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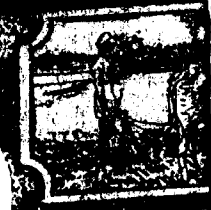
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Groundnut and Indigo in a South Arcot village.

N. R. RAJAGOPALAN.

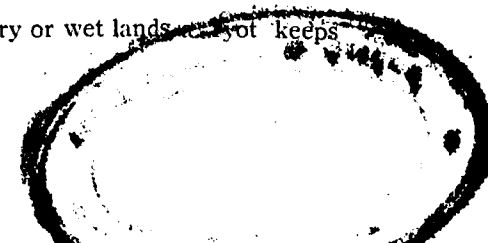
Alambadi is a village in the Vettavalam Zamin, Tirukkoilur Taluk and is two miles from Mohiyur Railway Station.

Area. It has an area of 60 kanies of tank-fed lands and 280 kanies of drylands (one kani equals 1.33 acres).

Assessment. The assessment varies from Rs. 2-3-0 to Rs. 7-4-0 per kani, an extra assessment of Rs. 2-1-0 being levied for the second crop of paddy.

Prices. Wet lands are sold from Rs. 900 to Rs. 1,500 and drylands from Rs. 300 to Rs. 500 per kani.

Cattle. For a unit of 5 kanies of dry or wet lands, a pair keeps a pair of cattle.



Working-classes. Kavandars form the working classes. Labourers or Padials belong to the Adi-Dravida class and are engaged for a whole year. They each get kambu or ragi kanji to the value of one-fourth Madras measure per day plus 14 marakkals of grain per month. (Capacity of one marakkal is 162 cubic inches). One padial is engaged for every kani of land to be cultivated by a landlord.

Physical features of the soil. The soil is sandy loam underlain by red soil two feet below.

Monsoons North-east monsoon rains which fall from July to November favor most. The summer showers during April, May and the late rains of January are scanty.

Wells. In a part of the outskirts of the village there are five wells which water seven kanies of garden lands. The water is brackish but is considered fit for Indigo extraction. These wells have cost about Rs. 500 each.

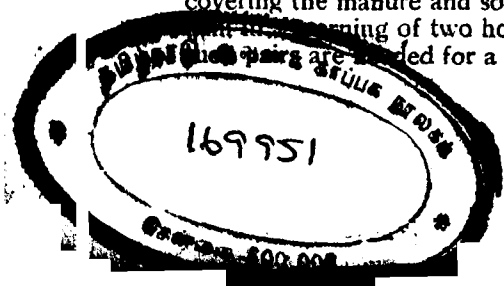
Holdings. The average holding of a ryot is 10 kanies of dryland and 2 kanies of wetland. 7 kanies of dryland are under groundnut and 3 are sown with cumbu and cholam. Periasamba—a sadaisamba paddy which is of six months duration is transplanted in the wetland.

Crops. The chief crops are groundnut, indigo, horse gram, red gram, cholam and lablab in drylands and paddy in wetlands.

Rotation in drylands. Groundnut is a first crop from June to December. Ragi and horsegram mixed is sown by a small number of ryots as a second crop, the rate being 4 M. M. of Ragi and 6 M.M. of horsegram per kani. Those who own indigo vats cultivate indigo and gingelly after groundnut. Indigo occupies the ground from Marghali to Adi la., December to August. If the land is cleared in July groundnut is sown again. For seed purposes one kani of Indigo is allowed to ratoon from July to October in which also is sown horse gram by giving a single ploughing. Every year the same system of cultivation goes on in all lands.

Groundnut as a rainfed crop. The sandy loam of this village is best suited for the cultivation of groundnut.

The preliminary cultivation commences after the summer (May) showers of Chitrai; 6 ploughings are given. The last two are for covering the manure and sowing the seed. A pair works one-fourth of an acre in the morning of two hours the hire for which is 4 as, and 24 pairs are needed for a kani for 6 ploughings.



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The fields are manured at 8 cartloads of Farm Yard Manure per kani.

The chief variety of groundnut sown here is Mauritius. The showers of June—July (Ani) help sowing. Seed rate is 12 marakkals or 36 M.M. of kernel per kani. The proportion of shell to kernels by weight is as 5 : 8.

