloured), 3 to 4 lobed, base cordate, lobes broadly ovate and obtuse entire, obtuse angled, pubescent at the upper, sparsingly hairy at the bottom and margins. Nectaries absent on the veins at the back of the leaf.

Flowers:— Solitary, terminal, bisexual two bracts, keel shaped and slightly dentate, one slightly bigger and more conspicuous than the other.

Peduncle: Short (½ to 1½″), the portion above the joint is trigonus.

Bracteoles: Three, jointed at the bottom forming an epicalyx broadly ovate triangular, acute, entire or toothed only at the apex, two to four teeth, teeth small, mucronate and hairy at the margins. Conspicuous reddish tint on the upper surface and at the middle of the base. Venation longitudinally sub paralled.

Calyx:—Gamosepalous, cupular, limb almost entire, occasionally wavy, nectaries at the base absent, accrescent and usually splitting in fruit.

Corolla:—Petals five, free contorted, adnate to each other at the base and also to the androceum. Deep yellow in colour with dark scarlet pinkish eye.

Stamens:—Indefinite, monodelphous, forming into a tube round the gynaceum almost coming to the top of the petal, anther kidney shaped, deep yellow in colour.

Filaments:—Single or branched, divergent at the base and inclined upwards towards the top, deep red in colour, in a few cases rosy higher up the column.

Style and stigma:—Intermediate, slender, rounded, differentiated into 3 to 4 stigmatic branches, grooved, without any black dots.

Ovary:—Superior, syncarpes, 3 to 4 celled, ovules 9 to 11 on axile placentation.

Bolls:—Drooping, well-developed, usually 3 celled, sometimes 4 celled, rounded at the base, almost spherical, tapering tendency towards the apex, but abruptly mucronate especially 4 celled bolls. Surface slightly pitted opening fully when ripe, valves strongly reflexed so that cotton becomes pendulous and drops off easily

Cotton:—Profuse, somewhat rough, curly, little less than an inch in length, pure white, seeds 7 to 8 per lock, well developed covered with velvet greenish grey fuzz and spiny hilum, rounded at the base and taper into a short point. Seeds well filled up and hard.

Acknowledgment:—I am very much indebted to Messrs. P. H. Rama Reddi, R. C. Broadfoot and G. R. Hilson for the facilities given in carrying out the above work and for valuable advice and suggestions made from time to time. My thanks are also due to Mr. K. R. Ramamoorthy Ayyar for the paintings and photos of the various parts of the plant.

APPENDIX.

TABLE I.

Frequency arrays.

Nodes.	1922–23	1923–24	1924–25	1925–26	1926–27
5	...	1	21	...	1
6	1	3	55	31	24
7	4	18	164	103	59
8	9	52	255	256	91
9	5	81	227	103	18
10	4	31	95	23	6
11	1	20	8	3	1
Total.	24	206	825	519	200
Average.	8	9	8	8	8

TABLE II.

Years.

Leaf Factor.	1923–24	1924–25	1925–26	1926–27
1·3	1	...	...	...
1·4	5	...	...	4
1·5	15	...	...	5
1·6	57	...	1	18
1·7	64	1	11	28
1·8	50	5	16	47
1·9	23	54	30	59
2·0	4	112	62	27
2·1	...	109	31	6
2·2	...	35	7	2
2·3	...	7	2	...
2·4	...	2	...	...
Total.	219	325	159	196
Average.	1·7	2·0	2·0	1·8

TABLE III.

Flowering Curves.

Mungari Strain 274.

August.		September.				October.				November.			
3rd	4th	1	2	3	4	1	2	3	4	1	2	3	4
						1923—24							
...	...	0·04	0·6	2·4	5·5	8·1	10·1	13·1	13·3	10·5	7·6	5·3	2·4
						1924—25							
...	...	2·4	5·0	7·9	8·9	13·0	13·7	14·7	13·3	10·3	9·5	4·4	4·3
						1925—26							
...	...	0·002	0·4	3·1	5·0	5·9	8·1	10·0	10·4	6·3	4·7	4·4	7·9
						1926—27							
0·72	2·55	3·47	3·53	3·06	1·74	1·65	1·89	1·27	0·99	1·06	0·74	0·74	0·58

TABLE III (Continued).

December.				January.				February.			
1	2	3	4	1	2	3	4	1	2	3	4
				1923—24							
0·6	0·26	0·2	0·2	...	0·06	0·18	0·5	1·06	2·2	2·8	0·8
				1924—25							
7·2	2·8	1·5	0·5	0·7	1·0	0·8	0·8	...	...	...	...
				1925—26							
9·0	7·6	4·7	4·5	5·0	4·3	6·5	9·2	10·3	14·4	12·0	8·7
				1926—27							
0·33	0·51	0·70	0·47	...	...	...	...	...	...	...	...

