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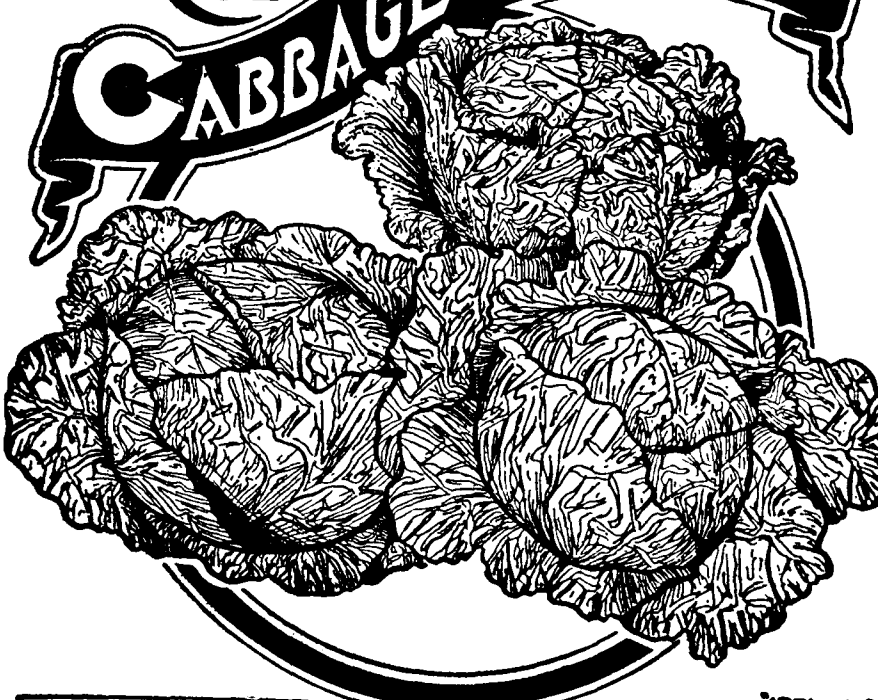
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PADDY CULTIVATION IN THE SALINE LANDS OF MALABAR

By E. K. GOVINDAN NAMBIAR,
Agricultural Demonstrator, Tellicherry.

In parts of N. Malabar, the mouths of streams are so formed that where there is lowlying ground, the large volume of water brought down during the monsoon spreads out just behind the bar and deposits large quantities of fine silt. These areas are subjected to tidal waves and annual inundation and can be seen between Mahe and Payanur very near or within a few miles of the coast. The soil in such areas is deep soft clay rich in organic deposits accumulated through years. The fossils of plants and shell fish suggest that these were in places submerged by the sea while there are also indications of the formation of salt pans in many places. Such areas are usually overgrown with 'mangrove formations' but in several places the land has been reclaimed and made to grow heavy crops of paddy.

Reclamation.—The scrub jungle is cleared and the area protected from the tides by big bunds often strengthened by a row of mangrove plants or even with rubble stone. A few drainage channels are made within the enclosure and communicate with the river outside through narrow wooden sluices joined across the bunds. The original laying out is a slow and costly process as often the soil for the bunds has to be brought from long distances and it may take many years before the bunds are able to stand the strong currents.

The paddy cultivation in such enclosed areas is locally known as *Kaipad* (sour land) or *Kuthiru* (heap) cultivation. The most common varieties used are *Bali* (awned) and *Orkayma* (kayma suited to saline

lands) raised during the first crop season and *Orkuttadan* grown during the second season. Of these *Bali* is the most popular and is cultivated in the main *Kaipad* enclosures detailed below.

Preparatory cultivation.—This starts in January when the area is thoroughly drained through the sluices and as soon as workable is laid out with the *mamatee* into rows of loosely heaped mounds the height of which is increased in lower situations so that the crop raised on them may stand quite clear of the normal level of water. The mounds are three to four feet in diameter and 2 to 3 feet apart at the bar. The bunds, channels and sluices are thoroughly repaired while the soil dries up and gets aerated through deep cracks and crab holes.

Sowing.—The first heavy showers in June wash down most of the salt from the mounds. This water is drained off and fresh water allowed to stand just below the top of the mounds, the crests of which are lightly stirred down to water level. Well-sprouted seeds are sprinkled over the mounds on a showery day and more water let in to submerge the mounds to a depth of about 3 or 4 inches. The seed rate may vary from 50 to 100 lbs. per acre according to the vagaries of the monsoon. On the 4th day after sowing, water is lowered and again when the seedlings are about 10 days old, fresh water is brought in to stand to about half the height of the seedlings. This process of occasional changing of water accelerates growth by the washing down of salt and by aeration. Even short spells of sun and floods may do much harm to the seedlings.

Spreading the seedlings.—In about 30 to 40 days the seedlings are ready to be spread in the field. A cloudy day is chosen and water drained off in advance. Weeds are pulled out and buried. Since the work has to be hurried through against probable floods and since the *Bali* seedlings cannot stand much disturbance, a dexterous process of chipping the mounds with a small *mamatee* to take 2 or 3 seedlings on each chip and distributing these chips in the field is adopted. In some places bigger chips are cut and thrown about by men while the final distribution is done by a band of women coolies. The work is done with such thoroughness that the field is again brought to its original level condition with the seedlings distributed about 6 inches apart. Water is now allowed to stand to about half the height of the seedlings which soon establish and tiller profusely.

After-cultivation.—The after-care consists only in the regulation of water and in the safe keeping of the bunds. Though the water in the river will not be saltish at this part of the year this is not let into the crop except when other sources are blocked. From the period of flowering in about September, about 2 to 3 feet of water has to be maintained to prevent lodging.

This is a very vital stage in the life of the crop and even a short spell of hot weather may do much harm. Water is drained off only after the earheads ripen, and the crop is ready for harvest—by about the middle of October. The earheads only are cut, the stubbles being left behind. The last supply of fresh water is now let in to cover the stubble and kept on till about January. The yield from such areas will be about 2,000 lbs. but may vary from 1,000 to 3,000 lbs. per acre.

One peculiar feature of this method of cultivation is that no manuring is done since the decayed stubbles, plant and animal deposits and the silt

brought down by the floods replenish the annual loss from cropping. The cost of the cultivation may vary very much with the cost of repairs to the bunds, sluices, etc. But in normal years the labour requirements will be about 100 men and 50 women per acre. This may appear very cheap and paying, but the occasional breaches of the bunds may wipe off the profits of many years. The yields are very unsteady though they may occasionally be heavy.

There are a few sources of subsidiary income from such lands. The bigger bunds may accommodate a short-duration crop of paddy or a row or two of heavy-yielding, though short-lived, coconut trees. The edges of the outer bunds give a good crop of ragi. In places where river water is let in after harvest, a variety of fish and prawns breed within the enclosure and these collected at the time of draining the fields often fetch about Rs. 10 to 15 per acre. The majority of the depressed classes, e.g. Panchamas are traditionally attached to this type of land which affords them employment not only in paddy cultivation but also in cottage industries like coir manufacture, mat-making, fishing, etc.

The outskirts of *Kaipad* lands are not conveniently enclosed by bunds and such areas are cropped with *Orkayma* which stands salinity to a greater extent than *Bali*. In this case the mounds are formed only in June and seedlings brought from high lands are transplanted on them. In another month the mounds are again dismantled as in the case of *Bali*. Subject to floods and salinity to a greater extent the yield is poorer and there will be a much higher percentage of chaff than in the case of *Bali*; but the rice is finer. The outskirts also can gradually be enclosed and converted into regular *Kaipad* lands.

In lowlying saline areas where water stands to a greater depth and for a longer period, transplanting cannot be done till about September. Such areas are also protected by strong bunds and sluices but are planted with a deep-water variety known as *Orkuttadan*. The method of cultivation is again different. With the first showers the land receives 2 or 3 ploughings with intervals of about a fortnight. The monsoon floods convert this area into a small lake and a large quantity of silt is deposited over the loosened soil. With the abatement of the S.-W. monsoon, water is drained off and after one puddling with the plough, seedlings raised in coconut gardens are brought and transplanted in big bunches about a foot apart. The excess water is drained off occasionally and one weeding is given. The crop comes to harvest in January-February and may give from 1,500 to 2,000 lbs. of grain per acre. The labour requirements per acre will be about 10 pairs of animals, 25 men, and 80 women. Unlike *Bali* and *Orkayma* the straw of *Orkuttadan* is very much valued for thatching purposes.

The high-level paddy lands adjoining *Kaipad* lands also develop a certain amount of salinity and may be rendered unfit if not attended to in time. Various methods have been evolved to keep down salinity in such areas. After the harvest of paddy the land is hand-dug and laid out into loose clods or even formed into loose ridges and furrows and levelled down only at the time of transplanting. Trenching at intervals or the replacement of the soil in the saline patches with good soil from outside, are also done occasionally. The bunds are kept high and strong against high tides while a temporary dam may be thrown across channels.

Possible lines of improvement.—Since the existing practices are evolved through age-long trials and since the yields are dependent more on weather conditions than on other factors, the scope for improvement is very limited. The introduction of better salt and flood-resistant and heavier-yielding varieties, better care in the maintenance of bunds and sluices, formation of trenches to facilitate quicker drying in the hot season, replacement of wooden sluices by reinforced concrete structures, arrangements for a fresh water supply in times of drought, systematic collection of crabs by trapping, and the incorporation of *Daincha* (*Sesbania aculeata*) or other green leaf in the case of the high-level saline lands are a few of the important items of improvement.

A portion of the saline marshes has also been reclaimed for coconut cultivation. There are still many extensive stretches of this type of land which are a hindrance to easy communication with the river, due to the thick growth of mangrove jungle which also harbour noxious creatures like crocodiles. With organised capital such areas can be cleared and converted into smiling farmsteads of paddy and coconut to support a large proportion of the unemployed and half-starved population of Malabar.

MADRAS MILKMEN

By P. K. KRISHNAN NAMBIYAR,

Assistant Agricultural Demonstrator, Live Stock, Veterinary College, Madras.

In Madras city, there are several types of men who maintain milking cows, either for commercial purpose or for their own consumption of milk and these can mainly be classified as:—

1. Private cow owners,
2. Milk contractors and rich milkmen,
3. Average milkmen,
- and 4. Poor milkmen.

1. *The private cow owners* are men who maintain milch cows for their own use and many permanent officials and well-to-do residents of this city are forced to keep one or two milch cows of their own in their backyards to provide them with pure milk.

2. *Milk contractors and rich milkmen.*—These are well-to-do men who take contracts for supplying milk to several institutions like the General Hospital, Mental Hospital, Maternity Hospital, etc., and to some of the prominent coffee hotels in the city. Some of these contractors do not possess cows of their own but they receive milk from the milkmen and supply it to the party concerned. Some rich milkmen are both contractors and cow owners. Both the above parties get their work done by coolies and they supervise and take the profit. Such men are very few in this city and can be counted on one's fingers.

3. *Average milkmen.*—These are the professional milkmen, who supply milk to the Madras city in general and are many in number in each locality. They adjust themselves in different streets of the city to suit their conveniences and facilities in carrying on their business. In certain cases the

milkman will have to hire out accommodation both for himself and for his cattle. The number of cows owned by him varies from 4 to 8 and sometimes 9 or 10 mainly managed by himself, his wife and children. In certain cases, if the children are very young, he engages a cooly for sometime to help him in carrying on business, but when his first child reaches the age of 6 or 7 years, he dispenses with the services of the cooly and manages without any additional expense. About 50 per cent of this class are illiterates and have their own ways and scruples.

4. *Poor milkmen.*—These are of the same type as mentioned above and the number of cows owned by them varies from 1 to 4 each. They are financially very poor and addicted to drink as well. Hence, the major portion of their daily earnings is mainly spent on that extravagant luxury. In some cases they do not even provide shelter for their cows during inclement weather, mainly because they cannot afford to do it. In certain cases, some do not even feed their cows properly, even though they extract every drop of milk the cows can give.

