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

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EDITORIAL.

The Journal.—For some months now, members have evinced a desire to see the journal in an enlarged and more attractive form in a line with similar journals published in this country and the management have as a tentative measure decided to enlarge the size, introduce novel features and to make it serve its ends better than before. The change of title which will come into effect with the first number of the next volume has given an opportunity to satisfy these needs and it is hoped that readers will extend their patronage as heretofore and find it a more helpful and handy magazine in their study. The enlarged size now secured will not involve any increase in subscription which will continue to be as before.

Importance of Marketing.—Economic solidarity is a necessity of the present day. Agricultural and other produce must find its level according to prices in world markets. The yield of white pepper of Cochin does not today affect the price of rice in Walluvanad but is regulated by the price which it fetches in New

York market. Failure of rains in the Tambaraparany valley does not produce such a scare as it did of old so long as Bangkok and Rangoon do not put on an embargo on rice produced in Rangoon and Siam. World markets therefore determine the value of articles produced and world demands depending upon quality and quantity to a larger extent determine the price than either the cost of production or local demand. Therefore the question of marketing is the question of questions amongst producers and this subject involves not the simple calculation of a few annas and pies but an intelligent understanding of the conditions of world markets and an adjustment to them. It is here that Commerce becomes the handmaid of agriculture and the co-operation of the cultivator with the trader should become very intimate if they have each to live and prosper. It is not enough that from an acre of land, by ploughing with an iron plough and applying artificial manures a cultivator has produced 2000 lb. of grain for only a thousand he produced before, he should be in very close touch day by day with world commercial movements and prices and regulate the quality and quantity of his products and the time when he could put his produce into the market. This is not a simple affair requiring little thinking and less imagination but is an intricate subject involving anxious hours and much thought. And a study of this subject in all its bearings is therefore one of very great importance to every agriculturist. Would any of our readers think whether the Royal Commission did err in referring to this subject too soon?

The Land of Jesus.—Palestine, the hallowed country where Christ was born has, during the past few years come to the forefront with an amazing rapidity of improvements in several directions. What it was in the old days, in the pre-Christian era is purely a matter of conjecture and biblical history the threads of which have still to be woven by historians and archeologists. That it has been a centre of attraction and object of adoration by the jealous princes of Europe for over a thousand years is however wellknown. The overthrow of the militarist classes in post war Germany and the ascendancy of the Jews amongt the councils of different nations have led again to bring back to their old home the scattered elements of the sons of Abraham.

That they have shown mighty efforts with the help of sympathetic governments like that of Britain to reestablish their home in Palestine, to fructify the barren country and establish intimate

relations with the Arabs and other followers of Islam shows the changed angle of vision which has drawned upon the Jews who have been leading a wandering life far from their home for the past several centuries and the sound judgment which seems to characterise their leaders today. We trust that the Hebrew University which was sprung into existence the year before has sent its roots deep into the hearts of the people and will liberalise culture shedding lustre upon Palestine and other Asiatic nations. Whether the theory which our countryman Mr. M.S. Ramaswami Ayyar has for some years now tried to build up from original works found in Western countries and a comparactive study of the local conditions in South India and Palestine may prove acceptable to western eccleasiastics steeped in age long native conservatism and perhaps legitimate pride and clear the mist overhanging the vision of their ardent followers we cannot say but we are led to believe that nations whether western or eastern, whether talking one language or another are after all the same kith and kin divided perhaps and changed in a bewildering degree by varying conditions of environment and will in time come to realise the inner soul and embrace each other in bonds of brotherhood and love. We hope that Palestine will soon grow up and assume a high place among the agricultural nations of the world.

Pathological Studies. The Royal Commission in their very valuable report have rightly laid stress on the extensive work that is awaiting the Entomologist and the Mycologist in India. That problems connected with the two branches of entomology and mycology are beset with innumerable difficulties which hamper progress is a matter well known to every patient worker in the field but this can be little understood much less appreciated by a superficial critic or a despondent cultivator. The life history of a pest can be studied by the Entomologist and the remedies he considers feasible can be made known. But unless a full knowledge of the fact combined with a determination to root out the evil by adopting immediate measures not alone by himself but with the co-operation of his fellow cultivators and the active support of the public is present, all the labours of the Entomologist are either lost or will be treated with indifference. The root cause of the disease thus appears to be not the want of enthusiasm of the Entomologist but want of adequate education on the part of the cultivator. This is a serious evil which neither the Entomologist, the Mycologist nor other brother scientists intent upon improving the countryside can by themselves eradicate.

The spread of education amongst the villagers is of necessity a matter of slow growth notwithstanding any huge efforts governments may put forth. The pace will only be accelerated if patriotic and leisured classes find themselves as part and parcel of the village and help in this direction. An ounce of practice in this respect is worth more than tons of papers on which schemes are lavishly put down.

Rural Enquiries at Appuneri (Tinnevelly Dt).

By C. Jagannatha Rao, B. A.,

Assistant Cotton Station, Koilpatti.

The village.—Appuneri, the agricultural practices of which village are detailed in the following paragraphs, is situated about three miles to the north of the Cotton Breeding Station, Koilpatti and is otherwise known as Palaya Appuneri to distinguish it from one of its hamlets of the same name. Lakshmiammalpuram is the second hamlet attached to the village. 250 houses with a total population of 2,100 souls, of which nearly half the number consists of Kammavar Naickers and the other half of Maravas, Shepherds and Pallars, constitute the entire village. The hamlet, Lakshmiammalpuram, is solely inhabited by Pallars. A small school of a type common in most villages is situated just outside the village proper.

2. *Cultivated area and crops grown.*—2,250 acres, consisting of 1,500 acres of 'Karisal' lands, 350 acres of 'Veppal' lands, 300 acres of red soil and 100 acres of garden land are under cultivation. The village possesses no wet-lands. In the major portion of the dryland area are grown cotton, cumbu and fodder cholam. Pulses such as red-gram, black-gram, horse-gram, green-gram, Bengal-gram, cowpea and lab-lab (and coriander) are grown to a small extent, mostly as mixture. Cholam, ragi, tobacco, chillies and onions are among the chief garden crops of the village. Last year, according to the inquiry, there were 800 acres under cotton, 600, under cumbu, 550 under fodder cholam, 100 under garden crops and the remaining area under miscellaneous minorcrops such as samai (Panicum miliare), varagu (Paspalum scrobiculatum) and red-gram. Ordinarily, a ryot owning about twenty five acres of black soil, apportions about thirteen acres for cotton, six, for cumbu, and the remaining area for irungu cholam (Andropogon sorghum var. irungu) fodder. A pair of cattle is said to command in this tract, either about twenty-five acres of dryland or twenty acres of dryland and one of garden land.

3. *Rotation followed and the principles involved in it.*—A four course rotation, i. e., cumu, cotton, fodder cholam, cotton, is the one generally followed. The principles involved in the rotation are:—

(1) By changing the crop, year after year, the ryot aims at getting the maximum yield from his lands without detriment to the fertility of the soil,

(2) He grows a cereal, i.e., cumbu for his food, a fodder crop, i.e., cholam for his cattle and an industrial or money crop, i.e., cotton for his other expenses,

(3) He utilises the interval after the harvest of cumbu or for ploughing and manuring the land for the succeeding crop.

This rotation is not strictly adhered to, in some cases, as its observance depends mostly upon the economic status of the ryot. For instance, a ryot owing three or four acres of land, crops cotton year after year on the same land, little caring for the deterioration of the soil fertility of his holding.

4. *Pulse crops, season for their sowing and their yields.* Pure pulses find no place in the rotation. They are, however, grown as mixtures with one crop or another. Black-gram, horse-gram, or Bengal-gram (or coriander) is sown mixed with cotton, and green-gram, cowpea or lab-lab is sown with cumbu. Lab-lab or cowpea is also sown with cholam. These pulses are usually dibbled in furrows, six to eight feet apart, in the midst of the main crops. Red-gram is mixed with varagu (Paspalum scrobiculatum). The ryot cares little for a pulse crop since he prefers to grow a fodder crop for his cattle. Besides, the pulse crops often fail to produce good returns. These two factors account for the fact that the ryot grows pulse crops only as mixtures the yields of which suffice for his household requirements. The economic status of the ryots, the seasonal rains and the nature of the soil are also factors determining the growth of pulses as pure crops. One or two ryots owning large holdings of from fifty to hundred acres occasionally allocate a few for a pure pulse.

