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EDITORIAL

Tree Planting With the onset of summer and the attendant shedding of leaves and drying up of all vegetation that surround us, we are left to ponder why there should not be more of the evergreen trees along the road sides and round about our habitation to afford some relief from the scorching heat. The feeling is all the more acute when we go out into the country side and find the weary pedestrian or the village cattle hastening their steps in search of a shady tree that has escaped the hand of destruction, to rest a while from the blazing midday sun. We have heard it often said, and probably observed it ourselves too, that most of the public pathways which were once decked with rows of trees planted and raised with great care by some philanthropic soul of 'good old days' have been severely denuded to make room for the electric wires that run across our towns and cities or for preventing the wear on the road surface due to the dripping of rain water from the over-hanging branches. The recent increased demand for timber for various purposes has also augmented the rapid disappearance of trees and even of saplings from the countryside. Cyclones and storms have also uprooted many trees and hastened the pace of destruction in some of the coastal districts. While we appreciate the good intentions of the concerned service departments to make their work more efficient and also realize our utter helplessness to overcome the destructive forces of Nature, we are sorry to observe that there is yet no organised effort in this country to repair this lamentable loss and compensate the destruction that has been going on all these years. We are not, however, forgetful of the salutory efforts of certain Local Bodies and district institutions in organising a tree planting day every year, but we fear that this has not been copied extensively and has not materially altered the situation. We very much wish that this drive for tree planting is more properly planned and carried out with sustained interest, so that the trees once planted are properly cared for and survive any future policy of road or village development that may be initiated.

Arboriculture to be successful requires a fair knowledge of the growth habits and requirements of the trees selected for planting, as well as their reaction to new environments. The embarrassing richness of our forests makes it no easy task to select the trees that would best suit the varied

climatic and soil conditions, that would grow quick, stand the fierce storms and live long. What is good for one tract may not suit another. In chosing trees for avenue planting, it may be worthwhile to have trees of some economic importance such as the tamarind, neem, *pungam* or *illuppai* which may yield useful products We would particularly recommend the planting of oil-yielding trees as the seeds can be gathered by the villager, crushed in the local *chekku* and the oil and cake put to a variety of uses. Again, as the trees growing round about a village are also innately connected with the economy of village life in so far as they provide timber for house construction and agricultural implements, fodder for cattle, green manure for crops, protection of the soil from wind erosion, or fuel, it is desirable to plant trees suitable for these purposes in the villages. The hon'ble Sir Jogendra Singh, Member for Education, Health and Lands, Government of India, presiding over the Forestry Board Meeting held at Dehra Dun in October last pointed out that "the time has come when the Forest Officers should include the villages as one of their responsibilities and that the need of 700,000 villages in the matter of tree plantations had received but scant attention" The hon'ble member also suggested that it may be useful to take a group of villages at a time and start plantations to provide fuel, timber, fodder for cattle and work for afforestation of areas which now lie waste. These are sentiments which deserve consideration of the Forest and other departments as well as of Local Bodies, so that we may have for each district a more precise policy of tree planting and after care with an adequate and regular supply of suitable planting material. It is common knowledge how trees planted without proper initial care exhibit poor growth and how trees planted and left uncared for are eaten away by cattle or cut down by the unthinking folk and disappear in no time. In this matter, we are reminded of the Agricultural Policeman of Haiti, West Indies, whose duty it is to prosecute any one, tenant or landlord, who without the written authority from a qualified Government agent injures, prunes, cuts or burns away trees While it may not be feasible to take action on such drastic scale in our country, we desire that the matter receives greater consideration of the authorities concerned. Probably the subject can be given prominence at the District Periodical Conferences and a co-ordinated and long range policy adumbrated as an item of Rural Reconstruction and adequate funds allotted for the planting and maintenance of trees.

Note on Improvement of the Coconut by Cross-breeding*

By C. M. JOHN,

Oil Seeds Specialist, Department of Agriculture, Madras

and

G. VENKATANARAYANA,

Superintendent, Agricultural Research Station, Kasaragod

Introduction The coconut (*Cocos nucifera* Linn.) has been an important oil yielding crop of the Tropics from ancient times and it still figures prominent in the edible oil industry of the world despite competition from other sources of edible oil supply. Though some attention is being bestowed on the selection of seed material, nothing appreciable seems to have been done elsewhere to produce economic types by cross-breeding different varieties. This is probably due to the fact that it takes normally 8 to 10 years for a coconut tree to come to the flowering stage and many more years should elapse before its bearing capacity can be fully assessed. The added risk of finding the cross progenies unproductive or uneconomic after they have been maintained at considerable expenditure for several years might have also deterred the enthusiasm of the few workers on this crop who might have conceived the idea of cross-breeding in coconuts.

Breeding in Madras Breeding work on the coconut was started in Madras at the Coconut Research Station, Kasaragod, 12 years ago with the chief object of producing high yielding and early bearing types giving large quantity of high grade *copra* (dried kernels). Under different schemes of cross-breeding, attempts were made to combine the economic characters of the different eco-types of the ordinary Tall variety, such as high production of female flowers, high percentage of setting, thick kernels, large size of nuts etc., as also the earliness of the Dwarf variety with some of the desirable characters of the Tall variety. The hybrid trees in the scheme of hybridization of the Tall and the Dwarf varieties have come to the bearing stage and in this note an account of the hybrids and the parents is given.

Tall × Dwarf crosses The scheme of crossing between the ordinary Tall variety that is largely cultivated in India and the Dwarf variety which is only occasionally met with was first conceived and started by Dr. J. S. Patel in 1931. The work has been further extended and the study continued by planting the parents and the hybrid seedlings in an area of four acres at the Coconut Research Station, Nileshwar (Kasaragod taluk) in 1934 and subsequent years. Most of the hybrid trees and the selfed progenies of the Dwarf parent which is an early flowering variety have begun to yield since 1939. The hybrids are found to be economic types being very vigorous, early bearing and high yielding in character.

* Contribution No. 22 of the Oil Seeds Section of the Madras Department of Agriculture.

Characters of the parents *Ordinary Tall variety* It is a tall growing, hardy palm attaining a height of about 40 feet or more and living up to the age of about 80 or 90 years. It begins to yield under ordinary conditions in about 8 to 10 years after planting. Under rainfed conditions the yield goes up to 100 nuts per tree, per year, which give about 30 lb. of *copra*. The kernel is thick and *copra* is of good quality and contains about 72 per cent of oil by chemical extraction.

Dwarf variety It is a delicate palm of small stature attaining a height of about 15 feet and living up to an age of about 35 years. It is a very early bearing variety beginning to flower in about four years after planting. The yield is about 60 nuts per tree, per year giving 5 to 10 lb. of *copra*. The nuts are very small in size with thin kernel. The *copra* is of inferior quality being leathery. The percentage of oil in *copra* is about 70.

Characters of the Tall × Dwarf progenies *Vegetative growth* The progenies of the cross being derived from two distinct varieties, exhibit considerable hybrid vigour even from the first year of planting. They have greater rate of leaf production and number of leaves and rate of growth of the stem than either of the progenies of the Tall or the Dwarf parents planted along with them.

For instance, the hybrid tree (Fig. 3) had a trunk length of 1 ft. 1 in. with 27 leaves in the crown in 1941 while the pure Tall progeny (Fig. 1) of the female parent of the same age did not form any trunk and had only 11 leaves. The pure dwarf progeny (Fig. 2) of the male parent of the same age had 9 inches of trunk and 22 leaves in the crown.

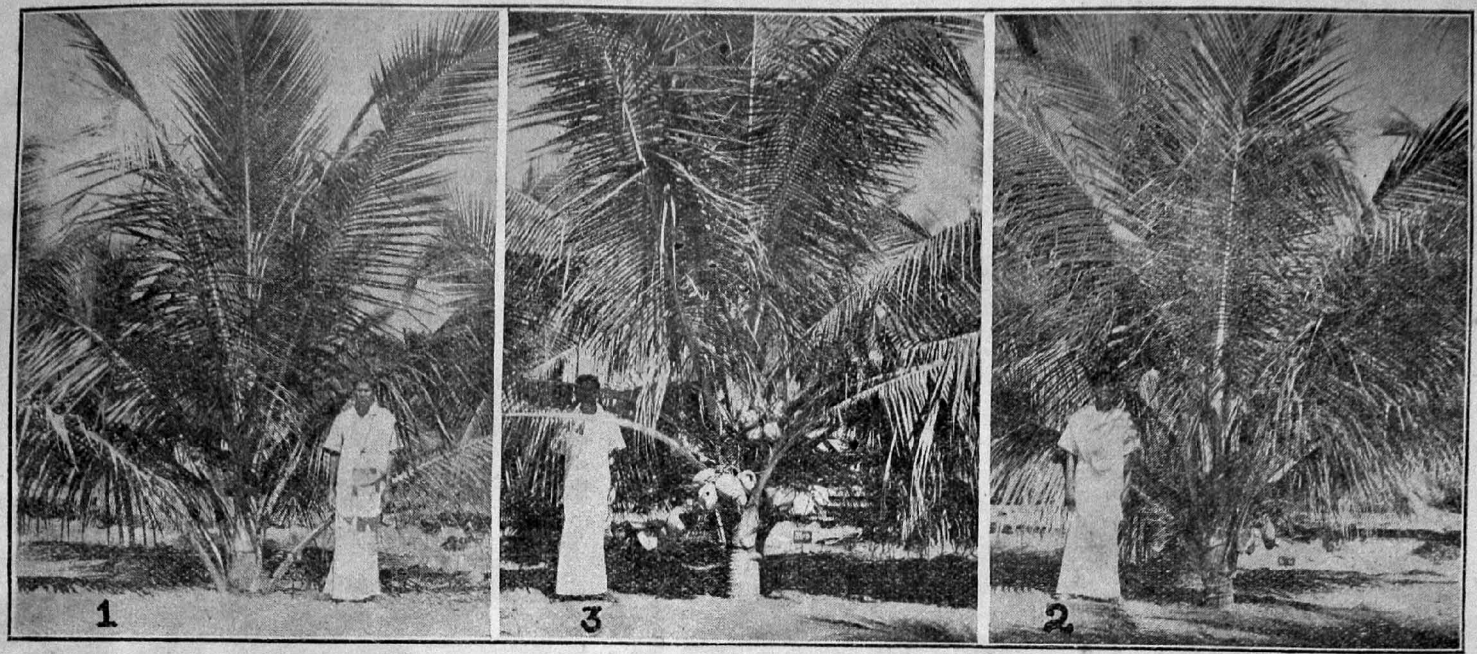
Flowering The hybrid flowered early like the Dwarf at about 50 months after planting while the Tall did not flower even after 63 months and is not likely to flower for another two or three years.