In both the above classes, especially among poor milkmen, many youths have not much to do at home, except milking cows, selling milk, etc. for a few hours in the morning and evening. Every other work, such as feeding, watering, cleaning stalls, etc. of these milch cows is done by female folk. Very often one is likely to find many youths of these classes loafing about the streets or picking up quarrels with one another for trivial things throughout the day. A sort of idle and easy-going life has been created in them by their profession which is more or less being carried on from generation to generation. To have plenty of leisure they keep only milch cows throughout the year, so that the maintaining of dry cows and calves might not engage their full time and attention for a successful rearing of stock. Their only business and aim in life is to milk the cows and sell the milk to their regular customers and make as much money out of it as possible for their living. They adulterate milk to the fullest extent if the customers happen to purchase milk from their houses or if they are a little bit slack in supervising the milking.

Milch cows in this city can be broadly classified under 3 main groups; and they are:

1. Crossbreds,
2. Ongoles,
- and 3. Locals.

The first group, i.e. the crossbred cows, do not seem to suffer much at the hands of these people, due to the following reasons. The first thing is that they form only about 25 per cent of the milch cows in this city at present, and among them many being too costly are beyond the reach of an ordinary milkman. Secondly there is no source of getting them on part-payment or credit system. The third and the most important factor is that they come into heat every month and even if the milkman overlooks the first two or three heat periods, he is forced to take them to a bull on the fourth or fifth month of their lactation, to be crossed. So, by the time they go dry, they will be about six or seven months in calf and some crossbred cows milk even a month prior to their calving leaving only a dry period of about a month or so. Hence, they do not find the necessity of disposing of many in this class.

The Ongoles.—The supremacy of this breed for its dual purpose over all other breeds in Southern India has been well established many years ago and even under its present deteriorated condition, there is no other breed in Southern India, to equal them or to surpass them, for their dual purpose. The importance and history of this breed, has already been recorded by several eminent men like Messrs. H. C. Sampson, G. A. D. Stuart and A. Carruth and a repetition of the same will only be superfluous.

It has already been pointed out that the main source of cows' milk supply to the public in this city is from the Ongole cows at present, and these are not indigenous to this locality. But, these are purchased by milkmen mostly at Thiruvotriyur where there are several reliable brokers and cow owners. These people in their turn go and purchase them from the Ongole tract at cheaper rates and collect them at Thiruvotriyur for sale. Some well-to-do milkmen go to the Ongole tract itself and purchase them at cheaper rates and bring them down by rail. Old cows, heifers and dry cows, are not generally purchased by these milkmen: they buy only milch cows a fortnight after their calving and that too mostly in their second or third lactations.

There are several methods of purchasing the animals and they are described below. Some prosperous milkmen who can afford to pay ready cash, pay in full at the time of purchase. A second class of people purchase them on part-payment system, i.e., they pay about half the amount when they purchase the animal and the remaining sum in one or two subsequent instalments within a month or two. The poor class of people purchase them on monthly payment system, i.e. they pay a small sum at the time of purchase and the balance is cleared in five or six subsequent monthly instalments. The last system is not very wide in practice at present in this city.

Thus a cow in milk with its calf is purchased by a milkman and brought down to the city to enable him to carry on with his trade. He feeds her well during the first half of her lactation period to get the maximum amount of milk out of her. Later on, when the lactation advances, he reduces her feed, taking care to see that he maintains her condition throughout, especially at the time of drying, as otherwise a butcher may not offer him a decent sum.

The housing problem is another troublesome thing for these milkmen; and many have to hire out sheds, if they happen to live in main streets. But some poor people, who live in side lanes manage to keep the cows in their backyards or front verandahs and road sides. A contractor or a well-to-do milkman has got his own cattle-sheds but these too are over-crowded. In almost all cases, except those of very few well-to-do milkmen, the stalls are always dirty and offensive-looking.

Granting that the cow is well fed and sheltered, his next attempt is to kill the calf, which he thinks to be a necessity, as he finds it to be an unnecessary burden on him. He brings about this end within a month or two, either by starving it or by too much exposure to inclement weather. The greatest pity in most cases is that the calf is not even allowed to taste a drop of its mother's milk from the date of its arrival to the milkman's house. Some kind-hearted milkmen feed them with *kanji* water and straw

and allow them to suckle the empty udder for a few seconds. But the calf dies within a couple of months and the man cheerfully carries on his milk trade with a dummy calf.

His next idea is to prolong her lactation, by not allowing the cow to be crossed by a bull even if she comes to heat twice or thrice during the first half of her lactation. He overlooks these heat periods and finally when the cow becomes boisterous and uncontrollable, he is forced to take her to a bull, as otherwise she refuses to feed or milk. But, this very rarely occurs in Ongole cattle, and that only when she is pretty advanced in lactation or when she is about to dry. Hence most of the Ongole cows when they go dry, are either one or two months in calf or might not have even received the bull. It is at this stage they are sold to the butcher. As is evident from the above facts, an average milkman in general does not care to maintain an Ongole cow for more than one lactation.

Most of these young milch cows that are brought to this city by the milkmen do not reach their maximum yielding capacity and many of them happen to be within their fourth lactation. It is a great pity that these young milch cows, coming from north in full milk with nice calves at foot, complete their particular lactation at the hands of the city milkmen and find their way to the slaughter-house. They as well as their calves are therefore entirely lost to the country.

One is likely to be surprised when he enters the city slaughter-house and sees the condition and state of the Ongole cows brought there and slaughtered. The average number of animals slaughtered daily in the cattle section will be about 48 and one-fourth of these can be taken as Ongoles. The remaining animals are buffaloes, country cows and crossbreds. Among the Ongoles at least 7 can be taken as young ones in good condition, just after the completion of their first, second or third lactation. The fact that they are sold on the very day of their drying can be witnessed from the slaughter-house itself. The cow as soon as she is taken in, is cast down on the platform or stall intended for the purpose, and a low caste man, generally goes and milks her. He gets a few drops from every cow thus cast down, and makes about a lb. or two for his daily use. The subsequent work of severing the heads one after the other, on the same spot is performed by a professional by means of a big chopper.

Thus, the average number of Ongole cows slaughtered in this city slaughter-house, between their first and fourth lactations can be taken as about 2,500 annually, based on a minimum daily average of 7 as mentioned above. One is likely to wonder, how long this kind of supply can be met by the Ongole tract, and what will be the fate of these milkmen in this city when sufficient number of cows are not forthcoming from the tract.

The reasons of the milkmen for behaving in this manner can briefly be summarised as follows:—

1. Want of proper grazing area,
2. Want of proper stalls to house animals,
3. Their financial circumstances,
- and 4. A desire to lead an easy life and at the same time to make a living.

Rich milkmen and contractors, who of course are very few in this city at present and who start the business with some capital, do not generally come under this description, as they have got some stalls to keep their cows in and have men in the neighbouring villages to look after their dry cows and calves on contract system. It is to be regretted that even these contractors have very limited knowledge with regard to animal husbandry.

Local breed.—Though they share the same fate as Ongoles they are very few in number, i.e. about 20 per cent and are not very good milkers in general. Even if some cows and calves are lost among this class through the carelessness of these people, the public will not have so much reason for grievance as they have at present in losing Ongoles. It is because of this, an attempt is made to illustrate briefly the sufferings of the Ongole cattle at the hands of the milkmen and to make them understand that the public are losing a valuable breed or rather the best breed in Southern India through their carelessness, and also to make them realise that if they are to carry on the same trade for some years more, not only the public but they too will have to suffer in the long run.

PLANTAIN VARIETIES IN THE CIRCARS

AN ALPHABETICAL LIST OF VARIETIES FOUND IN GODAVARI,
VIZAGAPATAM AND GANJAM DISTRICTS

By G. JOGIRAJU, DIP. AGRI.,
District Agrl. Officer, Vizagapatam.

Serial No.	Name of variety	District	Class	Remarks
1	<i>Amrithapani</i> ...	Godavari ...	B	For description <i>vide</i> notes appended—item 7.
2	<i>Do.</i> ...	Vizagapatam.	B	A name given to a variety similar to the above but with a lighter and drier flesh resembling that of the <i>Virupakshapazam</i> of the Palnis; grown on the hills.
3	<i>Billa mokiri</i> ...	Do. ...	D	A name sometimes given to No. 7 below.
4	<i>Bontha</i> ...	All the three districts.	A	A common name for Nos. 5, 6, 19 and 20. Same as <i>Monthan</i> of the south.
5	<i>Budida bontha.</i>	Do. ...	A	For description <i>vide</i> notes appended—item 2.
6	<i>Budida bontha bathis</i>	Do. ...	A	For description <i>vide</i> notes appended—item 4.
7	<i>Chakkarakeli</i> ...	Godavari ...	D	For description <i>vide</i> notes appended—item 5.
8	<i>Ginjala arati</i> ...	Do. and Vizagapatam.	G	A seeded variety cultivated for curiosity.

Serial No.	Name of variety	District	Class	Remarks
9	<i>Guinea</i> ...	Vizagapatam and Ganjam.	C	Same as No. 11 below; but fruit generally smaller on account of the different conditions under which it is cultivated.
10	<i>Jalakonda mokiri</i>	Do. ...	B	A variety of No. 1, cultivated in the hills and superior.
11	<i>Karpurachak-karakeli</i>	Godavari ...	C	For description, <i>vide</i> notes appended—item 6. Same as <i>Poovan</i> of the South.
12	<i>Karpurakeli</i> ...	Vizagapatam.	E	For description <i>vide</i> notes appended—item 10.
13	<i>Kommu arati</i> ...	All the three districts.	D	For description <i>vide</i> notes appended—item 8.
14	<i>Keesa</i> ...	Godavari ...	B	An inferior variety resembling 1, but of smaller fruit.
15	<i>Nallamokiri</i> ...	Vizagapatam.	E	Same as No. 12.
16	<i>Nendram</i> ...	Do. ...	A	Introduced from Malabar.
17	<i>Neesu</i> ...	Godavari ...	B	Same as No. 14.
18	<i>Mokiri</i> ...	Vizagapatam and Ganjam.	B	Same as No. 1, but the name is used as a common one for many others with some suitable prefix.
19	<i>Paccha bontha.</i>	All the three districts.	A	For description <i>vide</i> notes appended—item 1.
20	<i>Paccha bontha bathis.</i>	Do. ...	A	For description <i>vide</i> notes appended—item 3. Same as <i>Monthan</i> of the Nilgris.
21	<i>Paccha mokiri.</i>	Vizagapatam.	D	A name sometimes given to No. 7.
22	<i>Palakala bontha.</i>	Godavari ...	A	Same as <i>Nadan</i> of the South.
23	<i>Pedda mokiri</i> ...	Vizagapatam.	B	Same as No. 1 above.
24	<i>Potti mokiri</i> ...	Godavari ...	B	A dwarfish variety resembling No. 1 in general characters with hands and fruit set close as in No. 11.
25	<i>Sapota arati</i> ...	Godavari ...	A	Same as <i>Pey-vazai</i> of the South.
26	<i>Shahaja</i> ...	Vizagapatam.	D	A name sometimes given to No. 7.
27	<i>Suddha</i> ...	Do. ...	B	A variety of No. 1, but inferior.
28	<i>Tella chakkarakeli.</i>	Godavari and Vizagapatam.	D	Same as No. 7.
29	<i>Tella mokiri</i> ...	Vizagapatam.	B	Same as No. 1.

Serial No.	Name of variety	District	Class	Remarks
30	<i>Vamanachak-karakeli.</i>	Godavari ...	F	Same as No. 31 below.
31	<i>Vamanakeli</i> ...	Do. ...	F	For description <i>vide</i> notes appended—item No. 11. Same as <i>Kullavalai</i> of the Nilgris.
32	<i>Vasana arati</i> ...	Ganjam ...	C	Same as No. 11 above.
33	<i>Yenuga arati</i> ...	Vizagapatam.	F	A stout dwarfish variety similar to No. 31, but a bit taller.
34	<i>Yerra arati</i> ...	Do. ...	E	The red plantain of the hills. For description <i>vide</i> notes appended—item No. 9.
35	<i>Yerra chakkarakeli.</i>	Do. ...	E	Same as No. 34.
36	<i>Yerra mokiri</i> ...	Do. ...	E	Do.

Note.—The class noted in column 4 is intended to give a general idea of the nature of the variety. An explanation of the different classes is noted below :—

Class A—The Bontha type; Item 1 of the note appended.

„ B—The Amrithapani type; item 7 of the note appended.

„ C—The Karpurachakkarakeli type; item 6 of the note appended.

„ D—The Chakkarakeli type; item 5 of the note appended.

„ E—The Red plantain type; item 9 of the note appended.