If sufficient rains are received in May or June, red-gram is sown pure in red soils as well as in 'Veppal' lands and if the rains are delayed till July or August, it is sown mixed with varagu. The other crops are grown with the north-east monsoon rains; if they are received in September, black-gram is sown as a mixture with cotton; and if the rains are delayed still further, Bengal-gram is preferred.

It is no doubt desirable to include a pure pulse crop in the rotation. If it can be demonstrated that a cotton crop after a pure pulse gives an increase of about 50 per cent. out-turn i. e., if the extra income from cotton grown after a pure pulse more than recompenses or at least recompenses the loss sustained by growing a pure pulse instead of cotton, the ryots will be inclined to introduce a pure pulse crop in their rotation.

All the pulses yield about two kotahs or one hundred and ninty-two M. M. when sown as pure crops and about an eighth of this quantity when sown as mixtures.

5. *Farm Yard manure.*—Farm yard manure is the only manure in general use and its application to crop depends mainly upon its availability and the importance of the crop to which it is intended. Garden crops, for instance, are given preference. The grain crop, i. e., cumbu, stands next in importance; it is manured only when there is any surplus left after manuring the garden crops. Anything between ten to twenty cart loads of farm yard manure per acre is applied to garden lands. Little or no manure is applied to the fodder crop and cotton is usually sheep-penned.

A ryot owning a pair of bullocks, and an extra animal or two, may be buffalo or cow, obtains about twenty carts loads of farm yard manure every year. This quantity is mixed up with tank silt by some ryots at different stages and in some instances may come up to about one hundred cart loads per pair in the case of individual ryots.

It is said that, as matters stand, the Indian ryot gets the benefit of only 50 per cent of the total manure produced and the Appuneri ryot is no exception to this statement. The method of preparing farm yard manure is, in most cases, unsatisfactory. No ryot takes care to preserve the urine of cattle. Cattle dung and sweepings are thrown in heaps or pits exposed to sun and rain. Tank silt when put in is added in alternate layers to the manure so collected under exposure. All waste fodder is utilised for feeding the buffaloes. What little is left over by them is added to the manure. The ryots admit that urine is more valuble than dung and any litter added to absorb the urine increases the manurial value. Owing to the scarcity of fodder the ryot would prefer spreading a layer of fine earth to absorb the urine, instead of litter though no one seems to advocate it. The following are the ryots' objections to adopting the loose-boxys stem :—

(1) Their poor economic condition which makes them live in small dwellings wherein there is no moving space for them,

(2) their reluctance to tie their animals outside their houses for fear of theft,

(3) their apprehended belief that the animals will suffer from the attacks of ticks and mosquitoes when they are made to constantly stand on the manure, and

(4) the scarcity of fodder.

All efforts in making the ryots realise the importance of the proper storing and preservation of farm yard manure according to scientific methods are to be made with great enthusiasm.

No green leaves are added to the manure pit. No cakes are used as manure as there are no wet-lands. As regards prickly-pear compost the ryots seem to have no objection. Cotton stalks are their valuable fuel stuff and decaying them for synthetic manure is out of the question. They make use of their cumbu straw for feeding their animals and for thatching purposes.

6. *Sheep and sheep-penning.*—A few ryots of the village own sheep and goats represented in units of 'Moi.' Each 'Moi' consists of about fifteen sheep with sometimes one or two goats and a ryot owns one or more 'Mois' according to his status. A number of such 'Mois' go to make up what is called a 'Kedai' for purposes of joint ownership and business. The village boasts of two 'Kedais' or flocks of sheep, one consisting of about seven hundred sheep and the other of about five hundred. As noted before, the 'Kedais' are mixed flocks of sheep and goats, the latter constituting a very small proportion. The two flocks are collectively owned by some of the ryots of the village and penning is conducted on a co-operative basis. The owners, individually, maintain a cooly to look after the grazing of their sheep during the daytime. Charges on this account are usually about Rs. 50 per annum and three 'Cunjees' (whatever is prepared in the master's house) per day. For purposes of manuring, a 'Kedai' of seven hundred sheep folded on one acre of land for one night is found sufficient. The charges

for the watchman for the night are Re. 1 besides about 2/3 M. M of grain for every Moi.' For purposes of cash payment, when it is found necessary, 6 M. M. of grain are taken to be equivalent to a rupee. This works out to about Rs. 6 to Rs. 7 per acre. The flocks are folded in each ryot's fields in turn and in proportion to the number of 'Mois' he contributes to the flock.

These two flocks are not able to meet the demands of the village which has about eight hundred acres under cotton. The villages of Maniyachi and Moopanpatti, two neighbouring villages, possess flocks in excess of their requirements and these are engaged to meet the surplus demand at Appuneri. Usually, about seven hundred acres of the area intended for cotton are sheep-penned and other one hundred acres are left out as their owners cannot afford. Besides, about thirty to forty acres of the garden land, especially when a third crop like chitra cholam is intended to be grown, are also sheep-penned in addition to the application of farm yard manure, according to the status of the ryot.

Except for mutton and for penning, the sheep are not reared for other purposes i. e. as for the production of wool. The sheep are washed and sheared a month before the cold season as otherwise, they are said to lose condition in the cold weather. The sheared hair is, however, mixed with the farm yard manure on account of its manurial properties.

The increase in yield of Kapas (Seed cotton) from a sheep penned area over the produce obtained from a land not so treated is estimated to be from $\frac{1}{4}$ to $\frac{1}{2}$ a 'pothie' of cotton per acre (1 'pothie' is 250 lb).

7. *Trend of cultivation and labour.*—The trend of cultivation is becoming more and more intensive on the garden lands as the crops grown therein are more remunerative. The area under garden cultivation is slowly but steadily increasing. The number of wells about sixty-five years ago is said to have been about fifty. Some ten years back, the number seems to have gradually increased to one hundred and now the village boasts of one hundred and twenty wells.

Enough labour is available in the village both from the Naicker and the Pallar castes. The wages for a man are two

M.M. of grain or R. 0-5-4 to R. 0-6-0 per day of about eight hours, those for a woman cooly being one M.M. of grain or R. 0-2-8 to R. 0-3-0 per day of the same number of hours. Cotton picking is usually paid in kind. So far as hired labour is concerned, there is not much to say about the grain or loss in efficiency. Of late, the owner of the land has, himself in many cases,ceased to work in his holding. Formerly, the ryot's sons used to be trained by stages, first being put to graze sheep and cattle, next to drive carts, then trained to plough and so on. The present day tendency is different. The ryot's children have no inclination to attend seriously to their hereditary industry. In this sense, it may be remarked that there is a definite loss in the efficiency of labour.

8. *General.*—In the history of the village, one finds that cotton has gained ground of late and cumbu, once the boasted cereal of the villagers, has gone down in area. This is due to the high prices fetched by the cotton crop.

" During the past quarter of a century or two, owing to the rapid communication and dipersal of world ideas, labour has become restless, demands better comforts, less working hours, higher wages and greater freedom from control." As an accompaniment of the growing craze for ease and town life and its consequent changed outlook towards the agricultural industry, the Appuneri ryot, like his brethern in most villages. has taken to a fairly luxurious method of living and this has entangled him in debts. (Perhaps the report of the Royal Commission which is turning the attention of the country towards agriculture and a love for rural life may bring about a change in them.) Sometimes, he borrows at such a high rate of interest as 24 to 36 per cent per annum and becomes the slave of the village money-lender. The villagers feel the necessity for a co-operative credit socicty.

Time was, before the advent of the power gin when there were six private agencies for hand ginning cotton, each providing work for from fifty to sixty women coolies in the off-season. But, the introduction of the power gin has replaced them completely thus depriving the labourers of their bread in the slack-season.

There are only thirty to forty acres under Uppam cotton the rest being under Karunganni.

