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PRODUCE BETTER ANNALS

No. 2

THE AGRICULTURAL STUDENTS' UNION

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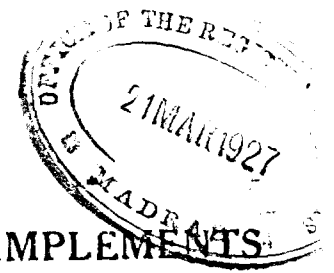
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1. The Prize will be awarded in July this year.
2. The Prize will be in the form of a Medal and will be awarded to the member of the Union who submits the best account of original research or enquiry, carried out by him on any agricultural subject.
3. The subject-matter shall not exceed in length twelve foolscap pages type-written on one side.
4. Intending competitors should notify the Secretary of the Madras Agricultural Students' Union not later than the 1st June the subject of the paper which they propose to submit and the paper should be sent in so as to reach the Secretary, Madras Agricultural Students, Union not later than the 15th June 1927, 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 the papers.
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.

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M. A. S. Union.

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Farming will never be a success unless the farmer
had more voice in the disposal of
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THE JOURNAL

OF

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FEBRUARY 1927.

[No. 2.

THE LEATHER TRADE AND THE AGRICULTURIST.*

CAPTAIN A. GUTHRIE,

Principal, Leather Trade School, Madras.

The principal raw materials of the Leather Trade are the hides and skins of domestic animals bred by the agriculturist.

The economic value of the exports during 1923-1924 amounted to about 13 crores of rupees in value. Compared with raw cotton (89 crores) this seems small but a better idea of its importance can be obtained when compared with other staple crops such as wheat (9 crores) and groundnut (7 crores.)

To the agriculturist there is however one great difference between these products. Raw cotton, wheat and groundnut are primary products to him whilst hides and skins are by-products.

On account of this difference the Agricultural Department has been able to do a good deal in the matter of improving these staple crops, details of which can be found in the publications of the

Paper read at the M. A. S. U. Golden Jubilee Conference July 1926.

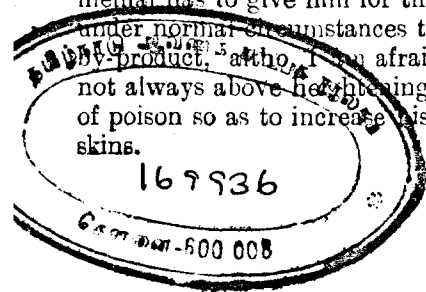
Dept. Whereas they have not been able to do anything as yet to improve the tanners' raw material. I am afraid that little can be hoped for in this line until the staff of the Agricultural Department is considerably increased. Work done so far to improve cattle breeding has been attempts to develop the animals either for dairy work or for draught purposes. With the small staff at present available I do not see how they could do otherwise.

During recent years one of the most noticeable developments in well organised industries has been the introduction of methods and appliances to save and increase the value of the by-products. As a result of this in some cases the main product can now be sold at a lower price than formerly as the by-product more than pays for the labour and material used in the manufacture. I am afraid it will be some time before the Indian Agriculturist begins to consider the particular by-product in which I am interested as its value seldom or never comes to him in a visible form.

Let us now consider in what cases the ryot obtains anything directly or indirectly for hides and skins.

The simplest case is where an animal is sold to the butcher for slaughter for food. In this case the price obtained is dependent on the value of the meat and the skin. During the post-war boom in the leather trade goat skins were selling at about Rs. 5 each with the result that the butchers were paying unheard of prices for the animals. When the slump came the price fell to under Rupee 1 with a corresponding fall in value of the animal. In this case it can be seen that the animal owner does obtain a direct return for this by-product.

I believe I am right in stating that in most parts of the Presidency when an animal dies its ownership changes from the ryot to the village menials, so that in this case the only value the owner of an animal gets for the carcase is the labour which the menial has to give him for the perquisites obtained. Even here under normal circumstances the ryot does get something for this by-product, although I am afraid in certain districts the menial is not always above heightening the death rate of animals by means of poison so as to increase his perquisites in the form of hides and skins.



You will notice that I have used the words "hides and skins" and before proceeding further I may mention that the term "hide" denotes the skin taken off the larger mature animals, cattle and buffalo whilst "skin" denotes that of the smaller or immature ones (sheep, goat and calves.)

Compared with supplies from other parts of the world Indian hides are normally of very poor quality whilst Indian skins are often equal to if not better than those from other countries.

Indian hides are normally poorer in quality than the skins for the following reasons.

1. The normal death of sheep and goats in India is slaughter by the butcher whilst cattle are usually allowed to die of old age and starvation.
2. Cattle are largely used for draught purposes.
3. Cattle having less hair than sheep and goats are more easily damaged by thorns etc.
4. The conditions under which cattle breed usually tend towards the survival of the unfittest.
5. Cattle are very often branded.

It seems very unlikely that alteration of the first three causes will take place for many years. Improvements in breeding methods are, I believe, just beginning to be felt near the centres where the Agricultural Dept. has its farms and outstations, but so far a very small proportion of the cattle are affected.

Speaking generally the branding of cattle causes a great economic loss to the country as the value of a branded hide may be anything from a few annas to several rupees less than that of an unbranded hide of similar size and weight.

In South India the branding of cattle is usually done for one of the following reasons.

1. In case of lameness.
2. For purposes of identification.
3. Ceremonial.

4. To keep off the evil eye.
5. To reduce the value of the hide so that there is less chance of the animal being poisoned.

Branding in case of lameness is necessary and wise, whilst for purposes of identification provided that the brand is kept small and is placed on some other part of the animal than the rump the damage is small. In the other cases the loss to the country is very considerable and I hope that all interested in the economic welfare of the country will try to stop the practice. Unfortunately I know that the poisoning of cattle for the sake of their hides is not unknown but I hope that some other method than spoiling the hides can be found to stop this practice. Some years ago when speaking to this Society I estimated the loss to South India on account of branding at over 20 lakhs of rupees per annum. I think that at present this figure is a little high but I am sorry to say that the difference is not due to there being less branding but to the fall in value of hides generally.

Defects due to insects and to disease are common to both hides and skins, and I consider that here at any rate the interests of the tanner and the agriculturist are in agreement. Modern veterinary and medical science is, I believe, finding out that more and more diseases are insect carried so that the protection of animals from biting insects is not only of value to the tanner but also to the animal owner as an insurance against disease. Unfortunately biting insects are often very difficult to exterminate and in many cases so little is known of their life history that it is impossible to formulate any method of attack. As an example of the difficulties attending the study of insect life I may mention that it is only during the last decade that the life history of the warble fly has been worked out. This insect is fortunately unknown in the greater part of South India altho, common in parts of the Punjab and neighbouring States. As the grubs of this fly are normally found in the backs of cattle it was thought that the fly laid its eggs there but this has been found to be far from the case as it deposits them on the hair of the hocks. In South India one of the worst insect damages to skins is that caused by the bite of the tick and any method by which this damage can be reduced would be of economic value.

All diseases reduce the value of a hide or skin, but this is especially the case with those diseases that cause sores, pimples, or other skin eruptions. Those commonest in South India are pox, scab, and pouri-pouri. The latter of these is a skin disease that affects animals chiefly during the rains when a large proportion of skins are damaged by it.

In addition to supplying the principal raw material to the tanner the agriculturist is the largest user of leather of any class in South India.

Some years ago Chatterton in his Monograph on Tanning and Working in leather in the Madras Presidency estimated that over a million hides were used annually in South India for irrigation purposes, and altho, in many districts an iron bucket with leather trunk has replaced the all-leather kavalai the number of hides used for this purpose is immense and I doubt if below this figure. The writer of this pamphlet gave the result of some experiments in using chrome tanned leathers in place of bark tanned ones for this purpose, and strongly recommended its use as he considered that chrome leather would last much longer than bark tanned. Unfortunately this optimism has not been fulfilled as these results have been found to only apply to certain districts. Generally speaking where water contains either temporary hardness in fair quantity or traces of free alkali chrome leather has not been a success, and as I believe that no chrome kavalais are used in the Coimbatore district I should be interested to know if the waters here usually contain one of these impurities.

Where ordinary bark tanned hides are used either for kavalai or other purposes it is well to remember that leather always lasts better if it has been treated with oil. If this is applied to the dry leather it makes it feel oily and does not soften it much whereas if applied to the leather in a damp condition and the leather then dried the oil will be absorbed into the fibres of the leather lubricating it thoroughly and softening it considerably altho, not giving it an oily feel. Kavalais are often considerably damaged by leaving them exposed to the direct heat of the sun. Bark tanned leather when in the wet condition is very easily damaged by heat altho, when dry it will stand much greater temperatures, and it is consequently advisable to dry out kavalais in a shady place with plenty of breeze, if long service is required of them.

A NOTE ON THE GROWTH PHASES OF RICE VARIETIES.

K. RAMIAH L. AG.

Assistant Paddy Specialist.

'Growth' has been defined as permanent and irreversible increase in dimensions. The size of a plant, though depending in various ways on external conditions is a specific character. The rate of growth, (i. e. the enlargement of cells as well as the formation of primordia of new organs) does by no means proceed at a uniform pace even when external conditions are constant. The three phases involved in growth are (1) the formative phase, (2) the phase of enlargement, and (3) the phase of maturation. The formative phase is mainly concerned with meristematic activity. Cell-division proceeds actively and the primordia of new organs are laid down. Increase in size is the characteristic of the phase of enlargement. The cells increase in size and the primordia of new organs undergo zonal differentiation. The increase in the height of the paddy plant is really the cumulative effect of a number of cells undergoing the enlargement phase in different regions of the plant. The phase of maturation or ripening is the final phase of growth. This starts when enlargement has practically ceased.