Table IV.

Frequency arrays.

M. M.	1924—25.	1925—26.	1926—27.
29	3	8	5
30	30	26	22
31	66	55	41
32	112	49	45
33	61	22	38
34	22	10	21
35	6	4	2
Total.	300	174	174
Average.	32 m. m.	32 m. m.	32 m. m.
19	..	...	1
20	...	2	19
21	1	26	35
22	10	60	69
23	30	52	43
24	79	29	7
25	134	5	...
26	44	...	...
27	2	...	...
Total.	300	174	174
Average.	25 m. m.	23 m. m.	22 m. m.

Table V.

Frequency arrays.

Average Number of locks per boll.	1923–24	1924–25	1925–26	1926–27.
3·0	20	13	55	61
3·1	54	78	64	50
3·2	79	164	59	30
3·3	39	105	16	17
3·4	13	49	6	4
3·5	3	10	...	1
3·6	1	1	...	1
Total.	209	420	200	164
Average.	3·2	3·2	3·2	3·1

TABLE VI.

Frequency arrays.

M. G.	1922–23	1923–24	1924–25	1925–26	1926–27.
46	1	...	...	...	...
47	1	...	...	...	...
48	1	...	...	...	...
49	2	...	...	...	...
50	...	...	...	5	...
51	5	3	...	1	...
52	2	1	1	4	2
53	2	2	2	3	...
54	...	1	3	2	...
55	...	5	10	4	1
56	1	10	5	7	3
57	...	9	7	6	1
58	1	13	15	10	...
59	...	6	23	7	3
60	3	28	30	17	...
61	...	19	38	16	4
62	...	26	39	22	4
63	...	24	56	28	1
64	...	17	50	23	9
65	...	27	72	16	9
66	...	13	77	30	11
67	...	4	79	15	9
68	...	6	69	12	9
69	...	4	57	4	2
70	...	...	46	3	6
71	...	1	33	...	4
72	...	...	30	...	5
73	...	...	20	...	2
75	..	...	14	...	1
76	...	...	13	...	...
Total.	19	219	789	235	86
Average.	54	62	66	63	66
Standard Division.	...	3·8	3.56	4.5	4·79
Probable Error.	...	4·0%	4.8%	4·7%	4·9%
Coefficient of variability.	Nil.	6·1	5·6	7·14	7.26

TABLE. VII.

Frequeney arrays.

M. G.	1922-23	1923-24	1924-25	1925-26	1126-27
19	1	...	...	...	...
20	3	1	...	10	...
21	4	1	...	6	...
22	5	5	1	5	...
23	3	7	...	16	...
24	2	14	9	22	2
25	1	21	11	33	8
26	1	32	40	33	5
27	...	43	60	38	5
28	...	38	122	37	19
29	...	32	127	18	22
30	...	15	144	15	19
31	...	6	127	3	3
32	...	4	97	...	1
33	...	...	41	...	3
34	...	...	15	...	...
35	...	...	1	...	...
36	...	...	2	...	...
Total.	20	219	797	236	87
Average.	22	27	30	27	38
Standard Deviation.	...	2·21	2·08	2·78	1·99
Probable Error.	...	5·4%	4·5%	5·0%	4·8%
Coefficient of variability.	...	8·2	6·7	10·9	7·1

TABLE VIII.

Frequency arrays.

M. M.

	1922–23.	1923–24.	1924–25.	1925–26.	1926–27.
20	2	...	...	...	...
21	3	...	...	...	...
22	7	2	3	7	1
23	6	15	48	45	14
24	3	66	213	132	41
25	...	94	349	140	77
26	...	42	148	39	26
27	...	...	43	7	5
28	...	...	4	...	2
Total.	21	219	808	370	166
Average.	23	25	25	25	25
Standard Deviation.	...	0.88	1.07	1.09	1.01
Probable Error	...	2·4%	2·3%	2·9%	2·72%
Coefficient of variability-	Nil.	3.5	4.2	4.3	4.04

TABLE IX.

Fibre length distribution. (Balls sorter).

Main group length in eighth of an inch.	1924–25.	1925–26.
2	...	0.9%
3	1.0%	2.0%
4	2.3%	4.2%
5	5.8%	10.0%
6	13.8%	26.4%
7	32.4%	43.6%
8	32.4%	11.0%
9	10.6%	1.9%
10	1.1%	...

EXTRACTS.

Cultivation of Perennial Cotton in Egypt.