„ F—The Mauritius plantain type; item 11 of the note appended.

„ G—The wild plantain type; The presence of pepper-like seed in the flesh of the fruit is the chief characteristic of this type.

NOTES ON SOME VARIETIES OF PLANTAIN

(STUDIED ON THE SAMALKOT AGRICULTURAL RESEARCH STATION)

1. *Paccha bontha*.—Mostly used for cooking; grown all over the country; trunk 8 to 12 ft. high; leaf sheaths slightly ashy; leaves 5-7 ft. long, 1½-2½ ft. wide; lower side slightly waxy; throws bunches in 7½-8½ months under average conditions; inflorescence large; bracts red with an ashy coating; 4 to 6 hands in the bunch; 40 to 70 fruits weighing 20-30 lbs.; fruit gets fit for cooking in 2 to 2½ months after the bunch is thrown; ripens off in another 1 to 1½ months; very hardy; withstands drought as well as excess of water better than other varieties; price per bunch As. 10 to Re. 1.

2. *Budida bontha*.—Also mostly used for cooking; resembles the above in all respects except that the unripe fruit has an ashy green colour; fruit considered superior to the green for curry or for ripening off; price per bunch As. 10 to Re. 1.

3. *Paccha bontha bathis*.—Used mostly for curry; tree resembles that of the first variety, but slightly taller; bunch much longer; 8-12 hands (sometimes 20-30) closely packed; 90-125 fruits (sometimes up to 200 or more); weight of bunch 30-45 lbs. Fruit less angled than the first two; tip stouter, not so good in taste when cooked; also inferior when ripened off; price per bunch about As. 12 to Re. 1-2.

4. *Budida bontha bathis*.—Similar to the above except that the fruit is ashy green.

5. *Chakkarakeli*.—The famous table variety of the Godavary district, highly esteemed and costlier than other table varieties; also considered healthier; trunk 7-10 ft. high; the plant can be easily recognised by the pink edges which hang down from the lower portion of the petiole; bunches in 7½-8½ months; fruit ripens off in 2½-3 months; inflorescence long, tapering and pointed; bracts lighter red than in No. 1; not so ashy; bunch has 4-6 hands ordinarily; and 40-70 fruits; weighs 15-25 lbs.; skin thick; remains green at the base and tip even when the fruit is fairly ripe, while the rest is bright yellow; pulp also slightly pinkish yellow; soft and sweet; tree delicate; cannot withstand heat, drought or water-logging. Price per bunch As. 14 to Re. 1-8-0.

6. *Karpura chakkarakeli* or Guinea.—The most popular of the table varieties; largely grown all over the presidency; trunk grows slightly taller than the above; midrib purple coloured both inside and outside especially when the leaf is still young; bunches slightly later than Chakkarakeli; inflorescence shorter; bracts dull red; bunch has 8-12 hands; sometimes up to 20; fruits 100 to 250; sometimes up to 500; weight per bunch 25-35, sometimes up to 90 lbs.; skin yellow when ripe; pulp pinkish; slightly acid and with a good flavour; stands water-logging better than Chakkarakeli; also stands ratooning better. Price per bunch As. 14 to Rs. 1-8-0.

7. *Amruthapani* or *Mokiri*.—A hardy table variety largely grown dry or under occasional irrigation on the perennial system; gardens standing in the same place for over 50 years seen in the west Godavari district; trunk grows 8-12 ft. high; tree resembles Bontha, but lower edges of the petiole pinkish; can be distinguished from Chakkarakeli by the fact that the edges do not generally bend down as in the Chakkarakeli. Bunching about a month later than in Karpurachakkarakeli: 5-8 hands and 60-90 fruits per bunch; weight 20-30 lbs.; skin light yellow when ripe; pulp white, soft and sweet; fruit should be ripened off to a greater degree than in Karpurachakkarakeli to bring on good taste. Bunches ordinarily cut for export before ripe; not therefore tasteful; fruit often infected with red fungoid patches which form hard lumps in the soft pulp; price per bunch about As. 12 to Re. 1.

8. *Kommu arati*.—A long-fruited variety; tree resembles that of Chakkarakeli in general but the leaves are narrow and stand more erect; bunches earlier than Chakkarakeli; inflorescence resembles that of Chakkarakeli; 5-7 hands; 70-90 fruits; fruits long and thin; skin generally remains greenish yellow even after ripening; pulp yellowish and has a peculiar flavour of its own; tree hardier than Chakkarakeli; grown in the hills of Ganjam and Vizagapatam; price per bunch As. 10 to Re. 1.

9. *Yerrachakkarakeli or Yerramokiri*.—Unripe fruit red, turning yellowish red when ripe; trunk tall (9 to 15 ft.) and bunches very late in the plains; grows well only in moist valleys rich in organic matter; veins of leaves, midribs and sheaths all markedly reddish in colour; inflorescence resembles that of Chakkarakeli; 5–7 hands on the hills under favourable conditions; 50–80 fruits; weight 20–30 lbs. per bunch; pulp yellowish and has a flavour of its own; usually sells at a fancy price of about half to one anna per fruit.

10. *Karpurakeli or Nallamokiri*.—A green sort from red plantain; the red colour is absent from the veins, midrib and sheaths as well as from the fruit; otherwise similar to red plantain.

11. *Vamanakeli or Mauritius plantain*.—A dwarf variety known as Paccha vazai in Madras; trunk only 3–5 ft. high; leaves broad and short but thick; bunches earlier than Chakkarakeli; but the bunch takes about 4 months to ripen off; inflorescence resembles that of Chakkarakeli; 6–9 hands; 90–150 fruits; weight 25–35 lbs.; fruit long and thicker than Kommu arati; bunch closely packed; skin remains green even when ripe; pulp slightly yellowish and has a fairly good flavour; does not keep well and hence not popular.

PROBABLE ORIGIN OF THE SOILS OF CENTRAL FARM, COIMBATORE

By C. RAGHAVENDRACHAR, B.A.,

Assistant to the Government Agricultural Chemist, Coimbatore.

Preliminary Considerations.—It is known that soils are broadly classified as (i) sedentary or *in situ* soils and (ii) drift or transported soils. The sedentary soils are distinguished by (1) the absence of any clear contact between the underlying bed and the top soil and (2) the existence of the fragments of the parent weathered rock mingled with the soil itself, as can be detected by the naked eye. A third test may be found in the close resemblance of the sandy fraction of the soil with the mineral constituents of the subjacent weathered rock, when examined under a petrological microscope.

In the case of transported soils a clear distinct contact is seen between the soil and the subjacent geological formation. This contact by itself should in most cases be sufficient to decide the nature of the soil. It is needless to say that the other two conditions mentioned for sedentary soils are absent in this case. In addition all the circumstances which prove an *unconformity* between two geological sedimentary beds (e.g. change of fossils, denuded surface, change in the angle of dip) go to show the transported nature of the soil.

Transported soils are classified according to the agent of transport, viz. wind, glaciers, rivers and rain. The next question arises as to where we can expect to find sedentary soils and where to find transported soils; for instance *Æolian* or wind-transported soils are found in parts of Rajputana and the Punjab. Glacier deposits may be expected only in the sub-Himalayan zone as they are not common in India as in Europe and North

America. River-borne soils are very common in India, e.g. Indo-Gangetic plain and the deltaic plains of South India and river terraces. Where agents of transport cannot be shown to be any one of the above three, we have to infer that the agent is rain. The amount of angularity of the sand particles in the sandy fraction of the soil will also give some indications about the origin of the soil. The drift soils are to be found mostly in flat countries while sedentary soils are to be expected in hilly or undulating country or in plateaus as in the Nilgiris and Mysore.

Sedentary soils are usually shallow when formed from granites. Occasionally they are deep when formed from calcareous shales, or traps which decompose easily as in some parts of the Cuddapah district.

The probable origin of the soils of the Central Farm, Coimbatore.—As stated above, an examination of the contact between the soil and the subjacent bed is more often a decisive factor in attempting to find the origin of soil. All that is necessary for this kind of examination is to dig some trial pits to sufficient depth at various points in the area. Such opportunities presented themselves when trial pits were dug in field No. 62 for the building of the animal nutrition shed, in fields No. 4 and 2 of the Cotton Breeding Station at the instance of the Government Agricultural Chemist. Trenches dug for laying pipes round about the Forest College were also examined.

In all these cases there could be seen a distinct bed of *Kankar* underlying the soil at varying depths, the contact between the soil and the *Kankar* bed being very clear. In the case of the trial pits of the Cotton Breeding Station the sandy fractions of the soil samples did not show similarity with the constituents of the *Kankar* beds.

More recently the trenches excavated for the foundation for the Boy Scouts' building on the College estate were examined. There was a layer of black soil about 2 feet deep overlying with a clear contact a bed of *Kankar* gravel 9" deep; under this *Kankar* gravel bed was a red highly weathered formation. This clearly proves the transported nature of the soil. Further investigation of the samples taken from these layers is in progress.

All these point to the conclusion that the soils are transported. The flat nature of the country round about the Central Farm lends indirect support to this conclusion.

We may now discuss as to what might be the probable agent of transport. According to the geologists there is no evidence of any glacial action. The geographical and topographical position of the mountain ranges and the direction of the wind exclude the possibility of the agents being wind or rivers. The only other agent which might have been responsible is rain.

It may be argued that the rainfall on the area is too scanty to explain this. But it must be remembered that the formation of soil is a very slow process taking long geological periods. In the case of a hilly country, the rain water collects into small hill streams and rivulets while in the case of flat country it spreads out as a shallow sheet of water distributing the soil particles in its movement. It is thus possible to expect rain-transported soils in areas with a very gentle slope but not in hilly country.

It is seen from the above that only a fringe of the subject has been touched. It would be interesting to make a closer examination petrologically and chemically of the soils and the subjacent formations in the case of sedentary soils of our presidency. In the case of transported soils the subjacent bed is of no importance for this type of work, but a similar investigation of the soils and the geological formations of the basis from which the soil has been derived, might reveal some inter-relationship.

Incidentally, it may be mentioned that in the geographical classification of soils it appears to be more rational and scientific to classify the soils according to the river basins or valleys in which the soils occur than by districtwar classification. Thus the Madras Presidency can be classified as the valleys or basins or plains named after the big rivers and their tributaries and the soils classified accordingly.

M. A. S. U. PARLIAMENT

(Proceedings of a Meeting held on August 7, 1931.)

Motion before the house.—'That the destruction of Prickly-pear by the Cochineal insect is not conducive to the welfare of this province.'

Mover.—M. R. Ry. V. C. Vellingiri Gounder Avl.

Opposer.—Dr. T. V. Ramakrishna Ayyar, B.A., Ph.D., F.Z.S.

Speaker.—Rao Bahadur B. Viswa Nath, F.I.C.

Before commencing the meeting the Chairman referred to the sad and sudden demise of Dr. K. Kunhikannan, the Mysore Entomologist and requested Dr. Ramakrishna Ayyar to speak a few words in that connection.

Dr. T. V. Ramakrishna Ayyar said: It is my very painful duty to inform this audience of the sudden demise of an old friend and fellow worker, Dr. Kunhikannan of Mysore. He was an entomologist of capacity and fame. It is all the more painful to refer to his loss on this occasion, since he was one of the first to interest himself in the destruction of the prickly-pear by the cochineal. I feel it is but appropriate that I am given the privilege of speaking something on this occasion since apart from our friendship for over twenty years we had the honour of receiving our Doctors degree in the same American University (Stanford) and as such it is not only the loss of a personal friend but a brother *alumnus* of a famous university. Dr. Kannan was a very good speaker with broad views and shrewd common sense and took lively interest in so many public and social affairs. His unexpected death is a serious loss not only to Mysore but to the small group of Entomologists in India. I would therefore request you all just to stand up in silence for a minute as a token of our great regard for the departed soul.

After this speech the audience stood for a minute in silence as a tribute to the memory of the deceased.

The Speaker then called upon Mr. V. C. Vellingiri Gounder to move the proposition standing in his name.

MR. V. C. VELLINGIRI GOUNDER'S SPEECH

MR. SPEAKER AND GENTLEMEN,

I must first of all thank you for giving me an opportunity to place my views before the experts and the youngsters of this College. In my several observations and conversations with my brother ryots, I have been led to form an opinion, and it is the ryots' point of view that I am placing before you to-day; and what we have to decide is whether the cochineal insect benefits or adversely affects the ryots of our Province.