Usually in the coconut, during the early years of flowering the number of female flowers produced and the setting percentage are very low, and increase with age. But in the hybrid, the total number of female flowers produced in a year was as high as 433 which is much higher than those produced either by the Tall or the Dwarf parents even in their prime of life.

Fruiting The hybrid progenies gave a definitely higher initial setting percentage and produced more nuts. These were like the nuts of the Tall variety in size, thickness of kernel, quality and out-turn of *copra*. The yield of nuts was more than double that of the Dwarf progeny of the same age. In one particular cross the hybrid yielded as many as 90 nuts in one year, about three years after first flowering. This should be considered very satisfactory even when compared with the production of the high yielding Tall variety.

The following table gives the characters of the hybrid, and the selfed progenies of the parents.

Improvement of the Coconut by Cross-breeding.



The Tall Variety | The Hybrid | The Dwarf Variety

Characters of selfed progenies of parents and hybrid
(63 months old).

Characters	Selfed progeny of ♀ parent Tall Fig. 1	Selfed progeny of ♂ parents Dwarf Fig. 3	Hybrid Fig. 2
Height of trunk above ground level	No trunk formed	0′—9″	1′—1″
Girth of trunk at base		2′—1″	2′—11″
No. of leaves in the crown	11	22	27
Mean length of leaf	12′—8″	10′—10″	13′—0″
No. of leaves produced in a year in 1941	9	14	14
Age at first flowering	Not flowered	49 months	50 months
No. of female flowers produced in a year	...	375	433
Setting per cent	...	5·6	11·7
Yield of nuts per year	...	20	51
Copra content per nut	...	20·69 gms.	165·0 gms.
Quality of *copra*	...	poor	good
Percentage of oil	...	70	70

(*Note*—The readings for items 7 to 12 for the Tall parent tree used for the crossing and which is about 50 years old are—No. of female flowers produced in a year—236; setting percent—34·7; Yield of nuts per year—81·8; copra content per nut—206·6 gms; quality of copra—good; percentage of oil—71.)

The above table gives a comparative idea of the characters of the three classes of progenies at the same age viz., 63 months after planting under rainfed conditions.

Conclusion The trials and the work done during the last 10 years with Tall × Dwarf hybrids have definitely shown that there is hybrid vigour in the progeny and that they combine the very desirable early flowering nature of the Dwarf parent with the economic nut characters of the Tall parent. One of the urgent requirements of the coconut grower is to get early bearing economic types in place of the late bearing Tall type which he is at present cultivating. It may be now said with some confidence that the Tall × Dwarf crosses have met this long-felt want and have opened a new field in the improvement of the coconut. Cross-breeding work is on hand to produce these hybrid seedlings for distribution among coconut planters.

A Note on the Cultivation of *Dioscorea esculenta* in the Neighbourhood of Anakapalli

By A. SANKARAM, B. Sc. Ag,

Introduction *Dioscorea esculenta* Burk. is an economic plant largely grown by the vegetable gardeners in the neighbourhood of Anakapalli (Vizagapatam District). It is cultivated in some places in the north of the district also. The underground tubers which the plant produces are largely used in the district as an agreeable vegetable. Well-developed tubers resemble potatoes in many respects, except for the numerous root fibres on them. In taste they are somewhat sweeter than the common potato and easily lend themselves suitable for the preparation of a variety of dishes. It is, hence, commonly nick-named as the 'Indian potato'. It is a cheap root vegetable available in the local markets and is favoured universally by the rich and the poor. Its Telugu name is *silakadam.*

Botanical *Dioscorea esculenta* Burk. belongs to the family Dioscoreaceae. Like other members of the family the plant is a herbaceous annual with twining or procumbent stems bearing large or small subterranean tubers. The following is a complete botanical description of the plant.

Stems prickly, leaves simple, orbicular or reniform, accuminate or cuspidate, base cordate, 2 to 5 in. long; petioles about as long; spikes 6 to 18 in. long; flowers erect, with a disk within the 6 perfect stamens. Capsule oblong, slightly narrowed below, apex retuse, seeds broadly winged all round. Tubers numerous, edible, stalked, protected by root fibres, generally bearing spines up to 0'5 in. long. It is very variable under cultivation when it often loses the spines in the roots.

Soil and preparatory cultivation Soils of high fertility with free drainage, *e.g.*, sandy loams, are considered to be ideal for this crop. However, soils of medium fertility when well supplemented by organic manures give equally good results. But free drainage is of paramount importance. After the removal of the previous crop the preparatory cultivation commences. Eight to ten ploughings are considered necessary to bring the land to very fine tilth. In the bed system of planting the field is thrown into beds of 8 ft. square. Irrigation channels are formed between every set of two beds. Where planting is on the crest of ridges the plot is worked up into ridges and furrows with irrigation channels at 16 ft. length of the furrows. In the garden lands the crop comes in rotation with other vegetable crops like brinjal, *bendai*, etc., or *ragi*. It is also commonly grown mixed with other vegetable root crops like colocasia (Tel: *chama*) and *Dioscorea alata* (Tel: *pendalam*). It is a common practice to plant setts of tapioca around plots of this crop.

Manures and manuring The crop is one which shows marked response to good manuring. Sheep penning is generally resorted to besides

Dioscorea esculenta —tubers

the application of 15 cart loads of farm yard manure. Still higher doses of manure are considered to give economic yields.

Seed material and planting The preparation of the land which commences in March comes to a close by the end of April, and planting will be in progress towards the end of May or during the month of June soon after some showers of the south west monsoon are received. The seed material for planting consists of mature tubers taken from the previous crop and preserved with care. During the harvest in January good and healthy tubers are carefully selected to serve as seed material for the next year's crop. The seed material thus collected is stored in a cool place under a thatched shed.

The prepared seed beds or ridges and furrows, as the case may be, are first watered. Planting is done in rows 9 inches apart on square, one tuber at each sowing spot, and four to six inches deep in the soil. In the ridge system tubers are planted on the crest of the ridges 9 inches apart. About 1500 lb. of tubers are required to plant an acre of land.

Irrigation Maximum production calls for copious watering coupled with free drainage. On the whole the crop requires eight irrigations besides the rainfall received during the life of the crop. The practice of well irrigation with a *picotah* is very common with the growers.

After-care The tubers begin to germinate in about 10 to 12 days after planting, and in about six weeks the vines require strong support for rapid growth. At the centre of a set of four vines, each arising from one tuber, a single bamboo pole is planted and the set of four vines is trained on to it. Nearly 10,000 bamboos are required for propping a crop in one acre. Where holdings are small, extending over few cents, dried plant stems or any suitable material is used for the purpose. A fortnight after planting the plot is weeded and two weeks later the first hoeing is given. A second hoeing follows a month later. The plots are weeded as often as necessary. About three weedings and two hoeings in the duration of the crop, will ordinarily keep the field free of weeds.

Harvest The crop stands in the field for more than six months from the date of planting. The sign of maturity is that some of the older leaves turn yellow and begin to drop off. Further the cracking of the land round about the plants is an additional feature of maturity of the crop. The harvest commences in November and is carried on in stages till the end of January. The harvest consists in lifting of the entire vines by digging round the plants with a crow bar. Great care is exercised during the harvest to avoid injury to the tubers by way of cuts, as such tubers will have little market value. Each vine produces 3 to 6 tubers depending on the soil, season and manure applied. The tubers are separated from the plant and after a little drying they are shaken to remove the adhering soil. The roots of each tuber are removed with a knife and they are thus rendered fit for sale in the local markets.

Yield and marketing A successful crop yields 8,000 lb of marketable tubers and an average yield can be taken to be 7000 lb. per acre. Still higher yields would be obtained during seasons of normal and well distributed rainfall. The tubers are available for sale from November to February. They command a fair sale in the local markets. It is at present not available in large quantities for export to distant markets. The price varies within a wide range from 8 annas to a Re. per maund of 24 lb. The price is usually at its maximum during October and at its minimum in December.

Economics of Cultivation The cost of cultivation comes to Rs. 142—6—0 per acre. Taking an average crop to yield 7000 lb. per acre and the produce valued at 6 ps. per lb. the gross income from an acre will be Rs. 218—12—0, with a net gain of Rs. 76—6—0. Under the contract system of disposal of the standing crop, common with many of the farmers, the *ryot* realises a net gain of Rs. 60 per acre, the harvest and cleaning charges being borne by the contractor.

Cost of cultivation per acre—Details.

Preparatory cultivation, 8 ploughings and ridging ...	Rs.	10	0 0
15 cart loads of cattle manure and sheep penning ...		20	0 0
Seed material (1500 lb.) and planting—10 men ...		49	6 0
8 irrigations		24	0 0
After care (2 hoeings and 3 weedings)		7	0 0
Harvesting and cleaning—30 men		7	8 0
Assessment on land, etc.		4	8 0
10,000 short bamboos for propping— proportionate cost per year ...		20	0 0
Total cost of cultivation per acre		142	6 0
Yield—7,000 lb. valued at Rs. 0—0—6 per lb. ...		218	12 0
Net gain per acre		76	6 0

Note:—Agricultural holdings of this particular crop are mostly small varying from 5 to 50 cents. Small holdings as these can easily be managed by a farmer and his family without any additional cash expenditure. Hence the total income forms a net gain to the farmer. In the case of larger holdings of one acre and more cash expenditure will be as high as Rs. 54 per acre. Many a farmer of the area cite this as an important reason for raising the crop on small holdings.

