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Editorial.

Mortgaged Land. Of the sense of possession and the primary satisfaction arising therefrom the most abiding is that pertaining to the ownership of the land. In this ownership the grip of possession is supreme. Land is mute and the sense of ownership is exercised with that full one sided-ness which is not thwarted or chilled by want of reciprocity. If, added to this succour and shelter are assured by that possession, no wonder ownership of lands has been and continues to be one of the most potent forces in the evolution and advancement of the art of agriculture. When in early times man ceased to be a nomad and took to stationary life he cleared the jungle and settled on a piece of land with his cattle for company; and an aggregate of such settlements was the beginning of corporate life and the dawn of collective agriculture.

It is, therefore, with not a little agony that a cultivator reconciles himself to a situation in which his very lands have to be mortgaged and after which he has to live the inconvenient and embarrassing life of being the owner and yet not the unfettered dispenser of the fruits incidental to such ownership. There is thus a sense of alienness in his own holding which is the root cause of much of the demoralisation that sets into the rural community consequent on such mortgage.

The owner could neither improve nor neglect his land. He drifts with impotent concern.

Into the causes of this mortgage it will be a task to enter and enquire, but suffice it to say, that when land is mortgaged, it is an undoubted symptom of chronic indebtedness in which, other valuables of a movable type could not come to the rescue. This tendency to raise debts is inherent in human nature. It is the natural reaction to present inability to meet traditionally old and currently egoistic display of power and patronage. The positive simplicity of a few peasants whose debtlessness we idealise, is none other than the want of credit on their part. In the words of Radha Kamal Mukerjee "They are free not because they are well-to-do, but because they have no credit." That being so, any system of credit that provides facile money and makes it easily available on sentimental grounds will eventually do more harm than good. Like the money-lender it may provide specific relief and play the protector, while all along it works really as an insidious destroyer.

That a good bit of land that ought to be owned with pride and cultivated with pleasure and profit, is thus in a state of thralldom will be obvious on a perusal of any report on economic enquiry in India. The continuous fragmentation of the land and the steady diminution of land resources thus induced, have been not a little responsible for this tendency to mortgage. Unlike other mortgages, a false sense of security pervades all such land mortgages, with the inevitable result that a quick redemption is invariably deferred and the land slips away unnoticed into hands that speculate but cannot cultivate. The owner becomes a tenant-at-will in his own holding leasing it from the money-lender at rates of interest which sap his resources, and this, added to his chilled interest and lowering of credit, results in indifferent cultivation, let alone an intensive one. There is thus induced a condition of absentee ownership and hired cultivation so very detrimental to sound agricultural progress.

The Provincial Banking Enquiry Committee has estimated that the debts secured and unsecured in this Presidency amount to about 150 crores of rupees. There is no doubt that much of this debt is secured of Land Mortgage. Any measures that are taken to stem the tide of this chronic tendency to mortgage lands, by lending a helpful hand to redeem them, and by taking effective measures against their re-encumbrance, are very welcome. It is no wonder, therefore, that when the institution of the Reserve Bank was discussed there was a universal demand for an Agricultural Wing and this was readily met. The deputation of so high an authority on rural matters as Mr. M. L. Darling, I. C. S., to enquire into the state of rural finance prior to the institution of requisite legislation, is a step in the right direction. So

also is the decision of the Madras Government to depute an Officer of their own, to investigate into the question of agricultural indebtedness and to recommend remedial measures, with particular reference to Mr. T. A. Ramalingam Chettiar's Bill for the establishment of Conciliation Boards.

In passing the Madras Co-operative Land Mortgage Banks Act of 1934, the Madras Government has the honour of being the first local government to undertake legislation for the purpose of financing the long term needs of the agricultural classes. The working of Land Mortgage Banks under this Act will receive an impetus if the debentures of these Banks are made tax-free which is the case in some of the countries in the West. It is desirable that concurrently with the provision of credit that comes to the relief of the agriculturist, there should be instituted a vigorous advocacy of rigorous thrift on the part of the borrowers. Any tendency on the part of the Banks to let the borrowers imagine that in these Land Mortgage Banks they have another thread to the existing web in which they find themselves enmeshed, should be discouraged. Proper and well qualified appraisers of the general credit and encumbering tendencies of the borrower, should be appointed so that in the hands of these pioneers the movement may be safe. In the words of Sir Hopetown Stokes such banks should not be organized in haste only to be liquidated at leisure. There should be strict integrity in the dealings of the Bank and much depends not so much on the institution as on the character and outlook of the men who run them. As Sir Hopetown put it "I would wish that every one concerned with the management of these institutions should regard himself so to speak as a trustee not merely for the good management of his institution but for the future well-being of the masses of agriculturists. I would wish that he should approach his work in this spirit, remembering that mismanagement of one institution must affect, and affect very seriously, not only the particular bank with which he deals, but the credit of the movement as a whole and the confidence of the public in it. A movement thus inspired cannot fail of success; without such inspiration, I fear that the end may well be disastrous. I would beg of you all to bear this continually in mind".

Our rural system is overlaid with a mass of irrecoverable debt. The mere provision of more credit facilities will not brighten up the situation. This attitude is reflected by Mr. D'Souza, Professor of Economics, Mysore, when he said that Credit Banks and Societies can be of very little use at this juncture. He advocated other concurrent basic measures like improved marketing facilities, debt conciliation measures and the steady increase in rural industries, which last is the only way of relieving the pressure on the land. With this balanced effort we would cultivate a policy of actual self-sufficiency in which

Agriculture and Industry will supplement each other and the country as a whole work towards that ideal condition indicated by the eminent economist, Marshall, viz., a country which has the least demand for foreign products while the foreign countries have the most demand for her own products.

The ancient conception of a monarch being virtually the father of the people has found an echo in the recent Mussolonian regulation of the Maharaja of Kapurthala in the matter of lifting his indebted agriculturists from the slough of despondency. He has ordered that in case a judgment-debtor has not the capacity to pay at once the decretal money, and also the judgment-creditor does not accept the lease of land according to the above mentioned regulation, civil courts will make arrangement to have the amount paid by suitable instalments. The term of these instalments will be upto five years and in conjunction with the order of the court as it thinks fit. Interest thereon will be payable which shall not exceed six per cent. simple interest. If a judgment-debtor intentionally defaults in payment of any one of the instalments, that instalment after being realized officially will be paid to the judgment-creditor within a month of that date fixed by the court for its payment. If any judgment-debtor, of the agricultural class is indigent, in such a case the State may pay out the amount decreed from the sum set aside as *Taqavi* budget and it shall be realisable as *Taqavi* loans. No interest shall accrue. Until payment of the decretal money or in case the payment is made by the state instead of by way of *Taqavi* loan, until the payment of the latter, the possessed land of judgment-debtor shall stand hypothecated.

In this connection we commend to the notice of the rich agricultural public the example of Sir Daniel Hamilton of Gosaba fame. Sir Daniel had taken over lands from the agriculturists and eliminated money lenders. He would not allow his tenants to borrow but charged them a fair rate of interest, half of which would be spent towards the betterment of the agriculturists.

In long term loans of the type contemplated the element of life plays an important part and with a view to induce a sense of personal responsibility on the borrower and check a tendency on his part to consider lightly his present credit facilities as a linked legacy to his successor in family distress, it is desirable to institute a system similar to those in vogue in Germany of combining life insurance with the extinction of mortgage debt so that both life and debt are extinct simultaneously and mother earth returns to her new son unencumbered.

A STUDY OF SOME ECONOMIC CHARACTERS OF THE COTTON BOLL IN RELATION TO THE FLOWERING PERIOD AND BRANCHING. *

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Introduction. The present study with special reference to "Northern" cotton has as its aim an analysis of some economic characters of the cotton boll such as shedding interval, maturation period, seed and lint weights and lint length in relation to the flowering period and to the development of the flower on primary or secondary fruiting branch. The cotton plant experiences a gradual rise in atmospheric temperature during the period of the development of its bolls and a very common observation is a general decrease in the values of some of the boll characters as the season advances (8, 17). It is also sought to present in this paper some aspects of variation of the cotton boll with reference to its position on the plant.

Material and Methods. Material for the present study was gathered from plants of two pure cultures, (1) Nandyal 14, a standard Indian Cotton and (2) No: 54, grown at the Agricultural Research Station, Nandyal, Kurnool District, during the season 1930-31. Both the cultures belong to the species *indicum*. The plants were spaced a foot and a half between rows and a foot in the row. They were hand-dibbled under field conditions and received all the cultural operations accorded to bulk crops on the station. For purposes of the present study, 25 plants ^a of each were selected in the two cultures, the choice being restricted to healthy normal plants not bored by the boll worm (*Earias Sp.*) and numbered serially. Each flower, as it opened, was numbered with dated tags and a record of its position (7, 17) as on monopodial or sympodial branch maintained. Daily collection of the shed labels afforded data as to shedding intervals of bolls dropped. Those, that persisted and burst were gathered individually and their picking dates noted. The boll-contents ^{*b} were examined in the laboratory and after the elimination of insect-damaged bolls, healthy ones were individually studied for seed and lint weights and lint length per seed, and ginning percentage. In the succeeding paragraphs the results of the following characters will be presented in order.

* Paper read at the Twenty-first Indian Science Congress, Bombay, in January 1934.

[^a During the course of the investigation, some plants were rejected as bored by the *Earias Sp.*: and finally material from 17 plants of 54 and 21 plants of N. 1 were available for the present study.]

[^{*b}. The bolls studied in the two cultures were of three locules or compartments. No. of 4-locked bolls were negligible.]

1. Flowering and bolling,
2. Maturation period (Interval in days between flowering and picking dates),
3. Shedding interval (Interval in days between flowering and shedding dates).
4. Weight per seed (determined from all available seed cotton (mgm) of each boll)
5. Lint weight per seed (do) (mgm)
6. Lint length (Average of third position seed of each locule of (mgm) the boll (16), combed according to Hilson's method (6)).

Results. *Flowering and bolling.* That the cotton plant produces two kinds of branches, (1) the vegetative branches monopodials or limbs and (2) the fruiting branches or sympodials is a matter of common knowledge to all workers on cotton. The monopodia develop usually at the lower part of the main stem and produce sympodials which are termed secondary fruiting branches while the primary sympodials or the main fruiting branches develop at the upper nodes. The development and configuration of these two types of branches afford distinguishing characters for cotton selections. N. 14 is of a monopodial type, the average number of monopodia borne by each plant being from 3 to 8 during the year and the first fruiting branch starts at the 20th node while culture 54 is of a distinctly sympodial type. The number of monopodia developed by this cotton ranged from 1 to 3 and the first fruiting branch started at the 11th node.