4 pairs of cattle with 4 drivers and 4 female coolies can dibble seed in one kani of land behind a country plough a span apart. Women get 2 as a head per day of four hours.

Weeding and hoeing. Hariali, nut and bulb grass are common. A weeding and hoeing is done in August by 15 or 18 female coolies. Labour engaged depends on the amount of weeds present. Wages are now 2 as. per head in addition to kanji equivalent to one-eighth M. M.

Flowering. Groundnut crop thrives well during the rains of August, September and grows 9 in. tall with its branches of a similar distance, 8 to 10 ovaries of fertilised flowers have penetrated into the soil by the end of July. During September the branches put forth further flowers which later on develop into pods.

Second weeding and hoeing. This is a state when the crop needs a thorough weeding and hoeing. Simultaneously after the soil stirring in September the pistils find an easy way into the soil and develop pods. In every pod there are from one to three kernels. The size and number of seeds in a pod depend upon the fertility and loose texture of the soil.

Enemies "Kadalai Verpoochi", "Surul poochi", "Hairy caterpillars" are common. Crows and jackals rarely attack the crop.

Time for harvest. Groundnut harvest commences from November. After the cessation of rain groundnut is pulled by the 15th of Karthigai (November 30). Sometimes harvest is interrupted by heavy showers when picking is continued into January. The harvest of July-sown groundnut after December is not profitable as most of the pods rot. The moist condition of the soil in November facilitates easy and thorough lifting of all pods. After Karthigai (November) the pods get imbedded in the soil which gets hard in December. Groundnut crops grazed by cattle need immediate harvest and neglect entails loss through germination of the nuts owing to moisture in the soil.

Harvesting. During November when labourers are plenty hundreds of coolies pull the crop. 3 or 4 kanies are finished in a day. While pulling, most of the pods come along with plants and the few

buried in the soil are immediately searched for and collected with the handhoe. A woman gets 3 pies for every 3 M.M. of pods gathered and in a day collects 32 M. M. Sometimes it so happens that 10 or 12 women are engaged and they are able to pick half a kani of groundnut in a day. After December the soil gets very hard and the hand-pulling becomes a difficult task as most of the nuts are left in the soil unremoved but they do not germinate.

Therefore the necessity arises to lift the pods by ploughing with country ploughs. With one pair and 12 women $\frac{1}{2}$ kani of groundnut is picked in a day. In this harvest only 16 M. M. can be collected by a woman in a day, as most of the pods remain buried below the soil. In some parts of Tiruvannamalai cultivators receive Rs. 8/- per kani by allowing pig owners to graze their pigs on the land already once picked.

Yield:—The maximum yield is 50 kalams per kani. An average yield from a kani of land is 40 kalams of unshelled nut. 1 kalam is 24 M. M. The harvest of Thai (January) fetches only 30 kalams; stems and leaves form 4 cartloads per kani. These are trampled in wetlands as green manure or fed to cattle.

Preparing for the market:—After the harvest the next attention paid is for drying of pods which is thorough. Seeds from December harvest are preferred for next season sowing. Heavy and healthy nuts are selected from the whole produce. 6 persons sitting on the floor beat 50 kalams of pods in a day and they get 2 as. for every kalam of kernel. The pods are spread in layers and beaten with a long stick.

Sale of produce:—The seeds are purchased by Messrs. Ralli Brothers of Tirukkoolur. Commission agents are busy at work who make an agreement with the company as early as September furnishing a security of Rs. 1000/- to supply 1000 bags of shelled groundnut. They get 1000 gunnies from the company, the cost of which is deducted later on. A whole-sale contract at Rs. 50 to Rs. 75 per baram of shelled nut is made according to the existing market rate.

There are also decorticators worked by power. The groundnut decorticated by machine fetches better price than the hand beaten produce. An increase of Rs. 10 per baram is common as the thinner red coating of the kernel is not peeled off in machine husking. For every bag of 72 M. M. of shelled seed Rs. 4-8-0 are charged. A baram of shelled groundnut of 20 maunds is sold at prices ranging from Rs. 40 to Rs. 75. An average yield of 2 barams of shelled nut is obtained from a kani of land.

Nuts are exported to Marseilles.

(To be continued).

Wet or Dry Nursery—Which is preferred for Paddy in the Godavari District ?