When the insect was first brought to the notice, it was thought to be a god-sent relief and received with open arms. After some time, however, when they became accustomed to the effects of prickly-pear destruction by this insect, ryots began to doubt whether it is after all a welcome guest. The crux of the whole problem is that the ryots never desired a complete destruction of the prickly-pear; because, they do want a perfect fence for their lands and this is all the more important in our district where the holdings are small. If, therefore, the fence is destroyed, the ryot has to make other arrangements and he is put to very great difficulty to find a suitable substitute. The idea, therefore was that the insect would be useful to check the overgrowth of prickly-pear within limits, but to-day we find that it is beyond our powers to control the cochineal. It was on this point that I addressed letters to the Entomologist and the Director of Agriculture, and both of them wrote back to say that the ryots must find suitable remedies.

The point for discussion is that the beneficial effect has to be weighed against its disadvantages. I have not got any further information which I can place before you except what I have gathered from ryots. I shall, however, place before you the correspondence between me and the Government Entomologist on this subject and I cannot do this better than bring to your notice the several points raised by him and my answers thereto. For the sake of convenience and cogency I shall go through these one by one.

1. The Government Entomologist lays down the dictum that ryots should welcome the cochineal for the good work that it does; I can only answer him that even a guest will not be tolerated if he begins to occupy the whole house and he is a source of inconvenience to the inmates.

2. Secondly he says that Municipalities are marking use of the insect to clear areas overgrown with prickly-pear; my answer is that Municipalities have no idea of clearing arable land apart from the sanitary and health point of view and while considering advantages and disadvantages caused to the ryots who form the major portion of our population, it is not fair to take the views of Municipalities as very important.

3. Thirdly I am accused of prejudice and the Entomologist asserts that there are indents from all over the country for the cochineal, to prove that many are not suffering from the evils of prickly-pear. That, however, is no argument for the insect, because yours is the Central Institute and it is but natural that any odd person who requires the cochineal has necessarily to apply to you.

4. He puts forward the opinion that large areas of land which can be put to profitable cultivation have been covered by the prickly-pear and by destroying it the cochineal will be releasing more lands for us. I will

answer this point at some length. I have travelled extensively in the southern districts and from my observations, I don't think that there are any vast areas which are suffering from pear growth. In many districts there is in fact dearth of lands for agricultural purposes. Nowhere is land available in suitable blocks; if it were so, the ryots would not consider that pear is a nuisance which cannot be removed. There may be areas covered with pear but they are not accessible to or available for ryots. For example reserved forest areas are overgrown with pear. These lands, however, would be classed with the last class, agriculturally. Before reservation, there was no pear growth in these areas; but closed even for grazing animals, the pear began to grow uncontrolled. The Forest Panchayats are now gradually clearing these growths and no doubt, the Forest department is also spending money on this. But the work is done on contract basis; no one has any personal interest, and this indifferent method of clearing acts as a weeding given to the pear and stimulates greater growth.

5. Dr. T. V. R. Ayyar refers to Australia, where the cochineal has been utilised on a very large scale to clear prickly-pear; our country with its small and scattered holdings cannot bear analogy to Australia. Conditions are very much different there. There, it is a capitalistic venture and the movement is largely directed by Government support unlike here. Besides, the population is very little—in comparison with the area—and so cheaper and highly mechanical contrivances for wholesale destruction will certainly be preferred to manual labour.

6. Referring to the Board of Revenue's expenses in periodical clearing of the pear, Dr. Ayyar says that many irrigation works are choked up with the pear, and that the cochineal clears the growth easily and without much expense. Here again I can only say, that it is want of personal interest and timely attention that is responsible for this overgrowth and nuisance. Ryots, in fact, with organisation and union can easily remedy the evil under the 'Kudimaramath Act', and are clearing pear growth every year and keeping it in check; after all the ryot spends only his spare time at this without keeping idle for it is during the rainy season when he has no other work on the fields, that he attends to this work; and it benefits him to the extent that he spends his time and energy on it.

I have here to stress on its importance and utility as a fence, when it is kept in check like this. Apart from this, it is of manurial value and its good or bad growth on a particular locality is a test of fertility or poorness of soil at that place. Recently, the Agricultural Department has advocated its conversion into synthetic farmyard manure, a very useful and helpful suggestion. Another point in favour of it, is that it is one of these hedge plants, which have no root effect on other crops; it in fact protects many trees growing in its midst; it requires very little water and also conserves moisture, for other shrubs and trees to grow near it; as an illustration I can tell you that in the western parts of the Coimbatore District where there are many forests, fuel is much dearer than in places like Erode and Dharapuram taluks where there are no forests at all. This is because the trees and shrubs growing amidst prickly-pear fences supply the fuel sufficiently and cheaply for these parts. In seasons of famine, when drought and hard conditions prevent successful cultivation of the soil, the ryot manages to get a living by the fuel he collects and the prickly-pear is thus a potent economic factor.

The prickly-pear is an all round, all-weather fence and grows in all places, while other plants available for fence, are difficult to grow and are quite different in different localities—depending on soil and climate. The *Kiluvai* which is suggested, would not grow in shallow soils and in places of scanty rainfall. *Thirukukalli* requires tending and careful handling and replanting while pear requires only mending during off-seasons. All this shows that it is not so easy to find a suitable and efficient substitute as fence, which is within the reach of the ryot.

Again the fruit of the pear is a food to the poor, and although it may look a small affair to you, or may not be a substantial food, it has been helpful during famines. I know, in certain seasons, poor people go a mile or two to get a meal of the fruit.

There is another thing about the prickly-pear—a mystery so to say—which is for your experts to solve. After some years of growth, the pear converts even a poor soil into a fertile one. You are all aware, I dare say, of the practice of the ryots, taking the earth from under prickly-pear bushes, and applying it as manure to their lands. Whether the plant takes up some important nutrient from air or soil and stores it up in the soil, or how it improves the physical texture of the soil and thus enhances fertility, is a problem worth investigating.

7. Dr. Ayyar says that the pear is an exotic after all and that we had better be without it, I agree; I also agree that it is a nuisance, it chokes up open spaces and is a haunt for venomous reptiles, etc. But we always experiment on exotics and new things and if they are useful we keep them; the cochineal, in fact is an exotic and we are experimenting.

Finally I have to say, gentlemen, that if controllable, the cochineal, is welcome, but if uncontrollable, it leads to trouble and financial difficulties in the matter of finding suitable substitutes for the prickly-pear, and hereafter, ryots will think twice, in future, about new things.

After all, the position has gone out of control now, the cochineal has been let loose and its process of destruction cannot be stopped, whether we will or not the pear is fast disappearing and the ryot is faced with the problem of finding a substitute. For the sake of argument, I am putting all these facts before you, for your considered opinion. The advantages of destruction of prickly-pear do not weigh to equal its usefulness to the ryot in so many ways, and I am therefore asking you to vote in favour of my proposition.

DR. T. V. R. AYYAR'S SPEECH

MR. SPEAKER AND GENTLEMEN,

As Mr. Vellingiri Gounder said, the present situation has already amounted more or less to an *ex-parte* judgment in favour of the cochineal, and we are here arguing for mere argument's sake. Consider it in any light you like, seriously, humorously or for the mere sake of argument. I have carefully heard the arguments of the mover yet I am sorry I have to hold that there is no doubt that the destruction of the prickly-pear by the cochineal has been of immense benefit to us. Everything in this world has in fact its uses—prickly-pear, hedgehog, night-soil, and so on—and it will therefore not be a correct view to take only usefulness of a particular thing for arriving at a decision. We

have to weigh in the scale the advantages and disadvantages of the prickly-pear and decide correctly. I have the greatest respect for Mr. Vellingiri Gounder the premier land-lord of the district and an authority in these tracts for the information on the ryots' side. The value of prickly-pear as a fence, as a food, as a manure, as a mulch, all these, I do not deny. But consider the other side of the picture. Mr. Gounder prefaced his numerous remarks with numerous *ifs*. 'If the ryot is careful' he said, 'pear will not be a nuisance', 'if we attend properly to its control it will be alright' and so on. But what exactly is the state of things? Is there really co-operation and union amongst the ryots in this matter? Do they check the pear growth and keep it under control? Is the pear really not a nuisance, a harbour for reptiles, a set-back against sanitation, the breeding centre for disease and a source of inconvenience and discomforts? Let us face the question boldly and without bias on such broad issues before we decide.

Before I go into the details of the necessity for eradicating the prickly-pear I may perhaps do well just to give a short historical account of its introduction and its subsequent thriving which might not be irrelevant to the matter. The prickly-pear was first introduced into India somewhere about the year 1780 and was supposed to be one of many good things that the East India Company first brought us. Physician-General, Dr. Anderson being one of the many early experts, was responsible for the introduction and spread of the weed. His was in fact a commendable idea with deplorable results, as you will see. The idea was to introduce not only the pear but also the cochineal insect which would prepare the valuable cochineal dye so that subsequently a small industry could be built up in the country. To start that industry a pear farm was started near Madras. By some misapprehension another species of cochineal which I might call the elder brother of the insect we are now familiar with, was introduced. The industry lingered some years and after some time everything had to be given up. The pear, however, overran the country and from *Hamilton's Travels* and other records we find that the condition was even ten times more serious than it is now. That pear variety *Opuntia monacantha* is very rarely in evidence now. The elder cochineal brother completely killed the monacantha species and then died, became a *rara avis* itself. The prickly-pear which we see now was introduced later and is different from the previous species in that it has clusters of thorns while the monacantha kind has only single thorns. The later species of pear *O. dillenii* in its turn overran the country and attained such conditions of rank and uncontrollable growth that the Board of Revenue seriously took steps to mitigate the nuisance. They tried to introduce the right sort of cochineal but without use. An experiment was in fact started in Trichy district where the old cochineal insect (a small brood of which was found in a corner of Ganjam) was tried on with prickly-pear but the attempt was a failure. The reason was want of sufficient biological knowledge regarding the insects and the two kinds of pear. The elder cochineal would not feed on this variety of pear and conditions grew worse. *O. dillenii* ran wild, overran acres and acres of pasture and arable lands, trespassed into rural lanes and pathways, overgrew the foreshores and banks of rivers and streams, blocked up entrances into villages, and in fact within about a decade or two after its introduction this prickly-pear marched unchecked and became an unmitigated nuisance and a plant pest of first-class importance. Any one of us can testify to the fact that prickly-pear bushes harbour vile reptiles and

offer cover for people to commit nuisance. In fact when we approach a village we are first greeted by prickly-pear, pigs and night-soil. How long are we to tolerate such a state of things? If we could possibly take the help of a small insect which offers to help us practically without cost in the control of the pest in which work we have ignominiously failed, is it not our duty to take advantage of such an offer and do our best? Is it not part of our duty, as educated men to help the country in this direction? The prickly-pear may have its own uses. No one can and does deny it. But how do the uses of the pear compare with its manifold harmful qualities? The Public Works Department, municipal and health authorities and a host of other people who have been spending thousands of rupees every year to keep the pear under control have now welcomed the cochineal and the landscape in and around some of our towns is getting cleared to the relief of all. I shall not add any more on the subject of the apparent good work the tiny insect is doing.

At this stage, I must answer two or three legitimate questions. The first is, can you assure us that the insect will feed on pear only? In answer, I may add that experiments have shown that the insect will feed exclusively on pear and even there the insect is found more partial to only this variety of pear as I have already told you of its aversion for the monacantha pear. The second question is, is this insect a necessity? I will ask in turn, is the prickly-pear itself a necessity? Has it been a necessity till it arrived? Is it a native of our country? No, I affirm that such a plant with more harmful qualities than good points is not a necessity. I come from Malabar which fortunately is free from pears and I do not find that it is a necessity there. People there have never asked for this unwelcome guest. Ryots are getting on as well as in other districts. We now come to the fence question. This is unfortunately the only weak and fragile plank on which our friends who want the prickly-pear can argue a little. I ask how was the country getting on until this prickly-pear came into the country? How are people in tracts where there is no prickly-pear managing for their fences. The answers to these questions must shatter the excuse of fences in favour of the pear. I feel therefore that the fence question is not a difficult or a real one. For, it is not allowed to grow only where a fence alone is required but everywhere else and very often where a fence may be necessary the prickly-pear is not there. Then again there are areas which are no man's lands and these are of considerable magnitude. We as a people do not look for a communal welfare. How are we to check growth in these places where no man will take the responsibility? In this connection, I venture to submit that the existence of the prickly-pear has made our ryots lazy with regard to proper attention being paid to the land boundaries, hedges, etc. It is their laziness that often contributes a good deal to the spread of the prickly-pear. From records, experience, books, conversations and newspaper reports the majority of our people are of opinion that the pear should be sent out, and it is only a parochial point of view that sticks to the retention of the prickly-pear on its utility as a fence. The ryot is an intelligent man and he will surely find other fences substituted in course of time.