The flowering in these cottons was in the usual regular succession, the flower opening in the beginning being low on the plant and nearest the main stem, the succeeding ones being away from the main stem or higher on the plant i. e., the order of opening being both "centrifugal and acropetal" (3). The flowering and bolling curves, in general, were as usual observed to rise somewhat slowly at first, then take a steep course, reach their maximum and then descend (3). The weekly flowering and bolling data of N. 14 and 54 analysed into sympodial and monopodial flowers according to their position are presented in Table 1 along with their respective totals. It will be seen in the case of N. 14 that the monopodial flowers form the majority as many as 58 % of the total while No. 54 shows itself as a distinctly sympodial type, the percentage of sympodial flowers to the total being 82. It is also noticed (Table 1) that in the case of 54, the sympodial flowers start slightly earlier than the monopodial flowers i. e., two weeks in advance, while in the case of No. 14 both the categories of flowers start simultaneously. In No. 54, 31 % of the flowers are seen to develop into bolls while 49 % develop in the case of No. 14. Analysing into

sympodial and monopodial bolls, 30 % of the sympodial and 36 % of the monopodial flowers develop into bolls in the case of No. 54 while the respective percentages in the case of No. 14 are 53 and 46 %. In other words, in the case of No. 54, 24.2 % of the bolls developed are sympodial in origin and 6.7 % monopodial, while in the case of No. 14, the percentages are 22.2 and 26.8, respectively.

Maturation period. The maturation period or the interval from flowering to the picking dates of the boll was investigated for sympodial bolls and weekly averages worked out. The data are presented in Table 2. The usual decrease in the maturation period with the advance of the season is seen most pronouncedly in both the monopodial and sympodial bolls of the two strains. The average maturation period of the sympodial boll is found to be slightly higher than that of the monopodial boll in both the cultures. When a comparison of the weekly averages of sympodial and monopodial boll maturation periods is made, it is found that the differences are not significant as per "Student's" method. This clearly shows that season is the factor responsible for the decrease in the maturation period with the increase in temperature and not its monopodial or sympodial origin. The higher averages in the case of sympodial bolls, are due to the production of sympodial bolls in the beginning of the flowering phase with no corresponding bolls on the monopodial branches in the case of 54 and due to the cessation of sympodial boll production towards the fag end of the season when monopodia have continued to bear, in the case of No. 14.

Shedding Interval. The shedding intervals of sympodial and monopodial bolls for No. 54 and N. 14 are cited in Table 3. In the case of sympodial bolls of 54, it is seen that the shedding intervals in the beginning and the end of the season are comparatively short in consideration with bolls of the mid-season. In the case of the monopodial bolls of 54 and both the sympodial and monopodial bolls of N 14, the short interval as the season comes to a close is pronounced. When the differences in the weekly shedding intervals of sympodial and monopodial bolls were considered as per "Student's" method, it was found that the averaged difference of the pairs compared was significant in the case of N54, while in the case of N14 the odds were insignificant. It is considered that season plays a prominent part in the shedding interval particularly during the advanced season while the physiological aspect of the plant has its own role especially in the early part of the season. The quick boll abscission during the beginning of the season in the case of No. 54 is to be accounted for as resulting due to the plant being ill-fitted at the time for proper reproductive activity.

Seed and lint weights & lint length. The variation found in the economic characters, seed and lint weights and lint length per seed

included in the present study is fairly wide. The data are given in Table 4. The difference between the highest and lowest values in the same season ranged from 7 to 55% of the means in the three characters. These variations are presented in Table 5, a and b, according to flowering periods and branching, sympodial and monopodial. A general fall in the values of the characters is noticeable in the case of both the cottons. The decline is most pronounced in the case of seed weight. In the case of lint weight it is gradual while it is very feeble in the case of lint length. Venkatraman (17) working with herbaceum cottons has observed similar declining tendencies.

The weekly mean seed weight of sympodial boll is higher than that of the monopodial boll in the case of 54 due mainly to the production of sympodial bolls in the beginning of the season without any monopodial bolls in the corresponding period. But when the available weekly average seed weight pairs of sympodial and monopodial bolls are compared, the observed difference is found to be statistically insignificant. In the case of N. 14, there is no difference in the general means and the comparison of weekly averages of sympodial and monopodial seed weights reveals no difference for statistical significance. The case of lint weight is similar to the behaviour of the corresponding seed weights in the two selections. No. 54 shows a higher sympodial mean with no significant difference in the weekly pairs, the contribution towards the higher lint weight mean being from the sympodial bolls occurring in the beginning of the season without any corresponding bolls on the monopodia as observed already in the foregoing paragraphs. In the case of N. 14, there is neither difference in the general mean nor in the weekly means of the lint weights of the two categories of bolls. As is to be expected, the case of ginning percentage (percentage of lint to seed-cotton) is similar to the seed and lint behaviours of the respective selections. The case of lint length is slightly different. In the case of No. 54, as in the case of the other selection, No. 14, there is neither difference in the general means nor in the comparisons of weekly average pairs. This is due to the fact that in the case of No. 54, the course of lint length has not been one of general decline; an optimum is indicated during the period January end to February beginning. The existence of sympodial bolls in the early part of the season without correspondingly any on the monopodia does not act as a factor for bringing about a higher average as in the case of the maturation period and seed and lint weights. It is noteworthy that season has a very prominent part in the trend of behaviour of these characters.

Literature. Hilson and others (7) working at Coimbatore, Buie (3) working at South Carolina, Zaitzev (18) working in Turkistan have recorded similar "centrifugal and acropetal" succession of flower opening as observed by the author.

As regards maturation period, Patel and Mann (15) working in Broach-Deshi cottons in Bombay observe "that the time required for the maturation of the boll would seem to be distinctly but feebly correlated with the seed weight.....and the time required for maturation of the bolls also affects lint weight and in fact to a greater extent than with seed weight." Venkatraman (17) working on herbaceum cottons at Coimbatore, concludes that the maturation period declines from day to day as the season advances. The results obtained in this paper are in agreement with the experiences of these authors while the experience of Loomis (10) at Sacaton, Arizona, that the maturation period of bolls of the same flowering date was longer on outer than on inner nodes of fruiting branches and that boll periods on all nodes lengthened as the season progressed, must be attributed to the entirely different seasonal conditions prevailing there. As observed in the present study, in the case of one of the cottons, No. 54, Venkatraman (17) has shown that the boll on the primary sympodial branch took a longer time to mature owing to the fact that the flowering-curve of the primary sympodia is earlier than that of the secondary ones and that the bolls from flowers of the same date do not show any difference in the bolling period.

Zaitzer (18) observes that shedding of the bolls increases from bottom to top and from the centre laterally along the branches and that this latter direction is characterised by a greater increase in the rate of shedding than the first and that this is due to the difference in the nutrition of the separate bolls in dependence on their position on the branch. Loomis (10) concludes that boll shedding increased appreciably on the outer nodes of branches. The work of Balls (2) in Egypt confirmed by Lloyd's (9) studies "conducted under relatively humid conditions at Alabama established a strong presumption that the major factor initiating abscission was a marked water deficit in the body of the plant." Ewing (4) working in Mississippi also attributed the disturbance in the water-balance of the plant as the main factor responsible for shedding. Harland (5) working in St. Vincent notes that shedding is heaviest after torrential rain and concludes that root absorption is interfered with as a result of the reduction in the oxygen-supplying power of the soil and that consequently a water-shortage ensues which is the immediate cause of shedding. Mihara and his collaborators (14) working in Corea opine that the phenomenon of shedding is accelerated by rain, excessive soil-moisture etc. Mason (13) working in St. Vincent concludes that the susceptibility to shedding is relatively small in the earlier stages of the flowering period but becomes much more marked in the later stages especially after the occurrence of growth cessation in the main axis. "Periods of day-times rain, low rates of evaporation and little direct solar radiation" were also opined to be "the precursors of augmented rates of shedding,"

due to a check in the assimilative activities of the leaves. We have here in the present paper an indirect proof of agreement with Zaitzer's (18), Loomis's (10), and Mason's (13) results in the case of the cotton No. 14; shedding, here, is seen to increase with the advance of the season when flower production is confined to the upper and outer zones of the plant scaffolding. It has been mentioned that Balls (2) and Ewing (4) view a disturbance in the water-balance of the plant as the major factor responsible for shedding and that Harland (5) is of opinion that it is maximum after torrential rain. The day-to-day conditions at Nandyal during the flowering period no doubt tend to a decrease in the moisture content of the soil and as the course of temperature is one of a steady ascent unrelieved by rain Balls (2) and Ewing's (4) views may be taken as suitable explanation for shedding. But, in our present study, shedding in only one of the strains, No. 14, shows a direct relation to temperature; in other words, shedding increases in the later developed bolls which synchronize with increase in temperature. But, the same phenomenon does not hold good in the case of the other strain, No. 54, where shedding decreases with increase in temperature i. e. in the later developed parts of the plant. It is, therefore, probable that the causal factor that holds good for shedding in one strain may not be equally responsible for that in another. Elaboration and translocation of assimilates may not take place concurrently in the season in all strains. What exactly is the cause requires to be studied. It is also shown in this paper that the weekly percentages of shedding in the case of sympodial and monopodial bolls (Table 3) do not show any significant difference in both the strains, although the average of weekly percentages of shedding in the case of the sympodial boll of 54 for the entire flowering period is higher than the corresponding average for the monopodial bolls since the sympodial bolling curve starts earlier. It is, therefore, to be concluded that the same causes that are responsible for augmented or low rates of shedding in sympodial bolls are equally responsible in the case of monopodial bolls also.

The author has shown elsewhere (8) that the characters seed and lint weights distinctly decrease in value as the season advances while lint length and ginning percentage show only a slight falling off. Venkatraman (17) observes a positive and most pronounced fall in seed weight and lint length as the season advances while the case of lint weight is more gradual. Patel and Mann (15) observe a marked tendency for seed and lint weights to decrease in the later developed parts of the plant and in the younger parts of branches (especially in the sympodia) They further observe that there seems to be a tendency for the lint weight per seed to diminish faster than the seed weight i. e., for the ginning percentage to be less on the younger parts of shoots though some strains show the opposite tendency. In the present study,

the previous findings of the author (8) are confirmed and also as observed by Patel and Mann (15) the decrease in lint weight is noted to be faster than that of seed weight with the result that a fall in the ginning percentage is brought about with the advance of the season. As observed by Venkatraman (17) the boll on the sympodial branch is better in seed and lint weights and to a less extent in ginning percentage in one of the two cultures examined namely No. 54. than that on the monopodial due to the earlier flowering curve of the former but the result in the case of lint length of the same strain does not show any increase. Venkatraman (17) further finds that from flowers opening on the same dates the primary sympodial gives a higher seed and lint weight for the bolls than the secondary branch but not a greater lint length. The results (Tables 5-a & b) with the present cottons do not show any significant difference in these three characters and also in ginning percentage.