In the most important cotton-growing countries, the plant has for years been cultivated almost exclusively as an annual. It must not be forgotten, however, it is a true perennial in habit, and in almost all countries where it was cultivated it was originally treated as such. The voluminous literature on the subject deals almost entirely with the behaviour of the plant in its first year, but quite recently a controversy sprang up in connection with perennial cultivation. The majority of the authorities is against the practice for a variety of reasons, chief of which are that the quality of the fibre is held to deteriorate after the first year, and that plants left in the ground more than one year will carry insect pests over the winter and so result in increased attack. In a recent paper, Dr. J. Templeton has brought together a mass of evidence relating to perennial cultivation of cotton in various parts of the world, and also describes experimental work carried out in Egypt (Bulletin No. 75, Technical and Scientific service, Ministry of Agriculture of Egypt). The evidence of the experiments as regards staple quality of first pickings is on the whole definitely against the theory that deterioration takes place after the first year. In addition the 'ratoon' is of a higher class than the first year cotton. Second-year plants cannot carry the insect pests of cotton in Egypt over the winter, and suffer less damage from insect pests in general than first-year plants. The flowering curve of the second-year plants rises more rapidly and reaches a maximum much earlier than that of the first year, thus shortening the useful flowering period, which has an important bearing on the possible damage to the crop from pink boll-worms. The cost of cultivation is also less no seed being required in the second year and no sowing, resowing, or thinning. Lastly, given pure seed to start with, the crop will remain pure longer.

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historic period there have not been wanting writers and public men who have in their own day found fault with the peasants' methods and suggested ways some of which perhaps he first spurned but later took up when he obtained better knowledge and conditions permitted. Amongst many instances one is furnished by the history of the introduction of Bell's reaping machine in England. The use of insecticides and fungicides is another case in point. Several examples are available from Indian sources also.

There are cases again, though not perhaps a very large number, where the farmer's view has turned out to becorrect and and others have had to recast their methods and discover to their chargin and dismay that what has been and is being done by him is not all wrong:but only baffles them in all attempts at reconstruction or dissolution.

Thus each has to learn and unlearn; teach and be taught in turn. So long as this process continues in Nature friends old and new must certainly exchange their positions and profit by such exchange to the lasting good of the race.

A 'Trite Method.—Every public man in this country has deplored the present condition of overindebtedness of the Indian ryot and several measures undertaken in this behalf have not proved efficacious. It was fondly hoped that the Co-operative movement would solve many a rural problem. Though it has done much good in several directions it has certainly tended to lower the rate of interest generally—the burden of indebtedness of fhe Madras cultivator remains as heavy as ever before, and the very original and bold suggesfion which Dr. K. Kunhikannan who knows the ryots' conditions intimately has put forth in the article "Co-operative farming" is well worth a trial. The method is simple and easily understandable to the uncanny ryot and with a right man to launch and work the scheme it should prove a success. Will the Registrar of Co-operative Societies who in 'collaboration with the Labour Commissioner is interested in the introductlon of co-operative societies for the Kallar Community examine this question and give it a trial?

An Woeful Neglect.—In his contribution appearing in this issue, Captain Guthrie has drawn pointed attention to the avoidable loss that is annually accruing to the owners of cattle in this province by their persistent attitude towards the question of branding of animals.

nation of brain and brawn and usually there is a greater demand on the body. Even if you take the oldest country and most populous country of the world as China you will find that the Chinaman beats every other national in the world in the skill and efficiency at any practical job, and that alone enables him to earn a living under any circumstances in any part of the world.

In India we have two classes of people. One class is out to earn its living only by brain and the other class-the vast majority of the population-has to depend only on its physical labour.

Unless we bring a happy union of both, in our educated young men who are going to be the future leaders of the rural community, we shall have very little chance of improving the lot of our people, which would mean that we will never be in a position to come up to a high pitch of national development.

Now the second question is that of training the heart. The sports, the various social activities of the college, the opportunity of living amongst such a cosmopolitan community of students and members of staff, the scientific habit of thought and action, the provision of working with your own hands in the field, and the close study of rural conditions of life, are bound to have instilled in you the true spirit of sportsmanship, the spirit of good will and honesty, the true spirit of a scientist and above all the spirit of service of the community, provided you have applied yourself in all seriousness to your task at the college during the last three years. This college has built up noble traditions and has a high rank in the colleges of India. Even these traditions should have demanded a high standard of work, character building, spirit of good will and service from you. There should have been no room for any narrow communal or provincial spirit if you are to go out of the portals of this college as graduates best fitted for the battle of life. The narrow communal spirit or provincial spirit can give at the most some little advantage, but it cannot help to increase your efficiency nor can you guarantee that the spirit would not be used against the interest of society as a whole.

This college has offered you unique opportunity for training your hands and hearts and has also automatically helped in the training of your head and if you have played your part well in all these activities of the college, I am sure, you are bound to have the best equipment for the battle of life.