Mr. Gounder spoke on economics and referred to the case of Australia where capitalistic ventures are undertaken. I say economics is the very reason why the cochineal should be welcome. Because it costs absolutely

nothing to clear the growth. Telegraph posts which were inaccessible, water-ways which have been choked up and public places overrun with pear growth have all been rid of this nuisance at a very small cost. These may appear to be small gains but when accumulated we find that the cochineal has saved us enormous amount of recurring expenditure by its wonderful work.

All exotic things thrive well in their new surroundings for the potent reason that 90 per cent of them are free from the diseases found in their original homes; the prickly-pear is no exception to this rule. Unless kept within bounds exotics are always undesirable, and we have therefore, to gauge very carefully the advantages and disadvantages of retaining these things. For, a situation might arise in the future when these exotics will completely exterminate the indigenous flora of the soil. In answer to Mr. Gounder I say we can keep the prickly-pear if properly controlled and we can also control the cochineal wherever it is wanted. But have we controlled the pear so far? That is the real question.

The next question is what will you do if pears die, at any time you want the plants again for a fence. I can tell you that neither the pear nor the insect can be completely exterminated for all time. Human energies are to be directed up to the point where the pest is not a nuisance. We can in fact have a farm where we can grow these different species of prickly-pear to supply ryots whenever they want it. There is in fact, in California, a farm of Cactii. The pear and the cochineal can be kept for any emergencies in special areas in Botanical gardens, Parks, etc., under proper control.

Finally, gentlemen, I want you to ponder over these points and if you honestly think that the cochineal insect, in spite of the effective good work it is found to do in controlling the prickly-pear and saving thousands of the people's money as detailed above and the pear is still to be retained untouched by the cochineal, if it is your definite opinion not to allow the cochineal to destroy the prickly-pear, I would certainly allow you to vote in favour of Mr. Gounder's proposition. With a number of *Is* the pear is alright and as an analogy I am tempted to refer to a Rajapalayam dog which is very good for watch purposes, but which if it is rabid and fierce and becomes absolutely uncontrollable even by the owner, you will not hesitate to destroy it. Gentlemen, if, therefore, you agree with my arguments I would request you to vote in favour and acquit my client, the cochineal insect who is arraigned as a criminal.

DISCUSSION

MR. V. C. SUBBIAH GOUNDER said that he represented a poor ryot and his arguments were advanced on behalf neither of Government nor of the ryot with a large amount of capital, but of the average cultivator who is really put to great difficulties on account of the destruction of prickly-pear. It is very easy to say to find another substitute, but how practicable and within the reach of the ryot this suggestion is, is for you, gentlemen, to decide. There is going to be enormous amount of practical difficulties and in these days of financial and economic depression, most of the ryots are going to be hard at it without a proper fence for their fields.

MR. M. SATYANARAYANA referred to the overgrowth of prickly-pear in the Western taluks of the Bellary District and mentioned how ryots

are nervous about the cochineal attacking *bandaru* (*Dodonia viscosa*) in Cuddappah. The assurance of Dr. Ayyar that the cochineal will not attack any other crop will now set the ryots at ease.

DR. T. R. SESHADRI was of the opinion that human beings being very conservative were always rather diffident about new things, and the decrying of the cochineal was but an illustration of this tendency. According to him the defence of the prickly-pear was an afterthought and its most valid reason about its fencing qualities were after all doubtful.

RAO BAHADUR T. S. VENKATARAMAN said that he had had already practical difficulties in the way of providing a fence for the area at the Sugarcane Station. His was a long narrow farm and the problem was how best to fence it now that the prickly-pear had been destroyed. In a fence the prickly-pear was a friend-cum-enemy fence. It was the cheapest and most efficient, fool-proof under conditions of neglect and thrive well while other plants tried were all nowhere. On the other hand if left unchecked it overran bounds and was a harbour for reptiles and very often from the fore-shores of the tanks the prickly-pear is washed even into the cultivated fields through floods. Now that the work of destruction is gone beyond control we will give prickly-pear a decent burial. We will think hard and vigorously and ere long we will have a suitable substitute.

MOVER'S REPLY

MR. SPEAKER AND GENTLEMEN,

I am not yet convinced from what all Dr. T. V. R. Ayyar spoke that the destruction of prickly-pear is beneficial. All the references that he made have their own time and old history and do not bear any relation to the present-day ryot's point of view. To replace the prickly-pear is beyond us. It is the sudden change that gives all the trouble. If the destruction had been gradual there would have been no difficulty felt.

Dr. Ayyar, with the permission of the speaker, then replied to some of the queries raised and re-affirmed his case.

SPEAKER'S CONCLUDING REMARKS

GENTLEMEN,

We have listened to an important and instructive debate. We are particularly fortunate in having the opinion of Mr. V. C. Vellingiri Gounder, a representative of the ryots. This discussion is different from the other two we heard previously where we had only to discuss the policies of higher authorities. Herein is a problem, a conflict so to say, between science and the ryot and on the result of voting will depend the policy of the future. A responsible body like you has to give your considered opinion. It is for you to decide whether arguments made on behalf of the small ryot have been answered and whether the opposition has made any constructive suggestion for a suitable substitute for the prickly-pear.

The house then divided and voted with the result that Mr. V. C. Vellingiri Gounder's resolution was lost, 41 voting against and 18 for his proposition.

FARMING CALENDAR, COIMBATORE DISTRICT

December—January (மார்ச்சு) Margali

The Tamil month of *Margali* is practically a harvest month. Most of the dry crops, especially cereals and pulses, are gathered. The early varieties of paddy are also harvested. The farmers are in possession of the fresh produce of grains.

In every Hindu home, elaborate preparations are made; the houses are cleaned, white-washed and decorated, and the feast day of *Sankaranthi*, popularly known as *Pongal Pandigai* which marks the end of *Margali*, is joyously awaited. On this day, the new grain is prepared and cooked. The cooked food is placed before the deity personified by the Sun whose blessings are invoked.

The weather during the month is fairly dry. Cold north-east winds blow steadily in the mornings. These are supposed to be very favourable for the late rice crops which are then in ears.

A peculiar weather condition is said to prevail in the month, beginning from the 14th night of Margali and ending with the 28th afternoon. In the Tamil land much importance is attached to this. The sky is cloudy, and is rather overcast in certain days. No rains are (or ought to be) received in this period. The clouds should be simply hovering about from one direction to another. From the observations of the nature and movements of the clouds, forecasts are made for the next year, in respect of rainfall and the general prospect of farming.

There is a Tamil verse that runs to this effect:

பாது தனுவிற்ப தின்முன்றே முக்கால்மேல்
ஆனிருக்குச் செல்லுநான் அறுகாலம்—மானேகேள்
கண்டுமுதல் தேள்வரையில் நாலரையே நாமாகாணி
கொண்ட தனுவென்று கூறு.

A free rendering of this stanza is as follows: The cloudy nature of the first one and a half days from 14th Margali foretells the rains of the first 6 months from January to June (Thai to Ani) of the coming year.

Following this, every 2½ days in succession is reckoned as representing the months from July to November. Gradual and steady movements of rain clouds with occasional drizzles, are indicative of the characteristics of the rainfall of the respective months. The last day of this period is responsible for the month of December.

Heavy rains resulting in the dispersal of clouds are not welcome in this period; on the other hand they are prognostic of the paucity of rain in the particular months in the following year.

This is a very interesting forecast and is based upon the experience of centuries. The present-day meteorologists might devote a part of their research time in observing this phenomenon, and record the results.

The usual farm operations of this month are intercultivation and irrigation to standing crops. The Cambodia cotton just in flower receives a good hoeing, and an irrigation towards the end of the month. Tobacco is regularly topped and the suckers are removed. The crop is also irrigated. Dry land cottons receive good interculture. Plantations of coconuts and areca-nuts round about Coimbatore are hoed with *mamoti* and the soil is kept loose and free of weeds.

The ryots are busy with the harvest of crops and preparation of the produce for the market.

Notes and Comments

Debate on the export of indigenous manures.—We regret that by an oversight we failed to mention, at the conclusion of the debate reported in our October issue, that the proposition of Rao Bahadur B. Viswanath, viz., that the export of indigenous manures out of India is not conducive to the welfare of the country, was carried by a majority.

Tuition fees in kind.—America has always been the land of innovations. The latest is that the Board of Trustees of the Park Region Luther College, have arranged to accept wheat grain from the students in payment of their college fees.

Committee for statistics of prices.—The Government of Madras recently appointed a committee consisting of Mr. C. A. Souter, Commissioner of Land Revenue and Settlement (Chairman), the Director of Agriculture, the Director of Industries and Mr. H. Trevelyn (Secretary). The Committee will consider the nature of statistics to be collected in and outside the Presidency, the agency to be employed to control the collection and compilation of statistical information and the use to which the information is to be put. Mr. Trevelyn has prepared a note on the subject and this will form the starting point for discussion by the Committee.

Agricultural Education.—The recent discussion by the Senate of the Andhra University on the subject of starting an agricultural college and of opening a Faculty of Agriculture, brings us again to the problem of agricultural education and the need for more agricultural colleges in this country. It is admitted, that going by statistics the number of agricultural colleges and agricultural students is disproportionately low in India as will be seen from the following figures extracted from the *Wealth of India* by Wadia and Joshi:—

Country	Population	Number of Agricultural Colleges	Number of students in the Agrl. Colleges
India	318,942,000	6	1,154
France	39,209,518	71	2,200
Belgium	7,415,782	70	5,000
Denmark	3,267,831	99	9,561

These statistics compiled a few years ago are necessarily below the actuals of to-day but the position in India in comparison to the other countries is certainly not altered. While the position according to figures

indicates the necessity for many more agricultural colleges, in actual practice, unemployment of the graduates produced in this presidency is staring in the face and naturally parents and guardians and students are hesitating to take to agricultural education in spite of the fact that at the present moment tuition and lodging is free and this is the cheapest education obtainable from the point of the student and his parent or guardian. The proportion of students going back to land after taking their degrees is practically *nil* and in so far as Government appointments are concerned the Agricultural Department is the only one into which they can have admission. It is futile to stick to the slogan 'they must go back to the land.' They have not so far gone to the land and now that entry into the Agricultural Department is getting restricted, it remains to be seen whether they will or can go to land. However that may be, we are of the opinion that the issue cannot be ignored any more and the problem must be taken in hand boldly and solved with courage. Immediate action is possible in two directions; the first is to induce the landed aristocracy and the big absentee landlords to employ agricultural graduates as their agricultural superintendents and managers, and to investigate why these men do not go back to land and see if anything can be done: the second is to make the agricultural graduates eligible, if asking for preference is not too much, for appointments in the Revenue, Co-operative and elementary and secondary branches of the Education departments. Surely for certain posts in these departments a graduate in agriculture can render better service and create a more distinct bias for agriculture in the minds of the rising generation than what non-agricultural graduates can do. Our agricultural graduates want only equal chances with others and nothing more. Until this is done and a denser or thicker atmosphere in favour of agriculture is created, it appears futile to expect agricultural graduates to go back to their own land.

It might be asked whether the agricultural graduates who are already in the Department serving in the districts, have created sufficient impression with the public so that there will be a definite demand from the public for such graduates in larger numbers. The concentration of propaganda and demonstration work at a few selected centres in different parts of the district recently inaugurated as the definite policy of the Department, will, we sincerely hope, bring about the desired change of outlook by the public. We are sure the agricultural graduate has got to have his place in any rural uplift or village reconstruction schemes.

The late Rev. M. Anderson.—We are sorry to learn of the demise of the Reverend M. Anderson at a ripe old age at Danishpet, Salem. To many of our readers Rev. Anderson was known as an enthusiastic agriculturist and as the father of Mr. T. B. Anderson one of our old students. The junior Anderson has just returned from America after taking the Bachelor of Science degree in Agriculture at Cornell University. We offer condolences to Mr. Anderson on the death of his father.