Conclusion. It is concluded that the general order of flowering follows much the same course of "centrifugal and acropetal" succession in the cottons studied and that with increased temperature, maturation period pronouncedly decreases; in other words, the later formed bolls in the upper and outer zones of the plant structure tend to dehisce quickly, the quickness being in proportion to the distance upwards and outwards from the centre of the plant. It is also seen that the position of the boll on the primary or secondary sympodia does not account for any difference in maturation period within the same flowering periods, although the general mean for the sympodial bolls is higher due to the earlier start in flower formation on this type of branch. Following the course of the maturation period, shedding also decreases with increase in temperature in one of the cultures (54) studied while, in the other (No. 14), the reverse is the case. Being an early strain, this selection, No. 54, perhaps behaves as an exception. It may be possible that in this case, by a suitable alteration in the sowing date, quite a different result might be obtained. It is further shown that bolls formed from flowers opening on the same date do not show any difference in shedding percentages due to differences in the type of branch. The course of seed and lint weights and ginning percentage is shown to be one of decline with the advance of the season, it being most prominent in the first two cases and moderate in the last. The variation in lint length is observed to be extremely small. No differences in these characters are met with due to the position of the boll as on primary or secondary sympodial although the general means of the primary sympodial characters were higher in the case of No. 54 due to the earlier start in the flowering phase as mentioned already. No doubt, as observed by Zaitzev (19), temperature is the most important factor determining the course of growth of the cotton plant, its influence affecting almost all stages of

its development but there may be certain strains where its influence may not be felt equally in all its stages, the deviations being attributable to a lack of physiological coordination with temperature, as in the case of rate of shedding in culture No. 54.

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Table 1. Flowering and Bolling data of N-14 and 54 (per plant).

Flowering Date		N-14						54					
		Flowers.			Rolls.			Flowers.			Bolls.		
		Symp.	Monop.	Total.	Symp.	Mon.	Total.	Symp.	Mono.	Total	Symp.	Mono.	Total.
1930	Dec. 7						1.06		1.06	0.06		0.06	
	14						1.71		1.71	0.29		0.29	
	21						2.41	0.06	2.47	0.47		0.47	
	28						2.76	0.12	2.88	0.53	0.06	0.59	
1931	Jan. 4	1.00	0.10	1.10	0.57	0.10	0.67	3.24	0.41	3.65	1.06	...	1.06
	11	1.57	0.66	2.23	0.57	0.43	1.00	3.41	0.41	3.82	1.06	0.18	1.24
	18	2.38	2.90	5.28	1.52	1.76	3.28	3.88	0.71	4.59	0.82	0.12	0.94
	25	2.67	2.86	5.53	1.33	1.81	3.19	3.88	0.29	4.17	0.88	0.06	0.94
	Feb. 1	2.00	2.52	4.52	1.05	1.10	2.15	1.71	0.47	2.18	0.59	0.18	0.77
	8	1.33	2.90	4.23	1.00	1.24	2.24	2.47	0.71	3.18	1.00	0.35	1.35
	15	0.86	2.57	3.43	0.33	0.86	1.19	2.18	0.76	2.94	0.94	0.47	1.41
	22	0.33	1.52	1.85	0.10	0.48	0.58	2.65	0.88	3.53	1.18	0.29	1.47
	Mar. 1	0.33	0.86	1.19	0.05	0.19	0.24	3.71	1.59	5.30	1.53	0.65	2.18
	8	0.10	0.38	0.48	0.05	0.05	0.10	2.82	2.18	5.00	0.82	0.76	1.58
Total.		12.57	17.27	29.84	6.62	8.02	14.64	37.89	8.59	46.48	11.23	3.12	14.35
%			58% of total.		53% of Symp. flowers.	46% of Mono. flowers.	49% of flowers i.e., 22.2% Symp. 26.8% Mono.	82% of total.		30% of Symp. flowers.	36% of Mono. flowers.	31% of flowers i.e. 24.2% Symp. 6.7% Mono.	

Table 2. Maturation Period. (No. of days).

Flowering date	N-14			54		
	Average Symp.	Average Mono	Average total.	Average Symp.	Average Mono.	Average total.
1931.						
Jan. 4				44.8		44.8
11	43.0	41.5	42.2	44.2		44.2
18	42.1	41.8	41.9	41.9		41.9
25	40.6	40.2	40.3	40.2		40.6
Feb. 1	39.0	38.7	38.8	38.3	37.5	38.1
8	37.0	36.6	36.8	37.1	37.1	37.1
15	34.7	35.3	35.1	36.2	35.5	36.8
22		33.5	33.5	33.6	34.8	33.8
Mar. 1		33.5	33.5	33.2	34.3	34.0
8				32.7	32.4	32.6
Average.	39.40	37.64	37.80	38.22	35.27	38.31
Difference in comparable pairs.	+0.4			-0.1		
Odds in favour of difference. (Students' method).	7:1			1:1		

Table 3.
Shedding Interval (Days) and % of Shedding.

Flowering Date.	Shedding Interval.				% of Shedding (to flowers).					
	N14		54		N14			54		
	Symp.	Mono.	Symp.	Mono.	Sym.	Mon.	Total	Sym.	Mon.	Total
1930										
Dec. 7			10					94		94
14			10					83		83
21			11					80		81
28			9					81		80
1931										
Jan. 4	15		11	10	43	0	39	67	56	71
11	17	12	14	18	64	35	55	69	83	68
18	11	13	12	9	36	39	38	79	83	80
25	10	11	14	15	48	36	42	77	79	77
Feb. 1	13	10	20	9	47	56	52	65	62	65
8	10	9	15	10	25	57	47	60	51	58
15	8	9	13	9	62	67	65	57	38	52
22	12	8	13	7	70	68	69	55	67	58
Mar. 1	9	8	10	8	85	78	80	59	59	59
8		7	8	6	50	87	79	71	65	67
Average.	12	10	12	10	53.0	52.3	56.6	71.2	62.2	70.9
Difference in comparable pairs.	+1.25		+2.9		-0.7			-3.56		
Odds in favour of difference (Student's method).	7:1		28:1 Significant.		nil.			6:1		

Table 4.
Variation in Characters due to the flowering period.

Character.	Strain No.	Weekly means.				
		Maximum.	Minimum.	Mean.	Difference.	Difference as % of the mean.
Maturation period (Days)	N14	42.2	33.5	37.80	8.7	23.02
	54	44.8	32.6	38.31	12.2	31.9
Seed weight (mgm)	N14	47.3	39.0	44.66	8.3	18.6
	54	52.2	36.1	46.47	16.1	34.6
Lint weight (mgm)	N14	12.6	9.0	11.61	3.6	31.04
	54	21.7	11.9	17.81	9.8	55.1
Lint length (mm)	N14	27.2	25.3	26.66	1.9	7.1
	54	26.5	23.4	25.36	3.1	12.2

Table 5-a.
Seed and Lint weights, ginning percentage and Lint length.

N14

Flowering Date.	Seed weight.			Lint weight.			Ginning percentage.			Lint length.		
	Symp.	Mono.	Total.	Symp.	Mono.	Total.	Symp.	Mono.	Total.	Symp.	Mono.	Total.
1931. Jan. 11	50.5	44.7	47.3	14.0	11.5	12.6	21.7	20.5	21.0		26.3	26.5
18	46.1	47.1	46.6	11.9	12.3	12.1	20.5	23.7	20.6	26.8	27.0	26.9
25	43.2	47.0	45.3	12.3	12.5	12.4	22.2	21.0	21.5	27.5	27.1	27.2
Feb. 1	43.9	44.7	44.3	11.8	13.3	12.4	21.2	22.9	21.9	26.8	26.4	26.6
8	48.1	45.2	46.6	11.4	12.3	11.9	19.2	21.4	20.3	27.0	26.7	26.8
15	43.1	43.5	43.4	11.9	11.2	11.3	21.6	20.5	20.7	27.0	26.7	26.8
22		45.5	44.8		10.7	11.2		19.0	20.0		27.5	27.2
Mar. 1		41.5	39.0		8.8	9.0		17.5	18.8		26.0	25.3
Average.	45.82	44.9	44.66	12.22	11.8	11.61	21.07	20.44	20.60	27.02	26.71	26.66
Difference in comparable pairs.	+ 0.45			0			- 0.1			+ 0.2		
Odds in favour of difference. (Student's method).	2:1						nil.			7:1		

Table 5-b.

Seed and Lint weights, ginning percentage and Lint length.

54

Flowering Date.	Seed weight.			Lint weight.			Ginning percentage.			Lint length.		
	Symp.	Mono.	Total.	Symp.	Mono.	Total.	Symp.	Mono.	Total.	Symp.	Mono.	Total.
1931. Jan. 4	44.8		44.8	18.9		18.9	29.7		29.7	25.2		25.2
11	51.8		51.8	21.7		21.7	29.4		29.5	25.8		25.8
18	52.2		52.2	18.6		18.6	26.3		26.3	25.7		25.7
25	53.5		51.5	19.5		18.9	26.7		26.8	26.5		26.5
Feb. 1	52.1	50.2	51.7	19.3	19.5	19.3	27.0	28.0	27.2	26.3	26.7	26.4
8	52.0	37.9	48.6	19.4	13.9	18.5	27.2	26.8	27.6	26.1	5.8	26.0
15	45.5	41.2	44.0	18.2	15.3	17.1	28.6	27.1	28.0	25.5	25.2	25.4
22	43.2	44.2	43.4	18.2	17.5	18.1	29.6	28.4	29.4	24.8	25.7	24.9
Mar. 1	38.8	45.3	40.6	14.6	16.3	15.1	27.3	26.5	27.1	24.4	24.0	24.3
8	36.0	36.3	36.1	12.6	11.0	11.9	25.9	23.3	24.8	23.2	23.7	23.4
Average.	45.99	42.52	46.47	18.10	15.58	17.81	27.77	26.68	27.64	25.35	25.18	25.36
Difference in comparable pairs.	+ 2.1			+ 1.5			+ 0.9			- 0.1		
Odds in favour of difference (Student's method)	3:1			7:1			12:1			7:1		

THE KAPAS MARKET AT DINDIGUL.—A STUDY IN THE LOCAL FACTORS THAT INFLUENCE THE PRICES

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I. The cotton crop of Dindigul. The Dindigul and Palni regions constitute an important cotton-growing area for the Madura District.

The area under cotton (1930—1931) is as follows:—

1. Cambodia (irrigated)	5340	acres.
2. " (unirrigated)	15,000	"
3. Karungunni (unirrigated)	1,500	"
4. Uppam	2,500	"
5. Tinni	100	"

It will be noticed at once that the staple variety of the Dindigul region is Cambodia unirrigated. Dry Cambodia is rather a speciality for Dindigul; for except in the Avanasi Taluq, it is raised everywhere as an irrigated crop. The hills that encircle the entire region are the cause for this peculiarity. The water that falls on the hills percolates through the soil and provides the necessary moisture for plant growth, and hence the raising of dry Cambodia Cotton.