I would like to request each of you, to take stock of what you have done, and the spirit and enthusiasm, with which you have acted your part in various activities of the college during the last three years, and search your heart to find out to what extent you have done your duty in the task of preparing yourself for the wider activities of life. The answer to this question is important if you are yet to make up the deficiencies in your equipment.

To earn a living by securing a job somewhere or by retaining a job somehow should be a poor satisfaction to an educated youth. Of course you have to make your living first. But your aim in life cannot end there. You should try to give the best service to Society whilst earning your living.

Your ideas by this time must have been crystallised, your plans for the future must have been well thought out, and if you have not wasted your time at the college, I think, you should find no difficulty in finding a suitable task for the uplift of the society wherever you go.

Your success at the college, or your popularity amongst the students and the staff, would give you some confidence and advantage in making a start; but if you have not developed the qualities of heart or rather not built up what is called "character" you will have poor chance of success in life. It often happens that the best student at the college or the most popular student at the college may fail in the test of character, and may be of very little use to Society which has paid for his education. So my advice to all of you is, do not be content with these achievements at the college, though they are very valuable, but go further and compare yourself with similar batches of young men that are ready to come out of any of the colleges of other countries: Students in foreign lands have no communal drawbacks and are not afraid of hard work, mental or physical. Even in vacations they go out to get practical training and even to earn a livelihood. This gives them real training for life and they are bound to be very efficient for the service of the community as workers as well as leaders.

Our students idle away their time in vacations and thus they get into idle habits which take some time to overcome when they go back to the college. If the college authorities can organise a

movement to keep the students engaged in some sort of work, either of learning some trade by working with their hands and earning a little money, or of doing some social work in the rural area, they would be better fitted for the service of the community as graduates.

I have asked you to compare yourself with other nations of the world, simply because the world is getting smaller and smaller every day. There are so many international organisations afloat. There is the League of Nations, the International Students' Conference, the International Women's Council, the International Olympic Sports and so on. All these show that the nations of the world are trying to come closer and closer together.

It seems that there is an under current for universal brotherhood. But the consummation of that idea is delayed simply because all nations are not equally efficient. This contact of various nations would stimulate the desire for equal efficiency. You have to fit into this world movement. If you, the would-be leaders of the community are not equipped as well as those of other countries, what chance is there for your success as individuals and as a nation amongst the people of the world?

Our economic existence is dependent on the economic conditions of other parts of the world. There is a close relation between the economic, social and political conditions. Under the conditions of the world competition if you are poorly equipped for the higher responsibility of serving the community you are bound to keep down the country in comparison with other countries of the world. Other countries have besides many advantages over us and thus your task becomes greater and accordingly your preparations too should have been greater. You have had enough talk of patriotism. Now it is time to prove your patriotism by doing the work.

If you still realise your responsibilities, it is not too late. You will have ample opportunities in life to correct your ideas and actions if you are determined to do so. I would therefore appeal to you to strive for nothing less than the best individual efficieny, the best family efficiency, the best village efficiency and even the best communal efficiency, the best provincial efficiency, the best presidency efficiency and the country will rise in efficiency. I wish you would view your past and

future thoughts and actions in the light of these and I am sure if you achieve even the smallest thing in this line of efficiency, you will feel the greatest satisfaction in life, which no amount of wealth can purchase.

Gentlemen, your responsibilities will be increased manyfold as soon as you leave this college and if you remember the days of hard work you have spent at the college and the high traditions and the sprit of the college in all you do, I am sure you will succeed in your new activities of life and be able to add to the achievement of the college and the country. With these words, gentlemen, I bid you farewell,

(Poona Agricultural College Magazine for July). T. S. V.

Utilization of Bagasse.

Bagasse, which for a number of years has been used chiefly as a fuel and prior to the perfection of the bagasse furnace was an encumbrance in sugar manufacture, has unquestionably a high value and one destined to have a marked effect in the economy of sugar production. Recent developments give the promise that bagasse furnishes one of the most important and economical sources of fibre and cellulose for industrial use. This product has been used for years in the manufacture of mulching paper in the Hawaiian Islands and more recently with great success in the manufacture of building board, having high insulation qualities, together with strength and a materially lighter weight compared with similar materials. The manufacture of building board is an established industry in Louisiana and is being extended in other cane sugar producing countries.

Cellulose produced from bagasse has in the last few years been used in various industries successfully and economically. It has been used in the explosive manufacturing industry for some little period of time and is attracting attention for its use in the manufacture of artificial silk or rayon, whioh is making such rapid strides in the United States and in Europe. Recent developments have shown a further potential use for bagasse as a source for paper pulp for the manufacture of high grade paper. Processes are reported which handle this product economically and efficiently for this purpose. As yet they are not in commercial use.