Hen's eggs weighing four ounces.—According to the JOURNAL OF HEREDITY for March 1931, a certain breed of hens in Manchuria, laid eggs each weighing four to five ounces in the year 1928. One pullet in 1930 laid 77 eggs with an average weight of three-and-a-half ounces. Ordinarily the average weight of an egg is $1\frac{1}{2}$ to 2 oz. and the average number is one hundred a year.

Correspondence—Queries and Answers

I

Duration of Summer Chulam

In reply to Mr. R. Ramakrishna Naidu's letter which appeared in the August number of the *Madras Agricultural Journal*, Mr. G. N. Rangaswami Ayyangar, Millet Specialist, writes:—

Mr. Naidu wants to know the factors that affect the duration of a crop, to wit, Summer Chulam—Yellow. As he himself has shrewdly hinted, the duration of a crop is affected by two kinds of factors—internal and external.

2. Fundamentally, the duration of a pure variety is controlled by certain genetic factors. The grain colour may be yellow but still within this yellow group there may be varieties with different genetic potentialities with regard to duration. However, within a pure line there is very wide range of variation determined by the second set of external factors.

3. These factors usually go under the name 'environmental conditions.' A few important conditions which affect duration are given below:—

(a) *Weather.*—Continuous rains and cloudy weather retard the maturing of a crop while bright weather quickens it.

(b) *Soil.*—Well-drained soils mature a crop earlier than sticky and badly-drained ones. Rich soils give a greater duration to the crop than poor soils.

(c) *Manure.*—A well-manured field prolongs the vegetative period of the crop in addition to contributing towards greater yield.

(d) *Time of sowing.*—Late-sown crops have a shorter duration than early-sown ones, because the flowering time of a crop in the year is fairly constant, for example, *Peria Manjal Chulam* comes to flower in November whether it is sown in July or August. The duration of the crop is reduced as the sowing is delayed.

(e) *Irrigation.*—Irrigations prolong the vegetative period of a crop. If water is withheld the crop rushes into flower.

4. The problem raised in the letter can be solved by an investigation along the lines indicated above, and applying them one by one to the point at issue by your correspondent.

II

Some Problems relating to Paddy and Sugarcane

Mr. U. M. Sundaram Iyer, Unjalur, Coimbatore District, writes:—

In our parts there are certain lands which after two paddy crops have been raised in the year, lie fallow for a period of $4\frac{1}{2}$ months, i.e., from the last week of *Thai* to the second week of *Ani* (Tamil months). Till the 30th of *Panguni* we have water from the Kalingarayan channel. For the rest of the months there are wells with baling conveniences.

1. *Paddy.*—(a) What green-manure crops can be grown during the interval of $4\frac{1}{2}$ months on 1 acre of land which will produce such sufficient quantity of green leaves possessing as good manurial value as *Kolinji*, as to minimise the enormous expenditure incurred by the ryots for applying green or other kinds of manures for both the crops. How to preserve them for both the crops without losing their manurial value?

(b) The more the tillerings in the paddy plant, the more the yield. How to increase the tillerings? What manures are to be applied, when and how?

2. *Sugarcane*.—Some of my fields are planted with J. 247, Java-Hebbal and local variety canes. Some of them are 5 months old and some 6 months. Even at this stage roots come out from first node up to the eighth node in the canes, all round, and in some canes the buds have grown to a height of 1 foot in addition to the growing of roots around the nodes. Why is it so? Does this in any way affect the growth of the canes and if so how to prevent it? If stripping of canes of their dried trash which is considered harmful as found in a query and answer in the December 1930 number of the *Madras Agricultural Journal*, is not advisable, what other means are there to prevent the canes from the above disadvantages?

Please enlighten me on the above points in detail by post to me and for public use, through the medium of the *Madras Agricultural Journal* at the earliest possible time and oblige.

Answer.—

1. *Paddy*.—(a) There is no green manure equal in value to *Kolinji* (Wild indigo) for paddy. But, in the absence of *Kolinji* leaves or in view of the great cost incurred in obtaining these leaves, two kinds of green crops—*Cowpea* and *Pillipesara* (*Phaseolus trilobus*) can be grown on the land during the interval of 4 months mentioned by Mr. Ayyar, from February to June. Seeds of these green crops should be sown at the rate of 25 lbs. per acre in the moist soil just a week before the harvest of paddy. At the time of paddy harvest the young sprouts do not get damaged. The green crop will grow fairly well during this interval under the conditions obtaining round about Unjalur in the Canvery-Bhavani valley. There is no need to preserve these green crops. They could be ploughed into the land as such at the time of preparation for the coming paddy crop. The second crop of paddy will also be benefited by this dressing of green manure to the first crop. However, a dose of 4 cwts. per acre of groundnut cake applied as a top dressing at the time of the weeding of the second crop will be found remunerative, or two cwts. of bone meal applied before planting of the first crop will give equally good results.

(b) In a well-prepared soil with the green crops ploughed in and with an addition of 2 cwts. of superphosphate at a cost of about Rs. 10 to be applied at the time of planting, the young crop will tiller well. Care should be taken not to crowd the seedlings, too much in planting. Two or three good seedlings obtained from a thinly-sown seed-bed and not more than 30 to 35 days old, should be planted about 6 inches apart.

2. *Sugarcane*.—Mr. Ayyar's queries about sugarcane rooting and shooting at the nodes cannot be answered in a Journal without examining the conditions under which the canes are growing on his lands. Such phenomena are not usual under normal conditions prevailing in this district, unless the crop is affected by some disease or from defective physical or biological conditions. There is a disease called 'Serrah' in sugarcane characterised by profuse rooting and shooting and a pronounced reddening in the case of J. 247. The weakening of the main shoot as a result of the side-shooting may be prevented by just breaking off the side-shoots.

III

The Prickly-Pear Cochineal

We are receiving numerous enquiries re. the cochineal insect, a sample of which is as follows:—

'The spread of the cochineal insect in Hindupur taluk has become so intense that in some villages for instance, Lepakshi, Cholasamudram and Hindupur, the whole atmosphere is filled with these notorious bugs and on very many occasions they enter even the nostrils while breathing. Sometimes the surface of water in the wells are filled with dead cochineal insects and the water gets an undesirable smell. Another trouble is that the insects sting the villagers like mosquitoes.'

[We hasten to reassure our readers that the prickly-pear cochineal is absolutely harmless to man. The alleged evil effects of the insects, viz., dirtying the water in tanks are grossly exaggerated and they are at worst a temporary nuisance which will pass away with the disappearance of the prickly-pear. The insects do not sting or bite and much less cause any disease. Ed. M. A. J.]

IV

Summer ploughing of Wetlands

Mr. L. T. Gowder writes from Sultan's Battery, Wynad:—

I am cultivating nearly 100 acres of single crop paddy lands at Kidanganad Village, Wynad Taluk of Malabar district. I would like to know whether summer ploughing, i.e., ploughing immediately after harvest of the paddy crop, is beneficial to these lands especially in view of the fact that paddy is transplanted and not broadcasted. Ryots believe that summer ploughing is injurious to paddy under such conditions. Is there any scientific truth in this belief? If so please let me know all the scientific data bearing on this point. Have any experiments been conducted in the Madras Presidency to verify this?

Answer.—Summer ploughing of wet lands will be found injurious if the soil is stiff or of a clayey nature. Sandy loams and light soils with good drainage facilities are not affected. Green manuring sometimes mitigates the evil effects of summer ploughing especially where the soil is not deep and overlies a sand bed. In the query the nature of the soil in the neighbourhood of Wynad has not been indicated. The Departments of Agriculture of Madras and Mysore have conducted experiments in this line, the former as early as 1912, and the results have been stated as above. To understand accurately the nature of the soil in the locality a representative sample of the soil of the place may be sent to the Agricultural Chemist, Lawley Road P. O. (Coimbatore R. S.) for physical analysis. Ed. M. A. J.

V

Restriction of Rice Area

Mr. T. S. Akilandam Pillai, Landholder, Ilanji, Tinnevely District, writes:—

I went through the papers published in the September issue of the journal on the debate on 'Restriction of area under rice cultivation' with much interest. As you have invited correspondence on the subject, I am giving out a layman's view-point on the matter. I think that, irrespective of the question, whether the rice area in this province should be increased any further or no, the one thing necessary and to strive for, both by the Agricultural Department and the ryot, is to try to get the utmost out of mother earth, whether it is from a rice crop or any other crop. A particular piece of land or tract of land may be eminently suitable for a particular crop and that must be found out and that crop should be raised on it. It is not an easy matter to find that out and it requires a good deal of thinking and experience, as there are so many factors to be taken into consideration for raising a successful and highly paying crop as the nature of the soil, the climatic conditions of the locality, the question of labour, marketing facilities, etc., and it is here that the Agricultural Department can best help the ryot. The conditions of a particular piece of land may be such as to be suitable only to rice crop and to no other. Willy-nilly, rice has to be grown on it. It will be folly to attempt to grow any other crop on it, as it will end only in loss to the ryot. Where lands are suitable for both rice crop and other crops, that, which gives most money to the ryot, should be raised. In short, if any landholder and ryot will work with this end in view, it matters little whether area under rice cultivation increases or decreases. The general economic position of the ryot and the province is bound to be much better.

VI

Ammonium Sulphate

The Managing Agent, The Indian Agricultural Development and Manure Organisation Ltd., Cocanada, writes:—

We have got on the market two kinds of Sulphate of Ammonia—one a synthetic product and the other a by-product from the gas works. We shall be very much obliged if you can let us know through your esteemed journal.

1. In what respects do they differ from the manurial point of view.
2. The difference, if any, in the nature and behaviour of nitrogen contained in both.

Answer.—There is no difference in the manurial values of synthetic ammonium sulphate and by-product ammonium sulphate. The latter is slightly darker in colour. Ed. M. A. J.

College News and Notes

Weather.—October, which usually brings in the North-East monsoon rains, has been practically dry, and the weather conditions have been peculiar, the monsoon having shown no signs of advancement. A fall of about two inches and a half, distributed over a few days in the end of the month, helped to finish the sowing on the remaining dry areas. Garden crops and paddy are fair but dry crops are having a very unfavourable season.

Games.—In the Hockey tournament of the season the College team met the redoubtable Stanes High School team in the first round and suffered a defeat by six goals. Lack of sufficient practice and poor team work contributed to this failure. The inter-class tournaments are now in full swing, each class being able to put up two teams in hockey and football. Matches are being played in the different games for the Victory cup and in hockey for the Parnell cup. The American sealed handicap Tennis Doubles tournament introduced recently has been started and seems to be quite popular judging from the entries which total 36.

The Hon. Mr. P. T. Rajan's visit.—The Minister for P.W.D., on his way down to Madras from Ooty, camped at Coimbatore for a few days. He visited the Research Institute and the College on the afternoon of the 17th October. The Minister evinced very great interest in the work carried on in the different sections and expressed that he would be glad to spend a much longer time at a later opportunity. In the evening Rao Bahadur D. Ananda Rao who was in camp at Lawley Road, was 'at home' to the Minister.

A Lecture.—Under the auspices of the M.A.S. Union a public lecture on 'The present position of Currency and Exchange in India' was delivered by Mr. R. K. Shanmukam Chetty, M.L.A., on the 27th October in the Freeman Hall when a very large number of the officers and students and a few visitors from the town were present. Mr. Chetty in his masterly way dwelt at length on the nature of currency, exchange and gold standard and then discussed the present position of India with reference to these. It was a very able and instructive lecture lasting over an hour. Mr. C. Tadulingam, presided over the meeting.

Our College cricketer in the University team.—For the first time in the history of the Agricultural College one of the students of our College was selected to play for the Madras University team in an inter-varsity match. Mr. U. Patnaick, of the third year class, secured a place in the Madras University Cricket team set against the Aligarh University, the match coming off on the 21st and 22nd October. It redounds to the credit of our College Cricket team to note that Mr. Patnaick had a brilliant rôle to perform in the match. He took 5 wickets for 29 runs in the first innings and was therefore responsible for the Aligarh men to be content with the lowest total they scored in their Southern tour. He bowled very well in the second innings also but due to the poor fielding of some of his comrades he had to be content with a single wicket. He batted only in the first innings and returned bat in hand with 4 runs to his credit.