Another peculiarity of this cotton is that the area fluctuates very widely according to the state of rainfall. If the rainfall is poor, the acreage, perforce, is reduced and vice-versa. The area under the other varieties remains more or less constant, unless price changes are sufficiently high or low to cause either an expansion or a contraction.

The yield again is poor—that of the dry Cambodia is only about 200 lbs., but the irrigated variety gives about 900 lbs., per acre. Low yield is accounted for by late sowing which the ryots adopt and by heavy rainfall at the close of October, when the growth of the plants is affected.

Consequently the quality of the cotton too is affected. Dry Cambodia fetches only a price of ten or fifteen rupees less than that in the Coimbatore District. The Cambodia raised in the Avanasi Taluq which gets an even rainfall is producing the highest quality Cambodia Cotton.

But, far and away the most singularly characteristic feature of the dry Cambodia product of this region is that there are no two pickings. Owing to late sowing and the arrested development by the heavy showers of October, the season's pickings merge with those of the summer; so much so that there is not much, if not no difference, whatsoever, between the earlier and the later pickings.

* The figures relating to the area and the yield of cotton were very kindly supplied to me by the Agricultural Demonstrator at Dindigul.

This has a vital effect on the whole cotton trade and markets of Dindigul. In the other cotton tracts, the first pickings, though usually sold off almost immediately by the ryots, are stored by dealers, with a view to sell in a rising market. This good stuff is not mixed with the inferior stuff of summer. The purchase of *kapas* by dealers is, therefore, very brisk in the season. Very different is the case in the Dindigul region. The earlier pickings are mixed with the later and are usually sold in one lump. The effect is that the market is neither very active nor very dull at any time. Buying and selling are spread over several months; the ryots on their parts are not in a hurry to bring the produce quick to the market; the merchants on their part do not rush to buy. The market is generally quiet; it is one of the least active of *kapas* markets in the south.

II. The position of the ryots. In addition to the above-mentioned factor of the physical production of the crop, there is another important factor which makes for the quiet tone of the market. The cotton grower of this region is generally poorer than his compeers in the Ramanad and Tinnevely Districts. Insufficient rainfall explains largely the difference as the crops depend almost entirely on rain. The percentage of literacy also must be lower, though I have no figures at hand to substantiate it. The cotton growers are, therefore obliged to sell the produce to the village dealer or the *mundi* merchants at Dindigul.

The *mundimen* make very liberal advances to these ryots—strange to say—often interest free, in order to attract their custom. There are 75 big *mundies* and the total available crop being not very large competition among them is very keen. Though this should naturally tend to raise the prices, no one can deny and one can positively affirm that the scope for frauds and dishonest dealings should be very great in this market, especially because of the position of the ryots. *

III. The dominant position of the Harveys A still more important factor in determining the tone of the market is the dominant position of the Harveys. Of the 20,000 bales of Cambodia brought to the market, full one half is purchased by the single firm of Messrs. A. & F. Harveys.

The causes are not far to seek. The spinning mills of that firm (The Madura Mills Company Ltd.) are—to use a local expression—‘in the backyard of Dindigul’. No other buyer can ship his cotton so cheaply as the Harveys. Their ginning factory at Dindigul is also equipped with about 40 gins. The two other spinning mills of Madura do not consume more than about 4,000 bales in all.

* My conclusions on other markets—Virudunagar, Satur and Tuticorin Markets—completely differ from those arrived at in this study. The apparent inconsistency is not due to prejudice; the conditions here differ fundamentally from those in others.

Of all the cotton markets in the South, that at Dindigul is the quietest and also the least efficiently organised. The causes for this phenomenon have been set forth already—the poor character of the crop, the weak financial position of the ryots and the domination of the market by a single purchasing firm. How could one expect the market to be otherwise than it actually is, if the produce that is really to be actively bought at competitive rates is limited to 10,000 bales only?

IV. Other Buyers. But within this limited sphere, competition is perhaps severer than in any other market in the South.

In the first place the local *mundi* merchants exercise a dominant influence; there is acute competition among these 75 shops which sometimes forces up the prices or brings them down considerably. Financially not very strong they feel nervous if the market is down and unusually buoyant if the market is up. There is hardly any co-operation or settled rate among them. If one buys or sells, everybody else rushes to buy or sell with the result that violent fluctuations are caused in prices.

In the Tiruppur market the buyers act more or less concertedly; and I am told that the differences in the buying rates of one merchant and another for the *kapas* of the same quality would be not more than As. 8 or Re 1 per candy; whereas in this market, the difference will be as high as Rs. 3.

Furthermore the purchasing firm of Messrs. Longley exert some influence on the market. They take just about 1,600 bales a year, but their prices based upon the Bombay market, tend to keep the market up at times when local quotations may be depressed.

Yet another influence on the price of the local market is that of the Coimbatore Mills. Most of them have their own ginneries and finding it impossible to get *kapas* in their district in sufficient quantities to feed them, they buy *kapas* in the next nearest market, namely at Dindigul. They take not less than 1000 bales a year, and pay slightly higher prices.

All these influences tend to keep the prices always up. The complaint of all buyers at Dindigul is that they can't buy cheap.

V. How the Mundies influence in Prices. The above analysis brings out the somewhat paradoxical characteristic of the Dindigul *kapas* market namely that though the market is generally not active the prices are highly competitive.

Here it must be emphasised that though the *mundi* merchants do not directly exercise any influence on the supply of the crop or its prices, they exercise a very real control over the distribution of the supply. It is they who move the crop from the villages by means of their advances and loans to the ryots either directly or through the village merchants. It is they who store the *kapas* on behalf of their

clients in their go-downs. It is they who actually sell the crop too. For, the supply is somewhat irregular and the *kapas* is such that it could be easily mixed and sold at higher prices, there is not in this market ready spot selling of *kapas* by the ryots or village merchants as is the case at Sattur or Virudhunagar. Usually only 25% of the *kapas* is sold ready and the rest is generally stocked and sold gradually according to the character of the market. In this way the *mundi* merchants can exercise a steadying influence on the price of *kapas*.

In addition to their control over the distribution of supply, they have a greater influence over the sales of *kapas* than in any other market. Some of these *mundimen* have established a reputation for securing the best prices for the *kapas* for their clients so that the clients have given full power to them to dispose of their produce within certain price limits. This being the case it is the *mundi* merchants who actually sell and not the village merchants (or the ryots in a small minority) as is the custom in other cotton markets.

The extent of their control of sales is illustrated very forcibly by a unique method in vogue in this market to which no parallel can be found elsewhere.

The method of sale as in all other markets is that of 'secret bids' under the cover of the cloth.* But there being no central market place at Dindigul where all buyers can come together, it is found to be a great waste of time for the buyers to go to each *mundi* and bid underneath the cloth. It is equally so for the seller, the *mundiman*. So he arranges for 'sales in lots.' The buyer is invited to quote his price for the whole lot of say 50 or 60 bags of *kapas*, and if this 'average price' is satisfactory, the *mundiman* effects the sales. A scrupulously honest *mundiman* will then allocate this average price according to the quality of each bag of cotton deposited with him say by 5 or 6 of his clients. What he will do if he is unscrupulous we need not labour to describe. This is not the only method or the one that is resorted to by all sellers and at all times. But the exception is a sufficient proof to illustrate the control of the sales by *mundimen*.

VI. The case for and against the open market. To the reader who has a deep distrust of all *mundies* and is impatient for reforms, these revelations would provide enough justification for the establishment of a regulated open market. If one would also point out that the market charges and commissions exacted here are higher, the conviction becomes stronger. If intimate acquaintances would bring to light (there is room enough for such conclusions) that the *mundimen* can practise several frauds with those ignorant sellers no more argument will be needed for the proposed reform.

* For a full description and appreciation of this method as found in the markets of the Ramnad District, see my article 'Underneath the Cloth' in the *Indian Journal of Economics*, October 1933.

There is absolutely no argument in theory or practice against an open market. In fact at Sattur and Virudungar such markets are really in existence though they are privately owned and controlled by the whole community of merchants and by the government. Why then should one pretend to argue against the open market at Dindigul in this article?

It has been pointed in this article that though there is no open market, the prices are highly competitive. In other words, there is an 'open market price' for *kapas* at Dindigul. Owing to the peculiar conditions of demand described already, the buyers can seldom buy cheap. Further, the impossibility of the village merchant to be present at the time of each sale is to be seriously considered as well. There are not at hand always. Each one's supply is small and intermittent. And further, half the crop is purchased by Messrs. A. & F. Harvey. Is there a need for an open market for *kapas* of 10,000 bales?

The Government of Madras, I understand, are contemplating the extension of the Marketing Act to Dindigul. The merchants, as a body, I am told locally, are seriously resisting the move.

If an 'open Market' is established for all commercial crops, under Government aegis, I imagine that it is likely to cause a great revolution in the existing mechanism. It is likely to disrupt if not dissolve the whole *mundi* organisation. Dindigul is likely to lose its importance as a huge distributing centre of all those important and diversified products that are grown in this area. If the Marketing Act effects a substantial reform at Dindigul, well and good. The present mechanism, as admitted by all, is none too good. But if it 'disperse' business, drive the mundimen to go to the villages direct and buy there, thereby virtually killing the Marketing Act and causing some damage to the ryots, the consequences should be weighed very carefully.

JASMINE. (*Bhatkal Malliga*) CULTIVATION IN SOUTH CANARA.

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"Bhatkal Malliga" is one of the prominent varieties of Jasmine cultivated in South Canara; and it has derived its name from the town of the same name in North Canara, from where it spread.

Soil. It is raised on small plots of about 25 cents, by the enterprising Christian communities at Coondapur and Udipi. A successful crop is seen in localities where the soil is loamy, fairly deep, and has good drainage and irrigation facilities.

Preparatory Work. An enclosure for the small plot has to be put in before planting the crop in order to protect it from cattle trespass. If neglected, the plants nibbled by cattle do not grow with full

vigour; and in several instances, they do not survive when nipped while young and tender. After the plot is fenced, it is dug with *mammatty* and the weeds completely removed. Pits $1\frac{1}{2}$ to 2 feet square and about a foot in depth are dug at intervals of $4\frac{1}{2}$ feet both in and between the rows. There are nearly 500 pits in a plot of 25 cents. The pits are filled with well rotten cattle manure and fine earth up to 2 inches to the surface and then fresh soil is added to fill in.

Season. The preparatory work is done early in August so that planting may progress in September, just after the heavy monsoon rains.

Planting Material. Generally rooted cuttings are planted, to procure which a nursery is raised earlier in the season. The nursery bed is prepared in a suitable place, a large quantity of sand, fresh soil and well decomposed farm yard manure being mixed for making the bed. The fresh long tender shoots that develop in an old plant during the monsoon showers of June-July, are cut and layered in the nursery. In the course of a month i. e., about the beginning of September, these cuttings strike roots and get established as individual plants. The nurseries are often protected from hot sun and heavy showers. The plants are removed with the ball of earth attaching to the root and planted in the main plot.