The cane manufacturer is now facing the possibility of a material change in equiqment through the use of bagasse for industrial purposes instead of its present use as a fuel, which will necessitate the substitution of other fuels. In this change it is not improbable that the milling process will be challenged again by the diffusion process. The use of diffusion would possibly provide a more flexible capacity which has always been desirable in cane factories. Some of the difficulties of clarification would be eliminated, particularly that of removing or controlling the colloids from the juice. This problem would be solved through diffusion with a resulting economy in evaporation and crystallization.

(The Planter and Sugar Manufacturer, August 18, 1928).

Y. R. R.

NOTES.

Uses for Borax:—Borax may be used to clean windows, mirrors, lamp-glasses, decanters, glasses, bottles, for removing grease from tables, floors and etc., washing marble, alabaster, and marble ornaments, washing straw hats, preventing blights in green houses and gardens, softening water, washing animals, destroying weeds etc. In preparing collars and cuffs, use one teaspoonful of borax dissolved in hot water to half a basinful of starch. Half a teaspoonful in the water you wash your hair in will make the hair bright and silky. To keep silver bright put a handful of borax in a pan of hot water, put silver in, and let stand the entire morning rinse in clean water, wipe with soft cloth.

How to remove stains:—Tea and coffee usually readily yield to the purifying influence of boiling water poured through the fabric, so too do some fruit stains. An application of lemon juice and salt, with good sun exposure, is an old and in many instances an effective remedy. Green stains can usually be removed by dipping in alcohol, and an application of paste made of cream of tartar wet up with water will remove them when alcohol will not. So, too, cream of tartar and water will remove iron mold spots, drying on the grass in the sun. If one application does not remove repeat. Soaking in sour milk overnight will usually remove ink-stains, while the juice of a ripe tomato is useful in removing stains from the hands. Kerosene will remove stains from cloth, brass, or copper. Surface that would be marred by sand soaps can often be nicely cleaned with kerosene, followed by an

application of hot soap suds. But the standby when all other remedies fail to successfully remove stain from white fabrics is *Javelle Water.* The formula is as follows:—4 lbs. bicarbonate soda 1 lb. chloride of lime, pour over the soda one gallon of boiling water, place over the fire and boil 15 minutes, then stir in chloride of lime until thoroughly dissolved. Allow to cool and settle, then strain through cloth, bottle and set aside to use. To remove stains, wet the stains, in cold water, dip up and down until the spot disappears, then wash as usual. Do not use on coloured materials as it will destroy colour. It will remove ink stains better than any other preparation we ever tried. One teacupful of this liquid to a boiler of water whitens garments that have grown yellow from disuse.

Cockroach Control:—1. Traps may be used as a means of control, but cannot be relied on as a method of extermination. Sugar liquor slightly poisoned used to be a favorite trap. Poisons however are always dangerous.

2. Boric acid is a safe and economical material to use against the cockroaches, as it is non-poisonous to human beings, and yet very effective against cock roaches.

3. A mixture of equal parts of powdered borax and powdered sugar ground together is effective against cockroaches, is safe and economical although acting slower than boric acid.

4. Cockroaches eat these substances in an effort to keep clean, and not for any possible food value.

The large cockroach which is more frequently a household pest may be controlled by the same means—the use of boric acid. This is freely scattered in places frequented by the cockroaches, and as they move about in search of food the boric acid adheres to their legs, bodies and antennae, and in cleaning it off with their mouth-parts, they eat enough to cause their death.

A cockroach covered with dust or dirt will, when un-molested again begin a series of cleaning. Usually it draws one antenna after the other slowly between the mandibles, then begins on the legs, later the abdomen, doubling up almost into a ball, until it cleans itself thoroughly. Boric acid being a very fine light powder, readily adheres to the insects legs and body and must be cleaned off. The powdered borax and sugar mixture is heavier, and

readily hardens if moisture is present, so that it is not well distributed upon the parts of the insect's body. Hence the greater efficiency of Boric acid as compared with the borax and sugar mixture.

Y. R. R.

Mosaic Disease. In earlier issues mention was made of the mosaic disease on sugarcane. Trials made at Pusa go to show that cane is not the only crop affected by this disease, but that maize and other common cereals may also become infected though the quantity depends upon the seasonal conditions and the resistence of the variety. Mosaic on tobacco has been recorded in other countries. Cultivators are forewarned to be on the look-out for this disease whether on cane, cholam, maize, tobacco or other crops, as what may be considered as immune in one year may become susceptible in the next under altered conditions.