Public Servants' Co-operative Society for the Estate.—A separate society for the officers on the Estate has been started and has begun to function from the 1st November. This came into being as a result of the separation of all the members of the Estate enrolled in the District Public Servants' Co-operative Society of the town, into a separate unit to form the new society on the Estate. With Mr. C. Tadulinga Mudaliar as the President and a representative and influential committee, the society is assured of a bright future.

Gazetted Officers' Conference.—It is understood that the Conference of Gazetted Officers which was announced to be held in December will be held at Coimbatore, in all probability, on the 16th, 17th and 18th December.

College Day and Conference, 1931.—The Twenty-first College Day and Conference will be held at the Agricultural College, Coimbatore, between the 19th and 21st December. The Hon'ble Mr. P. T. Rajan, B.A., Bar-at-Law, M.L.C., Minister for P.W.D. and Agriculture has been requested to open the Conference and to preside over its deliberations. The M.A.S.U. will, as usual, run the annual Athletic Sports which will take place on Saturday the 19th December. The Conference will be held on the 21st December when several papers will be contributed by some of the officers of the Department and some practical agriculturists to make a symposium on Sorghum.

University Affairs.—A meeting of the Board of Studies in Agriculture was held on the 11th November at the Agricultural College.

Mr. P. S. Jivanna Rao, Lecturer in Botany, was elected by the members of the teaching staff to represent the Agricultural College in the Academic Council in the vacancy caused by Dr. T. V. Ramakrishna Ayyar's resignation.

The Systematic Botanist.—Mr. V. Narayanaswami, whose probationary period as Systematic Botanist was terminated, handed over charge of the office to Mr. K. Cheryan Jacob on the 22nd October and left for Calcutta to rejoin his permanent appointment as Senior Systematic Assistant in the Botanical Survey of India.

AN APPEAL FOR THE CECIL WOOD MEMORIAL

Mr. V. T. Subbiah Mudaliar, Secretary, Cecil Wood Memorial Committee, writes :—

The Cecil Wood Memorial Committee has great pleasure in acknowledging below the contributions received so far for the above memorial.

May I request you to send in your bit by next post?

Contributions Paid

	Rs.		Rs.
Rao Bahadur T. S. Venkataraman.	7	Mr. U. Vittal Rao ...	5
Mr. E. K. Nambiyar ...	2	„ K. Unnikrishna Menon ...	10
„ K. Krishnamurthi Rao ...	6	„ K. Avudainayagam Pillai ...	5
„ V. T. S. Mudaliar ...	3	„ V. S. Narayanaswami Aiyar .	2
„ K. L. Ramakrishna Rao ...	3	Acknowledged in the February	
		issue of the <i>M.A.J.</i> ...	121
		Total ...	164

Weather Review

OCTOBER 1931

RAINFALL DATA

Division	Station	Total for month	Departure from normal	Total since January 1st	Division	Station	Total for month	Departure from normal	Total since January 1st
Circars ...	Gopalpore ...	14.9	+ 6.9	29.5	South ...	Negapatam..	1.9	- 8.6	18.6
	Vizagapatam..	14.2	+ 7.1	31.7		Madura ...	8.9	+ 1.1	18.6
	Cocanada ...	16.0	+ 8.1	47.5		Pamban ...	6.3	- 2.7	9.0
	Masulipatam	13.2	+ 5.1	36.9		Palamcottah.	3.7	- 3.1	5.1
Ceded Districts.	Kurnool ...	5.5	+ 2.0	23.6	West Coast	Trivandrum.	4.9	- 5.7	52.8
	Bellary ...	2.5	- 1.5	11.2		Cochin ...	6.1	- 7.0	126.3
	Anantapur ...	1.1	- 2.0	12.2		Calicut ...	7.0	- 3.3	127.7
	Cuddapah ...	3.4	- 1.7	17.6		Mangalore ...	4.1	- 3.4	144.9
Carnatic...	Nellore ...	17.7	+ 9.8	32.5	Mysore and Coorg ...	Bangalore ...	1.5	- 4.3	21.6
	Madras ...	6.8	- 4.9	31.6		Mercara ...	3.1	- 5.6	129.4
	Cuddalore ...	5.3	- 5.7	24.4					
Central ...	Vellore ...	3.4	- 2.3	32.9	Hills ...	Kodaikanal..	5.9	- 3.8	43.0
	Salem ...	5.2	- 1.5	26.3		Coonoor ...	7.7	- 5.9	29.1
	Coimbatore Town ...	4.1	- 2.3	16.3					
	Coimbatore Res. Inst. ...	3.3	- 2.7	11.2					
	Trichinopoly.	4.2	- 2.7	29.4					

Summary of general weather conditions:—

The weather over the Presidency was dominated by four disturbances which formed in the Bay. Rainfall in connection with these disturbances was concentrated chiefly on the East Coast north of Nellore, and conditions were not favourable for the setting in of the North-East Monsoon rains on the South Coromandel coast.

The first disturbance formed off the Orissa-Ganjam coast on the 4th and drifting westwards lay over North Hyderabad on the 5th and accentuated the already existing area of low pressure there. This Low drifted slowly north-westwards and became unimportant over Kathiawad on the 15th having caused unusually widespread and locally heavy rain over the central parts of the country. The second disturbance originated about the 7th in the Andaman sea as an area of unsettled weather and moving north-westwards developed into a depression centred about 17° N. and 88° E. on the 11th

and moving slowly westwards crossed the Circars coast near Calingapatam on the 13th and thereafter moved into Central Provinces and disappeared over the United Provinces on the 17th. This storm was of moderate intensity and caused very heavy rain in the neighbourhood of its track and much damage was done to standing crops. Nellimarla near Vizianagaram is reported to have received 22" of rain in 24 hours. The third disturbance formed off the Circars-Coromandel coast on the 23rd and was centred at 16° N. and 85° E. on that day, it moved in a north-easterly direction and disappeared at the head of the Bay on the 28th. The fourth depression was centred at 10° N. and 84° E. on the 30th and moving rapidly, crossed the coast between Nellore and Masulipatam between the 31st night and 1st November and lay over South Deccan. Very heavy rain was general on the north Coromandel and Circars coast during its passage inland.

Rainfall was markedly above the average over the region north of Nellore, most stations receiving double the normal quantity of rainfall, and in large defect elsewhere. The notable falls of rainfall were as follows: Nellore 9.4" on the 31st, Cocanada 4.1" on the 26th, Gopalpore 3.9" on the 25th, Vizagapatam 3.8" on the 14th and Madras 3.8" on the 30th.

Temperature fluctuations followed the course of rainfall but day temperature was generally above normal in the south and centre of the Presidency. Madura recorded a maximum of 100° on the 14th.

Weather Report for the Research Institute Observatory:—

Absolute maximum in shade	...	...	94.0°
Absolute minimum in shade	...	...	66.0°
Mean maximum in shade	...	...	90.1°
Mean minimum in shade	...	...	70.5°
Total rainfall	...	...	3.34 inches
Mean rainfall for October	...	...	5.97 "
Departure from normal	...	...	- 2.63 "
Heaviest fall in 24 hrs.	...	...	1.30 "
Number of rainy days	...	...	6 "
Mean daily wind velocity	...	...	2.9 m.p.h
Mean 8 hours wind velocity	...	...	1.9 "
Mean humidity at 8 hrs.	...	...	73.3 %
Total hours of bright sunshine	...	...	261.3 hours
Mean daily hours of bright sunshine	...	...	8.4 "

Summary of weather conditions:—

Weather was generally fine throughout the month and except for the rainfall during the week ending the 24th, weather was dry. The unsettled conditions in the Bay were too far away to influence the weather. With the exception of winds with a southerly component for the greater part of the month, weather was normal in most respects. Weather was thundery from the 19th till the 25th and rainfall in connection with the thunderstorms was very local in character. On the 20th afternoon two thunderstorms traversed the vicinity of the observatory and 1.30 inches were recorded, while at the Millets Station, a mile away, the fall was no less than 2.69 inches.

Total rainfall amounted to 3.34 inches and was below normal by 2.63 inches. Temperature in consequence of the fine weather was high and

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maxima of above 90° were reported on 19 days in the month, minima were low and a temperature of 66·0° was reported on the 14th on which day the diurnal variation was 23°.

The typical North-East Monsoon conditions failed to appear till the end of the month when the Bay depression was moving out of the area of influence.

Note.—The Madras Observatory has ceased publication of the daily weather chart with effect from November 1st. Future weather reviews will be based on the All-India weather report published from Poona.

P. V. R.
B. S. N.

Departmental Notifications

I Circle.—D. Hanumantha Rao, F.M., Samalkot, transfer to district work with headquarters at Amalapuram. M. L. Narayana Reddy, transfer to A.R.S., Samalkot. A. Ramamohan Rao, F.M., Samalkot, transfer to district work with headquarters at Dowleshwaram. K. Suryanarayana, A. A. D., Anakapalle, extension of l. a. p. for 15 days from 25—10—31. M. V. Kondal Rao, A.A.D., Ellore, l. a. p. for 11 days from 13—10—31.

II Circle.—S. Sitapathi Rao, A.A.D., Nellore, l.a.p. for 13 days from 2—11—31.

III Circle.—P. Nagadhar Naidu, A.A.D., Bellary, l.a.p. for 10 days from 5—10—31. K. Jagannatha Rao, F. M., Nandyal, l.a.p. for 3 weeks from 7—10—31; after expiry of leave he is posted to Anantapur as A.D. A. Krishnaswami Iyer is posted to Nandyal as F.M. P. V. Subba Rao, A. A. D., Nandyal, extension of l.a.p. for 2 days. K. Ramanatha Ayyar, A. D., Siruguppa, l.a.p. for 15 days from 4—11—31 and to be A.D., Adoni, after leave. K. Balaji Rao, A.A.D., Adoni to be A.A.D., Siruguppa.

IV Circle.—V. Kumaraswami, A.D., Tiruttani, l.a.p. for 20 days from 4—1—32. P. K. Palaniswami, F. M., Palur, l. a. p. for 12 days from 20—10—31.

VI Circle.—S. M. Kalyanarama Ayyar, Asst., Kovilpatti, l. a. p. for 2 months from 24—10—31. R. Narasimha Ayyar, Mycology Demonstrator, l.a.p. for 2 months and 4 days on m.c. from 20—10—31.

VIII Circle.—K. G. Sankappa Bhandari, F.M., Nanjanad, l. a. p. on m.c. for 4 months from 19—8—31.

P.S.'s Section.—M. K. Venkatasubrahmanian, Asst. A.R.S., Pattambi, l.a.p. for 18 days from 14—10—31. S. Venkataraman, A.F.M., Aduturai, l.a.p. for 1 month and 1 day from 20—10—31. S. Jobitha Raj, l.a.p. from 16—11—31 or date of relief to 23—12—31 with permission to suffix Xmas and New Year holidays.

G.E.'s Section.—K. P. Ananthanarayana Ayyar, l.a.p. for 1 month from 17—10—31.

G.S.B.'s Section.—M. Rathnavelu, Sub-Asst., extension of l.a.p. for 8 days from 24—10—31.

Curator's Section.—M. Arogyaswami Pillai, Asst. Curator, l.a.p. from 1—12—31 to 9—3—32 preparatory to retirement.

LATEST NOTIFICATIONS

D.D.L.S.'s Section.—M. C. Menon, Cattle Manager, transfer from Coimbatore to Hosur.

P.S.'s Section.—S. Dharmalinga Mudaliar, l.a.p. for 10 days from 11—11—31.

G.A.C. Section.—M. Suryanarayana, l.a.p. for 1 month and 1 day from 23—11—31.

G.E.'s Section.—K. P. Ananthanarayana Iyer, extension of l.a.p. for one month and 8 days.

G.S.B.'s Section.—J. Davis, l.a.p. for 1 month and 11 days from 13—11—31.

VII Circle.—C. Raman Moosad, F.M., Taliparamba, l.a.p. for 9 days from 4—1—32 with permission to prefix Xmas and New Year holidays and affix Pongal holidays.