Conclusion In and around Anakapalli the crop is commonly grown by the market gardeners. The average holding of a *ryot* with reference to this particular crop ranges from 5 to 50 cents. Only a few *ryots* grow it on an acre scale. At present there has not been any appreciable demand for the tubers from outside the production zone. This is largely due to its being little known in many parts of our presidency. In view of the decent profits arising out of the cultivation of this crop it should be an attractive proposition for market gardeners in the neighbourhood of urban areas to take to its cultivation.

If at the present juncture as a part of the "Grow More Food" campaign advantage is taken to raise this cheap yet delicious root vegetable in all suitable localities, the object of this short note will be more than achieved.

Acknowledgment I am deeply indebted to Sri S N. Chandrasekhara Ayyar, M.A., Lecturer in Botany, Agricultural College, Coimbatore, for kindly furnishing a complete botanical description of the plant.

Improved Agricultural Practices Introduced in Hindupur Taluk

By K. V. SESHAGIRI RAO,

Assistant Agricultural Demonstrator, Hindupur

***Pillipesara* in *Ragi* as a means of grow more food** In the taluk of Hindupur of the Anantapur District it is a general practice to grow a crop of *ragi* from March—April to August—September or June—July to October—November in the *ayacut* under tanks aided by wells, instead of paddy because of the insufficient supply of water in the early part of south west monsoon. The crop is invariably transplanted either in beds or in rows and before the end of a month after transplantation, a hoeing or two is given to remove weeds. A few days later in case of failure of rains a light irrigation is given wherever possible. On the small ridges formed at intervals of 3 to 5 feet lablab is raised. Two to four months after the harvest of *ragi* the lands lie fallow but for lablab. A portion of the early planted field is set apart for sugarcane planting. The rest of the whole area or a part of it, is put to paddy depending upon the quantity of water available in tanks.

By way of an improvement of the existing conditions *pillipesara (phaseolus trilobus)* was inter-sown in two years at 25 lb. per acre at the time of the final hoeing instead of lablab which resulted in :—

(i) The yield of *ragi* was about 5 % higher than the one without it.

(ii) After the harvest of *ragi* 1 to 3 cuttings of *pillipesara* forage was obtained depending upon the duration of the fallow period. Fifteen to twenty animals could be fed continuously on one acre produce with the result that there could be a 50 % higher yield in milk not to speak of the improved condition of the animals and (iii) The subsequent growth when ploughed in was manure to the next crop.

Sugarcane planting. Sugarcane is a paying crop which the *ryots* grow to get money to meet their various items of expenditure. It has been the endeavour of the Agricultural Department to improve it in all aspects viz., varietal, cultural and manurial. One of the methods of planting is to have the setts end to end in the row. With the same number of setts per acre, instead of their being in the line end to end if planted slantingly at about 45 degrees to the sides of the furrow and all in one direction, good results are obtained.

Observations on the two comparative methods of planting during the past six seasons show that (i) the slant planting in the furrow effects greater percentage of buds germinating successfully. When setts are planted end to end in the furrow there is a chance of the setts being pressed down to the level of the unploughed region at the bottom of the furrow. In the case of the setts planted at an angle to the furrow the setts cannot be pressed down so deep. Consequently below the setts there will be no hard layer of earth.

(ii) In the slant planting the stools are nearer each other than in the other system, therefore lodging is less.

(iii) Because of the greater number of plants in unit area and less expense on account of absence of propping the plants, there has been greater nett return per acre.

(iv) Yields were noted to be higher in the slant planting system.

The cultivators of the tract who have been convinced of these advantages are slowly taking to this.

A Plea for the use of Wooden Grinder Rice

By R. SWAMI RAO, L. Ag., M. A. S.,
District Agricultural Officer,
AND
Dr. S. RANGASWAMY,
Municipal Health Officer, Cocanada

The food problem, which is looming large in the eyes of all, at the present moment, is not a war time necessity alone. It exists at all times, but during war time the matter assumes tremendous importance and all energies are directed towards the production of more food.

One of the methods suggested to meet the shortage of rice is to improve the quality of rice. Rice, as at present consumed, is mostly machine milled, devoid of germ and bran. This high polishing has been primarily responsible for the prevalence of certain diseases, chiefly beri-beri in the rice growing tracts, chiefly the 'Circars' of the Madras Presidency.

Husking of paddy is done in mills, or by pounding in a mortar. An improved method suggested is by the use of the wooden grinders which shells the paddy but does not remove the bran from the rice. The analysis of rices obtained by the three processes of milling is given below.—

	Constituents	Wooden grinder	Hand pounded	Machine milled
1.	Protein	7·24	6·79	6·70
2.	Fat	2·33	1·42	0·73
3.	Ash	1·34	1·14	0·83
4.	Carbohydrate	75·04	76·19	77·34
5.	Calcium	0 007	0·007	0·005
6.	Phosphorus	0·231	0·209	0·158
7.	Iron	4·55	3·57	2 88
8.	Caloric value	350·10	344 70	342·70
9.	Moisture	14·05	14·46	14·40
10.	Vitamin	+ + + +	+	...

From the above it is clear that the wooden grinder rice is the best. Recently the Government of Madras have sanctioned a sum of Rs. 2,000 for the manufacture and distribution of wooden grinders in the East Godavari District. Wooden grinder for husking paddy should become as popular as the coffee grinder with the discriminating public.

There are limitations for the use of wooden grinder rice. It takes a longer time to boil, consumes more fuel and the housewives may find it irksome to cook. This can be obviated if it is soaked in water for 3 or 4 hours before boiling. Less quantity should be eaten, otherwise there will be digestive troubles in the beginning. The stuff should not be stocked long, as it is said to be more susceptible to insect attack than the milled rice. It can be stocked for a week in large families and in small families daily requirements may be obtained as in the case of coffee powder by the use of coffee grinder. The use of wooden grinder will be an auxilliary in the 'grow more food campaign' as an aid to National War Effort. If the wooden grinder rice becomes universally popular the shortage of rice in the Presidency will be reduced by nearly 8 per cent.

SELECTED ARTICLE

The Migratory Locust in South India

The migratory locust (*Locusta migratoria* L.) is another of the potential pests of India that may at times assume a serious character. Specimens of the solitary phase are met with in small numbers in almost all parts of India but so far, no observations appear to have been made anywhere on its breeding habits or on its powers of migration, nor are there any published records of instances of local multiplication.

Observations made in the course of locust surveys carried out in the desert areas of Baluchistan, Sind and Rajputana during 1931—1938 have thrown very interesting light on the migration and breeding of the *solitary* phase of this species (Rao and Bhatia, 1939). In the year 1937 especially, valuable data were obtained which showed how this locust bred in large numbers in spring in the hill-valleys of Baluchistan, and migrated in summer over a distance of over 300 miles to the desert areas of Bikaner and Jaipur, and bred there in July—August. The new generation of adults produced here migrated with the cyclonic winds accompanying a depression from the Bay of Bengal in September into the Palanpur, Sirohi and Mehsana areas of western India and gave rise to large bands of gregarious hoppers there. The hopper infestations found attacking millets in the Sirohi and Mehsana areas in October, 1937 should have been pronounced to have resulted solely from intense local multiplication, if the earlier data in regard to the breeding in Baluchistan and Bikaner had not been collected already.

Mention made by Coles (1891) in the *Indian Museum Notes* of a great locust invasion in Madras in 1878 prompted me to seek the original records for studying the data, if possible, in correlation with rainfall and seasonal winds. With the kind help of the Government of Madras, printed records of the Proceedings of the Board of Revenue pertaining to the locust infestation of 1878 were obtained in 1938 and studied. Subsequently in 1941, further records were examined with permission at the Madras Records Office, and recently in 1942, data on the prevalence of locusts in 1878 in the Mysore State were, with the kind courtesy of

the Chief Secretary to Government, Bangalore, extracted from the *Mysore Gazette* for 1878. As a result of studying the information thus gathered, and correlating them with the available meteorological data, it has been possible to make a rough conjecture as to the conditions under which the infestation had probably originated and to outline the probable course of its history. A detailed account of the infestation is proposed to be written up in due course, after collecting some further data not available at present, but in the meanwhile, a brief account of the outbreak as far as it can be ascertained from the data on hand will be given below.

The nature of the records The records in question are in the form of printed Proceedings of the Board of Revenue, and Orders of the Government of Madras on reports received from the Collectors of various districts on the movements of locust swarms and on the damage done to crops. Some of them deal with correspondence with Dr. Bidie, then Superintendent of the Madras Central Museum and Dr. Shortt, a retired Surgeon-Major of the Medical Service, on the subject of identifications of the specimens sent to them. The records are, on the whole, fairly complete and cover almost the whole course of the infestation. Indeed, it is seen from one of the Proceedings of 1883 that most of these records had already been studied by Mr. A. J Stuart, Collector of North Arcot at the time, and attempts had been made by him at drawing certain general conclusions. He was rather inclined to suppose that the infestation had originated by an incursion of swarms, carried into India from across the ocean by the south-west winds. He also considered that the final disappearance of locusts at the end of 1878 was similarly due to their being driven into the Bay of Bengal by the agency of the south-west current. Various other deductions made by him on the life-history of the locust in the course of his report, look rather unconvincing in the light of the highly developed locust lore of modern days.