Manuring. Jasmine responds to intensive manuring. Burnt earth (*Sudu mannu*) and the droppings of pigs and goats are used locally. Several ryots use only burnt earth, the other manures being scarce and not available in sufficient quantity. The burnt-earth is prepared by making a small heap of tank silt well mixed up and covered with dried leaves, sweepings etc., which is then set fire to. The silt becomes very friable and with the ash mixed up is valued as a good manure. Manuring is done once in 4 months. The old soil round the plant is removed to a radial length of 2 feet and fresh prepared material is put in. In order to facilitate distribution of work, the plot of 25 cents is treated in 4 lots, each quarter being attended to during a month.

Irrigation. The plants are pot-watered and about 4 gallons of water are added to the bed of each plant either in the morning or late in the afternoon after 4 P. M.

After care. The whole plot must be well-hoed, frequently weeded and kept clean.

Gathering Flowers. Though stray flowers appear in about 6 months after planting, the full bearing begins only after another period of 6 months. The yield varies with season and is also dependent on the vigour of the plants. The heavy flesh of bloom occurs during February to June, with a slack in yield during July to October. During the cold months of November and January there is an intermittent

crop yield. It may be taken that a plant may yield every day on an average about 100 flowers in the flush season, about 50 in the slack season and about 25 in the cold season. It has been observed that as much as 800 flowers are gathered in a day from a single plant when in full flush.

Girls are employed for collecting flowers and they are paid at the rate of half anna for 1000 flowers collected and strung in a wreath. Generally outside labour is not employed for this purpose as this is done by women and girls of the family.

Sale of Flowers. The produce is sold locally and is not at present sent to distant places. The price varies according to the season and also to the quantity that comes into the market to meet the local demand. The price ranges from annas two to rupee one per thousand. The seasonal average will work at the rate of four and a half annas per thousand.

The profitable working of a flower garden depends largely on the keen interest evinced by the cultivator and his family. During the first year he may have to spend about Rs. 100 in the purchase of manures and in engaging additional labour. From the 2nd year onwards his income will be about Rs. 1000 per year till the plantation lasts, while his expenditure will be only Rs. 100. Thus for a small cultivator a flower garden of 25 cents will give a net income of Rs. 900 per year, really a decent recompense for the work done by all the members of a family.

ABSTRACTS

MADRAS AGRICULTURAL DEPARTMENT

Report of the Operations in 1933-34.

Agricultural Education. There was a considerable fall in the number of applications for admission to the Agricultural College at Coimbatore. In the final University examination 51 appeared and 48 passed and qualified for the degree. On the recommendation of the selection committee, of the five scholarships one was given to the only Muhammadan available and the other four were awarded to students of depressed classes and backward communities. The Government sanctioned the institution of short courses on ten subjects in Practical Agriculture at the Agricultural College. Owing to lack of accommodation only one course on Farm Management was started. Government has also sanctioned the institution of a course of instruction in Co-operation, Auditing etc., at the Agricultural College from the year 1934-35, similar to that given in Co-operative Training Institutes so as to enable the students of the College to qualify for appointments in the Co-operative Department also. The Agricultural Middle School at Kalahasti could not be started this year also, as the scheme under contemplation in the Education Department has not yet been sanctioned. The school at Usilampatti (Madura District) was continued, and the Vocational Middle School at Muthanandal (Ramnaad District) imparted agricultural education also. The three farm labourers' schools at Anakapalle, Coimbatore and Palur were continued.

The 22nd College Day and Conference were held in October 1933 at which Sir T. Vijayaraghava Acharya Avl., K. B. E., presided.

Season. The outstanding feature was the early advent of the South West monsoon. The season was on the whole satisfactory and the rainfall was bordering on or above the average in the major part of the Presidency. During the North East monsoon though the rainfall was about average in most districts, it was not quite evenly distributed. The general effect of the monsoon on the crops at the several agricultural stations was adverse.

Research. Chemistry—815 samples, consisting of soils, manures, feeding stuffs, fodders, etc., were analysed. A note-worthy feature in the section's work is the evolution of a simple process for the production of cream jaggery and white sugar by the open pan method using activated charcoal from paddy husk. A few Co-operative Societies in Coimbatore and North Arcot districts carried out large scale tests of this process and expressed the opinion that the process was economically feasible. Work was also in progress, to find out the cheapest method of converting bone into fine bone-meal and night soil into an odourless manure, and to explore the possibilities of extending the crushing season of sugarcane by study of the effects of planting and harvesting in all the months of the year.

Botany. Nearly 600 specimens were identified. 1,897 sheets were incorporated in the Herbarium. 647 duplicates were forwarded to outside institutions and 196 specimens were received in exchange. Study of fodder grasses and forage plants, and study and survey of bananas and plantains were continued.

Crops. In sorghum, strain A. S. 367 of the Millets Breeding Station Coimbatore, proved a great success in Chittoor and Koilpatti. Four new strains were released for district trials from Nandyal Agricultural Station. Spacing and manurial experiments were in progress at Hagari and Nandyal. In *Ragi* (*Eleusine coracana*) strain E. C. 593 continued to be the best strain. *Tenai*, strain S. I. 523 tried in the Coimbatore district was favourably reported upon.

There was a phenomenal fall in the price of rice and as a consequence it ceased to be a paying crop in several parts of the Presidency. Attempts have been made to grow more remunerative crops. But as there is still no over-production of rice in the Presidency the only solution is to increase outturn and reduce cultivation cost. A special officer was appointed for studying the conditions of rice production and marketing so as to devise measures for improving the economic position of rice cultivation. A new strain from the Paddy Breeding Station, Coimbatore, Co. 9 was released for introduction in the Tinnevely District. Six *Piricularia*-disease-resistant strains with increased yields have been obtained from crosses G. E. B. 24 X *Korangu Samba*. Two new strains were released from the Paddy Breeding Station, Aduturai.

Superiority of transplanting over broadcasting was found to be true in the case of a short duration variety also. Differences in age of seedlings from 25 to 70 days at transplanting did not have any difference in yield under Coimbatore conditions. Double transplantation was more economical and resulted in increased yields at Samalkota. The summer cultivation of rice soils of the Tanjore delta was found to be definitely harmful. Closer spacing and manuring induced greater development of awns at Aduturai. The results of manurial experiments at Maruteru show that higher yields are obtained with artificial manures in combination with green manures.

In cotton the three new strains which were superior to Co. 2 did well this year too. The results of rotation experiments show that in a sandy soil it is advantageous to grow groundnut before cotton, but on alkaline lands sorghum or

rugi does equally well. Mixing pulse with cereals resulted in higher yields of grain on rainfed lands, but the quantity of fodder was reduced. In irrigation experiments it was found that irrigation once in three weeks is more profitable than irrigation once a week, though the latter gave highest yields. Intercultivation with *danthulu* (small blade harrow) raised the soil temperature by 1°F. at 16 inches below surface. A new scheme financed by the Indian Central Cotton Committee, the Madras Nadam scheme, was started this year, to evolve annual types suited to the tracts where perennial *Nadam* cotton is grown now.

In groundnut *Saloum* has done well in some trials in the districts. This variety has also been found to be drought resistant. Among the bunch varieties *Gudiyattam* bunch is the best. Other crops on which work was in progress were *Sesamum*, castor and coconut.

In manurial experiments with potatoes cattle manure and town refuse gave good results. Investigations on chillies and tobacco were continued at Guntur. In the latter crop several crosses between local and exotic types were made. The results of manurial experiments show that the best yields are obtained with complete fertilizers with a basal dressing of cattle manure.

Research work on sugarcane was continued on an intensive scale at Anakapalle. Experiments on month-war planting was in progress in almost all the Agricultural Research Stations. In a rotation experiment at Palur which was in progress for the last ten years, the results show that it is detrimental to grow cane in alternate years and that it is economical to grow it once in three years, while good yields are obtained by growing it once in four years. In manurial experiments at Samalkota, Ammonium sulphate by itself or in combination with oil cakes gave higher yields of cane than oil cake alone, and at Palur ammonium sulphate was found superior to sodium nitrate when used alone or in combination with oil cakes. The best yields were obtained when potash and phosphates were added to 200 lb. of nitrogen in the shape of oil cakes and ammonium sulphate.

A number of soya bean varieties were under trial in almost all the Agricultural Research Stations. Experiments on the crossing of the common vegetable crops were in progress, and a successful intergeneric cross between snake gourd (*Trichosanthes anguina*) and bitter gourd (*Momordica charantia*) has been made at Anakapalle. Trials of strains and varieties of red gram (*Cajanus indicus*) Bengal gram (*Cicer arietinum*) and sunnhemp (*crotalaria*) were in progress.

Research on fruit cultivation continued to receive increased attention. Systematic study of varieties of plantain was taken up at Coimbatore. Manurial experiments at Kallar show that a completely manured crop matures earlier and yields more. Research on the preparation of plantain figs was continued at Aduturai and Samalkota.

The study of indigenous fodders was in progress at Coimbatore. In comparative trials of sorghum and *cambu* as fodder crops at Coimbatore, *cambu* gave double the yield of cholam. Work on the selection of suitable fodder strains was in progress at Nandyal and Koilpatti. Teosinte and *Pillipesara* (*Phaseolus trilobus*) were grown with success at Hosur. Ensiling of hill grass was successfully carried out at Pattambi.

Implements. A series of experiments carried out since some years past have resulted in the design of a Persian wheel water lift of high efficiency, which can be used for any depth. A bullock cart fitted with pneumatic tyres was under trial. Testing of ploughs, seed drills, mhote wheels, cane crushers, centrifugals, etc., were in progress.

Livestock. The cross bred herd has been considerably reduced and the cows are served by *Scindhi* bulls to breed back to the country herd. Work on *Scindhi*

and *Kangayam* cattle were continued at Hosur. Different breeds of poultry were maintained.

Entomology. Intensive studies were carried out on the cotton boll worm, hairy caterpillar pest, and pests on vegetable crops. Special attention was devoted also to the study of natural enemies of important crop pests. Work on bees and eri silk worms was continued.

Mycology. Seed treatment with fungicides has been found to be effective in checking foot-rot of rice plants. In sugarcane P. O. J. 2878 and Co. 335 were found to be free from mosaic. The burning of trash on the seed bed prior to sowing was found to be the cheapest and the most effective method for controlling the 'damping off' disease of tobacco seedlings.

Trial Plots. In rice *Potti Akkalu* and *Potti Basangi* yielded 40 and 25 per cent more than local varieties in the I Circle. In Kistna delta strain No. 1745 gave 30 per cent increased yield. Three strains from Aduturai tried in II and V circles fared better than local varieties with 20 to 25 per cent increased yields. Five strains from Pattambi tried for the first time in the district trials proved distinctly superior.