R. VASUDEVA RAO L. Ag.

Nurseries for the Samba crop are mainly dry in the Ramachandrapur taluk and mostly wet and sometimes dry in the Amalapur and Rajole taluqs; for the second crop, however, they are mostly wet and occasionally dry in Ramachandrapur and invariably wet in the latter taluks.

The conditions which influence the choice of the one or the other are many.

The nature of the soil is one. On stiff clays and loams with an impervious substratum and on soils of saline nature, wet nurseries are usually raised perhaps with a view to prevent the salts from coming up to the surface. But on less clayey soils having a pervious sub-stratum, the dry system is generally adopted.

The adequacy of water supply in summer is another. When the source of water supply is limited in ponds or wells, the nurseries cannot but be dry. Even in such places, a small portion of the seed-bed is put under the wet method after the opening of the canals to provide seedlings for late plantings as in the Ramachandrapur Taluq. In the Rajole and Amalapur Taluqs, the earlier opening of the canals is largely availed of in raising wet nurseries with canal water, water in the ponds and wells, if any, being used to irrigate arecanut and other gardens.

The availability of labour for ploughing also influences the choice of the method of raising seed-beds. In the Rajole and Amalapur Taluqs, men and cattle are engaged in ploughing coconut and arecanut gardens after the harvest of paddy, as on this operation depends the yield of the gardens in the ensuing year. Hence, ryots do not find much time to plough land for paddy seed-beds. In the Ramachandrapur Taluq, on the other hand, where there are no coconut topes, men and cattle are at leisure after the harvest of paddy and they, therefore, have enough leisure to plough their nursery plots.

The raising of a second crop of paddy is another factor influencing the choice of the method of raising seedlings for the first crop. In certain villages of the Ramachandrapur Taluq, for instance, where the whole land is put down under Dalawa crop, there will not be sufficient interval for the ryot to prepare his land satisfactorily for dry seed-beds. In such cases, wet seed-beds are raised.

The adequacy or otherwise of summer showers is another consideration. When summer showers are received, the tendency of the ryot is to have the nursery plots ploughed and kept ready. In the Rajole and Amalapur Taluqs, the ryots consider economy and ease in preparation one of the chief reasons for adopting the wet method.

Last but not least in importance is the nature of seedlings obtained in either case. There is a diversity of opinion in regard to the relative merits of the seedlings obtained under the two different methods. According to the experiences of the ryots in Ramachandrapur, seedlings from the dry nurseries are healthier, easier lifted, establish sooner when planted, have better disease-and drought-resisting capacity and give a higher yield of a better quality than those under the wet system. But the above merits are claimed also for the seedlings raised under the wet system in the Rajole and Amalapur Taluqs. The Ramachandrapur ryot says that seedlings in the wet seed-bed come out in lumps when lifted and some break and many suffer in handling. Consequently, the planting operation is rendered difficult and more labour is required for planting. As roots of seedlings are matted together, the tendency of the women coolies is to plant them in bunches. This is strongly contested by the Rajole and Amalapur ryot who says that the seedlings under the wet system do not fare so badly. The only serious draw-back in wet seedlings, he says, is that they grow very slowly in the wet seed-bed on account of the compactness of the puddle, while the one point in favour of the seedlings raised under the dry system is that they can be kept longer in the seed-bed.

These conflicting opinions in regard to the relative merits of the seedlings under the two systems are worthy of investigation, a thorough knowledge of the conditions under which the one or the other may advantageously be adopted being essential to the successful cultivation of paddy.

Organic Manures and Availability of Plant Food.

K. ADINARAYANA RAO, L. AG.

It is well known that for nutrition all plants depend upon the food material available in the soil and in the manure applied. It is therefore of some importance to determine how much of the food material in any manure becomes available when added to a soil. Food stuffs are valued for their digestibility or availability of food material. The same is true of manures.

Organic Nitrogenous manures when applied to a soil undergo a series of changes owing to the activity of soil bacteria resulting first in the breaking down of complex albuminoid substances. Next comes a change leading to the production of Ammonia and its final oxidation into nitrous and nitric acids. The Nitrogen in an organic manure is said to be "available" to the degree in which it is readily converted into nitrates. Nitrates are the end product of these changes and are readily assimilated by all plants. Nitrifiability is, therefore, considered a safe measure of the availability of Nitrogen in manures. Many soil Biologists in Europe, America and India have often emphasised this view, and some of them consider that the fertility of a soil could be safely predicted.