The identity of the locust In a note on the locust invasion of 1878, Cotes (1891) gives a brief summary of the course taken by the invasion in South India, and observed, in regard to the identity of the locust concerned, 'nothing seems to have been ascertained at the time of the invasion, though the insects were spoken of in one of the reports as belonging to the species *Locusta migratoria*.' A set of specimens furnished by the Madras Central Museum as representing the locust of 1878 was examined by Dr. Henri de Saussure and consigned to no less than six species of Acrididae, consisting mostly of ordinary grasshoppers—species of *Acridium*, *Tryxalis*, *Euprepocnemis*, etc., and only one specimen in a very poor state of preservation being found to be *Pachytylus migratorius* or *P cinerascens*. There is little doubt that the set furnished was from random collections made by village officers in fields damaged after the main swarms had flown away, and naturally ordinary grasshoppers must have figured largely in such collections. Since no authentic specimens are now available for inspection, and since an infestation of a similar character has not developed in South India since 1878, it is not possible to make any positive statement in regard to its identity. Fortunately, however, there are some definite clues in the body of the records to indicate its identity: (1) the gregarious hoppers found attacking crops in January, 1878 in the Tinnevelly district were described to have been of 'reddish-brown' colour, and (2) the young insects (hoppers) observed in the Krishnagiri taluk of Salem district in August, 1878 were said to have been 'black and gold'. The coloration would indicate that the hoppers were definitely the young stages of *Locusta migratoria*. Again, in the case of pairing locusts in the neighbourhood of Coimbatore in April, 1878, the males were said to have been very small and of a green colour, which is true of the *transiens* and *solitary* phases of *Locusta*, and in another case of migrating swarms found in the Salem district on 27th July, 1878, the males are stated to have been yellow and the females

brown in colour, characteristic of the *gregaria* phase. Surgeon-Major Shortt, who had received specimens of the locust from the Collectors of various districts reported that they were variously coloured, some being spotted, others brown, yellow or green, which again is indicative of the migratory locust. There seems to be, on the whole, little to doubt that the Madras locust of 1878 was *Locusta migratoria* L.

The history of the infestation—The earliest information on record is a report from the Collector of Trichinopoly (5th January, 1878) regarding a heavy infestation of crops in about 70 villages in the Perambalur taluk and the northern part of the Trichinopoly taluk (probably in December 1877). The crops affected were *Cholam* (sorghum) and *cumbu* (*Bajri*) and apparently both hoppers and adults were present Similarly, the Collector of Madura reported the occurrence of locust damage in January-February 1878 in the Kamuti, Rajasingamangalam and Pallimadam taluks (of the present Ramnad district), and the Collector of Tinnevelly of a heavy attack of hoppers and adults in the Ottapidaram and Sattur taluks at about the same time. Cotton was reported to have remained untouched. During March, 1878 heavy breeding was reported from the planting areas of the Anamallai hills

From the meteorological data available, it would appear that during 1877 there was a serious shortage of rainfall in July-August, following which heavy rainfall occurred in September-October in most parts of the Peninsula. In addition, the north-east monsoon would appear to have been specially active in the coastal districts of the south in November-December. It is presumed that a widespread breeding of the *solitary* phase of *Locusta* had taken place in September-October in most parts of the south of India, and that the adult locusts bred in these areas had been swept down in a southerly or south-westerly direction by the cyclonic winds of the N. E. monsoon into the southern districts of the Presidency during November and December. Favoured by the high rainfall, dense egg-laying appears to have followed, leading to the development of heavy infestation in the Trichinopoly, Ramnad and Tinnevelly districts. Adults appearing in the course of January, February and March, 1878, formed swarms, which soon began flying about the country. Winds prevailing in the south of the Peninsula during February, March and April are variable, but are mostly east to west, south-east to north-west or south to north. Consequently the main direction of the swarms was towards the north or north-west, and flights reached Madura, Coimbatore and Malabar districts from the south. In March, flights passed over the Nilgiris and reached Wynaad, Coorg and Mysore. In the Mysore State, swarms were recorded in Hassan and Kadur districts by the middle of March, and in the Chitaldrug district in the third week. Flights were recorded in the Kudligi taluk of the Bellary district on 22nd March, and a week or two later in the Hospet Hadagalli and Harpanahalli taluks. By the end of March, swarms were reported at Kod and Kalghatgi in Dharwar district of Bombay Presidency, during April, locusts were observed round about Dharwar and Gadag, and by the last week of the month, flights had reached Saundatti in Belgaum district.

Good rainfall occurred in April and May in Coimbatore, Madura and Tinnevelly districts, in most parts of Mysore and in the Bellary district, and as a result, egg-laying by swarms took place in most of these areas in May, and in due course hoppers appeared and attacked the crops in May-June. The hoppers became fledged in June-July, and before long the young swarms were found taking wing. As by this time, the south-west monsoon was in full swing, the flights were, on the whole, directed towards the north-east, so that locusts bred in Madura and Tinnevelly were carried gradually into Trichinopoly and Tanjore; those from Malabar and Coimbatore into Salem, North Arcot, South Arcot and

Chingleput; and those bred in south Mysore, through Bangalore and Kolar districts, into Chittoor and Nellore districts, while those from Kadur, Chitaldrug and Tumkur into Anantapur and Cuddappa districts, and ultimately into Nellore.

As the central districts of Salem, North Arcot and Chittoor, and the districts of the East Coast fall within the rain-shadow of the Western Ghats, the rainfall in the S. W. monsoon period is relatively light. July was comparatively dry but fairly good rain fell in August and September in the central districts. There was little breeding during this period, except in the Krishnagiri taluk of Salem district in August, and in the vicinity of Chittoor during September. Owing to this paucity of breeding, a progressive diminution in the number and in the density of swarms was noticed by September 1878. During October-November comparatively few swarms were reported, the few on record being from South Arcot (October, and November) and Nellore (November). In these instances, the direction of swarm flights would appear to have been modified by the winds of the north-east monsoon. The rainfall of the return monsoon was defective in the southern districts in 1878, and there was apparently no swarm breeding anywhere, and it would appear as if the remaining locusts became scattered over the country as solitary individuals, thereby bringing the infestation of 1878 to an end by December.

Flights of the Bombay locust in 1878—Some of the Board's Proceedings belonging to the period October, 1878 to January, 1879, deal with reports of locust flights that took place in Bellary and Anantapur districts in October, 1878 and in Kistna district (Muktyala, Tenali, and Rapalle) in November-December, 1878. These, however, were evidently flights of the Bombay locust (as is evident from a reference to their red colour), which had presumably originated from the Dharwar-Belgaum area and had proceeded in an eastern or north-eastern direction during October-November. Heaps of these locusts were said to have been found dead in the fields during the cyclonic weather that prevailed in Kistna district during November-December, 1878.

Flights in the Ganjam district.—Three of the Proceedings of 1878 refer to reports received from the Collector of Ganjam regarding locust flights that had taken place in the Ganjam district in June and September, 1878. The flights appear to have occurred in the hill areas (2 000 to 4,000 ft. high) known locally as 'Maliahs'. The general direction of swarm movements in June was from west to east, and they would appear to have come from the low-lying valleys, situated to the west in the territories of Orissa and the Central Provinces, and passed over the Balliguda and Goomsur Maliahs north-eastwards into Boad. There are no indications that breeding had occurred, though the standing crops were said to have been damaged. There is no clue in the descriptions of damage given as to the species of locust concerned in these attacks, though it is probable that it was *Locusta* Cotes (1891), quoting from C. N. Gholh's Report of 25th February, 1890, states that 'locusts appeared in small numbers in 1878 in Orissa, but did no appreciable damage', and it is not improbable that these were part of those emerging from the Ganjam Maliahs.

Flights in 1881, 1885 and 1886.—Board's Proceedings for the years 1879 to 1886 were examined, among which references to the appearances of small locust swarms (presumed to be of *Locusta*) are found during the years 881, 1885 and 1886. *In 1881*, the Collector of Madura reported the appearance of a swarm of small locusts in a few villages of Tirumangalam taluk in the month of April. It was stated that they injured the crops a little and perished in the rains that fell 4 or 5 days later (possibly meaning that they disappeared). *In 1885*, there were three reports, of which one referred to locusts that appeared in crowds at Mangalam village in Madura taluk early in July, 1885, and damaged the crops. In the case

of the second, it was reported that a locust swarm appeared on the morning of the 3rd August 1885 at Kothamangalam in Lalgudi division of the Trichinopoly taluk from the western direction, and after attacking sugarcane, *ragi* and *Samba* Paddy, flew towards the east after three days. In a third case the Collector of South Arcot reported the appearance of locusts in the Vriddhachalam taluk in September, when they bred in large numbers and damaged the crops severely. In 1886, the Collector of Madura reported the destruction of young gingelly crops in Periakulam taluk about the 10th June, 1886, by a certain kind of locusts (which were, on reference, declared by Mr. Edgar Thurston, Superintendent Central Museum, Madras, to be the 'true locust'—presumably *Locusta migratoria*). Except perhaps in the last case, it is not possible to say which species was concerned in these attacks, but on account of the coincidence in the time of occurrence and in the circumstances connected therewith, the species was most likely to have been *Locusta* as in 1878. It has not yet been possible to examine records later than 1886, but to the best of my knowledge there has not been any outbreak of *Locusta* in Madras since 1906, when I joined the Madras Agricultural Department.

The probable origin of the 1878 *infestation.*—It is, of course, rather difficult to say, at this distance of time, how exactly the locust outbreak had originated. Even at the time of the invasion, however, it was the opinion of more than one responsible officer that the locust trouble had some connection with the occurrence of abnormally heavy rainfall during the last four months of 1877, following a long period of scanty rain during 1876-77. It is surmised that in 1876-77, while the general drought lasted, the breeding of insects in general, and of migrating insects like locusts in particular, was restricted to and concentrated in a few places where local rain had fallen. Generally, even in years of drought, hill areas get more rain than the plains, and there is little doubt that small concentrations of *Locusta* had formed on the hill areas. In more than one report of 1878, it was mentioned that breeding had occured in the grass areas along the hill-flanks, and in some it was reported that locust hoppers had invaded cultivation from the hills. Uvarov (1936) also mentions that, in the case of outbreaks of the Oriental Migratory locust—*Locusta migratoria manilensis* Mey.—in the Philippines and Borneo, they are associated with grass areas connected with shifting cultivation on the hills. Since shifting cultivation is quite in vogue on the hills of South India, it is probable that the outbreak centres of 1878 invasion had developed on the hill-flanks of the Western Ghats, the Shevaroys, the Kollimalis, the Pachamalais and other hill-ranges. Incipient swarming, begun on the hill-flanks in 1876-77, had probably become intensified on the plains during the heavy rains of August-September-October, 1877.—*Extracted from Presidential Address delivered at the 30th Indian Science Congress 1943 by Rao Bahadur Y. Ramachandra Rao.*

ABSTRACTS

Tea leaves as a maintanance food for animals, W. King Wilson, (*Nature Vol. 150. p. 199—201, August, 15. 1942*). In these days, when the conservation and utilization of vegetable waste of all kinds is so urgently necessary it is desirable that the possibilties of feeding spent tea leaves, which are produced in such large quantities should not be overlooked.