In *ragi*—E. C. 593 established its superiority over local varieties in the IV, V and VIII Circles.

A strain of *Karunganni* cotton No. 2622 has been put under district trials in the VI Circle. Cambodia cotton trials in I circle were very satisfactory.

In Vizagapatam, Co. 213 sugarcane gave an increase in jaggery of 36 per cent over the local red cane. In varietal trials P. O. J. 2878 gave the highest yield of 51.78 tons of cane per acre, and Co. 281 was the next with 46 tons. In the IV circle Co. 213 and Co. 281 proved better than Fiji B. In the VIII circle Co. 213 and Co. 290 established superiority over local varieties.

Demonstration. The demonstrations consisted of specific items of improvements on crops, manuring, cultural operations, and manufacture of jaggery with improved cane crusher and furnace. One Hundred and Ninety seven exhibitions were held and 497 agricultural lectures were delivered during festivals, fairs, conferences, etc. The three motor van exhibition units toured all the districts except the Guntur Circle and the Nilgiris. Officers of the Industries, Fisheries Veterinary, and Public Health Departments accompanied the vans and participated in the exhibitions and demonstrations.

Good progress was made in Vizagapatam and Tanjore in the reduction of seed rate of rice, and planting single and double seedlings. Growing turmeric on ridges was advocated in the II circle. In sugar cane cultivation, deep ploughing, line planting, trenching and wide spacing were introduced. The drill sowing of *karunganni*, and line sowing of Cambodia cotton were continued to be advocated in the VI and VIII circles. There was a general increase in the extent of cotton seed farms and in the sale of improved seeds in the different tracts. A Demonstrator was deputed to the Laccadives to demonstrate improved methods of coconut cultivation. There was a remarkable progress in the distribution of improved strains of rice seed. Strain G. E. B 24 has spread widely in Bellary, Malabar and Periyar tract. *Ragi* strain E. C. 593 did very well in both seasons in North Arcot Salem and Coimbatore districts. Sorghum strain N. 23/10 is spreading in the Nandyal valley, and strain A. S. 1543 has given increased grain yields in Salem and Coimbatore. The extension of sugarcane cultivation received a great stimulus this year; it was not possible to meet the demand for seeds fully. The area under Co. 213 is on the increase in the Circars. About 350 improved furnaces were constructed and over 500 demonstrations on the method of preparing good jaggery were arranged.

Special attention was paid and assistance given to ryots in matters connected with the lay out of fruit gardens and their proper maintenance.

There was a steady increase during the year in the number of demonstrations with improved implements, the total number being 9,585. 2,516 iron ploughs and about 250 other agricultural implements and machinery were purchased by the ryots.

There were 83 bulls under premium scheme and in addition there were 117 bulls at stud including those at Agricultural Research Stations, Jails and Veterinary Hospitals. A large number of eggs and chicks of good breeds of poultry was supplied to the ryots.

Loans amounting to Rs. 12,220 were granted to ryots for the purchase of agricultural implements.

There was fair progress in the adoption of improved methods of conserving cattle manure. The conversion of night soil into poudrette was demonstrated wherever there were the requisite facilities. 211 tons of green manure seed was distributed through the departmental agency.

The application of sulphur dust for smut on sorghum was continued with success. 115,000 arecanut trees in Malabar were sprayed with bordeaux mixture to save them from "Ma'ali" disease. Control measures against sugarcane flies in South Arcot district and thrips on chillies in the II and VI circles received special attention.

Large quantities of seeds of cotton, rice, and green manure, artificial manures, and implements were sold to ryots through Co-operative Societies and Agricultural Associations.

Legislation. The Cotton Ginning and Pressing Factories Act and the Cotton Transport Act continued to be in force during the year. The Cotton Control Act prohibiting the cultivation and *Pulichai* (*G. neglectum*) cotton and its sale was enforced in Madura, Ramnad, and Tinnevely districts. The Agricultural Pests and Diseases Act III of 1919 continued to be in force in respect of diseases and insects affecting Cambodia and Panchanadan cotton, groundnut, palmyra palms, and also for the eradication of water hyacinth.

Publications. 13 Leaflets, 2 Notes and 6 Bulletins were published by the department. The third revised edition of the Manual of Elementary Botany by Dewan Bahadur K. Rangachariar was published during the year. 57,800 copies of the villagers calendar were printed in the different languages.

Statistics. The scheme of Economic Enquiry into the cost of production of crops in the principal sugarcane and cotton tracts financed by the Imperial Council of Agricultural Research was commenced from April 1934.

M. A. S.

Gleanings.

Ultra-Violet Ray Apparatus for Trapping Insects We heartily thank M. Vitali Menasche, the French scientist for the kind demonstration of his ultra-violet ray apparatus to the students of our college. The apparatus is used for catching insects of different orders. It can be fitted with different types of quartz tubes which work on mercury vapour principle. The insects are attracted even from a distance of 7 miles and are drawn inside a wire gauze basket by suction fan. Afterwards these insects can be killed by crushing or by hydrocyanic acid gas. (*Poona Agricultural College Magazine*, Vol. XXVI, No 2, Sept. 1934).

Cochin as Tea Blending Centre. As the tea which is sold to the British Isles and to European countries is blended tea, a suggestion has been put forward by a European business man in Ceylon that an attempt should be made to make Colombo a tea blending centre by the admission of teas of other countries free of duty. It is pointed out that tea blending as carried out in London involves considerable expense, which is passed on to the consumer. The question is therefore raised whether Colombo, owing to its central position between the North and South Indian, Java and Sumatra tea-producing areas, cannot become a tea blending centre. The argument against the proposal is that pure Ceylon tea will lose that reputation for the maintenance of which the Ceylon Tea Propaganda Board spends twenty lakhs of rupees annually.

The suggestion, though it may not be practicable in Ceylon, can be adopted with profit, it is believed, by an Indian port like Cochin. As Cochin is as centrally situated as Colombo, between the Eastern tea producing countries and the West, and, as it has no reputation to uphold with regard to tea, an attempt to make Cochin a tea blending centre is worthy of serious consideration by capitalists. Apart from the wide field of employment which will be opened up for the people of Cochin, the industry, when established, would make more steamers call at that Port to bring tea from other countries and also take it away for distribution. It must be noted that the greater portion of the tea consumed in the West is blended tea, and that there need not be any fear about a market, especially as under the present tea restriction scheme, the supply is restricted. One great advantage that India will have over the West would be the great saving in labour expenses.—(Commerce). (*The Planthers' Chronicle*, Vol. XXIX, No. 21, October 20, 1934).

Dholi. Redgram pigeon plas (*Cajanus Cajan Zinu Millsp.*) contain high amounts of the important amino acids, arginine and lysine. (*Philippin Agriculture*, September 1934).

Home Universities and Institutions. Cambridge University. Up to the outbreak of War, agriculture at home and in many tropical areas was so comfortably placed that it could offer the possibility of a career to young men of common sense and energy, but without special knowledge. To-day, common sense and energy must be backed by sound training not only among those seeking specialist appointments, for example, in mycology or soil science, but also in those who are to farm themselves or to manage or guide the farming of others. The range of sciences and the practical knowledge which training for various kinds of agricultural work should include are now matters of general agreement. It has come to be realised, also, that on the land, no less than in the factory, labour, marketing, financial policy, the inter-action of one product or one country upon another, and many other problems of this kind, lie at the root of success. But over and above knowledge of this kind a student, if he is to become a successful farmer, planter or tropical agricultural officer, must possess a "business sense," in other words an instinct for quickly perceiving opportunities and possibilities, a faculty of the imagination rather than of reasoning. While no course of instruction, however, "practical," can create this sense in a man born without it, sound training can develop and encourage it where it already exists, and it may be of interest to describe here one step that is being taken in this direction at Cambridge with a view to giving due, but not excessive, prominence to this aspect of the training of those who intend to adopt an agricultural career.

During the past four years in the School of Agriculture at Cambridge, there has been maintained for graduate students including all those destined for cotton-growing countries—a system of excursions known unofficially as the

"Beagles". A cross-country route of some five to six miles is selected by members of the Staff. These, representing practical agriculture, soil science, botany, and other branches, carefully reconnoitre the route in advance, selecting it to illustrate points of cardinal importance and seasonal interest. The "Beagles," proceeding to the starting-point by bus or bicycle, according to the distance, go over the route, setting out immediately after an early lunch and finishing when darkness comes on, with tea at the inn from which the expedition started. The main purpose is to encourage students;

(i) To decide by observation, inspection of soils, examining the crops, and in any other appropriate way, what are the inherent agricultural characters of the area, e.g., soils, drainage, etc., and also its business advantages, e.g., accessibility of roads, water supply, etc.

(ii) To form an opinion of the use to which these inherent possibilities are in fact being put by the occupiers of the land.

(iii) For one or more of the farms of the area, to work out the general policy of crops and stock, to determine the sources of income and expenditure, and the general success achieved.

(iv) To suggest changes or developments remembering the economic circumstances concerned.

(v) To call attention by questions to any matter of interest, e.g., a fungus, an implement or a cultivation, which they do not fully understand.

(vi) To work out a number of specific problems, e.g., the treatment required for a field in bad condition.

Men in training for specialist appointments, e.g., cotton breeders, go out also with the "Beagles." Their special knowledge often contributes points of interest to the others. Further they themselves are brought into close contact, as every specialist should frequently be, with the practical and business aspects of the industry to the progress of which it is their duty to apply their scientific knowledge.

Sometimes a short lecture on the area to be traversed is given on the previous evening, particularly if the type of farming or the economic circumstances are unusual.

During the past three years the Farm Economics Branch of the School of Agriculture has been making a Farm Management Survey of the Eastern Countries. From this are now known the average values, in the various component areas, of capital per acre, of gross out-turn per acre, and so on, while tests of efficiency such as "gross output per £ 100 of manual labour," "livestock output per £ 100 foods" and "gross output per £ 100 farm capital" can also be applied. A study of the farms by "beagling" over them in relation to economic data of this kind is found to promote in men reading agriculture a lively sense of the importance of treating agriculture as a business—as "the production of crops and stock for profit". (*Empire Cotton Growing Corporation—Report of the Administrative Council of the Corporation submitted to the Thirteenth Annual General Meeting on June 14th, 1934*).

Geochemistry of Living Matter. Sixty of the chemical elements have already been found in living organisms, and there are good reasons to expect that the remaining ones will also be discovered in them.

Certain organisms can be regarded as accumulators of definite elements; for example, ants accumulate manganese Lycopodiaceae accumulate aluminium, etc. An extremely interesting graph constructed by Vinogradov demonstrates that the chemical composition of living matter can be regarded as a periodic function of the atomic weights of elements, and the periods go mainly in sixes, so that every sixth element has a special importance for organisms. Further, it appears

that organisms most ancient geologically (such as bacteria, Foraminifera, etc.) are able to concentrate a much wider range of elements, while the range of elements concentrated by the highest modern organisms (Aves, Mammalia) is very much restricted.