Leaf Tobacco. Britain has shown a decrease in its consumption of the type used for Pipe-tabacco and cigars and a steady increase in the cigarrette type of tobacco. The total consumption of leaf-tobacco was 222 million pounds in 1927 while in 1922 it was only 185 million pounds. It is however gratifying to note that Empire grown leaf has increased 200 per cent during the six years 1922 to 1927 and now stands at 184 per cent. India supplied during 1927 about 34 per cent less than in 1922 and it is reported that Indian supplies are irregular and undependable.

Effect of Manures on Sugarcane Juice. Mr. Sanyal of the Pusa Institute records that under the conditions of the trials reported by him, superphosphate has the greatest influence in producing juice of the highest purity and sucrose content; in other words that it improves the quality of the juice. Sulphate of Potash appears to maintain a juice of high purity whereas sulphate of ammonia exerts a depressing influence on the quality of the juice and of the two manures mustard cake and cyanamide, the latter was about equal to sulphate of ammonia.

In regard to their effects on the quality of jaggery (gur) it is made out that super and potash produce jaggery of much higher quality than other nitrogenous manures.

Rotations with Cotton Crops.—In this province cotton is often rotated with a cereal and sometimes Bengalgram also intervenes. But the results on the effect of rotations on cotton in Blackland region of Central Texas, America go to show that the

soils there are not so productive as they were when first put under cultivation. These soils are black waxy soils similar to those found in most parts of India and have been continuously cropped with cotton for the last 50 years. The average production per acre is recorded to have fallen from 226 lbs. in 1866-1875 to 135 lbs. in 1916-25. On Texas agricultural station with a four year rotation, which included maize, wheat and leguminous crops, the increase of cotton yield was over 100 per cent in the three-year rotations, the increase ranges from 50 per cent to 94·1.

Development Minister at the College :—The Hon'ble the Minister for Development, Mr. M. R. Sethuratnam Ayyar paid an official visit to the Agricultural College on the third instant. He went round all sections and gained firsthand knowledge of the working of the institution. His visit as well as that of the Development Secretary would seem to indicate more active interest on the part of the Government in the work of the department. The Officers' Club entertained the Minister at Tea as is usual on such important occasions.

Mr. K. T. Paul on the Royal Commission on Agriculture
Mr. K. T. Paul, one of the recognised leaders of public opinion in India and a figure well known in foreign countries delivered at the college an interesting lecture on the Report of the Royal Commission on Agriculture. Not following the easy-track of common politicians who on most occasions smell danger, Mr. Paul rose to a higher plane of criticism and imagined much more glorious prospects for the country by the adoption of the methods outlined in the report. First and foremost he wished his hearers to take a detached and farsighted view and picture to themselves a state in which agriculture was taken out of the changing orbit of political parties and saved for the nation as a whole, whoever might be in power. The second distinguishing feature he found in the recommendations was the sound commonsense view which the Commissioners took in advocating that the interests of the agriculturists should not be viewed from sectional standpoints and looked after by different departments but they formed one organic whole which required the attention of all the departments working together wholeheartedly. It is refreshing to note that Mr. Paul's criticism was the first of its kind to divert the attention of the public to these aspects which escaped the notice of several who have spoken on this report.

Agricultural Subordinates and Agricultural Developments
The announcement of the appointment of Mr. D. G. Munro as Special Officer to help the Director in formulating a scheme of agricultural development during the next few years stimulated the Upper and Lower subordinates and the Plant Collectors at the College, to approach him and discuss certain aspects regarding the services as affected them. The Plant collectors submitted a memorandum, the Upper and Lower subordinates each waited in a deputation on him with memoranda embodying the considered views of the respective associations. The Lower Subordinates asked for the speedy absorption of their members into the Upper cadre and pending final orders for the regrading of their posts on a scale of Rs. 80–5–130. The Upper Subordinates pressed for the adoption of a uniform scale of pay, Rs. 100–10–300 and of greater facilities for members of their group for study leave in and out of India as more than a third of the present total strength were both technically and academically qualified for such leave.

Prize distribution:—Boys and girls of the Board Elementary Schools on the Estate assembled at the Freeman Building on the 13th instant to receive prizes at the hands of the Principal Mr. Tadulingam. On the occasion "the Story of the Lost Camel" was staged by the little girls and the very sprightly, and dexterous way in which they did it under the guidance of the Headmistress emphasised the supreme need for the revision of ideas of parents in regard to the capacity of their children and the usefulness of their education. All credit in training the Estate boys and girls is due to the teachers Mr. Veerappa Gounder and Srimati Visvasam ammal.

STUDENTS' ACTIVITIES.