In the Paddy Breeding Station there are nearly 400 pure lines with enormous variations in their sizes, habits, and duration. As has been recorded already in the Philippine publications there is a slight positive correlation between the days to maturity and the height, the early varieties being generally short and the late ones tall. Though the size is subject to environmental and seasonal fluctuations, it has been found to be fairly constant from year to year among the pure lines. To compare the phases of growth in types of different heights and duration about 28 specially selected types were marked out. Of these 14 were short duration types with the life periods ranging from 90-131 days, and the other 14 consisted of types with duration ranging from 150-182 days. The life period of the paddy plant consists of 3 stages, (1) the seed bed stage, (2) the stage after the transplantation and until the earheads are produced and (3) the maturing stage when the grains develop and get ready for harvest. In both the 1st and 2nd stages the plants actively grow and there is hardly any increase in the

size of the plant in the last stage. In general the variations among varieties in the 1st and 3rd stages are very little, they are probably equal in most cases. The differences in the life periods of varieties are all apparent only in the 2nd stage. In very early varieties each of these stages is made up of $\frac{1}{3}$ of the whole life period and as the total duration of a variety increases the 2nd stage gets extended and in varieties of 4½ months in duration these three stages are in the proportion of 1 : 2 : 1., and this becomes again 1 : 3 : 1., when the varieties are very late and over 6 months in duration.

Soaked and sprouted seeds of these were sown in well puddled seed-beds at a uniform rate and a dozen seedlings from each of the varieties were labelled carefully in the seed bed and actually measured with a c. m. scale every 5th day commencing from the 8th day after sowing. When the seedlings were ready for transplanting the labelled seedlings were carefully removed along with others and planted in the middle row of each plot which usually consists of 5 rows of plants 1' apart each way and with a spacing of 6" between plants in the row. The recording of measurements was begun after the seedlings had established themselves, and continued up to the ripe stage when growth had completely stopped. Along with the measurements, notes were taken about the number of functioning leaves present at a time, the period of tillering, the period of flowering, and the period of ripening.

Germination. The rate of germination is probably dependent on the moisture content of the seed, the ripeness of the seed and the prevailing atmospheric temperature. Under the same conditions of temperature varietal differences do exist within small limits as regards the rapidity of germination. Some varieties are slow in germinating the extreme case in this group being the wild paddies while most of the varieties sprout in 36 hours. So far as observations go in Coimbatore there does not appear to be any connection between the rate of germination and the duration of the crop. Differences are probably due to the texture of the husk and its permeability to water. Strain 24 belongs to a group where the germination is slightly delayed. Under the conditions of sowing adopted in South India, every variety should be able to germinate almost completely in the first 48 hours, and it is only then, we get a uniform stand in the seed-beds.

Seed-bed stage. The period during which the seedlings are allowed to remain in the seed beds depends on the duration of the variety; broadly speaking, the general practice is to allow 1 week in the seed bed for every month of the total life period, no variety however being transplanted earlier than 3 weeks nor later than 7 weeks. Measurements of the seedlings were begun 8 days after sowing and continued every 3rd or 4th day for about 5 weeks, each time the maximum height to the tip of the topmost leaf being recorded. The dozen plants which were measured were selected in the centre of the bed to avoid plants near the margin which may be subject to abnormal conditions. The table below gives the average heights as recorded for the different groups under study.

TABLE I.

GROUPS.	Duration in months.	Average height.	Average measurements in c. m. when the seedlings were.					
			9	12	18	23	28	days old
Very early & very short ...	3½	2'—8"	10	14	23	31	86	
Early and short ...	4	3'—2"	6	10	16	22	26	
Early but very tall ...	4	4'—6"	7	14	22	30	34	
Rather late and tall ...	5	4'—4"	8	11	17	23	37	
Very late and tall ...	6	4'—10"	7	11	17	25	31	
Very late but not so tall ...	6	3'—2"	7	10	17	25	32	

From the table it is seen that the differences in growth are not very different in the different groups. The very rapid growth in the first group is very striking. In the very early group the growth increase is more prominent than in the other groups at every period.

Leaf formation:—Almost all the varieties under study had two leaves on the 9th day after sowing when the actual measurements were commenced. The interval between the formation of two successive leaves varies from 3 to 6 days. In the beginning the interval is somewhat longer and in the later stages as growth becomes more rapid, fresh leaves come up at shorter intervals. The early varieties on the whole show a tendency for a greater

leaf formation than the later ones, but at the same time the rate of leaf formation by which is meant the rapidity with which fresh leaves are formed and added on to those given out before is more sustained in the case of the early than in the case of the late varieties as is shown below.

TABLE II.

Days required for the reproduction of
successive leaves.

	1st.	2nd.	3rd.	4th.	5th.	6th.
Early and short ...	...	...	12	18	22	52
Late and tall ...	...	8	14	16	21	...

Irrespective of the duration the plants always have 4 functioning leaves at a time in the seed bed. When the 5th one emerges out and begins to function, the bottommost leaf turns yellow and dries up. The size of the leaves, though they were not actually measured were found to vary in width, stiffness etc. The area of foliage, a composite character made up of number, length, and width underlies the capacity to produce an ample crop and the quickness with which the plant develops a big area of foliage determines in a way the earliness of the crop. By the examination of the foliage of the different varieties in the seed-beds it is possible to differentiate roughly the early from the late and more precisely the coarse from the fine. During two seasons, just before the pulling out of the seedlings for transplanting, the seed beds of the various types were gone over carefully and from the look of the foliage they were classified into coarse or fine and when this classification was later compared with the actual measurements of the grains, the results were found to agree fairly.

Though there are variations in the intensity of the green colour observed in the seed-beds and which are sometimes persistent even after transplantation, one correlation of this character with that of any other has been noted so far. The colour of foliage is a varietal character though subject to environmental conditions like spacings and number of plants put in per hole.

Since the sowing is done fairly thick in the seed-beds, there is no indication of tillers being produced in the centre of the bed; but in varieties like strain 24 tillers begin to form in the plants on the borders of the bed after the third week.

Transplanting and after. When the plants are transplanted all the old roots die and new roots have to be formed. Soon after transplantation the plants show a withered appearance and the time taken to revive from the shock varies with the different varieties. All the early varieties under observation revived within 5 days whereas the later varieties took over a week. Though there is an indication of revival a few days after transplanting, yet the actual increase in size is not apparent till after 3 weeks. After the leaves with which the seedlings were transplanted dry up, fresh ones begin to form after the tenth day. The number of functioning leaves in each of the culms is 4, though in one or two of the late varieties it was occasionally five. The early group had invariably 3 leaves to each culm.

Tillering. After the shoots have begun to produce new leaves for some time, side shoots begin to develop. In both the sets of groups, the plants are found to possess 2 to 3 tillers 20 days after transplantation. When once the tillering has commenced the successive tillers appear to come faster in the later varieties than in the early ones, and the period of tillering is also extended in the former, and hence it is, that late varieties as a rule produce larger number of tillers. In the experiments under study all the varieties early and late had been given a uniform spacing of 12" x 6" which is certainly too big for the early ones. This wide spacing had unnecessarily prolonged the tillering period in the very early varieties which were observed to be producing tillers till they started flowering. The tillering period is about 3 to 4 weeks in the early varieties and about 5 weeks in the later ones i. e. the late varieties continue to produce tillers till about 8 weeks after transplantation. Of the early varieties E.B.335 was found an exception in that the tillering period got extended to 5 weeks and T.346 and E.B.371 are exceptions in the late varieties in that they finished their lateral branching in 3 weeks' time.

Growth. The growth as measured by the height of the plant from the base to the tip of the leaf or to the tip of the panicle if that happens to be more, is progressive and continues till they enter the reproductive phase. Though the initial height may be very nearly the same both in the early and late varieties, the size increases in each successive period are very much more marked in the early than in the late varieties. The increases are at their maximum just when the plants enter their reproductive phase. This phenomenon is very striking in both the early and the late groups. If two varieties of the same duration but differing in height are compared against each other, there is practically no difference in the height increases for the first two weeks, then the taller varieties grow much more rapidly till they approach the reproductive phase when again the increases are more marked in the taller varieties. In the case of very late varieties (Example E. B. 370) whether they are tall or short, the growth increase, though progressive, is very slow in the beginning, and it practically ceases for about 2 to 3 weeks. This happens to coincide with the time when the plants finish their lateral development. There is apparently no sign of activity during this short period and then it starts again slowly first and gets accelerated until the flowering commences when the maximum increases are recorded. The successive increases in height when plotted give an unimodal curve in the case of the early varieties and a bi-modal curve in the case of late varieties. The growth phase of late and tall varieties commences ascendancy when the early and short types attained the maximum growth.

TABLE III.

Successive growth recorded in c. m. at 5 days' interval commencing

from the 21st day after transplantation.

Days after
transplanting

GROUPS.

21 26 31 36 41 46 51 56 61 66 71 76 81 86 91 96 102 108 114

Very early and very short ... 37 48 49 56 64 74 81 85

Early and short ... 35 38 43 48 52 58 63 70 76 80 86 92 92

Early but rather tall ... 33 40 45 51 58 65 72 76 79 82 86 88 93 106 114 118

Late and tall ... 34 37 43 50 55 60 64 69 73 75 77 82 90 106 121 130

Very late but not tall ... 35 40 43 48 53 57 60 62 63 64 68 72 80 83 86 91 100 112 113

Very late and very tall ... 37 41 46 50 55 59 64 67 70 71 75 83 90 98 105 111 120 134 147

Flowering Phase. The period between which the flowering commences and finishes though influenced by environment one of which is too wide spacing appears to be a varietal characteristic. From an economic point of view the variety that starts and finishes flowering at a minimum period is always to be preferred. In the three very early varieties P. S. 24, P. S. 33 and T. 271, probably due to the extra spacing given, this period was as much as 3 weeks the maximum period so far observed. Generally in all varieties the duration of the period is from 5 to 10 days and it gets slightly extended in the case of varieties with a large number of tillers. In P. S. 24, the first head starts flowering and the 2nd head does not start until the first one finishes and a number of them may all start simultaneously later. This is true of several of the early varieties in general whereas in the late varieties a number of heads may start blooming all at once from the very beginning.