[NOTE.—The above inquiry was conducted in the month of movember 1927 with a view to get acquainted with the local agriculture of the tract with special reference to the problem of manuring and the place of pulses in the local ryot's cropping scheme. The original report which was based on a series of answers to set questions was drafted jointlyby Messrs. A. Ramalinga Ayyar, Farm Manager and V. Krishna Rao, Probationer, at the Cotton Breeding Station, Koilpatti and C. Jagannatha Rao. The last alone is however responsible for this string connecting the answers as it appears now though the inquiry was done jointly. Thanks are due to M. R. Ry., V. Ramanatha Ayyar Avl., Assistant Cotton Specialist, Koilpatti, for his thoughtful and well-arranged questionnaire and guidance, to Mr. Saadat-Ullah Khan, Deputy Director of Agriculture for his kind perusal and advice and to Mr. G. R. Hilson Cotton Specialist, Coimbatore, for his suggestion to have this published in this Journal.—C. J.]

Effects of Environments on Characters in Cotton.

By K. L. Ramakrishna Rao, L. Ag.

Introduction.—The great problem before the cotton growing nations of the world is how to meet world's shortage of cotton. The great portion of the cotton is supplied by the United States of America which produces 10 to 16 millions of balés annually. India standing second in rank produces 5 to 6 million bales. This position is of utmost importance to India, as cotton, next to food grains is the important crop with which the welfare of India is most intimately connected. Hence, it is the duty of the plant-breeder to increase the out put of cotton in all desirable ways but increased production has certain limitations. In a country like India where cultivation of crops has been going on from time immemorial the pressure of every increasing population has left very little margin for any new land to be profitably brought under cultivation. The possibilities of cotton extension have, therefore, reached the limit, except in few places where irrigation facilities are being extended. The only other way of having increased production is to follow the intensive method of cultivation viz., better tillage, judicious manuring, production of high yielding types by selection and proper rotation. Even if one may fulfil the above conditions yet the chances of his getting an ideal crop are dependent upon environment which is nothing but the actions of natural forces and agencies. If these are favourable a rich harvest is recorded while adverse actions of any one of them or some of them may nullify one's efforts.

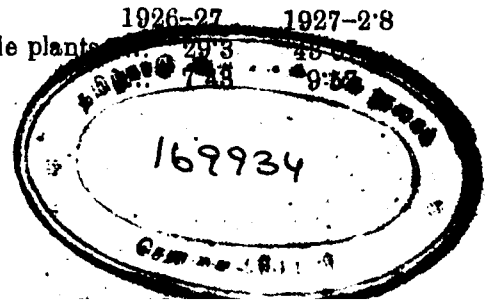
Such adverse conditions are very common in black soil areas of the Ceded Districts where the crop is mainly rainfed. The yield thus depends upon the season. Cotton does best in most parts of the black cotton soil tracts if the rainfall even though below the average is well distributed. Under these conditions the growth in early stages is very rapid, the size of a mature plant is well above the normal and bolls mature early. Further there is little disease and boll shedding is insignificant. Heavy rainfall on the other hand is very harmful to the crop, growth is slow, the plants are stunted. the yield is low and the bolls burst late. In suce seasons various pests take a heavy toll. Thus the grower in the black soil area is at the mercy of the rainfall and yield is a matter of chance. Instances are innumerable where in spite of average or even more than average rainfall the yields have been far below normal.

The reasons for such low yields are obvious. Environments are mainly responsible. These factors not only cause low yields in cotton but also affect their economic characters and cause variations even in genetically pure material. It thus becomes preeminently incumbent on the plantbreeder to eliminate if possible or correctly to assess the influences that are brought about by physiological and enviromental disturbances before he is in a position to analyse the fluctuations engendered by the differences in genetic constitution. But the interaction of various environmental factors is so intimate that it is difficult to ascribe the fluctuations to any one cause. Of course it is a well known fact that all characters of a plant whether structural or functional are necessarily variable, but these variations are very much accelerated by the change in environments.

The environment as already said is mainly the action of natural forces and agencies, each affecting the physiology of the cotton plant either individually or collectively. Most important of these are (1) Rainfall, (2) Temperature (3) Humidity and wind velocity, (4) Soil variations and (4) Insect and fungoid diseases. It is beyond the scope of this short paper to explain the actions of each of these natural forces or to state how they affect individual characters in cotton, but an attempt is made here to illustrate their collective effect on important characters in cotton.

Yield is the most important of all characters and the type of cotton best suited for a tract is greatly determined by the yield. The part which directly yields cotton is the boll and cotton plants vary very widely as regards the number of bolls and these variations though intrinsic are greatly controlled by external influences. Individuals enjoying a slight advantage of plant food, moisture or space by virtue of their position bear a greater number of bolls than their neighbours less favourably located and this is one of the reasons why strains sometimes cause disappointment in yield when grown on plot scale. These can be avoided by maintaining bolling records in both single plants and also in the bulk. The following results that were noted for the pure strain H. 62 are interesting.

	1926–27	1927–28
Average No. of bolls in single plants	29·3	48
Average No. of bolls in bulk	7·18	9·56



The above differences in yields are mainly due to changes in environment between the two sets of plants. Similarly soil variations affect the yield and this is the main reason why varying yields are recorded in different fields of the same locality. For instance, the maximum yield of H. 62 at the Hagari Experimental Station was 520 lb. minimum yield was only 160 lbs.

Lint and seed weights are the next important characters affected by the environment. The variations are wide in both the cases though fluctuations in lint weight seem to be proportionately less than that in seed weight. With a view to study such wide variations in these characters the period of picking in M. 274 was divided into 5 parts and the pickings of each part were tested separately. 100 samples each containing 100 seeds of each part of the season were tested for lint and seed weights and the results are shown in the Table at the end. It is seen from the table that taking the results of each period separately we get smooth curves in each case but when the results of the whole season are taken together the curves become irregular. This clearly shows that development of seed and lint varies with the period of the season and irregular curves of lint and seed weights are thus mainly due to their irregular development. The reason for such irregularities is the immature bursting of bolls during the later part of the season due to early advent of summer and consequently high temperature; whereas early in the season the temperature is optimum for boll development and they take their own time for maturation. Actually the bolls take a greater number of days for maturation during the early part of the season and a less number of days in the later part of the season. The maturation periods for these were worked out separately in all the pure strains and there was a distinct difference of 4 days between the two periods. Even wide spacing of plants causes variations in these characters, for instance the averages of lint and seed weights of M. 274 in the bulk plot are 26 m. g. and 60 m. g. while those of single plant selections are 28 m. g. and 66 m.g. respectively. These clearly show the influences of environment on these characters.

The lint length however seems to be less affected than any of the above characters but it varies with the season and variation in soils. A good shower in the critical period i. e., within 4 weeks after the opening of the flower has disastrous effect and the season

1925–26 was a typical example of such bad effects. There was incessant rain during the blossom period and consequently the length of staple was reduced by 5 m.m. Untimely rains and their after-effects are responsible for such low lint lengths. Besides these the lint length is also effected by variation in soil, and soil ingredients have much to do with this character. To find out the validity of this statement samples of kapas of M. 274 were obtained from different centres. 200 seeds were sampled out from the kapas of each centre, the seeds were combed and measurements were made The table below clearly shows the perceptible differences in averages between various centres thereby showing the influence of soil ingredients on the length of staple.

Localities.		Length of staples.
Hagari Experimental Station	...	24·51 m. m.
Godehal	...	23·84 m. m.
Hospet	...	23·54 m. m.
Adoni	...	24·84 m. m.
Tadpatri	...	24·69 m. m.