In order to ascertain the availability of plant food in Indian manures when applied to important soil-types, experiments described below were carried out at Coimbatore. Figures available relate to green-leaf manures and oil-cakes.

The soil selected for the purpose was gardenland taken from the insectary plot in the Central-Farm. In colour it is reddish and forms an important soil-type.

TABLE 1.—ANALYSIS OF GREEN-LEAF MANURES.

No.	Common Name.		Botanical Name.	Percentage of Nitrogen in
	Tamil	Telugu		Fresh Leaf with 90% Water.
1.	Erukam	Jilledu	Calotropis gigantea	0.3669
2.	Avārai	Tangedu	Cassia auriculata	0.3135
3.	Pungam	Kanuga	Pongamia glabra	0.3669

TABLE II.—ANALYSIS OF OIL CAKES.

No.	Common Name.	Botanical Name.	Percentage of Nitrogen in
1.	Illuppai cake	Bassia Longifolia	2.41
2.	Pungam cake	Pongamia glabra	3.50
3.	Black Castor cake	Ricinus Communis	5.60
4.	White Castor cake	Ditto	6.10
5.	Neem cake	Azadirachta Indica	3.88

N. B.—Cakes that are used as cattle food were omitted from the experiment.

Green-leaf manures were added to give 30 milligrams of Nitrogen per 100 grams soil. Optimum moisture was determined and sufficient water added. The soil was air-dried, sampled and sieved before use. 200 gram lots of dry soil were taken, requisite quantities of water and leaves added, the whole mass mixed well, put in glass jars and incubated at 30° C. for a period of eight weeks. Loss in moisture was made up every fourth day. Amounts of ammonia, nitrates and nitrites were determined once at the end of four weeks, and a second time at the end of the experiment.

Soil equivalent of 100 grams dry soil was taken. This was made up to 300 c. cs. with water and shaken for 30 minutes. The soil emulsion was then filtered until 30 c. cs. of clear filtrate had been collected, and the remaining portion of the emulsion was set apart for estimating ammonia. Nitrites in the filtrate were estimated by Griess-Illosway method, and nitrates by the Phenol-sulphonic acid method, the colours obtained matching the standardized glasses in the Tintometer. The remaining portion of soil extract was acidified with dilute hydrochloric acid and left for twentyfour hours. From this, aliquot parts of the supernatant liquid were distilled off with 30 per cent caustic soda and ammonia was estimated by the Titration method. N/20 acid and N/20 alkali were used for the purpose. Table III. shows results. Both Ammoniacal and Nitric Nitrogen figures are given, since these leaves are commonly applied as manures to Rice Soils.

TABLE III.—GREEN—LEAF MANURES.

No.	Common Name.	Milligrams of Nitrogen in the leaf added.	Milligrams of active Nitrogen formed after			Percentage of availability at the end of 8 weeks.			
			4 Weeks.	8 Weeks.					
			NH ₃	NO ₂	NO ₃	NH ₃	NO ₂	NO ₃	(NH ₃ —NO ₃)
1.	Avārai	30	6.50	Nil	Nil	6.75	Nil	1.00	25.83
2.	Erukam	30	7.02	„	5.14	7.60	„	8.40	53.33
3.	Pungam	30	6.02	Trace	3.60	7.30	Trace	4.20	38.33

In the case of Oil Cakes, the determinations were made once in two weeks. 400 gram lots of dry soil were used. Eight weeks was the period of incubation. Cake was added at 30 milligrams per 100 grams soil. Deficiencies of moisture were made up once in four days. Estimations of ammonia, nitrates, and nitrites were made as per methods described above. Table IV shows results of nitric Nitrogen. Only nitric Nitrogen figures are given, since the cakes are generally applied to arable land.

TABLE IV.—OIL CAKES.

No.	Common Name.	Milligrams of Nitrogen in the cake added.	Milligrams of Nitrate Nitrogen formed after				Percentage of availability (No. 3) at the end of 8 weeks.
			Two weeks	Four weeks	Six weeks	Eight weeks	
1.	Black Castor Cake	30	7	13	15	17	57 per cent
2.	White "	30	7	12	18	24	80 "
3.	Illupai Cake	30	—	—	—	—	—
4.	Pungam Cake	30	7.5	11	13.5	15	50 "
5.	Neem Cake	30	6.5	11	13	17	57 "

The above Tables (III. and IV.) represent figures given after deducting the controls.