The activities of the members of the Students' Club started in right earnest this month. They commenced with the inaugural address delivered by Mr. K. T. Paul, National Secretary of the Y. M. C. A. who dealt at length with his experience and outlook on high school and university life here and abroad and his intimate contact with men and manners of various nationalities. The lecturer opined that the responsibilities and duties of the young of the present day are of varied character and that university life is the basis of character on which the superstructure of

experience can be safely built. He emphasised the necessity of viewing persons of temperaments, creeds, manners, customs and religions, different from ours as our teachers and learning from them a good deal and humorously alluded to the saying " Salt of of the Sea and Fruit of the Hill " which though heterogenous elements in themselves, blend together to form a harmoneous whole for the service of humanity. In the end, he appealed for less of self-introspection and more of perseverent striving on organised basis for the economic emancipation of the country as the English did during the Great War. The Prssident, Dr. E. V. Ramakrishna Ayyar, in supplementing the speaker's remarks, referred to the inscription on the gateway of the Harward University—" Grow in Wisdom, Help the Country and thy Kind."

On the 23rd, Mr. Gulam Ahmad of B. Sc. II read an interesting paper on " Clubs, Libraries and National Progress " in which he elaborately dealt with the tremendous influence exerted by various typical clubs on the political, social and economic advancement of the world as evidenced by the opening of several institutions like Aero clubs, Radio clubs, athletic and physical training clubs and as many as 200 hospitals in London and in the evolution of dress, magazines and presses. He visualised to the, members how the establishment of clubs and libraries at different centres would broaden our outlook on life and usher in an era of cultured citizens in all walks of life. He suggested the starting of journals in all clubs and especially in one like ours which consists of hetrogeneous members for mutual understanding and exchange of ideas. Many members took part in the discussion that ensued, one of them referring to the parasitic influence of clubs on peaceful domestic life and the proper upkeep of children, if they are too much indulged in. The President Mr. Chandrasekhara Ayyar wound up by touching upon the instinct of humanity for club life and the immense good done to the country by literary, scientific, philosophical, and other clubs, by making a few remarks on social service and the youth movement and the benefits conferred by both and by sounding a note of warning on the dissipations caused by nocturnal clubs.

Games are in full swing and the football members are to be congratulated for their unique success this time in the Abraham Memorial Tournament after two draw matches. Cricket has become an indispensable feature of every holiday enjoyment. The

Compulsory games system on Tuesdays now attracts a large number. The short talks on entomological subjects introduced after the American University fashion, by Dr. T. V. Ramakrishna Ayyar, have become a permanent feature and are evincing keen interest among students.

THE UNION.

Income and Expenditure during the quarter ending 31-8-28.

Receipts.		R.	A.	P.	Charges.		R.	A.	P.
Building Fund	...	30	0	0	Stationery	...	3	10	6
Journal	...	283	2	0	Furniture	...	0	12	0
College Day	...	637	7	7	Journal	...	377	7	0
					College Day	...	528	15	10
		950	9	7			910	13	4

DEPARTMENTAL NOTIFICATIONS.

Gazetted:—Mr. N. G. Charley to be Research Engineer, Agricultural College; Mr. C. Narayana Ayyar, Assistant Director, from VI to IV Circle; Mr. Y. G. Krishna Rao, Assistant Director to II Circle; Mr. A. V. Tirumuruganatham Pillai to VI Circle; Mr. T. Budhavidheya Rao to be Assistant Director of Agriculture, Live Stock, Chintaldevi.

Mr. B. V. Ramayya, Deputy Director, extension of leave for three weeks from 11th July; Mr. K. S. Viswanatha Ayyar, Assistant Agricultural Chemist leave on average pay for three months from 12th July, Mr. P. A. Raghunathaswami Ayyangar to officiate as Assistant Agricultural Chemist Mr. B. Viswanath, Agricultural Chemist leave on average pay for 17 days from 19th July, Mr. P. V. Ramayya, Assistant Agricultural Chemist; to be in charge; Mr. C. Ramaswami Nayudu Assistant Director of Agriculture, III Circle leave on average pay for two months and 6 days aud leave on half average pay for 24 days.

NON-GAZETTED:—Appointments, transfers, confirmation etc.