Tea drinking has greatly increased in the United Kingdom in the past century, The increase is from 1·4 lb. per head a century ago to 9·2 lb. before the War. In Great Britain about 200 000 tons of spent tea leaves are available annually which might be utilised, with other waste food stuffs for domestic animals.

Analysis of a sample of spent tea leaves showed that it contained 84·2 per cent water and 15·8 per cent dry matter; a pound of wet leaves was equivalent

to about 3 oz. of air dry meal. The dry matter contained 26·1 per cent fibre 1·2 per cent oil and 4·6 per cent mineral matter. The high protein content is deceptive since much of it is in an indigestible form owing to the high tannin content of the leaves. In an artificial digestion test the dry substance yielded only 3·7 per cent of digestible protein. The tannin may also tend to reduce the digestibility of the protein in other foods with which tea leaves may be mixed.

Feeding experiments were conducted with rabits. The results indicated that adult rabbits could be maintained in body condition on a ration in which 10—20 per cent of the concentrates were replaced by spent tea leaves. There was an increase of live weight in all groups, being greatest on the control diet and lowest on 20 per cent replacement of concentrates by the tea leaves mixture. In neither case there was adverse effect on subsequent fertility. M. A. S.

Colours in food *(Nature, May 16, 1942).* The practice of adding colouring matter to foods is now wide spread in spite of official disfavour. The principal reasons for it are to replace colour lost in processing or to imitate an article of superior quality. Delicate tinting of an article of food often made it more acceptable to the public who demanded such colouring. Artificial colouring also serves to compensate for the unavoidable deterioration of colour which often occurs with time and also to standardize the products.

Foods are coloured by the addition of metallic salts such as copper sulphate, natural colouring matters such as cochineal, saffron, or annatto, and synthetic dyes, the principal method now in use.

Synthetic colouring matters have long been known to have various kinds of biological activity. Though the pharmacology of medicinal dyes have been much investigated the situation seems less satisfactory in the case of food dyes. Cases of dermatitis directly attributable to the synthetic dyes have been recorded. It is now recognised that many fluorescent dyes, introduced into the body may lead to lesions of the skin and that malignant tumours of the liver may be produced in rats and mice by the administration of large doses of some azo dyes. Though investigation with food dyes having structural resemblance to these have failed to reveal any deleterious effect on experimental animals, it is quite likely that the effect may not be the same on human organism. The possible cumulative effect of frequent small doses also cannot be ignored.

The above factors suggest that the time has come for a more intensive and thorough study of the effect of food dyes on human system and a review of the current practices and the existing regulations relating to this matter to draw up a legal schedule of permitted colours. M. M. K. M.

Gleanings.

Collective farming in Russia and the Ukraine. Sir John Russel has made a study of Russian Agriculture, and, through his visits to that country from time to time, has been able to observe trends in agricultural policy, and the results of the State and of collective farms. He discussed his observations in a lecture recently delivered at the Royal Institution.

It was impossible to arrive at once at the most desirable system of land utilization, this being influenced by progress in farming methods particularly as regards mechanization, and the effect of this on the growth of the workers' interest in the State or collective unit, as opposed to his own personal stake in the land. The application of modern machinery to tillage, and of methods of livestock improvement and disease control to herds and flocks are more suited to large than to small units, and it is probable that success in these directions influenced the workers' views as to the extent to which they were prepared to

identify their own interests with that of the large unit in which they are employed.

After the Revolution, State farms were developed, but the peasants, who expected nothing less than individual ownership of the land that they tilled, were not then sufficiently mature, either politically or technically, to make a success of this form of organization. Instead of the State farm, the collective farm figured more and more prominently in the development of Soviet land policy. Thus, by 1939, the area occupied by collective farms was more than eleven times that of State farms.

Collectivization is based on the principle that an entire village, with its land, is run by the inhabitants as one farm, boundaries being obliterated, and the whole area divided into a few fields, the number depending on the rotation. All possessions are pooled, and the workers share the produce remaining after paying out the Government share, and meeting other obligations. Collectivization at first met with great opposition, particularly owing to the compulsory pooling of all livestock ; peasants who by years of hard work and economy, had got together a cow and a few pigs, found it difficut to have to restart from the same level as those who had never made any sacrifice to provide their families with livestock necessary to maintain them in milk, butter and other produce. For this reason, collectivization at first resulted in a heavy decrease in the numbers of livestock. The opposition to collectivization decreased when the benefits of the tractor in large-scale farming were realized, and later by the action of the State in securing the land to the collective farm for ever, and in giving to each householder a small plot of land, a cow, one or two pigs and poultry. The peasant of the collective farm is allowed to sell the produce of his plot and of his stock. A worker's time is shared between the collective farm and his own plot, and in the same way, his income is derived from those two sources.

Sir John gave some data showing the proportion of workers' time spent on the collective farms, the proportion of his total income derived from that source, and the influence of efficiency in the management of the collective on the proportion of his total earnings derived from it. It has become necessary, in some instances to enforce a minimum of two hundred working days per annum on the collective farm in order to prevent the peasant from devoting too much of his time to his own plot and stock.

The most important feature of the new system however, is that production is planned, each farm being told what, and how much, to grow for a period of five years. Requirements are allocated to the different districts, and each farm in the district is alloted its area for the various crops, and told what quantities of animal products are expected of it.

Great efforts are made to utilize science. Thus extensive soil surveys are carried out, and made use of in developing rotations; one important result of this is a reduction in the area of fallow from 35 per cent under the old three course system to 20—25 per cent now that rotations are practised. Science also plays a part in the struggle against drought; the importance of this can be understood when it is realized that in large areas in the south the average annual rainfall is not more than 12 inches.

The standard of comfort and of living of the Russian farm workers has not reached that of the British land worker. Houses are smaller, and are not so well furnished. The diet is simple, and would be considered monotonous by many standards. Great strides have been made in education, and by 1939 the ladder was complete, every child having an opportunity of university education. *Nature, Vol. 149, No. 3790, June 20, 1942.*)

Extent of root system of plants Recent knowledge about roots has given new perception about their extent. T. K. Pavlychenko has measured the roots of single prairie grasses grown free from competition of other plants and has recorded more than 300 miles of root belonging to a single plant three years old, while a single plant 80 days old had 54 miles of roots of first and second order alone. A young plant may have a net gain of the order of one mile of root daily. Roots are neither permanent, as a rule, nor static. The finer roots of a living plant are constantly being shed, and thus are taking part in the cycle of decomposition in the soil.

There is a balance between the amount of root and the amount of top. By cutting the tops of a plant—say, by mowing the lawn—the roots are also trimmed. A closely cut lawn suffers during a drought because the diminished roots are not able to reach the soil moisture in the deeper layers—Dr. Hugh Nicol (*Nature, July 4, 1942.*)

Nutritive value of dried and dehydrated fruits and vegetables Research in the past 25 years has indicated the necessity of inactivating the enzymes of vegetables by scalding or by some other means prior to dehydration in order to obtain dehydrated vegetables of good palatability, high vitamin content, and good keeping quality. For retention of vitamin C it has been found necessary to store the dried vegetables in the absence of air. Dehydrated fruits retain vitamins, particularly carotene and vitamin C, much better than those which are sun-dried. Sulphuring of fruits aids in the retention of vitamin C, but causes the almost complete destruction of vitamin B_1 content.

(*Exp Sta. Rec. September 1942.*)

Cattle averse to grass In a paper published in the *Indian Farming* for June 1942, K. Cherian Jacob has described the characteristics of a peculiar breed of cattle found in some villages near hilly areas of the North Arcot and Salem districts of the Madras Province. These cattle do not eat grass but only browse on the tender shoots of a tree growing wild in the area, known as *thurinji* (*Albizzia amara* Boivin—Leguminosae), and so this breed is known as *thurinji thazhai madu*. The cows also feed only *thurinji* leaves and no other food or fodder is given to them. A cow yields 4 to 6 lb. of milk per day. The milk of this breed is considered to be more nutritious than that of other types. The calves also do not eat grass and have to be fed on tender *thurinji* leaves. This breed is maintained more for the dung, which is considered to have superior manurial value due to the exclusive leguminous feed of the animals. They are penned in the cultivated fields during the fallow period. These cattle are in a semi-wild state and are not used for drought purposes or other agricultural operations. However, in some villages they have been domesticated and are used for farm work. They are reported to be very prolific breeders. M. A. S.

Production of cotton cloth without spinning or weaving A new process has been developed in New Brunswick for the production of cotton cloth without spinning or weaving. This is done by pressing carded cotton into a fabric with the help of a plastic material as binder. The cotton fibres are then reinforced by putting on cross lines of adhesive plastic in a printing machine. This new fabric is called 'Masslinn'. It is now being made for the military. The new fabric, as it is, is not suitable for clothing; it can however, replace only some of the cheap wooven goods; it can also replace paper for many purposes. For instance, it is likely to be used for table cloth, window draperies, sheets, book bindings, etc. It has a greater flexibility than paper; it does not disintegrate when wet. The fabric can also be washed. The cost of its production is rather low being approximately equal to that of paper. P. B. S. (*Science and Culture, January 1943*).