The above are the important characters that are influenced by environments but the loss sustained by the cotton grower by way of bud and boll sheddings is so great that the effective control of the same will undoubtedly double his present yields. To find out this percentage of sheddings in buds and bolls in the black soil tracts of Ceded Districts, regular plant descriptions were taken in H. 62 during 1926–27 and information on the following points was recorded daily:—(1) Bud production. (2) Flowering, and the interval between the appearance of a bud and opening of flower (3) Bursting of bolls including the time interval between opening of flowers and bursting of bolls (4) shedding of buds and bolls with periods of greatest liability to and cause of shedding. Final tabulations of figures showed that for 313·4 buds produced 94·2 flowers opened and 34·4 bolls were picked i. e., the effective bolling was only 11 per cent. and 89 per cent. of the buds produced either shed as buds or as bolls. The figures further reveal that sheddings were greater as buds than as bolls and there was

70 per cent. shedding in the former and only 19 per cent. in the latter. The reasons for such high pIrcentage were mainly physiological as the damage due to boll-worms was too insignificant and the loss was even less than 1 per cent. These facts go to show the importance that one has to pay for knowing the causes of shedding and reduction of such high shedding even by a small percentage will materially help the ryots.

The above few examples have proved beyond doubt the influences of environment on characters in cotton and every breeder in cotton has to take special care of the influences of these environments before he attempts to isolate or introduce now strains. He has to study the physiological changes that take place in a cotton crop when a change occurs in environments and and it so happens that in certain peculiar seasons their influences are so great that it is very difficult to interpret the results correctly. One cannot even say that the influences were due to natural agencies. To avoid such an error one should be in a position correctly to assess the influences of these environments so that these may not vitiate the inherent qualities of new strains. These are possible only when the breeder is well equipped with necessary accessaries for such study. Hence it is suggested that all cotton breeding stations may be provided with necessary instruments for studying the effects of environments on cotton crops, so that the breeder may be in a position to interpret his results correctly.

TABLE I.

Mungari Periodical Pickings.

Table showing the variations in lint and seed weights between first and later pickings. M. 274.

Lint Weights.

Frequency arrays.

M. G.	First picking.	Second picking.	Third picking.	Fourth picking.	Fifth picking.	Total.
17	...	...	...	...	4	4
18	...	...	...	...	24	24
19	...	...	...	...	41	41
20	...	...	...	...	28	28
21	...	...	...	...	3	3
22	...	...	...	...	...	...
23	...	...	...	...	...	...
24	...	...	...	18	...	18
25	...	...	18	63	...	81
26	...	2	57	19	...	78
27	3	21	23	...	...	47
28	46	32	2	...	...	80
29	45	40	...	...	...	85
30	6	5	...	...	...	11
Total ...	100	100	100	100	100	500
Average ...	28·54	28·25	26·0	25·0	19·0	25
Standard deviation ...	0·65	0·91	0·7	0·97	0·27	3·49
Probable ...	1·55	2·7	1·82	2·6	0·96	9·42
Co-efficient of variability.	2.29	3·22	2·69	3·8	1·42	13·96

(Continued from page 505)

SEED WEIGHTS.

Frequency arrays.

M. G.	First picking.	Second picking.	Third picking.	Fourth picking.	Fifth picking.	Total.
45	...	...	...	...	12	12
46	...	...	...	...	20	20
47	...	...	...	...	21	21
48	...	...	...	...	30	30
49	...	...	...	...	8	8
50	...	...	...	...	7	7
51	...	...	...	...	2	2
52	...	...	...	...	...	...
53	...	...	...	...	...	...
54	...	...	...	...	...	...
55	...	...	...	...	...	...
56	...	...	...	8	...	8
57	...	1	2	24	...	27
58	...	...	28	42	...	70
59	...	2	36	20	...	58
60	12	15	23	6	...	56
61	16	31	9	0	...	56
62	35	33	2	...	...	70
63	29	15	...	...	...	44
64	7	3	...	...	...	10
65	1	...	...	...	...	1
Total ...	100	100	100	100	100	500
Average ...	62·0	61·5	59·0	58·0	47·0	58
Standard deviation ...	1·1	1·6	1·06	1·0	1·5	5·5
Probable ...	1·2	1·2	1·21	1·16	2·15	6·4
Co-efficient of variability.	1·8	1·89	1·8	1·7	3·19	9·46

Bio-chemical factors involved in the resistance of the cotton plant to the attack of the stem-weevil §

BY M. SURYANARAYANA, B. Sc.

Assistant to the Government Agricultural Chemist.

It is proposed to give here a short account of the investigations conducted in the chemical laboratories at Coimbatore on bio-chemical factors involved in the degree of resistance offered by the cotton plant to the attack of stem-weevil which is one of the most important pests on that crop.

Before entering on the bio-chemical side of the question, it may not be out of place to describe how the damage is actually caused. The stem weervil thrusts its small eggs just underneath the thin bark of the cotton plant; the egg hatches into a grub which burrows and eats up the material between the bark and the main stem leaving irregular tunnels of all shapes. It causes a heavy drain on the plant-sap going up the stem. When young plants are attacked they are in most cases killed. Where the plant is vigorous enough to maintain itself in spite of the drain caused by the grub, it develops characteristic nodular swellings. A strong wind might break the stem near the swelling and some more plants die as a consequence. The extent of damage therefore depends on the largeness of the gaps left over, when young plants succumb to the stem-weevil attack and when bigger plants die after the winds break off the stem.

Among the methods of controlling the pest, insecticides are of no use as the grub is an internal feeder. Burning of attacked plant is to be taken up by cotton growers if the damage is to be reduced.

Yet another method available for the control of the pest is artificially to set up in the plant certain conditions unfavourable to the normal vigorous growth of the insect; or conditions which enable the plant to survive the attack at the earlier stages. This involves firstly a thorough study of the bio-chemical relationships between the constituents of the various parts of the attacked and healthy plants; secondly the relationship between the constitution of the plant and the plant sap on the one side and the soil-solution on the other and thirdly, the influence of cultural and manurial treatment on the base exchanges and consequently on the composition of the soil solution and of the plant.

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

These have been under investigation for four years now. But in this paper attention will be directed to the more important aspects of the inter-relationship that appears to exist between the soil and the plant with reference to stem weevil damage.

(a) In 1923, the Government Entomologist observed in Virudupatti that in Mr. Osborne's, field 50 per cent of the cotton plants were killed by stem weevil, while in a neighbouring ryot's field there were practically no deaths.

The absolute quantities of the chemical ingredients as revealed by the usual soil and plant analysis did not indicate any notable differences but on studying the intake of Potash relatively to that of Phosphoric acid, the following results were obtained.

The ratio Available Potash Available Phosphonic acid = 1·46 in Osb's field whileit is about 1 in ryot's field.

The ratio (k) intake/(p) intake of plants in Osb's field = 4·96 ; Ryot's field = 9.64.

Thus the state of health of the plant may be traced to the intake of Potash relative to that of Phosphoric acid. The ratio of Potash to Phosphoric acid thus seems to have something to do with a plant's ability to survive an attack by the stem weevil.

(b) The next step in the investigation was the examination of plants, healthy and killed and those attacked by stem weevil but not killed, obtained from Feld No. 18 of the Central Farm, growing Karunganni cotton.

The ratio of Potash to Phosphoric acid in plants attacked but living = 5·56.

The ratio of Potash to Phosphoric acid in plants healthy = 4·95

The ratio of Potash to Phosphoric acid in plants killed by stem weevil = 4·50.

Statistical examination of the results point to the conclusion that in the attacked plants Potash to Phosphoric acid is significantly higher than in the killed plants. The surviving plant appears to absorb more potash or in general more bases to counteract the damage caused by the grub.

(c) A large set of healthy and stem-weevil attacked plants C 440 were collected from field No. 4 of the Cotton Station. Those with distinct swellings and showing galleries made by the insect were cut up into their constituent parts and analysed. The healthy plants which were free from any such galleries were similarly examined.

Examining the ratio Potash to Phosphoric acid and Potash plus Lime plus Magnesia to Phosphoric acid :—

	$K_2^0/P_2^0{}_5$	$K_2^0+Cao+Mgo/P_2^0{}_5$
Healthy minus Attacked in Leaf	= 0·30	1·69.
in Stem	= 0·62	— 3·14.

Assuming that normal absorption and assimilation obtains in the healthy plant, it will be noticed that in the attacked plants, there is a defect of the basic constituents in the leaves, and an excess of the same in the stem. In the case of phosphoric acid, the reverse is the case. Thus it would appear that there is a tendency to the movement of the basic constituents from the leaf to the stem which is the seat of injury.