Ripening and Maturation phase:—The ripening period is the interval between the stage at which the main head is ready for harvest and the stage at which the whole plant gets ready for harvest. From the ryots' point of view the quicker the period of ripening the greater the advantage. Too much of moisture in the soil particularly in heavy and retentive soils tends to prolong the ripening and hence the local practice in the delta soils to drain the water off completely as soon as the heads are in the milk stage and thus hasten ripening. The period between the stage at which the main head is ready for harvest and the stage at which the whole plant gets ready for harvest is found to vary from 2 weeks which is the maximum noted in the case of the very early varieties, to 5 days the minimum noted in the case of the late variety E.B.371, there being no apparent connection between the duration of the crop and the length of this period. The actual period taken from the first commencement of flowering in a plant to the grain ripening appears to be distinctly a varietal characteristic. In the case of a very early variety like P.S.24, the grains are fully formed and give 100% germination 3 weeks after the flower opening and the fertilisation of the ovaries. In 5 other varieties of about 5 months in duration, there was hardly any germination even after 30 days. Satisfactory germination was obtained in one of them after 40 days and in others it took as many as 45 days. The period between the commencement of flowering and the commencement of ripening was noted in all the

varieties under study. This period is found to be 30 days in the case of most of the early varieties while in the case of the late varieties it varies from 35 to 40 days and occasionally to even 42 days. T.372 is an exception among the late varieties in that this period was only 28 days in this variety.

The branching of the culm is a common phenomenon particularly in the early varieties and these are found to remain green for a much longer period than the later ones. This is in all probably due to the fact that the early varieties ripen at a time when the environmental conditions are such to induce further growth. The late varieties generally dry up quickly except in some cases—G.E.B.24 is a typical example—where, after the harvests are over the stubbles put forth some fresh shoots and even diminutive earheads with a little grain. This phenomenon is in all probability associated with a bigger root system.

The 12 plants of each of these lots under study when ripe were harvested individually and the determinations made are recorded in the table below, the averages of two seasons.

TABLE IV.

Group.	Average number of			Average yield of individual plot in gms.	Average weight of 100 grains in gms.	Percentage of unsetting.
	tillers per plant.	Panicles per plant.	Grains per panicle			
Very early & very short	8	8	44	9.65	2.44	21
Early and Short	8	7	78	12.28	2.15	12
Early and rather tall	6	5	*83	8.86	1.98	15
Late and tall	9	8	95	14.73	1.84	24
Very late but not tall	8	8	101	13.90	1.91	19
Very late and very tall	9	8	100	14.38	1.97	18

*Does not include T. 298 which has nearly double this number of grains per panicle.

These determinations being those of a small number of varieties and there having been variations among the varieties themselves in each of the groups, cannot probably be taken as really accurate but still they give a general indication of the differences occurring in the several groups.

Summary. Observations have been recorded regarding the growth phases of early and late strains of paddy. The relative rates of growth in the seed bed stage of the two groups early short and late tall do not disclose any significant difference. After transplanting, however, the early variety manifests a fairly rapid rate of growth which soon attains a maximum value and comes to a termination whereas, in the late variety, the rate of growth is sustained and there is even a period when there is practically no growth, and attains ascendancy just when the early one has reached its maximum limit. In both the groups the growth rate is at its maximum when the plants start their reproductive phase. There is no significant difference in the maturation phase of the two groups.

I am indebted to the sub assistants Messrs. S. Muthusawmi Ayyar and R. Subbayya Gounder by whom the actual measurements in the field were recorded.

MOSAIC DISEASE OF SUGARCANE*.

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*Introduction :—*The most serious disease of sugarcane which is at present engaging the attention of the Pathologists of the cane growing countries, is the one which is known as the mosaic, mottling or yellow stripe. The disease was first noticed in Java in 1892 and is now a very serious problem in all sugarcane areas except in Mauritius. For a long time it was thought that India was free from the devastation of this much feared epidemic. The disease was first observed in India in 1921 by Dastur on two varieties D. 99 and Sathi 131 growing on the Pusa farm. Even

then the other cane growing places in India were thought to be free from it. In our own Presidency the disease was first noticed in June 1925 and a preliminary survey has shown that it is present in most of the important cane tracts. How and when the disease was introduced here is not known. Now that we find that the disease has come to stay an effort is being made to study the disease in all its aspects under conditions existing in our Province. Before tackling the problem it is necessary to collect all the available information regarding the subject and the present paper is the outcome of such an endeavour. The writer's observations also have been included to a certain extent.

Symptoms (general):—As was said before the disease was first noticed in Java and there it was known as 'yellow stripe disease'; but the choice of the name is very unfortunate for the term does not convey a correct idea of the disease. When the disease appeared in Porto Rico, Stevenson proposed the name 'Mottling disease' which about describes it. Earle sometimes later proposed the word 'mosaic' and Stevenson says that it has nothing to recommend it in preference to mottling. The terms mottled, blotched, marbled describe the symptoms of the disease as aptly as 'mosaic.' When it was found that the malady is closely allied to the mosaic diseases of tobacco, tomato, potato and others, the disease is now generally known as the 'mosaic' disease of sugarcane.

This disease is characterised by the mosaic effect produced on the leaves caused by the varying density of the green colour in the tissues. This variability may be found in all gradations. In some cases, the blotches are formed by the paling of the normal green colour in some others by whitening and in others by yellowing of portions of the leaf. In some cases all these gradations are found in one and the same leaf. The chlorotic areas are always linear and are distributed all over the surface of the leaf sometimes in a regular manner and at others very irregularly. Though the mosaic symptoms are generally variable, each variety has its two characteristic symptoms.

Symptoms (varietal.) Detailed observations were made on 4 varieties (Java Hebbal, Co. 1, Vellai and Poovan) growing in the Central Farm, Coimbatore.

In Java Hebbal, the disease is quite conspicuous on the young leaves just unfolding from the spindle and also on the one surrounding it. The whole leaf appears chlorotic with only a few islands of green here and there.

In Co. 1, the young leaf enclosing the spindle is not so severely chlorotic as in Java Hebbal. The leaf is fairly green with only a few inconspicuous pale green linear areas here and there. The leaf just outside the spindle shows these chlorotic islands conspicuously.

In Vellai, the symptoms on the young leaves resemble somewhat that of Java Hebbal; but the green islands in this variety are in larger numbers and the paling of the chlorotic areas is much deeper than in Java Hebbal.

In Poovan the mosaic symptoms are quite conspicuous and far different from any of the other varieties observed. Even the young leaf in the unfolded spindle shows symptoms of blotching. The mottling in the other variety is only a paling of the normal green colour whereas in this case some of them are white. Consequently they are in evidence even on very young pale green leaves before they acquire the normal green colour. These white spots are smaller than in the other varieties and are distributed in larger numbers, all over the green surface; but in no case do they become so large in numbers as to make the whole leaf chlorotic with only a few islands of green as in Java Hebbal. In older leaves these spots coalesce and form irregular patches. In some cases as the leaf ages these white spots gradually turn yellow.

These chlorotic symptoms are also present in the leaf sheaths of diseased plants but not in such a conspicuous manner as in the leaves.

Although the symptoms described above are the invariable features of mosaic canes, there are cases in which the stalks are also similarly affected. In canes which have red or purple colour on the rind, whitish or yellowish linear blotches are seen near the nodes. These symptoms have been observed here in the varieties Fiji B, Red Mauritius and J 247. In Porto Rico, cankers are formed resulting in the complete destruction of tissues. Such

instances have not been observed here. A few cases of cankered canes were met with but in no case was it possible to trace the cause directly to mosaic infection. Frequent instances have been met with where the affected canes were lanky, stunted and of poor growth.

Transmission of the disease by insects:—It has been positively shown by carefully conducted experiments by Brandes, Kunkel and others in Hawaii and other places that the natural transmission of the disease is through the agency of *Aphis maidis*. As these insects were never or only rarely found on sugarcane, the mere fact of its ability to transmit the disease was held by some as of no practical value as it failed to account for the rapid spread of the disease. In Coimbatore also it has never been found colonising on sugarcane and some doubts were expressed that if they were forced to confine themselves to canes, they would die.

To set this point beyond dispute, some experiments were carried out to see whether *Aphis maidis* could live and thrive on sugarcane. Individuals of these Aphids were collected from cholam fields and transferred with a fine brush to some Poovan cane seedlings about a month old. They were found flourishing and multiplying for nearly a month.

Another case was observed where a cane growing in a pot in the Pot-culture house was found naturally infected with a huge colony of *Aphis maidis*.

After thus proving beyond all doubt that these insects are able to thrive well on sugarcane, the writer introduced a large number of these Aphids and transferred them to a mosaic cane in order to conduct some inoculations. After allowing these Aphids to remain on the mosaic leaves for 5 days, some of them were transferred to three vigorously growing cane seedlings about 2 months old. The controls were similarly treated with Aphids collected from healthy cholam. None of the plants thus inoculated gave any positive results. These should be repeated again on a much larger scale. It was not then possible to do so for want of a sufficient number of insect-proof cages. Observations of a number of fields here indicate the possibility that there might be other insects serving as carriers of the disease besides *Aphis maidis*. A list of sucking insects frequently found on sugarcane

is being collected, determination of the potentialities of these insects as sectars is to be one of the future lines of work.