Some significant findings of the Experiment Stations in 1941 Injections of ascorbic acid the pure form of Vitamin C, were found by the Wisconsin Station to be a practical method of rejuvenating impotent bulls and promoting pregnancy in cows which had failed to conceive before treatment.

Fluorine in well water and other water supplies used for drinking and cooking has been found by the Arizona Station to be the main cause of mottled teeth and means for removing this element have been worked out. Only small amounts were found in vegetables and other foods raised on soils containing this element, but it was absorbed on cooking in fluorine-containing water. Milk from cows drinking such water carried only a harmless trace. These findings point the way to greater safety for those living in communities with water supplies containing excessive fluorine. (*Exp. Sta. Rec. August 1942.*)

White wash which lasts Common lime wash, made by slaking freshly burnt lime and diluting it with water, is often found to be friable when dry and rubs or flakes off rather easily. Effort has, therefore, long been directed to the discovery of a method of preparation which will make the coating more resistant to rubbing, less liable to flake off, and having some waterproofing qualities.

At the start, it should be said that a good deal of the flaking which occurs is due to new coats being put over previous applications which are practically already detached from their base, and merely require the slight "pull" caused by a succeeding coat to cause them to break. There is no known way of overcoming this condition other than removal by washing or scraping of the defective coating.

Ordinary lime-wash is made by slaking about 10 lb. of quicklime with 2 gallons of water. As an ordinary fixative, alum, 1 oz. to the gallon, will stop white-wash from rubbing off easily. Alternatively, the addition of flour paste, which, however, needs the further addition of zinc sulphate as a preservative to prevent mildew, may be tried.

A reliable recipe for interior use (walls, ceilings, etc.) is:— (a) 62 lb. (1 bushel) quicklime, slake with 15 gallons of water, and cover with sacking till steam ceases to rise. Stir occasionally to prevent scorching; (b) 2½ lb. flour, beat up in ½ gallon cold water, then add 2 gallons cold water, then add 2 gallons boiling water; (c) 2½ lb. common rock salt dissolved in 2½ gallons hot water. Mix (b) and (c), then pour into (a) and stir until well mixed. This produces a mixture of good brushing consistency, and is used in factories, being recommended to prevent easy ignition.

Where a weather-proof coating for use out-of-doors is required, the following is a recipe which should prove satisfactory:— Place one bushel of good fresh quicklime in a barrel with 20 lb. of beef tallow, slake with hot water (about 15 gallons added gradually so as not to "drown" the lime) and cover with sacking to keep in steam. When the lime has slaked the tallow will have disappeared, having formed a chemical compound with the lime. Dry earth colours (ochre, sienna, etc.) may be added before slaking if a cream or buff tint is desired. The mixture should be stirred occasionally, and thinned to easy-flowing consistency with clear water when cold.

"Lighthouse" whitewash, again suitable for exterior purpose, is made in the following way:— (a) 62 lb. (1 bushel) quicklime, slake with 12 gallons hot water, (b) 12 lb. rock salt, dissolve in 6 gallons boiling water, (c) 6 lb. Portland cement. Pour (b) into (a) and then stir in (c) and use at once.

Skimmed milk used in place of diluting water is sometimes advocated to increase the tenacity of the wash, and an old recipe for external colouring of farm building is:— Lime ½ bushel slaked with one gallon of milk and remainder of water; 1 lb. salt, ½ lb. zinc sulphate to withstand weather.

It has been found that an old cob-webby roof not easily accessible to brushing can be effectively cleaned by machine spraying with common white-wash (well strained) which will bring the dust and cobwebs down, so that a second application produces a reasonably clean, white finish. (*J. Jam. Agric. Soc. Jan. Feb, 1942*).

Research Items.

[illegible]e—A promising source of tannin (*Diospyros peregrina*).

Tannin is one of the important vegetable products extracted from various plants like, wattle, cassia, gallnut, and myrobalan, and occurs in different parts such as, bark, fruits leaves etc. It is used principally for tanning of hides, in ink manufacture, dyeing and also in a few pharmaceutical preparations. There is of late an increasing demand for materials containing tannin.

Diospyros peregrina Gurke (Ebenaceae), known by different names as *Panichi* in Malayalam, *Panicnkai* in Tamil and *Tumiki* in Telugu, is considered a good source of tannin. It is an ever green tree with dark green foliage and is common throughout India and Burma except the arid regions. It is also found distributed in Ceylon, Siam and the Malayan Peninsula, and is abundant in Bengal. A fairly good number of trees are found in South Malabar and Cochin State. The tree flowers from March to May and the fruits ripen by about December. The fruits are round and green when unripe and rusty yellow when ripe. A good tree gives about 1000 fruits and the full bearing starts by the eighth year. The tannin is reported to be present in the bark of the tree and more in the fruits. The high percentage of tannin of about 15 per cent in fruit pulp[1] which compares favourably with other tannin materials[2], suggests its adoption as a promising source of commercial tanning material.

The fruits are put to a variety of uses in South Malabar and Cochin State due to its tannin content. The viscid pulp of the fruit when green, is commonly used in caulking bottom of boats and as a glue. The decoction as well as the pulp of the green fruits are applied to fishing nets to resist the action of weather and sea water. The utilisation of the fruit decoction for processing and colouring of arecanuts is very common in certain parts of the West Coast and the fruits sell in some seasons at 4 to 6 annas per 100. It is also recorded that an infusion of the fruit is used as a gargle in apthae and sore throat The oil from seeds of immature fruits is said to be used for preparing curatives for dysentry and diarrhoea. A detailed investigation on the economic possibilities of this tree with particular reference to its tannin content is desirable.

Oil Seeds Section, Coimbatore,
16—2—43 } C. T. Ittyachen

1. G. Watts—*Dictionary of Economic products of India*, Vol. III, p. 141 1893.
2. Luz Baens—Tannin from kernels of green betel nut *Philipp. J. sci.* 75, 363. 1941

The Red Tamarind (*Tamarindus indica* Linn.)

Two different kinds of tamarind trees are recognized, distinguished mainly by the colour of the pulp of their fruits. The common tamarind has greenish-yellow pulp when green which turns into reddish-brown on fully ripening. The other kind has red pulp with smaller seeds and is more valued than the common sort and makes a very fine preserve. The young fruits of this variety are less flattened and more turgid than those of the common one. It is largely grown at Lucknow, Guzerat, Bijapur and other places in North India and is not commonly found in this Province. Stray plants, however, are met with at Tindivanam in the South Arcot District. Venkatachalampalli village in Darsi taluk of the

Nellore District and certain other places. It goes by the local name *Sampulian* at Tindivanam. Since this variety is said to yield more than the common one besides the superior qualities attributed to it, it may with advantage be extensively grown in this Province.

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The Herbarium, Agricultural Research Institute,
Lawley Road, P. O., Coimbatore.
24th February 1943

K. Cherian Jacob

Hints for Bee-keepers.

For April

Pasturage and weather conditions tend to deteriorate during this month. Pollen is available only from maize and *Peltophorum ferruginosum*. The main source of nectar is the straggling flush of cotton, but the supply is augmented by avenue trees such as the Indian elm, rain tree *Crataeva religiosa* etc. The flowering of margosa, which usually occurs in March, may sometimes extend to this month. Strong colonies in favourable localities may gather and store honey, but there is a general deterioration in the breeding and foraging activities of the bees. As a result of the adverse factors the hive population tends to go down and in such colonies, the supers and the superfluous combs should be removed and stored carefully for the next season's use Fairly large numbers of drones may still be present in some colonies and they should be eliminated by the use of the drone trap.

Honey is a thick syrupy fluid containing about 60 to 75% of readily assimilable sugars. In samples kept for a long time, one of the sugars—dextrose or glucose—separates out in the form of fine crystal and settles at the bottom as a hard mass. This process is called 'granulation". If it is necessary, this can be liquified by keeping the containeer in warm water for a time. Some samples do not granulate easily. These can, however, be forced to solidify artificially by keeping the bottle at low and room temperatures on alternate days for about a fortnight. Honey is hygroscopic and as such is likely to absorb moisture from the air and ferment, if it is not bottled in airtight receptacles.

Honeys from different sources have their own individual colour, consistency and flavour. Cotton honey is yellow, thick with little or no distinguishing aroma. Honey from tamarind is reddish, thin, with a peculiar acid taste. Margosa honey is golden yellow and thin in consistency. The aroma of the flowers is easily noticeable even in the hives when the trees are in bloom. Plantain honey is almost crystal clear, very thick with a strong smell of the flowers. Bees also collect and store honey from animal sources such as plant lice, leaf hoppers etc. This is popularly known as 'honey dew' honey. It is dark in color, thick with a taste like that of molasses and a disagreeable flavour.

Honey, in addition to its being an easily assimilable food and a wholesome sweet, is reputed to be a specific for numerous complaints such as colds, coughs, heart complaints, blood pressure, eye diseases etc. It is also said to be both an internal and external antiseptic. The importance of honey bees as cross-pollinating agents of flowers and the use of their stings as a remedy against rheumatism, arthritis etc., are too well known to deserve any special mention here.

M. C. Cherian and S. Ramachandran.

Crop and Trade Reports

Statistics—Crop—Sugarcane—1942—Third or final report The average area under sugarcane in the Madras Province during the five years ending 1940-41 represents 3·0 per cent. of the total area under sugarcane in India. The area planted with sugarcane in 1942 is estimated at 121,970 acres. When compared with the corresponding estimate of 112,110 acres for the previous year and the actual area of 109,527 acres according to the Season and Crop Report, the present estimate reveals an increase of 8·8 per cent and 11·4 per cent respectively. The estimate of the previous year was greater than the actual area by 2·4 per cent. The present estimate of area exceeds the second forecast by 5,580 acres. The excess occurs mainly in Vizagapatam, Kistna, South Arcot, North Arcot, Trichinopoly and Madura.