(d) Agreeably to this view the hydrogen-ion-concentration in the extracts of the leaves and the stems gives the following results.

	Healthy.	Attacked.
	av-pH	av-pH
Stem	... 6·11	6·18
Leaves	... 5·37	5·41

There seems to be a tendency on the part of the attacked plant to get less acid.

(e) If there should be any difference in the absorption and assimilation of mineral matter by the cotton plant as a result of stem weevil attack and if the bulb or the nodular swelling is the damaged portion requiring urgent repair there should occur the most prominent differences in the mineral constituents of the stem and its bulb.

(Per cent in stem.—Percent in bulb.)

Potash	...	0·064	not significant.
Phosphoric acid	...	−0·080	do.
Lime	...	0·98	Significant.
Potash/Phosphoric acid in stem minus Potash/Phosphoric acid in bulb.	...	0·52	do.
Magnesia.	...	−0·10	not significant.

Whether attack of the stem weevil is the result of a certain pre disposition of the plant either as a result of the increased acidity of the sap is too premature to say. It would appear that the stem weevil has no particular choice among cotton plants and that the unattacked ones are those that have escaped by accident. The eggs having been laid, the grub goes on feeding the plant and unless the plant is vigorous enough to repair the losses and damage done and still maintain the supply of sap to the leaves, it succumbs

(f) Manuring and incidence of weevil C. 440 was grown in the old and New Permanent Manurial plots involving differential manurial treatments with N, K, P singly and in combination with No manure and Cattle Manure plots. Whereas in the old set of plots there is emphasised manurial action as a result of 15 years of continuous treatment, the new set received such treatment only for 3 years. Counts of attacked and dead plants were made by the Government Entomologist.

In the old permanent manurial plots, the percentage of attacks is highest in the plot continously receiving cattle manure while the deaths therein are the lowest. The next lowest deaths occurred in plots receiving potash. Wherever Potash occurred in combination with Nitrogen or phosphoric acid, the deaths are correspondingly lower than with nitrogen and phosphoric acid either individually or in combination.

In the new manurial plots where the conditions may be said to be similar to the ordinary irrigated cotton crop, potash stands only next to cattle manure in low deaths on account of stem weevil.

The analysis of the kappas from these different manurial plots shows that application of potash resulted in a relatively greater intake by the plant, not only of potash but also of lime thus enabling the plant to set up a reaction by increasing its basic constituents namely, Potash, Lime, and Magnesia.

(g) Yet another experiment conducted in big pots placed in Field No. 75 shows that C. 440 when manured with potash gives the minimum deaths due to stem-weevil. Next come no manure and cattle-manure. Where the phosphoric acid content of the soil is high, the deaths are great and the bolling capacity is low.

	No.	C. M.	K. P.	K. P.
Weight of plant ...	3.77	4·01	5·66	5·68
Weight of kappas ...	15·84	18·04	19·22	11·66

I beg to tender my thanks to the Government Agricultural Chemist for affording the facilities for conducting thispiece of work and for his constant guidance.

AVERAGE ANALYSES OF SAMPLES.

	No. of Samples.	Nitrogen.	Ash.	Insolubles.	Potash.	Phosphoric acid.	Lime.	Magnesia.
1. Leaves of healthy plant ...	13	4·33	16·47	1·06	2·12	0·83	5·63	1·63
2. „ stemweevilled.	13	4·22	16·15	1·00	2·02	0·87	5·91	1·13
3. Stems of (1) ...	13	1·08	8·89	0·34	1·46	0·45	1·08	1·01
4. Stem of (2) ...	13	1·10	7·64	0·30	1·52	1·52	0·39	1·59
5. Swellings ...	12	1·21	4·87	0·38	1·46	0·42	0·61	0·65

EXTRACTS.

Paddy Breeding Station, Pattambi.

The Paddy Breeding Station at Pattambi, South Malabar, is the fourth station of its kind to be established in the Madras Presidency. The first station was opened in 1915 at Coimbatore. The second followed in 1922 at Aduturai, in the Tanjore District, to serve the large Cauvery delta system. This station took over the work started on the Manganallur Agricultural Station, and the seed from improved strains evolved at Aduturai is now in great demand in the Tanjore and Trichinopoly districts. The third station was located at Maruteru in 1925 for work in the Godavari and Krishna Deltas, and the station at Pattambi is intended to serve Malabar and South Kanara.

The sites of these stations were chosen to be typical of the chief paddy growing areas of the Presidency, and statistics show that the area which the Pattambi station may be expected to serve is given roughly in acres as follows:—

District.	Wet land.			Dry land.
	1st crop.	2nd crop.	3rd crop.	
Malabar ...	500,000	218,000	5000	15000
South Kanara ...	460,000	136,000		*

There is a limited amount of movement of produce from one place to another, but more paddy is imported into Malabar and South Kanara than is exported though South Kanara by itself raises more paddy than is required for local consumption.

There is ample room for improvement in the paddy crop of the West Coast and a future lies before the Pattambi Paddy Breeding Station if it is supported in its efforts by the co-operation of cultivators and land-owners.

The station comprises 82 acres of land in the Walluvanad Taluk of South Malabar, about one mile east of the railway station of Pattambi, Some 51 acres are cultivated with wet paddy and 11 acres with dry paddy. The remainder is garden land and high ground. The total cropping capacity is 110 acres when account is taken of the land which grows two and three crops a year.

* The area under dry paddy in South Kanara is included in the figures for rst crop wet land crop.

The single crop lands, or pallayal, are terraced in the manner typical of the district. Water is obtained from a central channel which has been strongly revetted with laterite blocks to withstand flood water. There is an abundant supply of single picottah wells, but most of these give out during the dry weather. The area that can be irrigated in a day from a single picottah is about one-fourth of an acre. It is therefore not an economic proposition to employ this type of irrigation on a large scale, and the advice of the Research Engineer of the Madras Agricultural Department has been obtained as to the best means of utilising mechanical aid to water lifting.

The main object of the station is to raise bulks of improved seed of varieties peculiar to Malabar and South Kanara. The principal method of improvement to be adopted is that practised in all paddy growing countries, namely, by Pure Line Selection. In brief, this consists in an initial selection of heavy yielding single plants, from which strains are raised and rigorously compared the one with the other, the best one being eventually multiplied as a Pure Line Bulk. This method of selection, which takes a minimum of five years to complete, is rendered possible by the fact that the average sample of seed from a ryot's field contains plants of various types, many of which are of low yielding value and the presence of which depresses the yield of the whole. The mere elimination of these plants would effect an improvement, but Pure Line Selection goes farther than this in that it selects the best of the heavy yielding types only and propagates this as a Pure Strain. The obvious advantages are even and good germination, uniformity of stand, uniformity of flowering, uniform size of grain, and much less variation in yield from year to year.

Among the varieties at present represented on the station are:-

Malabar.

1st crop ... Ayyan, Ponnaryan, Thavalakkannan Paramba vattan, Velutharikazhama, Thekkan Cheera.

2nd crop ... Eravapany, Vellari, Chitteni, Mundakakutti, Thekkan, Kuttadan.

South Kanara.

1st crop ... Kazhama, Mascathi.

2ne crop ... Athikarya, Punjakhazama.

Modan Crop. Kattamodan, Budama, Modan.

Deep water varieties.—Baital fakir, Panianala, Harisankar.

Other crops which enter into the rotation, or are grown on other land, are coconuts, pepper, gingelly, samai, horsegram, ginger, and fodder cholam. The heavy crop of grass which covers the fields towards the close of the north-east rains is convered into silage and fed to the working animals, of which 11 pairs are maintained.

Records of weather are maintained by means of rain-gauge maximum, minimum, wet and dry bulb thermometers. When the rush of initial work permits, investigations on problems of cultivation, irrigation, rotation, manuring etc., will be undertaken. A feature of the station is an orchard of indigenous fruits, which has just been started on some high ground, unfit for paddy. At the moment this contains young plants of mango, guava, leitchi, citron, lime, orange, custard apple, etc. No special treatment is being given to the plants and the cultivation, if successful, will be within the means of the ryot and will offer a profitable way of utilizing low hill slopes now under scrub jungle.