Transmission of the disease by artificial inoculations. Brandes was again the first to show that the disease can be transmitted by artificial methods. He obtained juice from the youngest leaves and upper joints of mosaic canes and used it for inoculating healthy plants. The controls also were similarly treated from juice obtained from healthy canes. Two methods were successfully used by him. One was by injecting $\frac{1}{2}$ c. c of mosaic juice into each shoot of a healthy cane and the other was by making numerous pricks on the young leaves with a needle dipped in the mosaic virus. Later on Kunkel was able to confirm these results. Dastur in Pusa also has successfully transmitted the disease by mechanical means. All these methods have been tried here, but as yet it has not been possible to get any positive results. Elmer says that inoculations are more successful when the inoculum is macerated in a solution of acetone. This method will also be utilised when the next set of inoculations is done.

Though it has not yet been possible to get successful inoculations, it has been definitely ascertained that when diseased setts are planted they always reproduce the disease. A number of top setts from CO. 1, Java Hebbal, Poovan, Vellai and Red Mauritius were planted to see whether they developed mosaic. Two months after planting it was observed that all the setts had developed mosaic. This shows that whatever may be the nature of second-infection, the distribution of diseased setts has been one of the surest means of introducing the disease in places where it has not been previously known to exist.

Distribution of the disease in Madras.—It was said in the beginning that the disease was present in most of the important cane growing tracts. Mosaic has been found in Samalkota, and in North Arcot, South Arcot, Salem, Trichinopoly, Coimbatore and Malabar districts. Of all these the most severely affected district is South Arcot.

Varieties attacked.—In East Godavari, Red Mauritius, B 254, A 95, Java Hebbal, Purple Mauritius, D 625, D 1135, A 2, Q 116, B 6388, B 208, Q 813 and J 247 are found to be affected. In South Arcot, Fiji B, Red Mauritius, B 203, B 174 ashy Mauritius and local reed canes and local striped are diseased.

In North Arcot the disease has been found only on a few red Mauritius canes in two gardens. The most severely affected place in Coimbatore has been the Central Farm. Four varieties of cane were cultivated, two of which CO. 1 and Java Hebbal showed 100 per cent infection. The other two local varieties Poovan and Vellai also showed some cases of mosaic. Round about Coimbatore in addition to Poovan and Vellai, local striped cane known as Chittan also showed the disease. In Salem, Java Hebbal showed mosaic as the setts were obtained from Coimbatore Central Farm. In Malabar also only those varieties that were obtained from Coimbatore showed mosaic. In Trichinopoly, CO.1, Fiji B and B 208 showed mottling of the leaves. The CO. 1 setts were obtained from Coimbatore in 1924. This fact throws some light about the existence of the disease in Coimbatore in the past few years. The very first observation in Coimbatore showed 100% attack in CO.1 and Java Hebbal. Such a heavy infestation is hardly possible if the disease had not been in existence for a considerable period of time. Now by the observation of Trichinopoly CO. 1 canes, we can conclude that mosaic was present in the year 1923 on the Central Farm.

Varietal susceptibilities:—It is a common observation that different varieties react differently whenever they are attacked by any disease. This fact holds good for sugarcane, also when they are subject to mosaic infection. Some varieties are susceptible, others resistant and some others are tolerant, i, e., though the plants show mosaic there is no appreciable difference either in the manner of growth or yield. In fact they are practically as good as healthy canes. Our observations so far indicate that Red Mauritius and CO. 1 are the most susceptible varieties. The Deputy Director of Agriculture, I Circle also says in his report that Red Mauritius was the only variety that showed as high an infection as 67% in the Samalkota station. CO. 1 showed 100% infection in Coimbatore Central Farm and also a very heavy percentage of infection in Trichinopoly. As regards Java Hebbal it is not possible to say anything conclusively about it. Though the farm canes showed 100% infection this variety showed very little infection in Malabar except those setts distributed from Coimbatore Central Farm; but in Samalkota, there were 14% of infected plants. J 247 and Fiji B seem to be the most resistant of all the varieties observed. J 247 has nowhere been found to have more than $\frac{1}{2}$ % infection and

Fiji B was found to be seriously affected only in one place (Mudiyanur demonstration farm). It is not quite possible to pronounce any variety tolerant by mere observations alone. Only after comparing the yields of healthy and diseased canes, one can be in a position to say which variety is tolerant and which is not. Experiments are in progress to determine this and many other points. As regards the Barbados varieties, all of them seem to be generally susceptible to mosaic.

Loss caused by mosaic:—As experiments are just being conducted it has not been possible to determine the loss under conditions existing in the Madras Presidency. Various opinions are expressed regarding the actual loss by this disease. Some say that it does not cause any appreciable damage; some others that it is one of the worst diseases a sugarcane planter has to deal with. In Hawaii it has been found to be a very serious disease and the loss caused by it has been exactly determined for some of the varieties grown there. The following table gives the results of these experiments:—

Variety.		Weight of cane from healthy plot.	Weight of cane from diseased plot
		lbs.	lbs.
Badila	...	5466	1196
Striped Tip	...	5386	941
Yellow Caledonia	...	8613	2470
H 109	...	7280	4573
Lahaina	...	5425	2835
D 1135	...	6530	4201

Transmissibility of Sugarcane mosaic:—Hitherto it was thought that the cane mosaic could only be transmitted to other grasses. Mosaic was first noticed on tobacco and the virus from these plants was found to transmit the disease to plants of closely related families. When sugarcane was found to be affected, it was thought that it was due to a strain far different from the one occurring on tobacco. Brandes again showed that the strain on sugarcane was transmissible to other grasses. However all his inoculations were confined to the families of Gramineae. It

was never suspected that cane mosaic could be transmitted to any families of Dicotyledons. Elmer has now shown that it is transmissible to widely separated species of plants. Inoculations on tomato and tobacco and other plants have been successfully carried out with the strain on sugarcane. He has obtained 15 inter-family and 11 inter-order transmissions.

Masking of symptoms. Some species of plants even though they are affected, do not show any signs of mottling on the leaves. But if we utilise these plants for inoculation purposes as the source of inoculum we find that the virus is still active and able to inoculate other plants. Dastur has shown that the inoculated plants do not always show signs of infection in the first season but if setts are taken and planted from these inoculated plants, they invariably showed the characteristic mottling of the leaves. Many writers have reported that in some cases, affected canes after producing diseased leaves for some time, begin to produce normal and green shoots without any signs of mosaic. It has not yet been definitely ascertained whether it is an actual recovery or only masking of the symptoms with the virus still active.

Control measures. The measures that are to be pursued in putting down the disease must depend on the conditions existing in those localities. If the percentage of affected plants is very low, it should be dealt with at once by removing and destroying the affected ones. This method is known as roguing. On the other hand if the fields show a large percentage of infection roguing is impracticable and expensive. These canes should be allowed to stand and when ripe should all be milled. Setts from these should on no account be taken for seed. Setts should only be obtained from places where the disease is not known to exist. Opening of farms for distribution of disease-free setts will go a long way to solve the problem of eradication of this disease.

ADONI COTTON MARKET.

1925—1926 Crop.

K. BALAJEE RAO.

Date of Report March 1926.

The Cotton Market Season:—The usual cotton season begins in the month of October and ends by the end of May.

Mungari kappas comes to the market for sale from the middle of second fortnight of October and finishes by the end of March.

The Javari kappas comes to the market in the month of January and finishes by the end of May. If the sowing season of the Hingari crop (Javari Cotton) is late, then the season prolongs till the end of June.

Market system;—Most of the kappas or lint that comes to the market belongs to the village middlemen who purchase cotton in the villages from the ryots. Only very few ryots bring their produce direct to the market.

All the village-middle-men and the ryots bring their cotton produce to the market in double bullock carts packed in borahs, Jollas (bamboo baskets) or in Chikkulu (rope nets). The maximum number of borahs that can be carted in a double bullock cart is three in the case of kappas and 4 in the case of lint. The maximum quantity in each cart will be about 48 to 56 maunds.

All the carts come to the market, from different villages, at about 10-30 or 11-30 a.m. and they are left in the market till 1-30 or 2 p.m., when the market rate is fixed according to the speculation of the buyers and the Dallalidars. Neither the Dallalidar nor the party knows the Bombay market rates. Some of the buyers get the Bombay rates by wire from their Bombay merchants or firms with whom they have their dealings and those rates will be kept secret.

On the arrival of the carts, the buyers and the Dallalidars gather near the market and exchange their views with each other about their stock, quality and the prices of the day. Every buyer goes round the whole market and seeing the quality of the pro-

duce in the market, one after another asks the ryot or Asami to which dallalidar the carts belong. The market rate is not fixed with reference to Bombay Market rates or on any other principle. The local buyers in Adoni usually make forward contracts with the European and other firms in Adoni and the rate fixed for the day depends on the needs of the local sellers to fulfil their forward contracts. The rate offered by the most needy local seller becomes the market rate for the day. But, in practice, even this rate is not kept up and undergoes further reduction through the prevailing system of allowances &c as explained later on. Each dallalidar asks his respective Asamies or the ryots (to whom they have advanced money) to take the carts into the compounds of the buyers with whom he has arranged the price previously. The carts are taken into the compound of the buyers at about 2-30 p. m. and are unloaded and the borahs are arranged in separate lots for each ryot. Then the buyer comes, sits in a place and asks his men to cut open each borah and get a small quantity of sample of kappas or lint (which will be about 6 to 9 seers) for rough examination. The sample is placed before him on a bench in the presence of the dallalidars. After seeing the stuff, the borah is passed according to the quality, fixing the rate for each borah, which may be equal to the market rate or one or two rupees less according to the quality with or without allowance.

This sample kappas or lint does not go back to the borah but half of it is taken away by the buyer and from the remaining, half is taken by the dallalidar and what is left behind, i. e., $\frac{1}{4}$ of the original quantity, or even less goes back to the borah. While putting this quantity into the borah the buyers' man will inform the rate of that particular borah as fixed by the buyer and marks the borah with the rate announced by him.