SUMMARY AND CONCLUSIONS.

Green-Leaf Manures.—Cassia auriculata which is largely used by the Indian cultivator as a green-leaf manure does not seem to be of immediate use to the first crop. The Nitrogen becomes so slowly available that this leaf does not compare favourably with other green-leaf manures. This aspect of the manure problem is being experimented upon at the present time. It seems likely that the tannic acid in the leaf is really responsible for the initial inhibitory action. In a period of eight weeks only 3.33 per cent of Nitrogen was available as nitrate; but if we add ammonia also, nearly 25.83 per cent of the Nitrogen becomes available.

Pongamia glabra is the next higher, but does not fulfil the hopes entertained of it by the cultivators, only 14 per cent of its Nitrogen being available as nitrates in the course of eight weeks. With ammonia, the percentage of available Nitrogen increases to 38.33 per cent.

Calotropis gigantia is the best since 28 per cent of its Nitrogen is available as nitrates during the same period. This is in entire accord with the popular practice. When ammoniacal Nitrogen is added on, the availability rises to 55.33 per cent.

Oil Cakes. Of all the cakes tested, White Castor was found to be the best, as 80 per cent of its Nitrogen becomes available for the nutrition of a growing crop in the course of eight weeks. In the same period 57 per cent of Nitrogen in Black Castor Cake is nitrified, thus showing that the removal of the husk (i. e., decorticating) enhanced the availability of Castor, and the Ryot may with advantage go in for the decorticated cake wherever possible. 57 per cent of the Nitrogen in Neem and 50 per cent in Pungam become available in the same period. In some localities Pungam is in great demand, but the value of Neem is not sufficiently realised.

Illuppai Cake is peculiar. It resists all bacterial action in the soil at least during a period of eight weeks. This inhibitory character is perhaps due to the presence of a large percentage of a poisonous glucoside "Saponin" (29 per cent to 31 per cent), and it is a problem whether it would not be worth while attempting to remove the 'Saponin' with a view to make it nitrifiable as the cake contains 2.41 per cent Nitrogen, i. e., five times as much as is contained in the Farmyard manure. Further work will elucidate this point. In its raw state it has absolutely no manurial value.

EXTRACTS.

SOME ASPECTS OF ECONOMICS IN RELATION TO AGRICULTURE.

R. D. ANSTEADON, A.

Director of Agriculture, Madras.

The Agricultural Department of Madras is the only Agricultural Department in India which has a Statistical Section attached to it. We publish a weekly season report showing the progress of the sowing and harvesting of the main crops, and the influence of the

weather on them, the state of irrigation supplies, and grazing for cattle. We also publish fortnightly statements of retail prices. Each year we issue a season and crop report which shows the area under each crop in the presidency and the yield. In addition to these we publish forecasts of the more important crops, such as sugarcane, cotton, paddy, groundnut, and gingelly, and we pride ourselves on the accuracy of these forecasts and that we are justified in doing so is shown by the fact that our forecasts are accurate within a percentage of error never higher than three per cent and in the case of some crops as low as 0.2 per cent.

Now it may be asked, "What is the use of all these figures. A lot of time and trouble is taken to collect them and a certain amount of expense is involved. Does anyone ever look at these publications with their pages and pages of tabulated figures?" That is a fair question.

Forecasts serve many useful purposes. Government for example are able to see beforehand whether there is likely to be any shortage of a food crop. For instance our next paddy forecast will show to what extent the recent floods have damaged the crops in any particular locality and by how much the crop is likely to be reduced in consequence, and the Government will be able to decide whether it will be necessary to make arrangements to import paddy into the country on a large scale, or to make any special arrangements for ensuring supplies to the affected areas or for controlling prices, and if so to make the necessary arrangements in plenty of time. In the case of an exported crop like groundnuts any large increase or decrease would mean a corresponding increase or decrease in revenue which again is a desirable thing to know about in advance.