Malabar Soil Survey.

Bulletins Nos. 68, 70, 75, 83 and 84 of the Agricultural Department describe the soil surveys carried out in the deltaic areas of the districts of Tanjore, Guntur, Kistna, and Godavari and in the Periyar tract of the Madura District. The survey has now been extended to the district of Malabar and the results obtained are recorded in Bulletin No. 91, "A Soil Survey of the Malabar District," price Rs. 1-6-0 which has just been issued.

The object of these surveys is to obtain some knowledge of the relative manurial requirements of these districts. They do not pretend to determine the relative fertility of the soils as the fertility of a soil is not determined by its manurial requirements alone but depends also on many other factors.

Previous surveys have been confined to deltaic tracts, but the present survey extends to the whole of the district where the nature of the soil is quite different from that of the deltas. The area surveyed consists mainly of low laterite plains and the soils belong to the red ferruginous series.

The following main conclusions may be drawn from the result of this survey:—

(1) The soils of Malabar generally contain adequate supplies of nitrogen.

(2) These soils are very deficient in lime and magnesia.

(3) The supply of total phosphoric acid is fairly adequate, but the supply of available phosphoric acid is very low.

(4) The supply of total potash is relatively low, but the available potash is not deficient.

(5) The existing practice of applying green leaf, and when it is available, the use of cattle manure requires to be supplemented with other concentrated manures. The soils are deficient in lime and contain large amounts of iron and alumina. It is desirable to apply phosphatic manures like bone-meal and superphosphate after assuring adequate supplies of lime, as otherwise insoluble compounds of phosphorus with iron and alumina may be formed. Applications of lime may in some cases tend to decrease the amount of available potash, but this defect can be easily remedied by light doses of potassic manures.

(Madras official Digest October).

NOTES

The Imperial Sugarcane Breeding Station:—Coimbatore. A demonstration week was arranged by the Sugarcane Expert from the 14th to 22nd December in connexion with the visit of some distinguished scientific workers from the north and also a few officers of the Department of Agriculture Madras who were specially deputed to be present. This canebreeding station has now attained international importance in view of the fact that the varieties evolved here are giving excellent results in many of the foreign countries like Cuba, Florida, Mauritius etc. Opinions of well-known workers in these countries are remarkably favourable and testify in very flattering terms, to the exceptional qualities of some of the Coimbatore varieties sent from this station.

Very interesting and instructive demonstrations of the results achieved and the actual methobs of work have been arranged both in the old breeding station and at the new thick-cane breeding station at Chitrachavadi, a few miles off to the west. The origin of the cane, the sustaining qualities of sugar as a food, the

consumption of sugar in India, the imports from Java and also the world-production of sugar and the area under cane are all exhibited with the aid of charts and beautiful pictures. Another set of diagrams and pictures explain the great improvement achieved by breeding work in this station in point of increased yield and quality over the indigenous canes in North India. This coupled with the opinions of the great foreign workers (which are also exhibited) form the most important portion of the exhibits in the laboratory.

Out in the field, the germination of cane seeds in pots, the transplanting of these seedlings, the study of the root systems of different varieties and the methods of crossing flowers of two varieties for hybridisation as well as the actual specimens of canes evolved in this way, clearly showing the improvement effected, are all nicely exhibited. One can have a clear idea of the remarkable progress achieved in this station by simply looking at the vertical arrangement of actual specimens of canes on a framework showing the first type of canes taken up for work (beginning with the wild variety) and the gradual improvement effected both on the father's and the mother's lines up to the varieties that have been distributed now. It has been a question of evolving a cane of medium thickness possessing the hardy nature and vigour of the wildcane. by crossing this with some of the thick tropical varieties. How far this has been a success can be judged from the fact that this station on which is spent only half a lach a year, has been responsible for an increased profit of 73 lakhs in North India, some of the Co-varieties of this station having trebled the yield besides giving satisfaction in the matter of withstanding drought and early maturity.

It will be seen that this station has been working for improving the North Indian canes mainly. But it is observed that the varieties evolved for North India are holding their own in many other foreigntracts and therefore it is anticipated that these varieties will make themselves felt on account of their peculiar good qualities and thereby create a demand even in South India and many of the foreign countries also. But this may take some time. The necessity of a thick-cane breeding station for supplying the tropical tracts with good varieties of thick canes, heady, vigorous, and resistant to certain diseases, has been felt and a station was opened in 1928. It is hoped that this station will ere

long supply the needs of tropical cane tracts in India and elsewhere where both tonnage and quality are required. In this station work has been started on certain varieties obtained from crossing the local vellai variety with some suitable Java and Mauritius types.

The visitors were taken round by the Sugarcane Expert who explained in his characteristically interesting way, the nature of the various varieties and the methods employed in the selection and hybridisation work. The visitors included Mr. Francis, Manager in charge of Parry's cane farm at Nellikuppam, Mr. K. Roy from Calcutta. Mr. Govinda Kidavu, Mr. S. S. Patrudu and Rao Bahadur D. Ananda Rao.

Village Libraries. The educative value of libraries is not a matter of controversy. Illiteracy, paucity of funds, absence of a feeling of reverance for the past and admiration of the beautiful, the noble, the chivalrous and the magnificent account for the presence of few libraries in the Tamil country. The yearning for a separate province and the noble urge engendered thereby brought into existence a mass of literature amongst the Andhras which was quickened by the prevision of Andhra scholars of the type of the late Mr. K. Viresalingam Pantulu and the ardent admirers and followers of his in the Telugu country. The number of libraries in Andhradesa has tremendously increased so is the movement of spreading education amongst villagers running in diverse channels in most provinses in India. So far as we are aware, the library movement in the Tamil country has been confined to a few chosen centres and has not spread far. It is not, we are sure, owing to want of love on the part of the Tamilians for their mother tongue or for want of resources however much scanty they may be at present but owing to want of evangelists in this line of national activity. The birth of a few democratic movements during the past decade or two has certainly tended to infuse a spirit of reverence for the ancient Tamil language and the output of new literature but the change produced has not assumed very appreciable dimensions so as to make it an enduring institution in the Tamil country. For, the meek, hardworking, intelligent, self-reliant, simple and adventurous Tamilian who makes himself at home, leads a peaceful life and makes a good citizen whether in far off Saigon, Fiji, Cape Colony, British Guiana or

Tanganiyaka, this is not a superhuman task but should become a rejuvenated habit which will knit him and his kinsmen in whatever part of the world he may be found. Is it too much for the merchant princes of Chettinadu who spend lakhs on renovating old Siva temples in the Madras presidency to divert a portion of their charities in this line? The peasant is better fitted to profit by this movement as he commands more leisure than his brother in the town and can improve himself to a larger extent too.

Total daily Sunlight Intensity and Ecology of Plant Diseases.—Need for a portable, inexpensive and reasonable reliable method for measuring the cumulative effect of sunlight in the study of plantdiseases led to the adoption of Dr. R. F. Bacon's chemical photometer method, using uradyl acetate and oxalic acid.

By this method the percentage of total sunlight available to plants under various conditions appeared to be, on the average, about as follows: Open frame 87 per cent, frame with thin single glass 70 per cent, with double glass 60 per cent, thin muslin 47 per cent, medium weight muslin 40 per cent, heavy muslin 8 per cent, shady portion of green house 15 to 20 per cent, central green house 30 to 35 per cent, and sunny portion 35 to 45 per cent. The very small effect under both the Uviarc quartz lamp and the 500 watt Mazda showed how inadequate they are for plant illumination, as compared with sunlight, as well as possibly suggesting that the photo-chemical effect may be produced by a fairly wide range of the spectrum, rather than being confined to the violet and ultra-violet portion.

As a method for use in the field and green-house this chemical photometer has seemed quite satisfactory.

(F. S. Beecher—Phytopathology—November 1928) Y. R. R.

Invisible rays.—Ultra-violet rays, used to prevent the bone disease, rickets in young children aud animals by raising the calcium and phosphorus content of the blood, have parallel effect on plants. This is indicated by the results of experiments by Herbert C. Beeskow, a graduate student at the University of Chicago.