The allowances made for the inferior quality of kappas or lint ranges from 3 seers to 1 maund per borah according to the quality but the usual allowance is from 3 seers to 1 dadian per borah. Thus the buyer finishes his passing all the borahs one after another. The cotton of each dallalidar is then weighed separately.

Weighment of each borah is noted against each dallalidar separately under different rates in a weighment book and the same weighment is taken down by dallalidar also in his weighment book and the dallalidar writes the name of the Asami or the ryot to whom those borahs belong.

System of weighment:—Weights of the borahs are taken in maunds, dadians, and seers (one maund 26 lbs.) Weighment is made in an ordinary scale which is locally called 'chintalu.' On either end of the chintalu there is a hook to which big cotton ropes are attached; on its left side the weights (made of stones) are placed on a gunny bag stitched to the cotton ropes which is termed 'sepoi,' the usual weights being 10 maunds, 5 maunds, 3 maunds, 2 maunds, 1 maund, 2 dadians, 1 dadian, panchar (6 seers), three seers, and a seer. To its right the borah (which is to be weighed) is attached to the hook by means of cotton ropes which secure the borah firmly. The weights are then adjusted till the needle stands exactly in the centre of the balance. From the weight thus obtained, 6 seers in the case of kappas and 3 seers in the case of lint are deducted and the balance or the remaining weight is then given out by the weigher which is taken down in the weighment book as the gross weight of the borah. Against this gross weight the approximate tare weight for the empty borah is given out and noted. This tare weight varies according to the quality of the borahs used in packing kappas. If all the patalus of the borah are new, the usual weight of one dadian and $1\frac{1}{2}$ seers is deducted and if they are old and patched up an additional weight of 3 to 6 seers is added to it. By the side of this tare weight another weight is also noted which is termed as mark or allowance for the inferior quality of the kappas or lint brought for sale. The allowances are kathries and gundu. One 'Kathry' means three seers and four 'Kathries' make one 'Gundu' i. e., 12 seers or one dadian. The usual allowances are one or two kathries or even a gundu, and the maximum allowance is one maund which is however rare. This allowance is marked in ink on borahs according to the inferiority of the kappas or lint while passing and fixing the quality and rate of each borah. The following symbols are marked on borah for rate allowances.

Rate of kappas after passing is marked in figures as 35, 36, 37 and so on as the case may be i. e., Rs. 35, 36 and so on for 12 maunds of kappas or 312 lbs.

Symbol for 'Kathry'	...	X
Symbol for 'Gundu'	...	O

Borahs of each dallalidar one after another are separately weighed and weights taken down under different rates as marked on borahs. After finishing the weighment of all the borahs purchased the buyer goes away with his weighment book to his office room where he totals up all the gross weights, tare weights and allowances separately. He then adds up the total tare weight, the total weight of "Petchhu" at the rate of $\frac{3}{4}$ seer per maund of gross weight and the allowance for the quality, and deducts the total of these three from the total gross weight of all the borahs; the balance forms the net weight of the kappas purchased by him. It is on this net weight that the money value is calculated at the rate fixed at the time of passing and from the total amount thus obtained, he makes a deduction towards weighing charges at Re. 0-1-0 or 0-1-3 per borah as the case may be and a further deduction of vattam i. e., commission for converting notes into silver to it the market rate of the day which varies from $\frac{1}{4}$ to $\frac{1}{2}$ per cent on the net amount paid to him in silver coins, but he never makes any such deductions if the payment is made in currency notes as per desire of the dallalidar. By European firms, this deduction will not be made when payment is made either in coins or currency notes. The whole transaction thus finishes in the night at about 8 or 8-30.

DETAILS OF DALLALIDARS' DEALINGS.

The dallalidar after finishing the weighment of all the borahs of his Asamies in all the compounds of various buyers with whom he has arranged to sell the stock of his asamies, goes to his shop and prepares separate lists for each asamy or ryot according to the rates taken down by him in his weighment book with all the details of weighments of respective parties as noted by his respective buyers. From the total net weight as shown by the buyer some dallalidars make a further deduction towards sample at the rate of one seer per borah and some dallalidars do not make this deduction. For the remaining net weight he calculates the money value at the rates given by the buyers. From the total amounts thus obtained he makes further deductions of the following items :-

(1) Dallali, (2) Weighing charges, (3) Stamp, (4) Dharmadaya (charity), (5) Vattam, (6) Battara badigi, (hire for borahs for weighing the loose kappas brought in jollas,) and (7) advances with interest if any.

Dallali :—Re. 1. per cart of kappas of 3 to 4 borahs, but if they are less than three 6 to 8 annas per borah is charged; but in the case of lint Rs. 2 per cart of four borahs and if they are less than four, Rs. 0-12-0 per borah is charged.

2. *Weighing charges* :—One anna to 0-1-3 per borah according to the charges made by the respective buyers to whom he delivers the stock.

3. *Stamp* :—One anna for each list prepared according to the different rates, even though the stock belongs to the same party but he pays only one stamped receipt to the company from whom he receives money for the sale of all the borahs delivered to the buyer.

4. *Charity* (Dharmadaya) :—Half anna per borah for kappas and nine pies for lint per borah.

5. *Vattam* :—This is charged only when the payment is made in silver coins to the party at the prevailing market rate of exchange of the day which varies from one to eight annas per cent on the net amount paid to the party.

6. *Battara Badigi* :—This is charged only to those ryots or parties who had brought their produce in jollas to market for sale at 4 to 6 annas per borah.

7. *Advances and Interest* :—No charge for interest is made on advances taken by the party on that day of selling his produce, but the interest is calculated at 12 per cent per annum on the advances received previously. The total charges of all these items is deducted from the total money value of the kappas sold and the remaining balance is paid to the party in the night at about 10-30 or 11.

General remarks :—In most cases the dealings of the dallalidars with the asamies and the ryots are very unfair and defective in all respects such as in weighment of the stock, arrangements of the rates with the buyers and in passing the quality and also in payment of money to their asamies.

It is a general complaint from most of the ryots and asamies that they do not get the same weight of kappas or lint as weighed by them in their villages. Generally one or two dadiams of kappas becomes short per borah or per naga of 18 maunds or 318 lbs. taken to the market for sale, because the weighment is not done properly by the buyers' weigher who will have some underhand dealings with the dallalidars through whom the buyer gets the kappas carts. But this is very difficult to prove.

Regarding the fixing of rates:—The market rate is only nominal but neither the ryots nor the asami ever gets the real market rate for his stuff delivered to the buyer. The buyer simply announces in the market and assures the seller with a false promise that he would pay him the exact market rate of the day and asks him to take the carts into his compound but as soon as the carts are unloaded in his compound for passing he will fix for one or two borahs out of 8 or 10 borahs the so called real market rate of the day and refuses to purchase other borahs at the same rate with some plea or other and begins to dodge and asks the dallalidar to take back the other borahs. Afterwards the dallalidar informs the party whether he is willing to part with the kappas at the rates asked by the buyers. If the party takes back the refused borahs into the compound of another buyer he will either ask at a much reduced rate or put unusual marks and allowances. Therefore the position of the ryot is very precarious and is left to the mercy of the dallalidar and the buyer, as he has no choice of his own over his stock when once the stock is entrusted to a dallalidar.

*WORK ON RICE IMPROVEMENT IN THE TANJORE DELTA.

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Before dealing with the subject of Rice Improvement in the Tanjore-delta, I propose to give briefly the salient points relating to work on crop-improvement in general. It is a commonly recognised fact that the agricultural prosperity of a country is

*Paper read before the Mirasdars' Conference at Aduturai on 9—1—1927.

dependent upon the magnitude of its crop-production. The growing of better crops, the reaping of heavier harvests, and the realisation of better returns, are objects that are ardently desired by all agriculturists. There are over a million acres under rice cultivation in the Tanjore delta area and if it should be possible to increase the output of rice from this area, it would undoubtedly be a material contribution to the welfare of the country. A recognition of the following facts is a necessary preliminary to work on increasing the productivity of any crop.

It is a truism to say that no two individuals are quite alike, and this saying holds good with regards to plants as well. A close examination of a large number of individuals discloses the fact that there is a very large range of variation occurring among them. There are minor differences distinguishing one individual from another, and there are also what may be called racial differences separating one class or race of individuals from another class or race. A recognition of this fact is of great importance in work on plant-selection.

It would be futile, nay ridiculous, to think of converting a pigmy into a giant by carefully regulated nutrition. 'Nature' is something entirely different from 'nurture,' although the two factors co-exist in actual life. The yield of paddy plant is determined by the interaction of two factors namely, heredity and environment. The environment may be favourable or unfavourable to the expression of a hereditary factor, but the factor must be there before it can be made to show itself. All paddy plants are not of the same yielding-capacity, and it would be absurd to imagine that a very high yield could be produced by manuring alone: and that is rightly so, because the capacity to assimilate nutrition and build it up into paddy-grains is something quite different from the supply of nutrition alone. It is a well-recognised fact that different varieties or races of paddy possess different yielding-capacities. It should therefore be possible to get at the best yielders by judicious selection.