One use of such figures is that they indicate the balance between food crops and commercial crops in any particular area, be that area a taluk, or Province, or country and I need hardly tell economists that this is of the greatest importance. The primary duty of any country is to feed her population. In England it is impossible to feed the population by food grown in England itself. England has passed during the last century or so from an agricultural country to an industrial country and she now depends on other parts of the Empire for her food. Not so India. India is still an agricultural country though we hear much talk now-a-days about industries. Any change to industry must be carefully watched by her rulers and provision made for feeding an industrial population crowded into towns, and statistics of the nature described help those whose business it is to keep their fingers on the pulse of the nation so to speak and note how it beats, agriculture or industry—and act accordingly.

Another axiom not always realised as fully as it should be is that money is not wealth—you cannot eat money. I remember when the cotton boom was on some years ago how there was a rush to grow cotton all round Coimbatore and how it was planted on all kinds of land suitable and unsuitable at the expense of food crops. The ryots in those years had more money than they had ever had before but no food. Outside holders of food raised the prices and people were worse off though they had more money. They soon learned the lesson and have now replaced many of the food crops.

Statistics help us to solve much bigger problems than this and I will take as an example the case of the Cotton situation. I choose this because it is one which is before the public just now and one in which the Agricultural Department is particularly interested.

The problem is purely an economic one and may be stated thus. There is a world shortage of cotton. To meet it which is the better policy for India—to endeavour to increase the quantity of cotton grown in this country irrespective of quality, or to try and increase the output of long stapled cotton. In other words is an increase of 100,000 bales of good stapled cotton more important to the world than an increase of a million bales of short stapled cotton.

The Indian Cotton Committee stated very plainly that there was a genuine demand for Indian long stapled cotton and we know that such cotton can be produced in this Presidency. Now an Agricultural Department has to decide on a policy to suit its own particular area. Admitting that Madras should grow more long stapled cotton is there an area on which it will PAY? To what extent is improvement necessary? Will a moderate increase in staple be profitable or should an effort be made to grow something new? Will the extra price for staple pay for decreased ginning percentage? and a possible lower yield? These you will at once see are questions of economics. They must be answered because to isolate, test, multiply seed, and establish a new strain of cotton is a matter of years whatever method be adopted to gain the desired end—hybridisation or selection.

To answer the above questions in a satisfactory way it is necessary to know the trade demand for different cottons and the trend of the changes which are taking place, and here statistics come to our aid.

Turning to those statistics we find that India in an average year consumes internally rather more than half her cotton crop and the surplus is sold for export to some country or other. Further statistics

show where it goes. I need not trouble you with these figures, but an examination of them makes it very clear that the principal demand at present is for cotton spinning counts of 20s. upwards—that is for long stapled cotton and the groups of counts above 20s. include 50 per cent. of the total yarn spun in Indian Mills, while cotton of sufficiently long staple for these counts forms only 33 per cent of the Indian crop.

It is clear therefore that in an average year the production of our short stapled cottons is more than double the requirements of Indian Mills. What becomes of it? An examination of statistics again—this time those of Japan show that Japan takes most of it. But these statistics also show another thing and that is that not only has the percentage of yarn of higher counts increased steadily in Japan of recent years, but that recent additions of spindles have been for medium and fine counts, i. e., to utilise long stapled cotton.

Our examination of statistics therefore leads us to this conclusion that so long as India depends on foreign markets for buyers for approximately half her crop of cotton it is clear that she must cater for the needs of those markets or lose them. Unless India in fact takes steps to increase the staple of her cotton she will find herself with cotton to sell which no one wants to buy. As my Cotton Specialist recently put it India will be in the position of a man with onions to sell in a market where all the people want eggs. India must be prepared to produce eggs.

This then is the economic problem which the Agricultural Departments in India have to face and in this Presidency we are doing our best to increase the staple of our cotton and to make and introduce new strains.

But this is not all the problem. If it were it would be comparatively simple. The task of lifting the Madras cotton to a higher plane of excellence is beset with difficulties—difficulties caused by practices of adulteration, i. e. the mixing of short stapled cotton with long staple and lowering the prestige and good name of Madras cotton in the world's markets—difficulties of pests and diseases which attack these long stapled cottons which are more delicate than the country cottons. The question arises whether it is not better from an economic point of view to take only one picking and then uproot the crop and replace it with a food or fodder crop.

Here again we are faced with another problem. In how far are you justified in introducing legislation to control adulteration and

disease, legislation which interferes with the liberty of the subject for the good of the community?