Mr. Beeskow grew groups of soy bean plants in solutions of known mineral composition. He subjected different groups of ultra-violet radiation for varying periods of time, keeeping other groups away from the rays as "controls." Then he dried the plants and analyzed them for calcium and phosphorus. In each case it was found that the irradiated plants had noticeable higher contents of these important minerals than the corresponding unrayed controls.

The effects of irradiation with ultra-violet light were not all beneficial to the plants. Soy beans grown in the greenhouse and subjected to direct ultra-violet raying for as short a period as one minute every other day showed a distinct reddening in the parts of the stem and leaves struck by the rays. In cases where the under side of the leaves was exposed to the rays the reddening action was much in evidence.

Plants grown in darkness and subjected to the rays showed this red color much more distinctly than plants grown in daylight and permitted to become normally green. Heavy overdoses of the rays simply killed the plants.

(The Philippine Agriculturist November 1928). Y. R. R.

Bacteria in the shirt. Prof. G. P. Winager of the Nebraska University has been able and industrious to count the number of bacteria per sq. inch in an underware, after a day's ware, after about six days' ware and after it is laundered and dried. Ordinarily there are about 400,000 bacteria after a day's ware and ten million after six day's ware. But when laundered and dried particularly in the sun the number is reduced to less than a thousand. This of course, shows the good effects of washing and drying in the sun. The chief bacteria found are those that cause skin diseases like eruptions and pimples and also those that form pus. The wearing of a garment for a long time especially by women seems to be the cause of certain skin troubles in those regions in which the garment comes in contact with the skin often.

(From Scientific American, October).

[One would be curious to know if silk dhoties and garments in our homes, which are used time and anon, without any kind of washing but still considered safe for wear, ever harbour such bacteria. It would look as if cotton clothing daily washed and sunned—which practice is fast dying out in this province—would secure better health conditions of life in this poor country than unwashed heavy garments with folds and counterfolds worn right up to the chin.—Editor.]

Agriculture in Madras in 1927—28.—The work of the agricultural department has shown steady and solid progress during the year. The reports of the several stations which form a separate volume furnish ample material for thought and guidance to a patient reader. We are of opinion that if this volume was released for sale and was not confined to official use only as is now, the public would realise the immensity of the task which responsible members of the department have borne with cheerfuless, courage and perspicacity of mind. True it is that important useful information is culled from these reports and forms the subject matter of the annual report of the Director and is also published broadcast through monthly digests, leaflets and bulletins but a perusal of such publications by readers now and then would not in our opinion create so favourable an impression about the work of this growing department as that of the scientific reports of several stations of this presidency, which record details with accuracy and a statement of collateral circumstances leading to particular results. There is enough matter in these reports to enthusevivacity, clearness, realism, alacrity and optimism readers.

The late Mr. N. R. Malayandi Chettiar.—One of our patrons, a native of Udamalpet, Coimbatore district, a shrewed businesslike agriculturist and a public spirited man passed away on the 28th of this month in the person of Mr. Malayandi Chettiar. The deceased gentleman was well known for his charitable disposition and silent work in the local and district boards and in several other institutions which have largely benefited the public. He was throughout his life religiously minded and was a friend of the deserving poor. We offer our condolences to his son and to his equally noble brother Mr. Chikkan Chettiyar to whom as well as to the well wishers of his family the loss of such a member is irreparable.

STUDENTS' ACTIVITIES (In November).

A lively debate took place in the Freeman Hall on " East is East and West is West.

And never the twain shall meet" the oft quoted couplet of Kipling. The mover Mr. Damodara Mudaliyar contended that the East as typically represented by India is essentially spiritual while the West is materialistic in outlook, that the East is large by characterised by Hinduism and symbolised in a high plane of ethics and morals while the West is characterised by Christianity and of a carnal and terrestrial mentality and hence if there were to be any union between these two mutually contradictory cultures and civilisations either the West should be converted to the Eastern outlook or the reverse. He was followed by a few speakers in vehement opposition, the main theme of their arguments being the adaptability of human nature to environments, the lessons the East has to learn from the West in publicity, sanitation, philanthroppoy, other social activities and the spirit of imbibing in the Eastern culture whatever that is good and admirable in the West—one of them humorously referred to the fact that the East and West really meet due so the spheroidal shape of the earth and what is West in India is East of Europe.

The President in his closing remarks observed that the West is not as materialistic and the East as spiritualistic as is imagined to be, that it is a pity our spiritualism is not shown in our public service and charities and causes which undergo abject suffering, that human nature is after all the same all over the world though appearing in different externals, like constumes, manners and religions and that the couplet is after all an amputation of the whole from its trend being that great men from the West and East are of the same caste and temper. He sounded a piece of advice to students to translate more of their ideas and ideals into action, to be better actors than prattlers and to be more charitable in their criticisms.

All the games are astir due to the approaching inter-class and Parnell-cup matches and the several classes are sparing no efforts in putting up a strong tug.

THE UNION.

Income and Expenditure during the quarter ending 30-11-1928.

Receipts.				Charges.			
Building Fund	...	10 10 0		Journal	...	168 1 0	
Journal	...	220 4 0		College Day	...	42 6 0	
College Day	...	38 6 0		Furniture	...	2 8 0	
Miscellaneous	...	0 14 0					
Total Rs.	...	270 2 0		Total Rs.	...	212 15 0	

APPENDIX. LIST OF MEMBERS UNDER OLD RULES.

Abdulla, P.
Achyutham Pantulu, V.
Alaghiriswami Reddi.
Ananda Rao, D. Rao Bahadur.
Anantarama Sastri, S.
Ankaraju Pantulu, P.
Annapurneswara Rao, Ch.
Annaswami, A. K.
Antony, J. C. S.
Appadurai Pillai, C.
Appa Rao, D.
Arunachalam, M.
Atmaramayya, S.
Audinarayana Chetti, B.
Audinarayana Rao, K.

Babu Rao, S.
Balakrishnamurthi, D.
Bania, V. M.
Belliappa, M.
Baghiratha Padi, M.
Bhakta Samuel, C.
Bhaskara Ayyar, C.

Chandrasekara Mudaliyar, A. R.
Chelvaranga Raju, J. Rao Bahr.
Cheriyan Jacob, K.
Chockalingam Pillai, R.

Deviah, K. C.
Dhanakoti Raju, V. G.
Doraiswami Ayyangar, C. S.
Dwarakanath Sastri B.

Eapen G. M.
Ellappa Chetti, C.

Ganapathi Pillai, V. S.
Ganapathisundaram Pillai, T. S.
Gopala Chetti, M.
Gopalakrishnayya, A.
Gopala Rao, M.
Gopalaswami Mudaliyar, S.
Gopalaswami Rao, C. S.
Gopalayya, S.
Govindakidavu, M.
Govindan Nambiyar, K.
Gowrisankara Ayyar, M. P.

Iswaran Pillai, I. C.

Jagadisa Ayyar, E. V.
Javarayya, H. C.
Jivanna Rao, P. S.
John, W. J.

Kanaka Raju, P.
Kesava Pillai, N.
Kochugovinda Marar.
Krishnan Nayar, C.
Krishnan, P. G.
Krishna Rao, K.
Krishnaswami Ayyar, A.
Krishnaswami Ayyar, K. V.
Krishna Reddi, M. K.
Kunhisankaran Nayar.
Kunhunni Nambiyar, V. K.
Kuppuswami Ayyangar, S.

Lakshmana Rao, T.
Lakshmana Rao, T. S.

Madhava Rao, B.
Mal Rajagopal.
Mangesa Rao, M.
Manikka Mudaliyar, V.
Muthuswami Ayyar, S.
Muthuswami Ayyar, T. G.

Nagaswami Reddi, T.
Narayana Ayyar, K.
Narayana Ayyangar, K.
Narayanamurthi, G.
Narayanamurthi, J.
Narayanamurthi, N. S.
Narayana Rao, B. V.
Nellakumara Pillai, P.
Nithyakalyana Reddi A. S.