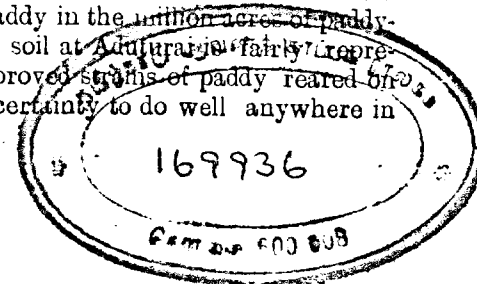
If we look at a paddy-crop growing on a ryot's field, we notice that some plants are tall and good-looking, some short and low-yielding, some sickly and producing very little grain. From the plant-breeder's point of view these seemingly different kinds

represent distinct varieties. This mixture of good, bad and indifferent plants is the chief cause of deterioration of the ryot's paddy. If the ryot had taken care to select the very best plants in his fields, and used the produce of such plants for the next sowing his crop would certainly be better. Two charts are placed before you all in the exhibition which make my point absolutely clear.* We received a sample of 'kuruvai-seed' from an ordinary ryot in the neighbourhood, and when we looked at it closely in the laboratory, the so-called kuruvai paddy which was supposed to be one variety with the ryot, really consisted of six different kinds of paddy and two different colours of rice. Some of the varieties are positively unmarketable, being either black in colour or slender and fragile or with awns. The rice too being a mixture of red and white rice is graded as a low class of commercial product, and consequently the financial return to the cultivator is poor indeed. You may ask what the remedy is, to solve this problem? We do not propose to teach the ryot the details of scientific work. The State or the Government gladly undertakes the trouble and expense of such work. We examine very carefully a sample of the mixed-paddy grown by the ryot, separate it into its constituent pure-races by single-plant-selection, try these varieties one against the other with regard to yielding-capacity and finally isolate the very best strain, multiply it on a large scale, and recommend the new seed to ryots for adoption. We do not wish the ryot to give any preferential treatment to this seed, but we only ask him to grow it in place of the mixed seed which he had been growing formerly. These processes lead to the evolution of an improved strain of paddy by pure-line-selection. This method can be relied on with certainty to produce good results. It stands to reason that once we fix upon an extremely good race of plants and keep it pure, it will certainly go on producing its like. It takes usually as many as six years before an improved strain of paddy can be produced by this process. I invite every enlightened mirasdar present here to look at the diagrams and miniature-models illustrating every stage in pure-line selection work. Varieties of paddies grown in various parts of the country are collected and grown here to give us an idea of their relative yielding-power under local conditions. This again affords us material for further selection-work. There is yet another more interesting and absorbing line of work for effecting crop-improvement. This method is known as 'hybridisation' or

*not reproduced here.

'crossing';—a method which holds out very great promise of future possibilities. Every mirasdar knows that if he wants to improve his breed of cattle, he should set about it by the crossing of local types with superior foreign breeds. He fully recognises for instance that it is impossible to raise the milk-yield of his cow above a certain limit, by feeding it with any amount of nutritious cattle-fodder. The same fact holds good in regard to plants as well. Among paddy plants, as has been already pointed out, there are numerous varieties, the plants of each variety exhibiting definite characters. One variety is late and heavy-yielding. It may be asked how one variety of paddy may be crossed with another. It would be unnecessary for me to go into the details of this process which has been demonstrated clearly this morning to all the visitors who went round the farm. There is a variety of paddy cultivated largely in the Tanjore-delta which all of you, mirasdars, will be familiar with. This is the Korangu-samba paddy which gives a very good yield in years in which it is free from the attack of fungal disease (paddy-blast); but should the paddy be attacked by the disease it is very badly affected and most of the grains get chaffy and sowers have to reap with regret a harvest of chaff. Another strain of paddy called Kichili-samba (G.E.B.24) appears to be rather resistant to the disease but in grain size and other qualifications it does not offer an absolute alternative to korangu-samba. To combine these two desirable characters of heavy-yield and disease-resistance found in 'Korangu-samba and Kichili-samba respectively, a cross is made between the two types. When the progeny of the cross is examined, we may get true breeding plants which are disease-resistant and high-yielding. It may thus be possible to produce a new type of 'Korangu-samba' which will be able to resist the disease. Work of this kind is laborious and slow, and it takes a long time (about ten years) before definite results are achieved.

Having so far, dealt with facts relating to scientific work, let me now briefly tell you what exactly has been done so far at the Paddy Breeding Station here to improve the paddy-crops of the Tanjore delta. This station was started in 1922 with the intention of increasing the output of paddy in the million acres of paddy-fields in the Tanjore delta. The soil at Adupuram is fairly representative of the delta-soil, and improved strains of paddy reared on the station can be expected with certainty to do well anywhere in



the delta-tract. As a result of several years of work, seven improved strains of paddy have been distributed to the ryots, and encouraging reports have been received from places where they have been tried.

These strains are.—

(i) Aduturai No. 1 (Red sirumani).

This crop takes about six months from sowing to harvest, and the seed issued from the station gives an increased yield of 16% over the ryots' sample of the same variety.

(ii) Aduturai No. 2 (white sirumani).

This is again an improved variety of white sirumani paddy, and it gives an increased yield of 10% over the ryots' seed of the same variety.

(iii) Aduturai No. 3 is a selected strain from 'Kuruvai' taking only about 90 days to mature.

(iv) Aduturai No. 4 is another improved 'kuruvai' variety giving 12% increase over the ryots' seed.

(v) Aduturai No. 5 is a selected Nellore-samba paddy which gives an increase of 25% (or 3 marakkals per kalam) over the unselected variety.

(vi) Aduturai Nos. 6 and 7 are selected ottadan varieties which give a 13% increase over the unselected ryots' crop.

May I conclude this paper with an earnest appeal to all of you, mirasdars, present here, to co-operate wholeheartedly with one another in growing, multiplying, and distributing to your less enlightened neighbours, seed paddy of improved strains issued from Aduturai, so that in the fullness of time your purses will grow long with increased profits, and the Agricultural Department may have the satisfaction of looking back with sincere pleasure on an era of useful service to the country.

CURRENT TOPICS.

Food Capacity of Cattle—J. A. Murray; Summary:—The 'Food capacity' is taken to be the amount of total dry matter consumed when the animal is offered as much as it cares to eat.

The food capacity of steers is subject to a nearly uniform acceleration of 40 lbs. per month from birth up to the age of 12 or 14 months, after which it remains approximately constant. It cannot therefore bear any simple relation to the live-weight of the animal.

In the case of steers the average constant rate of consumption was about 18 lbs. of total dry matter per head per day throughout the period from 1 to 4 years; in the case of milk cows it is probably about twice as great, viz.; from 30 to 40 lbs.

(From Journal of Agricultural Science, October, 26, 1926.)

Co-operative Farming £. 1,000,000 loss.—At the National Farmers' Union dinner, the Chancellor of the Exchequer (Mr. Winston Churchill) referred to the advantages of co-operation. In reply, the President of the Union (Mr. Langford) placed a few facts and figures regarding the farming activities and failures of the Co-operative Whole Sale Society whose activities represented co-operation in its widest terms. In 1917, there were 105 distributive societies engaged in farming; they owned or rented 25,000 acres with an invested capital of £ 634,000. They showed a profit of £ 32,646 after paying an interest of £ 23,120. But during the next 4 years, 76 more societies went in for farming with an additional 50,000 acres and a total turnover of £ 3,230,000 paying an interest of £ 127,750. Money recklessly speculated during the above period!! In 1921, the loss was £ 362,500. Since 1921 some of the societies sold their farms. The loss since 1921 has been £ 1,000,000. (From Farmer and Stock-Breeder dated November 1, 1926.)

The Broadshare instead of the Plough:—The most important and the most expensive operation on the farm is ploughing is good in theory but in Fenland the best result is obtained by broadsharing instead of ploughing.

The land is ploughed fairly deep for beans which during their growth are horsehoed several times. This leaves the top inch or two of soil in a fairly loose condition. As soon as the crop is carted the land is broadshared to a depth of 2 inches which cuts off all rubbish and induces germination of thousands of small seeds after a few days interval the rubbish can be harrowed up and burnt and the field is ready for wheat. Fen farmers never plough for wheat. The two fold advantages are :—the country corn is drilled without hindrance of clashing with the lifting of sugarbeet and the labor bill is decreased considerably. The broadshare makes a firm seedbed and less rubbish seems to grow than when land is ploughed. It ensures drilling of wheat in proper time and if sugar beet is grown more men are available for its early delivery.

(From Farmer and Stock-Breeder, December 27, 1926.)

Rotations for Tobacco :—The most common rotation used in Virginia for tobacco is

First year—Firecured tobacco—well manured and fertilized.

Second year—Wheat—no fertilizer.

Third year—Clover and hay—limed.

Fourth year—Clover and hay—unfertilized.

Rotation in Rhodesia :—

First year—Firecured tobacco—well manured and fertilized.

Second year—Maize—phosphates used.

Third year—Monkey nuts, beans or peas for market.

Fourth year—Cowpeas or velvet beans as green manure.

Lime if necessary, 3rd or 4th year.

(From Rhodesia Agricultural Journal, December. 1926)

Empire Silk :—The whole of silk raw material used in England is imported and is worth about 2 million pounds sterling per annum. On an average 98 per cent of the imports are from foreign countries. The only countries of the Empire producing silk on a commercial scale are India and Cyprus.

The world's annual supplies of raw silk amount to about 70 million pounds and are not equal to the increasing demand of the

silk manufacturing countries, prominent among which is America with a consumption of 70 per cent of the world's silk entering commerce.

((From Journal of Jamaica Agricultural Society, December. 1926)

British Sugar Enterprise :—The Englishman with his characteristic industry has taken to producing sugar in his own country. During the past 20 years a few beet sugar factories have been established and cultivation of beet strenuously pushed on. The pioneer of the industry in great Britain was, says Mr. A. Aitkin, Lorp Denbergh. In 1909 the Steaford factory was established; in 1911 the Cantley factory in Norfolk was set going and in 1925, the Colwich factory in Nottingham was built under war pressure. In 1924, the Anglo-Scottish Corporation was founded and now have factories going at Colwich, Spalding, Kidderminster, Poppletras, York, Felstead, Essex and Cupar. This season they had handled 307,000 tons of sugar beet and produced 35,000 tons of sugar. The area of sugarbeet in Britain in 1922 was 8,000 acres; in 1923, 16,000 acres; in 1924, 23,000 acres; in 1925, 60,000 acres and in 1926, 128,000 acres. Fifteen years ago the maximum percentage of sugar from beet grown was 15 and during the past season, six farmers had a record of 24.3 per cent.