Mr. K. Achyuthan Nambiyar, Lower subordinate VIII Circle to be Sub-Assistant Mycologist's section; Mr. D. V. Subramanyam, Engineering Upper Subordinate is appointed as temporary assistant lecturer in Engineering on Rs. 100 per mensem on scale of Rs. 100—5—175. Mr. G. Sundaresah, B. Sc. Ag. to be Assistant V grade on probation in the Cotton section. Messrs. M. K Venkatasubramanyam and M. K. Padmanabhan to be Assistant Paddy section, Agricultural College; Mr. P. Oothaman, Upper Subordinate, VIII circle to be Assistant Paddy section and posted to Pattambi. The following Upper subordinates now on probation are confirmed in their appointments:—Science Section Messrs. (1) T. Rajagopalan (2) T. Varahalu (3) R. Kochukrishna Pillai (4) V. Panduranga Rao (5) T. R Narayanan (6) E. R. Gopala Menon (7) N. Krishnaswami Ayyangar (8) V. Marghabandu (9) M. Kylasam; Agricultural Section:—Messrs. (1) S. Mahadevan (2) N. S. Rajagopalan (3) A. P. Balakrishnan Nayar (4) and V. Karunakaran Nayar. Messrs. V. Kumaraswami and P. Krishnamurthi lower subordinates are confirmed in their posts. Mr. T. G. Anantharama Ayyar, Manager, on return from training to the Agricultural College Dairy. Mr. M. P. Kunhikutti on relief is transferred to Hosur Cattle Farm as Live Stock Demonstrator, Southern area. Mr. K. B. Vythiswara Ayyar Upper subordinate to Madurantakam for training in district work.

LEAVE ETC :—

Fourth Circle.—Mr. K.E. Viswam Ayyar, assistant demonstrator, extension of leave on average pay for 5 days from 29th August.

Sixth Circle :—Mr. P. R. Subramanya Ayyar, assistant demonstrator, extension of leave on average pay on medical certificate for two months from 16th July.

Seventh Circle :—Mr. P. Abdullah, assistant demonstrator, extension of leave on average pay on medical certificate for 3 months from 11th August Mr. M. K. Nambiyar, Headmaster, Agricultural School Taliparamba, leave on average pay on medical certificate for one month and 6 days from 27th August.

Live Stock :—Mr. T. V. Krishnaswami Rao, Manager, leave on average pay for two months.

M. S. Section :—S Rajagopal, Manager leave on average pay for one month from 22nd August.

G. M. Section :—Mr. P. S. Suryanarayanan, sub assistant, leave on average pay for 3 weeks from 20th August.

G. A. C. Section :—Mr. M. R. Balakrishnan assistant leave on average [redacted] two months from date of relief.

The Ramasastrulu-Munagala Prize 1929.

1. The Prize will be awarded in July 1929.

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 15th May 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 Stu lents' Union not later than the 1st June 1929, 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.

7. The Union reserves to itself the right of publishing all or any of thepapers.

8. All references in the paper to published books, reports or papers by other workers must be acknowledged.

9. Papers submitted will become the property of the Union.

Any further particulars may be obtained from the Secretary, Madras Agricultural Students' Union, Lawley Rd. P. O, Coimbatore.

OFFICE-BEARERS FOR 1927—28.

The Council (25 Members.)

President.

President (Ex-officio)Principal—C. Tadulingam F. L. S

Vice-Presidents (4)

Resident:—Rao Saheb Y. Ramachandra Rao.
Mofussil:—C. Ramaswami Nayadu, Guntur.
,, K. T. Alwa, Bellary.
,, G. Rajagopala Nayadu, Periapalayam.
,, K. Unnikrishna Menon, Tellicherry.

Members (20)

Resident: (10) M. C. Cherian, *Secretary*.
,, D. Srinivasa Rao, *Treasurer*.
,, V. Muthusami Ayyar, *Editor*.
,, R. Narasimha Ayyar, *Manager*.
,, C. S. Krishnaswami *Member*.
,, T. R. Naganatha Ayyar ,,
,, M. Rajagopala Ayyar ,,
,, M. V. Raghava Rao ,,
,, H. Shiva Rao ,,
,, U. Vittal Rao ,,
Mofussil: (10) D. Panakala Rao, (Samalkot).
,, R. Swami Rao, (Nandyal)
,, V. N. Subbannachar, (Bellary.)
,, S. Rama Rao, (Chittore).
,, C. S. Namasivayam Pillai, (Usilampatti.)
,, M. U. Vellodi, (Nileshwar).
,, V. S. Narayanaswami Ayyar (Salem).
,, V. G. Dhanakoti Raju, (Hosur.)
,, K. G. S. Bhandari (Ootacamund).
,, T. Paramanandam, (Anakapalle.)

Working Committee (14 Members).

The resident Vice-President and the ten resident members with he following student members form the Working Committee.

Student-Members (3)

C. Annamalai of class III
Kerala Varma ,, II
K. Venugopal ,, I

AUDITORS:—S. N. Venkataramanan.
C. V. Sankaranarayanan.

Editorial Board (as per resolution passed in July).

T. V. Rajagopalachari.
M. C. Cherian.
V. Muthuswami Ayyar,
P. N. Krishnan.
G. Renga Rao (Student).
S. V. Duraisami Ayyar.

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