APPENDIX

ADDITIONS TO THE LIBRARY DURING SEPTEMBER 1931

A. BOOKS

- | | | | |
|--|------------------------------------|-------|------|
| 1. <i>The Development of Physiological Chemistry in the United States.</i> | By Chittenden | ... | 1930 |
| 2. <i>Colloid Symposium Monograph, Vols. II, III, IV, and VI.</i> | | | 1925 |
| 3. <i>Chemical Aspects of Immunity</i> | By H. G. Wells | ... | 1929 |
| 4. <i>Plant Succession and Indicators</i> | .. F. E. Clements | ... | 1928 |
| 5. <i>Plant Life through the Ages</i> | .. A. C. Seward | ... | 1931 |
| 6. <i>Flora of the Presidency of Madras, Part IX.</i> | .. C. E. C. Fischer | ... | 1931 |
| 7. <i>The Genera of Fungi</i> | .. F. E. Clements and C. L. Shear. | and | 1931 |
| 8. <i>Fauna of British India. Reptilia and Amphibia, Vol. I.</i> | .. M. A. Smith | ... | 1931 |
| 9. <i>The Encyclopædia Britannica, 14th Edition, 24 Volumes.</i> | | | 1929 |
| 10. <i>The Asylum Press Almanac and Directory of Madras and Southern India.</i> | | | 1931 |
| 11. <i>Madras Manual of Special Pay and Allowances, Vol. II. (Corrected up to 1-4-1931).</i> | | | " |
| 12. <i>The Madras Budget Manual, 1st Edition. (Corrected up to 31-7-1931).</i> | | | " |
| 13. <i>Income-tax Manual, 4th Edition</i> | ... | | " |
| 14. <i>The Universal Ready Reckoner</i> | By Dudani | ... | " |

B. REPORTS

- | | |
|--|-------|
| 1. Report of the Botanical Survey of India for 1929-30. | |
| 2. Annual Report of the Society of Chemical Industry on the Progress of applied Chemistry, Vol. XIV. | 1929 |
| 3. Do. do. Vol. XV. | 1930 |
| 4. Kenya Colony 12th Annual Agricultural Census Report. | 1931 |
| 5. Annual Report of the British Guiana Agricultural Department. | 1930 |
| 6. Do. Uganda Protectorate Agricultural Department. | " |
| 7. Do. Jamaica Agricultural Department. | " |
| 8. Do. North Borneo Agricultural Department. | " |
| 9. Veterinary Research Report of the New South Wales Agricultural Department, No. 6. | " |
| 10. Report of the Entomologist, U.S.A. Agricultural Department. | 1928 |

C. BULLETINS, MEMOIRS, Etc.

11. Cattle Breeding in India	By Raja, K. J. V. Naidu, 1931.	
12. Cotton Improvement in India	I.C.C. Committee Publication, 1931.	
13. Note on Indian Tobacco	I.T.J. Supplement.	
14. The Wind at Agra and its structure	Indian Meteorological Department Memoir, Vol. XXV, Part 6.	
15. An analysis of the base line values of Autographic Instruments.	" Memoir, Vol. XXV, Part 7.	
16. Anthropological Observations on the Anglo-Indians of Calcutta II. Analysis of Anglo-Indian Head length.	Records of the Indian Museums, Vol. XXIII.	
17. Manuring of Paddy in Upper Burma	Burma Agricultural Department Bulletin No. 27	
18. List of Cambridge University	Cambridge University Agricultural Department Publications, Memoir No. 3	
19. Memorandum on the use of the Universal Decimal System of Classification.	I.A.B. Publication.	
20. Proceedings of the first Imperial Agricultural Conference II. Papers on the Application of Science to Horticulture.	I.A.B. F.P. Publication.	
21. Do. No. III. Papers on the Progress of Fruit Storage Methods.	"	
22. Ringing Fruit Trees—The Present Position	I.A.B. F.B. Tech. Com. No. 1	
23. Field Experiments in Horticulture	"	2
24. Imperial Bureau of Fruit Production (I.A.B. F.B.) Organization, etc.	"	
25. The Present Position of the International Method of Mechanical Analysis.	I.A.B. Soil Science Technical Communication No. 1	
26. The Examination of Organic Matter in Soil	"	2
27. Preliminary Soil Map of the Empire	"	3
28. Soil Erosion with Bibliography	"	5
29. The American Method of Soil Classification and Survey.	"	6
30. Methods of taking soil Profiles	"	7
31. Publications on Soil Science issued from the Empire Overseas during 1929.	"	8
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33. Note on an area of Alkali Land in Western Australia.	"	11
34. Determination of Exchangeable Bases and Lime requirement.	"	12
35. The Second International Congress of Soil Science.	"	13
36. Weights and Measures occurring in Agricultural Publications of the Empire Overseas.	"	14

37. A Soil Survey for irrigation purposes in South Africa.	I.A.B. Soil Science Tech. Com. No. 15	
38. Soil Erosion—Supplementary Note	"	16
39. Proceedings of the Conference on Soil Science Problems held at Rothamsted Experimental Station during 1930.	"	17
40. Publications of Soil Science issued from the Empire Overseas during 1930.	"	18
41. Air Survey in Relation to Soil Survey	"	19
42. Agricultural Economics in the Empire	Empire Marketing Board Publication No. 1	
43. Report on Development of Agriculture in Trinidad	"	3
44. Report on Development of Agriculture in the Leeward and Windward Islands and Barbados.	"	5
45. Geophysical Surveying	"	6
46. The Chemistry of Wine-making—A Report on Oenological Research.	"	7
47. Viticultural Research	"	11
48. Report on Insect Infestation of Dried Fruit	"	12
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67. Soil Conditions affecting Coffee in Kenya	Kenya Colony Agricultural Bulletin No. 7	
68. The Supplementary Feeding of Dairy Stock	"	8
69. A Decade of Agricultural Progress in Kenya	"	9
70. A Bulletin of Potato	"	10

71.	Memoirs of segregation for control and eradication of bovine contagious abortion.	Kenya Colony Agricultural Bulletin No. 11	11
72.	The control of cut-worm	"	12
73.	Ticks and Tick eradication	"	13
74.	Preliminary Report on crops Expts. 1930	"	14
75.	Guide to the grading of Grapes for export	Union of South Africa Department Bulletin No. 87	
76.	Statistical Methods in Agronomic Research	Canada Plant Breeders Series Publication No. 2	
77.	Two citrus Leaf miners of the Far East	U.S.A. Agricultural Department Technical Bulletin No. 252	
78.	Weeds—How to control them	U.S.A. Agricultural Department Farmer's Bulletin No. 660	
79.	How to attract birds in the East Central States	"	912
80.	How to grow rice in the Sacramento valley	"	1249
81.	Slash pine	"	1256
82.	Tomatoes as truck crop	"	1338
83.	Canning fruits and vegetables at home	"	1471
84.	A Comparison of methods for determining the Volume weight of soils.	Reprint from J.A.R., Vol. 42, No. 11	
85.	Dispersion of soils by a supersonic method	" Vol. 42, No. 12	
86.	Seasonable hints from the Dominion Experimental Farms.		
	(a) New Points concerning rotations		
	(b) Thinning Apples		
	(c) Home Canning		
	(d) Spraying versus dusting for control of Foliage Disease of Potato	Ottawa Agricultural Department Publication E. and B.C. Edition No. 52	
	(e) Rotational Basis—Its Chemical Basis		
87.	Seasonable Hints from the Dominion Experimental Farms.		
	(a) Feeding and care of dry cow		
	(b) New points concerning rotations		
	(c) Perennial flowers		
	(d) Marking use of Farm by product	Prairie Edition No. 52	

D. LEAFLETS, MISCELLANEOUS PUBLICATIONS, ETC.

88.	Instruction to Authors of Publications of the Imperial Council of Agricultural Research.	Imp. Council of Agricultural Research Publication.	
89.	Swine Erysipelas	Ministry of Agriculture and Fisheries Leaflet No. 17	
90.	The Lacky moth	"	37
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95.	The Destruction of rats and mice	"	49

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105.	An Economical Sheep dipping bath	"	64
106.	The Control of the lesser Peach Borer with para-di-chloro-benzene Solutions.	U.S.A. Agricultural Department Circular No. 172	
107.	Moss peat, Its Uses and Distribution in the United States.	"	167
108.	Directory of Field Activities of the Plant Quarantine and Control Administration 1931.	U.S.A. Miscellaneous Publication No. 47	
109.	Important Western Browse Plants	"	101
110.	Forest Rangers Catechism—Questions and Answers on the National Forests of the California Region.	"	109
111.	Rural Standards of Living—A Selected Bibliography.	"	116
112.	The Outlook of the Dairy Industry and some essentials of a National Dairy Programme.	"	124
113.	Bracing Farm Building	" Leaflet No. 77	
114.	Dresses for Little Girls	"	80
115.	Irrigation of Citrus Trees	Cyprus Gazette No. 2155, Agricultural Supplement No. 38.	

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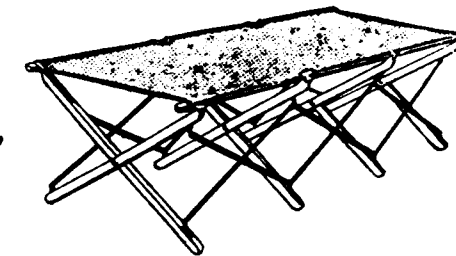
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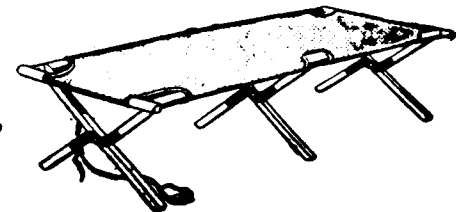
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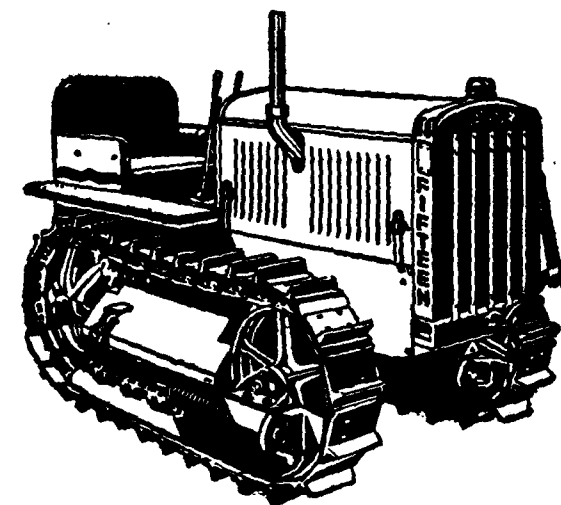
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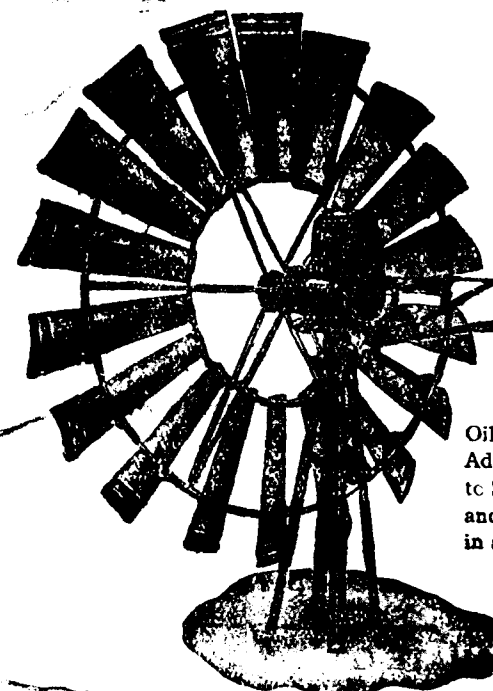
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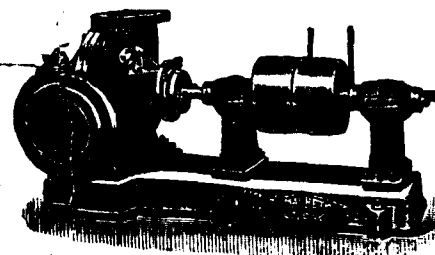
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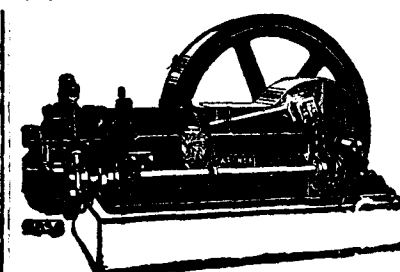


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