The crop suffered to some extent from insufficient rainfall in parts of the Province. The harvest has commenced. The yield per acre is expected to be normal in Tanjore, Madura, Ramnad and South Kanara and below normal in the other districts. The seasonal factor for the Province as a whole is estimated at 89 per cent of the average as against 92 per cent in the previous year according to the Season and Crop Report. On this basis, the yield is estimated at 3,068,300 tons of cane the *gur* equivalent of which is 328,230 tons as against 2,836,310 tons of cane with a *gur* equivalant of 309,280 tons according to the final figures of the previous year. The present estimates reveal an increase of 8 7 per cent in the case of cane and 6·1 per cent in the case of *gur* as compared with the previous year.

The wholesale price of jaggery per imperial maund of 82⅔ lb. as reported from important markets on 30th January 1943 was Rs. 14—13—0 in Cuddalore, Rs. 13—3—0 in Erode, Rs. 12—13—0 in Coimbatore, Rs. 12 2—0 in Mangalore, Rs. 11—8—0 in Salem, Rs. 11—0—0 in Adoni, Rs. 10—15—0 in Chittoor, Rs. 10-9-0 in Trichinopoly, Rs. 10—5—0 in Vellore Rs. 9—14—0 in Cocanada and Rajahmundry. Rs. 9—7—0 in Bellary, Rs. 9—2—0 in Vizianagaram and Rs 8—4—0 in Vizagapatam. When compared with the prices published in the last report, i, e. those which prevailed on 7th December 1942, these prices reveal a rise of approximately 31 per cent in Coimbatore, 21 per cent in Bellary, 18 per cent in Chittoor, 9 per cent in Trichinopoly and 6 per cent in Vizagapatam and a fall of approximately 20 per cent in Adoni 8 per cent in Salem and 6 per cent in Cocanada, the prices remaining stationary in Vizianagaram, Rajahmundry, Vellore and Mangalore.

Statistics—Cotton—1942-43—Fourth forecast report The average area under cotton in the Madras Province during the five years ending 1940-41 represents 9·7 per cent of the total area under cotton in India. The area under cotton up to the 25th January 1943 is estimated at 2,127,900 acres. When compared with the area of 2,472,800 acres estimated for the corresponding period of last year, it reveals a decrease of 13 9 per cent.

196,900 acres have been reported as sown since the last December forecast was issued. This extent comprises chiefly +158,500 acres under Tinnevellies including *Karunganni* in Coimbatore, +55,100 acres under Cambodia, +12,200 acres under Warangal and Cocanadas, −25 500 acres under Westerns, −5,000 acres under White and Red Northerns and +1,600 acres under other varieties. The area sown in December 1942 and January 1943 is less than that sown in the corresponding period of the previous year by 54·9 per cent.

The decrease in area in the current year as compared with that in 1941-42 occurs in all the important cotton growing districts of the Province except in Guntur, Kurnool and Cuddapah.

The area under irrigated cotton mainly Cambodia is estimated at 272,800 acres as against 303 100 acres estimated for the corresponding period of the previous year, a decrease of 10 per cent.

Pickings of the *mungari* or early sown cotton crop in the Deccan are nearing completion. The yield per acre was below the normal due to drought. The crop was affected by drought in parts of Kistna, Guntur and the Deccan The yield per acre is estimated to be normal in East Godavari, West Godavari, Salem, Coimbatore (irrigated cotton only), Ramnad and Tinnevelly (Tinnevellies cotton only in each case) and Malabar. A yield per acre below the normal is estimated in other districts of the Province.

The seasonal factor for the Province as a whole works out to 81 per cent of the average as against 97 per cent in the previous year. On this basis, the total yield is estimated at 431 600 bales of 400 lb lint as against 563.800 bales for the corresponding period of the previous year It is however too early to estimate the yield with accuracy as the harvest has not yet commenced in the major portion of the area and much will depend upon the future weather conditions and the toll taken by insect pests.

The estimated area and yield under the several varieties are given below :—

(Area in hundred of acres, i. e. 00 being omitted ; yield in hundreds of bales of 400 lb lint i. e., 00 being omitted).

Variety.	Area from 1st April to 25th January.		Corresponding yield.	
	1942-43. Acres.	1941-42. Acres.	1942—43. Bales.	1941—42. Bales.
Irrigated Cambodia	2,583	2901	1594	1813
Dry Cambodia	2 839	3208	567	675
TOTAL CAMBODIA	5,424	6109	2141	2488
Uppam in the Central districts	2 6	217	31	35
Nadam and Bourbon	330	330	16	17
TOTAL SALEMS	546	547	47	52
Tinnevellies *	4 865	68 0	1206	1714
White and Red Northerns	1 800	1400	158	170
Westerns	7 385	8700	540	1002
Warangal and Cocanadas	1 18	1082	203	202
Chinnapati (short staple)	77	89	9	10
TOTAL	21.2 9	24 728	4304	5638

* Includes *Karunganni* cotton grown in the Coimbatore district and *Uppam*, *Karunganni* and mixed country cotton grown in the South.

The average wholesale price of cotton lint per imperial maund of 82⅔ lb. as reported from important markets on the 6th February 1942 was Rs 29—10—0 for Cocanadas, Rs. 30-14-0 for White Northerns, Rs. 23-14-0 for Red Northerns, Rs. 28-13-0 for Westerns (*mungari*), Rs. 25-15-0 for Westerns (*Dhingari*), Rs. 58-13-0 for Coimbatore Cambodia, Rs 4 -10-0 for Coimbatore *Karunganni* and Rs. 35-7-0 for *Nadam* cotton. When compared with the prices published in the last report, i. e., those which prevailed on the 11th January 1943, the prices reveal a rise of

about 9 per cent in the case of Cocanadas, four per cent in the case of Red Northerns and Westerns (mungari) and three per cent in the case of White Northerns and a fall of about 4 per cent in the case of *Nadam* cotton and one per cent in the case of Coimbatore Cambodia and *Karuganni*, the price remaining stationary in the case of Westerns (*kungari*).

(*Additional Joint Secretary, Board of Revenue, Madras*).

Cotton Raw, in the Madras Presidency The receipts of loose cotton at presses and spinning mills in the Madras Presidency from 1st February to 5th March 1943 amounted to 23,422 bales of 400 lb. lint as against an estimate of 393,900 bale of the total crop of 1942-43. The receipts in the corresponding period of the previous year were 21,981 bales. 47 120 bales mainly of pressed cotton were received at spinning mills and 140 bales were exported by sea while 30,050 bales were imported by sea mainly from Karachi and Bombay.

(*Director of Agriculture, Madras*).

Moffussil News and Notes

Madura The American College Rural Service Extension Board, Madura, celebrated the Annual Rural Conference for student workers on the 13th January 1943. The Village Day Celebration and Rural Service Exhibition were held at the College Rural Centre, in Melamadai village, Madura taluk. The Agricultural Department took part in the celebration by arranging an agricultural show and delivering lectures on increasing food production. The exhibition was opened by Sri C. Vedachalam, B.A, B.L.

Palni The Agricultural Association at Manur, Palni taluk, Madura district, celebrated its first anniversary on the 23rd February at Manur, Rao Bahadur I. T. Oblakondama Naicker, Zemindar of Ayakudi presiding. The function was a grand success. Besides all the local officers at Palni, *ryots* nearly a thousand in number were present during the occasion and took part in the function. The District Lecturer, National War Front, Madura, with the Bomber Van was also present. The Agricultural Exhibition was put up for two days in a specially decorated pandal, where the various improved strains of paddy, millets and other seeds, specimen crops of green manure, fodder, etc. were exhibited.

Vizianagaram The 13th Vizagapatam District Agricultural Exhibition was held at Vizianagaram between 21st and 23rd January, 1943 in the Samasthanam Officers' Association premises. This is the first of its kind held here, though the activities of the Department are in progress for the last score of years. The exhibition was opened by the Collector. The variety of exhibits specially from *ryots* of the district were superb and won the appreciation of all visitors. There were not less than 2,000 exhibits from *ryots* concerning all kinds of agricultural produce, cereals, pulses, oil seeds, fibre crops fruits, vegetables, (English and Indian), fruit preserves dairy products, honey samples and cottage industries such as rope making, and mat making and live stock including poultry etc. The improved furnaces, specimens of green manure crops of *daincha*, sunnhemp, indigo and *pillipesara*, live colonies of bees and practical demonstration of extracting honey and posters on 'Grow More Food' formed the special features of the exhibition.

Koilpatti An attractive agricultural exhibition and cattle show was held at Kalugumalai during the *Thaipoosam* festival between 25th to 31st January 1943. This is one of the biggest cattle fairs in this district where nearly 14,000 cattle from all parts of the Presidency are brought. The prices of bulls ranged from Rs. 200 to 300 per pair and even fancy prices of Rs. 400 to 500 were offered. Opportunity was taken of during this occasion as in previous years, to exhibit

the various kinds of improved strains of implements and advocated by the Department. The various posters recently published by the Department were also put up in conspicuous places.

Tiruchendur An Agricultural Exhibition on a big scale was conducted at Tiruchendur on the occasion of the *Masi* festival of the local Subramania Swami temple from the 15th to 28th February 1943.

Pulivendla An Agricultural Exhibition was held in Putrayanipeta, Pulivendla taluk on 23rd and 24th February '43 on the occasion of the Annual Harvest Festival. The exhibition attracted large crowds. Improved strains of paddy, millets, green manure, and other garden and dry land crops, combed specimens of cotton varieties etc. were on show Various appliances, including fungicides and insecticides for control of plant diseases and pests were also on show. Improved implements were exhibited and demonstrated.

Estate News and Notes.