Another point of interest is the conclusion reached after a study of several species of *Lemna*, which proved to possess each a definite chemical composition, while the variation within each species was very small. Hence it appears probable that the quantitative chemical composition is a specific character. (*Nature*, Vol. 134, No. 3375, July 7, 1934, pp. 11-12),

Research Notes.

Striped Plants in Sorghum.

In the course of work on sorghum at the Millet Breeding Station, stray plants with white or yellow striped leaves have been occasionally met with in different varieties. Striping is visible from the seedling stage onwards and is generally present in all the leaves including the flag. Stripes are either white or greenish yellow. In white striped plants, the stripes on the earlier leaves are white, those on later leaves being of a creamy colour turning white later. These stripes, which may be one or more, extend from the base of leaves to the tips. Individual stripes vary in width from a fine streak to more than half the leaf's width. Where the stripes are clear and prominent, they can be traced to the leaf sheaths also, but those on the sheaths are not as well marked as on the leaf blades.

In a few cases striping is observed only in a few leaves in the seedling stage, the later leaves showing no visible traces of it. Two such plants carried forward gave no striped seedlings, one of them not even in the second generation.

In one instance a plant was met with in which one half of the leaf blade, in every one of the leaves, towards one side of the plant, was white, as also the corresponding half of the leaf-sheaths. The plant was less vigorous than the rest and was two leaves less than the average of the family. The white halves of the leaves were narrower than the green halves. The plant grew up but gradually dried up prior to heading. The main shoot being dead four tillers were produced, two albino and two like the main shoot. These shoots also shrivelled up, and this chimera could therefore not be pursued in later generations. This seems to be an instance of sectorial chimera somewhat similar to the one noted in maize by Khadilkar in the *Journal of Heredity*.

Striped plants in which the chlorophyll deficient areas predominate have a slow growth and meet with an early death.

Striped plants were less vigorous in growth compared to full green plants from the same family. They had fewer number of leaves. They were late in flowering also. In three cases recorded in one year the striped plants were one week later in flowering than adjacent green plants:—

Family No.	Flowering date	
	Green plants	Striped plants
A. S. 61	13-11-29	19-11-29
„ 63	8-11-29	15-11-29
„ 2536	28-10-29	4-11-29

Seeds from striped plants when sown gave three kinds of seedlings, green, striped and albino. Striped plants were few. Green and albino plants were

roughly parallel to the manifestation of albino areas on the leaf of the parent plant. In one instance where the striping was faint only a few albino seedlings appeared and none striped.

The ear-head of sorghum is loose and spindle shaped. There are many whorls with varying number of seed branches. These branches vary widely in the number of seeds. These facts militate against a clear pursuit of longitudinal zones in the ear-head. With these limitations panicle branches were separated and the seeds sown in 1931, and the indications are that a localisation of non-albino and albino throwing areas could roughly be made out on the ear-head, an experience similar to the one elaborated recently by Karper in the Journal of Heredity.

Agricultural Research Institute }
Coimbatore. }
17-11-'34. }

G N Rangaswami Ayyangar.

M. A. Sankara Ayyar.

Correspondence.

Graduate Farmers.

Mr. S. V. Doraiswami writes :— Practically all the graduates of the Coimbatore Agricultural College have sought employment under the Government, firms or other bodies apart from those who are actually unemployed at present. It is a redeeming feature to know at least two of them have taken to independent farming and are now full-fledged farmers. Given below are some details about these graduates.

Mr. B. V. Venkatacharya, who belongs to the batch of graduates of the year 1929, is an Inamdar in Alakere village, Mandya. Mysore State. After two years service in the department to gain experience, he resigned and took up cultivation of about 15 acres under the Irwin Canal system. He has been growing improved types of sugar-cane and paddy besides trying other garden crops like wheat, onions, garlic etc. Last season he planted three acres of cane (H. M. 320) on a slightly black alkaline soil, five acres of paddy (G. E. B 24) and three acres of groundnut (H. G. 1). The yield of cane was about 25 tons per acre, the whole of which was sold to the Mandya sugar factory at Rs. 12 per ton. The paddy crop gave 2160 lb. per acre. During the current season he has planted about 9 acres of cane on a red loam and hopes to get a much better yield.

Mr. G. Mahadevan belongs to the 1933 batch of graduates and has to be congratulated on his enterprise in obtaining about 12 acres of uncultivated land on the Nilgiris, 2 miles off Kotagiri town, in a rather isolated place. Within the short space of one year he has been able to clear about 7 acres and plant tea on the improved method with proper contour drains, etc. He proposes to plant fruit trees in portions alternating with tea, the shade trees of the latter serving as wind-belts. In one of the hollow valleys there is a spring which can supply water for irrigation throughout the year, for about one to two acres. In this portion vegetables like cabbage, cauliflower etc. are grown. He is also trying Saffron, seeds of which were got from Kashmir. He proposes to grow potatoes and it is interesting to hear that last season he supplied our college hostel some bags from his limited crop. He has turned out to be a typical hardy planter and has just finished construction of a small house on the estate where he proposes to live. His estate is reached by getting down at about the 12th mile on the Coonoor-Kotagiri road and walking along for about a mile past Mullasingh's estate. Mr. Mahadevan has invested up till now about Rs. 3000 including the cost of land which was purchased at Rs 50 per acre.

It will be very interesting to have from these farmers more details about their experiences and a profit and loss account now and then. It is suggested that they may kindly communicate to the editor of this journal (both of them

being members of the M. A. S. U.) whenever they think they have interesting facts to be published for the benefit of the readers.

It is not unlikely that many of the graduates of this college, either employed or unemployed, could command some capital with which they should have started independent farming and thus leave greater chances for their less fortunate brothers to enter into service or get other employment. There are still portions of uncultivated land on the Nilgiris which could be got at reasonably low prices and with small investment of capital and gradual improvement, good profits could be had, particularly by growing potatoes. The parents of some of the employed and unemployed graduates do possess holdings of decent size but the enterprise, enthusiasm and confidence are lacking. It is hoped the example of the above two graduates would serve to give due encouragement and instil courage in others who may be still wavering. The Agricultural Department will only be too glad to help them in every way.

Besides regular farming there seems to be good scope for our graduates thriving in the manure business on the Nilgiris. The total annual demand for manures for the potato crop is estimated at about a million rupees. With a small capital, I am told, one can manage to get enough personal credit to do good business and secure from Rs. 600 to Rs. 1000 net profit per year. This line of employment is worth exploration by our unemployed graduates.

S. V. D.

*In this connection, we commend to our readers the following views of the Government on Agricultural Education in this Presidency, as embodied in the Report on the Operations of the Department of Agriculture, Madras Presidency, 1933-34; "There was a further fall in the number of applications received during the year for admission to the Agricultural College. The final strength of class I consisted only of 40 selected candidates. No student from the Agency tracts obtained admission. The reduced chances in recent years of employment under Government for graduates in Agriculture may have accounted for this decreasing demand for Agricultural Education. If that is so, it is a matter for regret that the true object of education in agriculture has not been appreciated. The Government wish to emphasize again that the Agricultural College does not exist merely to train persons for service in the Agriculture Department. The primary aim is to provide agricultural instruction of a type which will equip the students for the profession of agriculture, and enable them to direct their own labour on their own lands. The College estate comprises over 300 acres and is representative of a variety of soils, black cotton, red soil, loamy soil, garden lands of varying fertility and wet lands; and the college farm exhibits a variety of crops and agricultural conditions. The college gives a thorough practical training suitable for students from all parts of the Presidency and it is hoped that the *raison d'être* of the college particularly in this aspect will be more and more understood and that students who have been trained in modern methods of agriculture will apply the knowledge so acquired to increasing the value of their lands and enhancing their crop returns."*

(Ed. M. A. J.)

College News & Notes.

Students' Club. The Inter-tutorial Cricket Tournament for the Tadulingam Cup conducted during the month, resulted in a win for Mr. Sundararaman's wards. Ramnatha Rao for the winners was consistent right through and in the decisive match between Mr. P. V. Ramiah's wards and Mr. Sundara Raman's wards. He scored a brilliant 142, out of 171 and enabled his side to win by one run.

The preliminary rounds in the Inter-tutorial Hockey Tournament have all been played and Mr. P. V. Ramiah's wards and Mr. S. Sundara Raman's wards have come to the finals.

A foot-ball match played with the Government College resulted in a draw of one goal all.

Association of Economic Biologists. Under the auspices of the above association visits were arranged to the Paddy Breeding Stations and to the Millet Breeding Stations on 4th and 11th November respectively.

These visits were greatly enjoyed and appreciated by all the members who were taken round by the hosts and had all the experiments explained to them.

Changes amongst office-bearers of the Union. Consequent on the resignation of Mr. M. Rajagopala Iyer, Mr. K. Ramaswamy, B. Sc. Ag., Member of the Managing Committee has been elected as Treasurer. In Mr. K Ramaswamy's place Mr. V. T. Subbaya Mudaliar has been elected as a Member of the Committee.

Personal. Mr. T. R. Narayanan, B. Sc. Ag., B. A. (Cantab) returned from England and joined duty under the Cotton Specialist

Indian Academy of Sciences, Bangalore. To the list of fellows given in the last number, the following are to be added:—

Rao Bahadur B. Viswanath, Imperial Agricultural Chemist, Pusa; Dr. T. R. Seshadri, Andhra University, Waltair; and Dr. J. S. Patel, Oil-seeds Specialist, Coimbatore.