Sea birds :—Dr. Walter E. Collinge writes in "Nature," December 25, 1926, that no action of sea birds can produce any appreciable effect on the plenitude of the fishes of the sea. Moreover, many species are exceedingly valuable from an agricultural view point and their wholesale destruction is fraught with the gravest possibilities.

Banalore "Maintenance Experiments"—Dr. F. J. Warth Physiological Chemist, Bangalore, has pursued his studies on animal rations under Bangalore conditions and has given the results of his observations in a Memoir entitled "Bangalore Maintenance Experiments". The author has struck an original line in his scheme and has adapted it for local breeds of cattle. His conclusions are worth careful study, by all who are interested in the cattle problem and especially of those who are ever possessed with the night mare of fodder scarcity, and in this connexion we invite our readers, attention to the note on "Food Capacity of Cattle" published elsewhere in this number.

Bombay Cattle Breeds:—The Bombay Agricultural Department is to be congratulated on its up-to-dateness in bringing to the notice of the public a short account of the 8 existing cattle breeds in that province. The leaflets issued on this subject give a fairly full description of the tracts in which they are found and of the characters and prices of the several breeds. Of the 8 breeds it is satisfactory to note the Scindhis are the best milkers. Their reputation, as our readers are aware, has extended beyond the limits of the Bombay Presidency. We find Scindhi cows in requisition in Madras, Ceylon, Java, and other countries. Of the dual purpose Breeds Kankraj, Gir, and the Thar Parkar hold an unrivalled position though the last by virtue of its location in the arid tracts of Thar Parkar in Sind is fitted more for tracts where pasturage is scarce. The three draught breeds are reported to be the Krishna Valley, Khillari and the Amrit Mahal, which last has become a special feature of Mysore Agriculture.

Y. M. C. A's Rural Work:—Of the organizations, the one that has given a very practical turn to rural reconstruction work in this province is the Y. M. C. A. now under the able guidance of Mr. K. T. Paul. Since his return in August last, from the World Congress at Helsingfors, he has been devoting his utmost attention to this aspect of the Y. M. C. A. The number of lectures he has delivered on this subject in several centres, the enthusiasm he has evoked amongst his hearers and the practical scheme he has laid down for rural rebuilding through honorary or paid workers deserve commendation. Mr. Paul seems to believe more in concentration and this is all for the good as satisfactory work done in one centre becomes infectious very soon and spreads even uninvited to places otherwise inaccessible.

NEWS AND NOTES.

Cottage Industries:—Mr. S. K. Sundaracharlu, whose name was prominently before the public as Assistant Labour Commissioner and in connexion with the Labour Conference at Geneva 3 years ago, has been placed on special duty to investigate the actual requirements of power from the Hydro-Electric works at the Pykara Falls and will after its completion make enquiries on the Cottage Industries in this Presidency. The unemployment problem is staring in the face. All are agreed that in an agricul-

tural province like this, the amount of unemployment cannot be inappreciable or reduced unless efforts are put forth on a colossal scale to induce the agricultural population to take up cottage industries. Several industries have been suggested and it would be well that in the agricultural college a few such industries are taught as optional subjects. This would not only be popular, but would also gain the approbation of all sections of public opinion and make the college more useful and better appreciated.

Agriculture in schools:—The Guntur District Educational Council has resolved that agriculture should be taught in schools under its control. (Hindu dated 2-2-27).

Special lectures:—A series of special lectures was given this month to the final year students of this College.

7th to 10th.—Revenue by Mr. M. V. Vellodi, Pers. Asst. to Director.

16th and 17th.—Hydrogen-Ion concentration and phosphatic values by Mr. T. Lakshmana Rao, Asst. Agri. Chemist.

18th.—Plant Breeding Mr. R. O. Iliffe, Paddy Specialist.

21st and 22nd.—Experiments—How to conduct them by Mr. B. V. Nath, Govt. Agri. Chemist.

23rd.—Bacteriological technique by Mr. P. D. Karunakar, Agri. Bacteriologist.

24th.—Factors affecting growth and sugar content of cane, by Mr. K. Krishnamurti Rao, Asst. Sugarcane Expert.

25th.—Plant Breeding—Millets, by Mr. G. N. Rangaswami Ayyangar Millets Specialist.

Students' Club:—On the literary side this club has been more than active recently and it had the unique fortune this month to have an extremely lucid and thoughtful address from Dr. S. K. Datta, Secretary, Y. M. C. A. India a practical exposition of the principles and working of farm implements by Mr. S. Ramachandra Iyer D. A. and a valedictory address by Rao Bahadur T. A. Ramalingam Chettiar.

Dr. Datta traced the apparent race conflict that rages very furiously in the modern world between 'whites' and 'nonwhites' to the bed-rock of economics, drew for his illustration events from the present position of the Indians and the Whites in the Fiji Islands and incidentally referred to the communal conflicts in this country which was a very unwelcome feature from his point of view. Everyone in the audience having heard Dr. Datta felt that one's weight should be thrown on the side of humanity and against narrow sentimentalism which bulks largely in the present day controversies.

Mr. Ramachandra Ayyar deplored the condition of the Indian cultivator and suggested in a descriptive manner the one means of securing through waterlifts and ploughs increased crop production in regions where the country plough now simply scratches the soil and where wells are possible but do not at present exist.

Officers' Club :—The annual meeting for election of office bearers was held in the last week of this month. Our President, Mr. Rao Sahib M. R. Ramaswami Sivan retired and Mr. K. Krishnamurthi Rao has taken his place for the current year. The meeting excited mirth and conviviality as is usual in a unique colony as the Agricultural College Estate. The retiring President was congratulated from all quarters. Mr. M. C. Cherian becomes the Secretary and Mr. B. V. Nath, again Vice-President, the other members of the Committee being, V. Gomatinayagam Pillai, K. M. Thomas and C. Vijiaraghavan.

Co-operative Stores :—The local branch of the Coimbatore Co-operative Stores and Bank has as the result of a general body meeting held at the College on the 13th secured a local pensioned officer in the person of Mr. T. A. Subramanya Ayyar on the Directorate. On the initiative of Mr. Rao Sahib M. R. Ramaswami Sivan, the meeting enthusiastically constituted a local consultative body consisting of Messrs. P. Ramaswamy Ayyar (Sanitary Inspector.) R. Chockalingam Pillai (Cotton Botanist.) S. Ramasubramanya Sarma (Accountant, Central Farm), the Warden of the Students' Hostel and the Secretary Officers' Club to help the Director.

Honorary Visitors :—The institution of Honorary Visitors to the College does not seem to be popular. Few have the

required time at their disposal or the inclination to visit the College, busy men that they are, and plunged in their local affairs. This month Rao Bahadur Nallathambi Chakkarai Mandradiyar, the Pattagar of Palayakottai, the famous breeder of Kangayam cattle, paid an official visit to the College and acquainted himself with the work of the various sections, the Central Farm and the Dairy.

The Madras Paddy Crop:—1926-27—Final Report. The area sown with paddy up to Decr. is estimated at 10,954,000 acres against 11,050,000 acres estimated on the corresponding date of the previous year.

The area under second crop paddy will be much less than in the previous year owing to insufficient or poor supplies in most of the irrigation sources, especially in rainfed tanks, as a result of the partial failure of the North east monsoon. The reduction of area under the second crop has more than set off the increase in area under the first crop and main crop for which there were sufficient supplies in the irrigation sources.

The harvest of the main crop has been finished in most districts. On the West Coast, first crop paddy and single crop paddy gave good yields owing to the well distributed rainfall. The crop has been affected by drought in the other districts. In Chingleput, South Arcot, Salem, Madura, and Ramnad, the yield per acre was the lowest reported. In parts of Coimbatore, the crop suffered from the attack of insect pests. It was less than in the previous year except in Godaveri, Anantapur and Coimbatore and on the West Coast and the Hills.

On the seasonal factor basis, the yield works out at 92,777,000 cwt. of cleaned rice as compared with 106,440,000 cwt estimated for the previous year, a decrease of 15.9 per cent. The present estimate is less than the average estimated yield of 107,814,000 cwt. by about 14 per cent.

EDITORIAL.

The Ministerial Policy :—It is well that at the very outset the present Ministry has found it desirable to enunciate their policy and outline their programme for the constituents and the public to know and assess their work when they lay down their office. The public would certainly welcome this feature as some experience of the necessity for the forming of policies by the various parties who are intent on capturing the electorate and clamouring for power and opportunities to show their talents, sincerity and organising ability has sadly shown during the past six years. The present programme aims at the initiation, if not completion, of several schemes, primarily for rural construction and therefore should meet with the approval of the whole province. No one need, on this account, be oblivious of the fact that a mere enumeration of policies will go a long way towards the realisation of their aims but should whole-heartedly work to whatever party one may belong, towards the advancement of the basic ideas on which improvement of this province rests. In our opinion Rebuilding of the Rural edifice is the prime desideratum at present. Political strife may rage in urban areas but that this should poison or dry up the springs of activity in rural parts should be and we feel sanguine is, far beyond the dreams of even the worst partisan who may lay any claim for work as a public man.