Pallama Raju, M.
Paramandam, T.
Parameswara Ayyar, M.
Parameswara Nambudripad.
Parthasarathy B. K.
Ponnappa K. B.
Pranatharthihara Ayyar, S.
Prasada Rao, K.
Pundit, R. P.

Raghavachari, K.
Raghavachari, W.
Raghavan, K. K
Raghaviengar, S.
Raghavendra Rao, P. V.
Raghunathasami Ayyangar, P.A.
Rajagopala Nayadu, G.
Ramachandra Ayyar, S.
Ramachandra Nayadu, M.
Ramadoss. Kapila.
Ramalinga Vadhyar, C. S.
Ramanatha Ayyar, K.
Ramasubramanyam, T. S.
Ramaswami Ayyar, C. V.
Ramaswami Ayyar, R.
Ramasami Sivan M.R. Rao Bahr.
Ranganath, T. R.
Ranga Raju, J. R.
Ranga Reddi, C
Ranga Reddi, C. M.
Rangaswami Ayyangar, C.
Rangaswami Pillai, K.

Sakharama Row, G.
Saldanha, I.
Sankara Ayyar, M. S.
Sankara Ayyar, S. A.
Sankaran Pillai, K. S.
Sankarakumara Pillai, L.
Sankaranarayana Ayyar, C. V.
Sankaranarayana Ayyar K.
Sankunni Menon, K. P.
Sankunni Menon, K.
Satya Reddi, K.
Satyanarayana, P.
Satyanarayana, Raju, K.
Seshaghiri Ayyar, C. S.
Seshaghiri Rao, K. V.
Seturamalingam, C. A.
Siddaramayya, G.
Sinnappa Tolar, B.
Sitharama Chetti, M. K.

Sitharama Patrudu, S.
Sitharama Raju, P. V.
Sitharamaswami Nayadu, N.
Sivarama Rao, D. B.
Sivaramakrishna Ayyar, N.
Siva Rao, Badami.
Siva Rao, Bhairy.
Srikantayyar, S. V.
Srinivasachari, K.
Srinivasachari, N. S.
Srinivasa Rao, H.
Srinivasa Rao, L.
Sriramulu, K.
Subba Rao, K.
Subramanya Ayyar, A. K.
Subramanya Ayyar, K. K.
Subramanya Ayyar, P. S.
Subramanya Ayyar, R.
Subramanya Ayyar, T. V.
Subramanya Kandar, T. P.
Sudarsana Raju, C.
Sundaramayyar, K. P.
Sundaramayyar, K.
Sundarapandiyan, A. S.
Swaminathan, M. K.
Tillo, K. P.
Vedantamayyangar, C.
Venguswami Ayyar, K.
Venguswami Ayyar, P. S.
Venkatanarasimham. S.
Venkata Rao, Badami, K.
Venkataramana Ayyar, D. K.
Venkataramana Ayyangar, P. S.
Venkataramana Ayyar, S.
Venkataramana. B.
Venugopalayya, U. V.
Vijiaraghavachari, C.
Vijiaraghavachari, V.
Viraraghava Rao, M.
Viraswami. Bikkina.
Viravarada Raju, S.
Viswanatha Ayyar, N. V.
Vittal Punja, A.
Vriddhachalam Pillai.
Vyasarajachar, C. P.
Vythinatha Ayyar, K.
Wilson, A, J.
Yesudasan. A.

N. B.—Members under the new rules which came into force in January 1924 pay an entrance fee of Rupee one on admission and an annual subscription on a sliding scale. They are each entitled for one copy of the journal free for one year. If any break occurs in their membership, re-admission involves payment of a fresh entrance fee.

All admissions after '24 can only take place under the new rules.

Members under the old rules are all life-members and are not entitled for any free supply of the journal. Unless they elect to come under the new rules, they must pay an annual subscription of Rs. 4 for a copy of the journal if they desire to have one, but have the privilege to be invited for the College Day and annual meetings and to vote in elections.

DEPATMENTAL NOTIFICATIONS.

GAZETTED :—

Mr. C. Ramaswami Nayadu, Assistant Director, extension of leave on average pay for ten days from 12th November. Mr. K. Unnikrishna Menon, Assistant Director, leave on average pay for two weeks from or after 1st December. Mr. K. Ramayya, Assistant Paddy Specialist. leave on average pay from date of arrival in Madras till 14th March 1929. Mr. M. V. Vellodi, Personal Assistant to the Director, leave on average pay for 6 days from 17th December with permission to avail of the Christmas and New year holldays.

NON-GAZETTED :—

Transfers etc :—Mr. K. Ramannjachari. Manager will take charge of the office of demonstrator on Ongole survey from Mr. A. Gopalakrishnayya, proceeding on leave Mr. V. Karunakaran Nayar, Manager. Chintaldevi is posted to Buffalo Breeding Station, Guntur Mr. T. V. Krishnaswami Rao Manager to Chitaldevi. Mr. P. K. Natesan, Demonstrator, is transferred to Madura.

LEAVE ETC :—

FIRST CIRCLE :—Mr. T. Rangabrahma Rao, Demonstrator, Parlakimedi, leave on average pay for 17 days in continuation of the Christmas and New year holidays.

FOURTH CIRCLE :—Mr. S. Venkataramana Ayyar, Demonstrator Trivellore, leave on average pay from 5th December or date of relief to 22nd December. Mr. N. Lakshminarasimhaswami, Assistant Demonstrator, Tirutani, leave on average pay for 5 days from 17th December. Mr. R. Venkatarama Ayyar, Assistant Demonstrator, Kallakurichi, leave on average pay for 2 days on 21st with permission to avail of the Christmas and New year holidays.

SEVENTH CIRCLE :—Mr. K. Soopi, Assistant Demonstrator, leave on average pay for 2 days from 11th December. Mr. E. K. Nambiyar, Manager Kasargod, leave on average pay for 15 days from 8th December.

LIVE STOCK :—Mr. A Gopalakrishnayya, Demonstrator; leave on average pay for 8 days from 14th December. Mr. A. Venkatarangam, Manager, Chintaldevi leave on average pay for 3 months and 15 days from 10th January. Mr. M. Alaghiriswami Nayadu, Assistant Manager, leave on average pay for 5 days from 18th December.

PRINCIPAL'S :—Mr. S. Narayana Ayyar leave on half average pay for 10 days from 13th December. Mr. V. Viswanatha Ayyar, Assistant Manager, leave on average pay for 10 days from 4th December.

C. S's SECTION :—Mr. R. Sankara Ayyar, Assistant Koilpatti, leave on average pay for 15 days from 8th December. Mr. V. Chidambaram Pillai, Manager, Koilpatti, leave on average pay for 11 days from 12th December.

M. S's SECTION :—Mr, V. Gomatinayagam Pillai, Assistant, extension of leave on average pay for 3 days.

G. M's SECTION :—Mr. D. Marudarajan Assistant, leave on average pay for 9 days in continuation of the Christmas and New year holidays. Mr. P. Vishnu Somayajulu, Assistant, leave on average pay for 8 days from 15th December.

G. A. C's SECTION :—Mr. P. A. Raghunathaswami Ayyangar Assistant, leave on average pay for two months in continuation of the Christmas holidays.

The Ramasastrulu-Munagala Prize 1929.

1. The Prize will be awarded in July 1929.

2. The Prize will be in the form of a Medal and will be awarded to the member of the Union who submits the best account, of original research or enquiry, carried out by him on any agricultural subject.

3. The subject matter shall not exceed in length twelve foolscap pages type-written on one side.

4. Intending competitors should notify the Secretary of the Madras Agricultural Students' Union not later than the 15th May the subject of the paper which they propose to submit and the paper should be sent in so as to reach the Secretary, Madras Agricultural Students' Union not later than the 1st June 1929, with a covering letter showing full name and address of the sender. The author's name should not be shown on the paper which should be entered under a *nom-de-plume*.

5. Four type written copies of the essays should be sent in.

6. The name of the successful competitor will be announced and the prize awarded at the time of the Conference.

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

8. All references in the paper to published books, reports or apers 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.