Weather Review (OCTOBER—1934)

RAINFALL DATA

Division	Station	Actual for month	Departure from normal	Total since January 1st	Division	Station	Actual for month	Departure from normal	Total since January 1st	
Circars	Gopalpore	6.0	-2.0	42.0	South	Negapatam	13.3	+2.9	26.0	
	Berhampore*	3.3	-5.4	32.0		Aduthurai*	11.0	+2.0	25.6	
	Calingapatam	3.5	-3.6	24.6		Madura	9.9	+2.1	21.9	
	Vizagapatam	5.4	-1.7	29.0		Pamban	13.3	+4.2	25.9	
	Anakapalli*	3.1	-4.4	31.1		Koilpatti*	9.6	+1.9	22.4	
	Samalkota*	7.5	-1.5	33.7		Palamkottah	11.2	+1.4	23.3	
	Maruteru*	6.9	-2.5	27.0						
	Cocanada	9.3	+1.5	36.2						
	Masulipatam	5.7	-2.4	27.4		West Coast	Trivandrum	8.1	-2.5	49.7
	Guntur*	5.1	-0.5	31.8			Cochin	15.6	+2.4	94.8
Ceded Dists.	Kurnool	0.8	-2.6	18.3	Calicut	12.6	+2.5	101.7		
	Nandyal*	1.2	-2.8	25.3	Pattambi*	15.2	+3.5	85.5		
	Hagari*	2.3	-1.0	13.2	Taliparamba*	11.1	-0.1	126.6		
	Bellary	5.4	+1.5	13.4	Kasargode*	6.9	-2.6	118.4		
	Anantapur	1.5	...	8.8	Nileshwar*	6.8	-2.6	123.2		
	Cuddapah	4.6	-0.3	20.1	Mangalore	7.7	0.3	114.7		
Carnatic	Nellore	10.8	+2.4	17.5	Mysore and Coorg	Chitaldrug	9.7	+5.4	26.2	
	Madras	16.8	+5.1	32.6		Bangalore	9.2	+3.1	23.5	
	Palur*	30.4	+22.4	46.1		Mysore	15.0	+8.5	32.6	
	Palakuppam*	14.4	+4.9	32.8		Mercara	8.1	+0.3	107.4	
	Cuddalore	23.7	+12.6	42.0						
Central	Vellore	16.7	+9.3	33.2	Hills.	Kodaikanal	9.7	+0.1	48.8	
	Hosur cattle farm*	10.7	+4.8	22.5		Coonoor	18.2	...	45.7	
	Salem	12.5	+5.8	30.8		Ootacamund*	11.2	-0.6	39.0	
	Coimbatore	8.0	+0.6	18.5		Nanjanad*	6.3	-1.3	37.6	
	Coimbatore Res. Inst.*	8.8	+3.0	19.5						
	Trichinopoly	8.3	+1.3	19.6						

* Meteorological Stations of the Agricultural Department.

Summary of General Weather Conditions. The weather during the month is characteristic of the transition from the South West to the North East monsoon. The South West monsoon withdrew from the Peninsula on the 5th and from North East India and Burma on the 7th. With the withdrawal of the monsoon there have been nearly general thunderstorms in the Madras Presidency, Mysore and Malabar. The North East monsoon set in in the South Bay of Bengal on the 20th and strengthened in South East Madras on the 24th causing general rain in South Madras.

Three depressions appeared during the month causing widespread rain in different parts of the country. The low pressure waves which was observed on the 29th September, intensified into a deep depression off the Chittagong coast on the 2nd, its centre lying near Cox Bazaar. After causing widespread rain in the Assam, Central Provinces and along the Chittagong coast, it got filled up on the 4th. Unsettled conditions appeared in the Bay on the 10th, developing into a deep depression on the 14th off the Circars coast. Causing widespread rain on the Circars coast, it moved inland on the 15th at Balasore and on the 17th got filled up after causing general rain over North East India. A low pressure wave formed in the South West Bay on the 27th, crossed over South Madras, Malabar and Canara causing widespread rain in the Peninsula.

Three Western disturbances affected the extreme North on the 9th, 18th and 27th causing a few showers in Kashmir and Murree hills.

Rainfall was markedly above normal in Carnatak, Mysore, Central and South Madras and defective in the Circars and Ceded districts. Minimum temperature was below normal in and around the central parts of the country after the 24th.

In South India heavy rainfall for 24 hours was received at the following stations:—

1. Cranganur (Cochin) on 9th.	...	...	57"
2. Neriamangalam (Travancore) on 11th.	...	...	75"
3. Palur on the 29th.	...	...	69"
4. Ponneri (Chengleput) on the 30th.	...	...	82"
5. Kurinjipadi (South Arcot) on the 31st.	...	...	53"

Weather Report for the Research Institute Observatory :

Report No. 10/34.

Absolute Maximum in shade	94° F
Absolute Minimum in shade	68.5° F
Mean Maximum in shade	88.7° F
Departure from normal	+ 0.9° F
Mean Minimum in shade	71.3° F
Departure from normal	+ 1.1° F
Total Rainfall	8.78 inches.
Departure from normal	+ 3.03 "
Heaviest fall in 24 hours	2.25 "
Total number of rainy days	10
Mean daily wind velocity	2.8 M. P. H.
Mean Humidity at 8 hours	81.1%
Departure from normal	+ 2.2%
Total hours of Bright Sunshine	184.7
Mean daily hours of Bright Sunshine.	6.0

General Summary. The North East monsoon has given good precipitation. Rainfall is in excess of normal by 3.03". Humidity also is above average.

Departmental Notifications.

D. A.'s Office Orders. The following promotions in the subordinate service of the Agricultural section are ordered with effect from the dates, noted against each:— Mr. L. Narasimha Acharya and Mr. K. W. Chakrapani Marar from II to I grade from 8—6—33 Mr. K. Ramanujacharya from III to II grade from 8—6—33; Messrs. K. Gurumurthi, K. S. Ramana Rai, M. Chinnaswamy Naidu, T. Ranga-
brahma Rao Naidu, C. S. Krishnaswami Ayyar and R. Govinda Rama Ayyar from V to IV grade from 1—5—33; Messrs. P. Narayanan Nair and V. Satagopa Iyengar from V to IV grade from 3—1—34. The upper subordinates mentioned below will continue to officiate in the respective vacancies shown against each:— Mr. L. Krishnan from 17—10—34 to 22—12—34 vice Mr. K. T. Bhandary on leave; Mr. K. C. Thomas from 15—9—34 to 16—9—34 vice Mr. A. M. Muthayya Nattan on leave; and from 17—9—34 to 14—4—35 vice Mr. V. Suryanarayana on leave; Mr. Ch. Venkatachalam from 5—10—34 to 21—11—34 vice Mr. S. V. Ramachandran on leave; the officiating appointment of Mr. M. L. Balasundaram as Assistant, Paddy Section will terminate on 31st October 1934. He is transferred to the Agricultural Section with effect from 1st November 1934 and appointed to officiate as Farm Manager, Agricultural Research Station, Maruteru, till 23rd January 1935 vice Mr. T. Lakshmipathi Rao on leave. The following provisionally substantive promotions of upper subordinates in the Agricultural section are ordered with effect from the dates noted against each:— Mr. K. T. Bhandary from II to I grade from 3—1—34; Mr. K. Gopalakrishnaya Naidu from III to II grade from 3—1—34, Mr. T. G. Ananta Rama Iyer from IV to III grade from 3—1—34, Mr. M. Gopala Chetty from V to IV grade from 3—1—34 and Mr. P. Kesava Unni Nambiar from V to IV grade from 4—6—34. Mr. M. Bhavani Shankar Rao, whose officiating appointment as upper subordinate, Agricultural Section ceased on 23rd October 1934 will continue to officiate from 24th October 1934 to 6th December 1934 vice Mr. K. Jaganatha Rao on leave. He will continue to work as Farm Manager, Agricultural Research Station, Kasargod. The following officers in the Madras Agricultural subordinate service will retire from public service with effect from the dates noted against each:— Mr. T. R. Venkaswami Rao, A. D., Tiruvalur from 16—5—35, Mr. T. S. Venkatarama Iyer, A. D., Palni, from 16—7—1935. Mr. M. Ramaswami Pillai, Sub Assistant from 16—9—1935. The following transfers of Assistants in the Entomology section are ordered:— Mr. M. S. Subbaya, Assistant, on completion of special duty in connection with chillies thrips Experiments in the Madura District to be Entomology Assistant in the VI circle with headquarters at the Agricultural Research Station, Koilpatti. Mr. K. Brahmachari, Assistant, Coimbatore, to V circle with headquarters at the Agricultural Research Station, Aduturai, consequent on the grant of leave to Mr. M. Rajagopala Iyer, Assistant Lecturer in Chemistry, Agricultural College, Coimbatore, the following officiating arrangement is ordered to take effect forthwith:— Mr. T. Varahalu, Assistant, Chemistry Section, to officiate as Assistant Lecturer in Chemistry, Agricultural College, till further orders.

Postings and Transfers:— Mr. S. Muthuswami Iyer, F. M., Palur to be A. D., Tirutani. Mr. E. Achyutan Nair, A. A. D., Tirutani to be A. A. D., Kallakurichi, on relief by Mr. E. Achyutan Nair, Mr. K. B. Vydeswara Iyer, A. D., Kallakurichi to be F. M., Kalahasti vice Mr. V. Suryanarayana, granted leave. After expiry of leave granted to Mr. C. S. Madiah will report himself for duty at the A. R. S. Taliparamba as Senior Farm Manager. The following transfers of the executive subordinates are ordered:— Mr. A. Krishnaswami Iyer, A. D., Koilkuntla, to be A. D., Kurnool, Mr. M. Narayana Iyer, A. D., Kurnool, to be A. D., Koilkuntla,

Mr. R. Anantapadmanabha Pillai, A. D. on completion of the special duty on the investigation of the village consumption of cotton, to Tenkasi as A. D., Tenkasi. Mr. T. V. Ayyaswami Iyer, A. A. D., Tenkasi, to Tirutani (Ramnad District) Mr. P. Satyanarayana, A. A. D., Kadiri, posted for the Vanduty for a month in the Anantapur District from the 15th November 1934. Mr. G. Konda Reddy, Offg. Assistant Millet Section, Guntur, on relief by Mr. T. Narayana Rao, on 19th November 1934 is transferred to Nandyal to officiate as Cotton Assistant vice Mr. C. Jaganatha Rao on leave. The following postings of upper subordinates in the Science Section are ordered :— Mr T. R. Narayanan on return from leave will join duty under the Cotton Specialist, Coimbatore. Mr. D. S. Rajabhushanam, officiating Assistant, Millet Section, will, from the date on which Mr. T. R. Narayanan, rejoins duty continue to officiate vice Mr. P. Seshadri Sarma on other duty in the Dry Farming Scheme. Mr. T. Venkataramana Reddy, officiating Assistant to continue to officiate vice Mr. T. Varahalu on other duty in the Agricultural College. He will however, continue to work in the Millet Section, on the expiry of leave Mr. S. V. Ramachandra Iyer A. D. is posted to Sathur to assist the A. D., Sathur in enforcing the Cotton Central Act, against sowing, growing or handling Pulichai Cotton.

Leave :— Mr N. M. Bhukta, A. A. D., Vizianagaram l. a. p. for 2 months from the date of relief Mr. P. V. Sambasiva Rao, A. D. (on leave) granted an extension of leave on M. C. for one month in continuation of 2 months leave already granted with effect from 13—8—34. Mr. T. D. Eswara Iyer, A. F. M. Sim's Park, Coonoor, l. a. p. for four months from 1—12—34. Mr. M. Rajagopala Iyer, Assistant Lecturer in Chemistry, granted leave on M. C. for one year from 23rd October 1934 made up of :—l. a. p. for 8 months from 23rd October 1934 and leave on half average pay for four months in continuation thereof. Mr. T. V. Srinivasacharlu, A. A. D., Villupuram, l. a. p. for four months from 3—1—1935 with permission to prefix Xmas and New Year holidays. Mr. G. Sitarama Sastri, A. D., Vinukonda, l. a. p. on M. C. for 4 months from 5—11—34.