Students' Club Day The Thirty-fourth Annual Club Day was celebrated on Saturday, the 6th March with great success. The chief guest and president of the occasion was Sri R. M. Savur, B A. (Cantab). The sports in connection with the Day had been concluded earlier. The evening function began with Tea at 5-15 P. M. The fancy dress competition provoked mirth and amusement and was appreciated by all. After tea the guests and students assembled in the tastefully decorated Freeman Hall where the further proceedings were held. The reports on the literary and games activities were read by the respective secretaries. The prizes for winners in the literary competitions and sports were distributed by Mrs. R. M. Savur. This was followed by a fine and amusing variety entertainment. Later the President delivered his valedictory speech. The function came to a happy and successful close with the vote of thanks proposed by Sri C. R. Srinivasa Ayyangar, Principal and President, and by the Secretary.

Games—Tennis In the Cecilwood Tennis Singles Tournament, Sri P. Seshagiri Rao of class I came out successful in the finals defeating Sri M. Suryanarayana Sastry of class II.

Agricultural College Hostel Day Celebration The Hostel Day was celebrated on the 4th March for the first time this year, the 34th year of the existence of the Hostel, under the Presidency of Mr. C. R. Srinivasa Ayyangar, Principal of the College. There were several interesting items of sports and competitions, viz , the inter-mess *Iddali* competition, the Inter-mess Tug of War, the Inter-mess Relay race, and the Inter-mess *Chidugudu*. The first and last items evoked keen competition Another important item was 'Tree Planting'. A few sapota, pomello and curry-leaf plants were planted by the President.

The outgoing students The students of the final year and short course were entertained at Tea on 17th March by the students of class I and II.

Farewell On the 8th March, Sri T. Venkataramana Reddy, B.Sc.(Ag.), M.Sc. Assistant in Botany was entertained at a Farewell tea on his appointment in the Rubber Scheme. At the same function Sri S. V. Parthasarathy, B. Sc. (Ag.) M. Sc. the new Assistant in Botany was welcomed

Estate Scouts The Ramakrishna Scout Group celebrated "Parents' Day" on the 13th March before a very large gathering of ladies and gentlemen of the Estate. Mr. M. C. Cherian, Government Entomologist, presided. Messrs. M. A. Sankara Ayyar and V. Gomathinayakam Pillai spoke in appreciation of the work of the Group. The displays given by scouts and cubs were much appreciated.

The sixth annual Honey Week celebration and Bee keeping exhibition. Coimbatore Dr. C. F. Scudder, District Medical Officer, Coimbatore, inaugurated the sixth Honey Week celebration and opened the exhibition connected with it on Friday, the 5th March, 1943 at the Government Training School for Mistresses, Rajah Street, Coimbatore, in the presence of a large audience The Government Entomologist in welcoming the guests spoke about the large scope that bee-keeping has as a cottage industry and traced the development of the industry in the Presidency for the last six years. Dr Scudder in his introductory speech stressed on the value of honey as food and in medicine. Sri S. K. Venkataramaier. B. A., L. T., Headmaster, Government Higher Elementary Training School, in a short speech gave his experiences as a practical bee-keeper and spoke about the educative value of bee-keeping. The president then distributed certificates of merit to a few private bee-keepers who exhibited their hives. The members of the Entomological section staged a small farce in tamil depicting the various phases of bee-keeping. With a vote of thanks proposed by the Assistant Entomologist, Sri T. V. Subrahmania Ayyar the function came to a close. The exhibition was kept open till Monday next and attracted a large number of visitors every day.

Lecture on Indian Air Force On the 17th March the Air Force Technical Recruiting Officer, Coimbatore delivered a lecture on the Indian Air Force in the College hall in the presence of a large gathering of students and officers.

Departmental Notifications

Gazetted Service—Appointments

On return from leave Sri A. Gopalan Nayar to resume his post as D. A. O. Calicut. Sri K. K. Raghavan, D. A. O. Calicut to be D. A. O. Mangalore. Sri T. K. Balaji Rao, Asst. Paddy Section is appointed to act as Asst. Paddy Specialist, Coimbatore.

Leave

Sri U. Vittal Rao, D. A. O. Mangalore l. a. p. for 2 months from the date of relief.

Subordinate Services - Appointments

The following officiating appointments of Upper Subordinates are ordered to take effect from 8—3—1943.

Muhammad Baig Sahib, F. M. Anakapple. S. M. Muhammad Suliman Sahib, Asst. in Fruits, College Orchard, Coimbatore. P. A. Muhammad Ibrahim Sahib, Asst. in Mycology, Coimbatore. K. Fazlullah Khan Sahib A D. Palladam. Sri T. S. Francis, Asst. in Mycology Coimbatore. Sri D. Daniel Sundara Raj, Asst. in Botany, Coimbatore. Sri D. Isaiah, A. D Trivellore Sri V. Mahimai Doss, F. M. Central Farm, Sri M D Azariah, F. M. Nanjanad. Sri G. Rama Rao, Asst. in Fruits, Kodur. Sri H. Gurub sava Raj F. M. Siruguppa. Sri A. Adivi Reddi, A. D. Rajampet. Sri K. Mahabala Shetty, A. D. Kudligi. Sri K. Rajaratnam Chetti F. M. Siruguppa. Sri K. Rama Mohan Rao, F. M. Samalkota. Sri B. Narayana Reddi, A. D. Kalahasti. Sri G. Ramalingam, A. D. Darsi (Nellore Dt.) Sri A. Subba Raju, F. M. Guntur. Sri T. D Muthuswami, A. D Siruguppa. Sri V. Gopalakrishna Gokhale, A. D. Krishna Dt. Sri M. Narayanan Nambiar, F. M., Nileshwar. Sri K. Sheenappa, F. M. Nileshwar. Sri M. V. Bhaskara Rao, A. D. Kaikalur. and Sri B. Padmanabha Raju, F. M. Anakapalle.

Promotion

Sri J. S. C. Antony, Asst. A. D. Vth grade to IV grade with effect from 7th October 1942.

Transfers

Sri Rajaratnam Chetti, A. D. Palladam as A. D. Ootacamund. Sri K. Raman Menon F. M. Nileshwar as A. D. Coonoor Sri M. Subramania Chetti, F. M. Hagari as A. D. Rasipuram. Sri N. Rama Doss Pantulu, F. M. Nandyal as A. D. Kaikalur. Sri P. Narayanan Nair, F. M. Taliparamba as Asst. in Fruits Taliparamba. Sri K. P. Sankunni Menon, A. D. Cheyyar as F. M. Taliparamba. Sri G. Narasimha Murthy F. M. Siruguppa as A. D. Hospet. Sri A. Subba Rao A. D. Hospet as Asst. in Fruits, Anakapalle. Janab A. Abdul Sammad, Asst. in Paddy, Coimbatore as Senior Asst. Aduthurai Sri V. Srinivasan, Asst. in Paddy, Aduthurai as Asst. in Paddy, Coimbatore. Sri B N. Padmanabha Ayyar. Off. Asst. in Paddy. Coimbatore to Pattambi. Sri M. Vaidyanathan, A. D. Madkasira as A. D. Special duty Octacamund. Sri R. Soundararajan F. M. Central Farm as A. D. Podanur. Sri M. V Narasimha Sastry, F. M. Samalkota as A. D. Chodavaram. Sri P. Nagadhara Naidu, F. M. Nandyal as F. M. Hagari. Sri G. Kameswara Rao, F. M. Anakapalle as A. D. Tadepalligudam. Janab K. Fazlullah Khan Sahib, A. D. Palladam as Asst. in Fruits Coimbatore. Sri A. Shanmugasundaram, F. M. Koilpatti as A. D. Coonoor.

Leave

Sri P. S. Suryanarayana Ayyar, A. D. Tanjore, l. a. p. for 2 months from 5-3-43. Sri S. M. Kalyanarama Ayyar, Asst. in Cotton, l. a. p. for 1 month from 1-3-43. Sri B. L. Narasimhamurthi, Millet Asst. Anakapalle, l. a. p. for 30 days on m. c. Sri R. Alagiamanavalan, A. D. Punganur, l. a. p. for 45 days from 15-4-43. Sri K. Kondayya Sarma, A. D. Polavaram, l a. p. for 3 months on m. c. from 24-1-43. Sri P. Krishnaswami, Asst. Millet section, l. a. p. for 1 month from 1-3-43. Sri R. Guruswami Naidu, A. D. Proddattur, extension of l. a. p. for 2 months and half average pay for 2 months from 8-2-43. Sri K. S Ramana Rai, A. D. Hospet, l. a. p for 1 month from 21-3-43. Sri M. C. Krishnaswami Sarma, F. M. Palur, l. a. p. for 1 month from 5-4-43. Sri P. V. Hanumantha Rao, A. D. Virdachalam, l a. p on m. c. for 2 months from 28-2-43 Sri N. S. Rajagopala Ayyar, Asst. in Fruits, extension of l a. p. for 4 months on m. c. from 25-1-43. Sri S. Venkataraman, Asst, A. D. Nannilam, l. a p. for 2 months from 15-3-43. Sri B. G Narayana Menon, F. M., l. a. p. for 62 days from the date of relief. Sri M. P. Narasimha Rao, Cotton Asst. Nandyal. l. a. p. for 10 weeks on m. c. from 27-1-43 Sri M. Ratnavelu Gounder, A. D. Bhavani extension of l. a. p. on m. c for 1 month. Sri C. S. Namasivayam Pillai, A. D. (on leave) extension of l. a. p. without allowance for 3 months from 3-1-43. Sri K. Ambikacharan, A. D. (on leave) extension of l. a. p. on m. c. for 1 month from 7-3-43.

ANNOUNCEMENT

The Ramasastrulu-Munagala Prize, 1943.

1. The prize will be awarded in July 1943.

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

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

4. Intending competitors should notify the Secretary of the Madras Agricultural Students' Union, not later than the 15th May the subject of the paper which they propose to submit, and the paper should be sent in so as to reach him not later than the 1st June 1943 with a covering letter showing full name and address of the sender. The author's name should not be shown on the paper, but should be entered under a *nom-de-plume*.

5. Four type-written copies of the essay should be sent.

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

7. Papers submitted will become the property of the Union and the Union reserves to itself the right of publishing all or any of the papers.

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

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

S. V. DURAISWAMI AYYAR,
Secretary.