Revision of Gazetteers :—The earlier decades in the British administration of Madras witnessed the compilation and production of admirable works on economic, social and other conditions of the districts which enthusiastic and brilliant civilians found themselves thrown in. The work done, however, found its acme in the publication of the Madras Manual of Administration in three volumes in the eighties of the last century and concomitantly with this the publication as times and funds permitted and talents were available of what were known as District Manuals. In the last decade owing to a fairly settled character of the province during the previous 50 years, subjects which were of special import or of local importance became increasingly limited in number and it was considered sufficient if supplementary information alone in regard to details to show the economic changes was given and this was published in the form of Gazetteers. Nearly 10 years have elapsed since this work also saw its completion and Government have now come back to this work and appointed Mr. J. J. Cotton, a senior Civilian and an officer of great literary abilities as Editor of the projected

Gazetteers. At the time that the manuals and the series of Gazetteers were written, the Agricultural department in its present form and size was not in existence. The then officers really seem to have taken what care they could in collecting information on seasons, crops, and other agricultural conditions, but in our opinion the present times, in view of recent developments, do need that an agricultural officer should be attached to the General Editor for this part of his work. It may be that information under this head is collected through various circle officers but the final touch and shape besides coordinating the information so obtained can only be satisfactorily given by one who has specialized in the line. Despite this defect, however, we hope that the general editor will be put in possession of all aspects of rural conditions by the district staff and the public may eagerly look forward to the early issue of these Gazetteers.

The Unemployment Problem :—Work for idle hands, more work for the industrious, enough work to give food for all is the Slogan at present. The problem of unemployment has only recently been forced to the forefront by the educated classes. The Local Government, acting on a resolution moved by our townsman Mr. C. V. Venkataramana Ayyangar—appointed an Unemployment Committee with Sir George Paddison as the Chairman. Owing to his more pressing duties elsewhere this work could not be completed early. Witnesses representing all shades of opinion were called in. We believe the report is being got ready and we hope the recommendations would indicate the source which may be successfully tapped to reduce this tension of unemployment. We are glad to note in this connexion, that the Travancore Durbar are tackling this problem and have taken it up seriously. We find that the questionnaire issued by the Travancore Government follows the same lines as that issued by Sir George Paddison, probably due to not much dissimilarity in conditions between Travancore and Madras. With immense natural resources in land, forests and the sea, Travancore enjoys advantages and for a territory of the size of Travancore and the percentage of literacy in population this question seems easier of solution. We hope that as an all round awakening is taking place in this country the Government of India will have to turn their attention to this question which with the output of 15 universities every year is bound to assume an All-India character in a few years.

Exchange Ratio. This country is peculiarly circumstanced in that the token of exchange has changed both in value and material during the past several decades. Even in countries where bimetallism is the rule and the permissibility of minting of two different metals and of sending sufficient quantities in circulation is not in doubt, the exchange question is not non-existent. In India, therefore, this question is more complicated where the absorption of gold is reported to be assuming alarming proportions. One school of thought is of opinion that the absence of gold coins for circulation is the cause of hoarding of gold by fewer individuals to the detriment of the public while the opposite school advances the same argument against the introduction of a gold standard. History tells us that the presence of any commodity in large and available quantities has always tended to break down monopoly. It is therefore pertinent to ask whether the introduction of gold coins into the country will not familiarise the people to the use of this metal and the novelty and the necessity for hoarding may not wear away in time. Assuming for the sake of argument that the gold exchange standard is an accomplished fact, one may deeply plunge oneself into the burning question of exchange ratio. The Government of the day with one of the most capable of financiers Sir. Basil Blackett as their spokesman is introducing a Bill to fix the exchange ratio at 1 sh. 6d. a Rupee and thus to stabilise the currency. Bombay capitalists and financiers backed by leading public men with a leaning towards industry and commerce have set up a currency league with the Right Honorable V. S. Srinivasa Sastry, P. C. as Chairman to combat this opinion and gather all forces available in the country against this move of the Government. It is really very difficult to oppose such a solid phalanx of patriots as Sri P. Thakurdas and a substantial portion of the Indian Press, but we feel it our duty to bring to more prominent gaze one aspect of Indian life and that the least vocal viz. the rural population. Agricultural produce is largely exported to foreign countries and the agriculturists live by the export of such produce. Any exchange ratio which will give him an advantage is therefore welcome to him because the nature of imported articles he uses is such and their volume and value are so small that an exchange ratio of 1 sh. 4d. to the Rupee is not advantageous to him. Further it is his painful experience to note that however high the prices may range in countries outside or even in his own, the value he gets for his

produce does not materially rise as the middlemen snatch away the margin of profit for themselves. It is common knowledge that when the last war was raging and the prices of the Calcutta gunny cloths were three to four hundred per cent in the world market, the jute cultivator did not get much more than his prewar price. Such conditions are similar all over the country. Unless therefore the knowledge of the cultivator increases and he is in a position to assert himself, the 1 sh. 4 d. ratio will not attract his attention. In his own simple way he would still hanker after 1 sh. 6 d. ratio which may seem plausible in the eyes of the capitalist magnates but would certainly lead him to think that for one hundred rupees worth of produce he sells not 1600d. but 1800d. he gets.

Cattle Fairs:—A perusal of the Madras Villagers, Calendar of the past few years discloses a lamentable fact that in this province where over 40 millions of people inhabit and 9 million cattle are reported to live, fairs and markets for purchase and sale of these useful animals should not number more than fifty-five. This shows, in our opinion, the paucity of knowledge on the part of the ryot to better economic conditions through cattle which are now his sole mainstay. These fairs are scattered over the whole Presidency and for an area of 92 million acres look ridiculously small. Some of them last only for a day and are held in connexion with local festivals and do not seem to assume the character of cattle marts in recognised agricultural countries. It is no wonder that even with the prodigious exertions of the live-stock section of the agricultural department, the results of improvements of the few existing breeds will not be felt for several decades to come. The question of reasons apart, it behoves the public to turn their attention to remedy this defect in rural economy. We are aware mere opening of more cattle fairs and markets alone will not solve the problem but the increase in the number of such fairs and markets will certainly improve the tone of such breeds. The failure of a few agricultural and cattle fairs in the past is no indication of the apathy of the ryot towards this aspect of his life but the time was not yet and the improvement through shows was forced on him when he had not enough general knowledge, as he now possesses of the agricultural conditions. Important markets and fairs should be opened and held not in district centres or junctions where railways meet but in places where large concourse of people assemble in off seasons bent on religious or other pursuits.

DEPARTMENTAL NOTIFICATIONS.

Appointments Promotions etc.—Mr. M. Ananthan to be Assistant Paddy Specialist, Pattambi, on probation, from 17-11-26.

Mr. K. Venkataraman, to officiate as Assistant Paddy Specialist, Aduthurai, with effect from 17-11-26.

Mr. P. D. Karunakar, to be Agricultural Bacteriologist, in the Madras Agricultural Service on probation. Joined duty on 7-2-26.

Mr. Rao Sahib M. R. Ramaswami Sivan, to be Principal Agricultural College from date of taking charge which was on the afternoon of 23-12-1926.

Mr. A. V. Tirumuruganatham Pillai, Assistant Director of Agriculture, extension of leave on medical certificate for 4 months from 12-1-27.

Mr. P. S. Jivanna Rao is confirmed as Assistant Government Lecturing and Systematic Botanist, with effect from 3rd September 1923.

Mr. C. Krishnan Nayar, Assistant, Mycology section promoted to IVth grade (provisional) from 17-11-26.

Mr. A. Krishnaswami Ayyar, Agricultural Demonstrator is confirmed in the Vth grade.

Leave etc.

First Circle:—Mr. V. Achyutaramayya, Farm Manager, leave on average pay for 2 months from 1-2-27.

Third Circle:—Mr. S. Varadarajulu Asst. Manager, leave on average pay for one month from or after 8-2-27 Mr. M. Satyanarayana, Manager Hagari, leave on average pay for one month from 20-4-27.

Sixth Circle:—Mr. K. Ramaswami Ayyar, Demonstrator, Sholavandan, leave on average pay for one month from 7-2-27.

Eighth Circle:—Mr. S. S. Katchapeswara Ayyar, Demonstrator Hosur, leave on average pay from 29-1-27 to 17-2-27.

Live Stock:—Mr. M. L. Narayana Reddi, Assistant Manager, leave on average pay for one month in continuation of the leave already granted.

G. M's Section:—Mr. C. S. Gopalaswamy Rao, Assistant leave on average pay for two months from date of avail. Mr. C. S. Krishnaswami Ayyar, Assistant, leave on average pay for one month from 1-2-27.

Mr. S. Rajaratnam, Sub Assistant, leave on average pay for one month from 1st March.

P. S's Section:—Mr. T. K. Balaji Rao, Assistant, leave on average pay for 17 days from 5-2-27.

E. S's Section:—Mr. R. Narasimbacharya, Sub-assistant extension of leave on average pay for one month.

(v)

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2. Tanjore.	Caddel's Road, opposite Ex. Engineer's Office.	S. Varadachari, L. Ag.
3. Tinnevely.	Kaliappa Nadar's Building, Main Road.	M. Kanthimathinatha Pillai, L. Ag.
4. Madura.	32, West Masi Street.	S. Subba Rao.
5. Coimbatore.	C/o B.O.C. Sub-Agent, Railway Compound.	S. Ramaswamy.
6. Pollachi.	52, Kumarapalayam Road.	N. R. Rajagopala Iyer.
7. Erode.	288, Lord Napier's St.	P.P. Subramony Iyer

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Asst. Propaganda Inspector. Conjeevaram.	70, Ekambareswarer Sannadhi Street Conjeevaram.	K. R. Ramaswamy B. A.
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3. Tenali.	Do. do.	Ch. V. P. Subramaniam.
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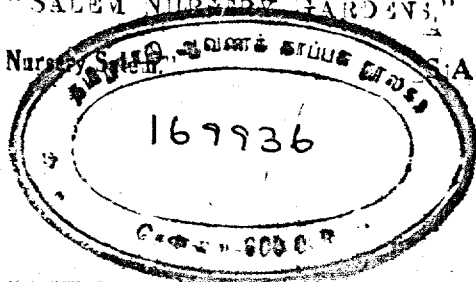
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