As you see it is a complicated problem and one which your Association might well study. It will I hope serve to illustrate the value of statistics and the wide issues which are involved and how closely economics and agriculture are related.

I will now turn to another phase of my subject and give you another example of this close connection between the two subjects in which you and I are interested.

Farming is almost entirely an economic problem. The farmer wants to get a living and the best possible monetary return out of the crops he grows. His problem is how he can best utilise his land to that end. Now let us consider the great question of manuring from its economic point of view. It is quite easy to prove and to demonstrate that the addition of manure produces an increase of crop. For instance experiments carried out on one of our Experiment Stations (Samalkota) show that by the addition of 300 lb. of bonemeal the yield of paddy can be increased by 289 lb. of grain per acre and by the addition of 500 lb. of bonemeal that increase can be raised to 455 lb. per acre.

Here you have an example of the Law of Diminishing Returns which simply means that if 100 lb. of manure give an increase of crop of 96 lbs an application of 500 lb. of the manure will not give an increase of 5 x 96 but something less and that a point will be reached ultimately when no further increase in yield will be produced by the further addition of manure. The limit has been reached and any further increases in yield can only be produced by improving the inherent yielding capacity of the crop by hybridisation. However this is a fascinating side-line which I must not now stop to follow. What I want to show you is the economic aspect of the question.

Last year the average price of rice was 16·2 lb. to the rupee so we can calculate the value of the increase in crop produced by the manure. We also know the cost of the manure—bonemeal cost Rs. 1·20 per ton—and if we subtract the one from the other we shall arrive at the profit obtained by the farmer. And here you see an extraordinary economic position. Despite the fact that the use of manure increases the crop very materially the value of the crop is so low compared with the cost of the manure required to get this increase that it hardly pays to use it and were the price of rice to fall by a very little, one would manure at a loss.

Suppose however the price of the manure could be reduced. In 1910 bonemeal only cost Rs. 80 per ton. Then a very different state of affairs appears and it pays well to manure.

Manure Bonemeal in pounds.	...	300	500
Increase in crop pounds.	...	289	455
Value of Manured crop Rs. as.	...	17-13	28-1
Cost of Manure at Rs. 120 a ton	...	16-1	26-12
Profit	...	1-12	1-5
Percentage	...	10	5
Cost of Manure at Rs. 80 a ton Rs. as.	...	10-11	17-13
Profit	...	7-2	10-4
Percentage	...	66	55

Now the price of bonemeal rises steadily year by year because it is exported to European countries who can afford to pay big prices for it because they are using it to produce crops which have a much bigger market value than rice. Now here is your economic problem. Which is the better for India (1) to export her bones getting a big price for them, money which does not reach the farmer but goes to the scavengers, the middle men, and the exporting firms—or (2) keep the bones in the country at a low price and turn them into food thus increasing the total quantity of food produced the profits from which will go to the farmer. Can such an effect be produced by legislation such as prohibiting the export of bone?

That is a problem which needs very careful consideration at the hands of economists. As an agriculturalist I am no doubt prejudiced and I say the bones should be kept in the country and turned into food. I should like economists to tell me whether I am right or not and if I am right then it is no good talking about it, something should be done at once and the necessary legislation introduced.

There are other economic problems which I could expound to you. Agricultural improvement does not end with increased outturn from the land. The cultivator needs assistance to provide him with the necessary capital at a reasonable rate of interest to free him from a state of perpetual bondage to the moneylender, to aid him in the marketing of his produce to the best advantage, and many other things. But I will not weary you with any more. My purpose will have been served if I have succeeded in indicating that Agriculture and Economics are very closely allied and that they have to solve similar problems.

In conclusion I will quote one paragraph from the proceedings of the Board of Agriculture Meeting held at Bangalore last January.

"The goal of each department (agricultural and co-operative) should be aimed at by the study of economic problems, for the ultimate end of all such study was that some economic good should accrue to the people of India. It was therefore necessary to study rural economics and the Punjab would seem to be the only Province that had attempted this. There was an increasing tendency in the Universities to study local problems. Directors of Agriculture could make suggestions to students for enquiries during their holidays".

[An address delivered before the Indian Economic Association, Madras Section, in September 1923 and published here through their kind courtesy.]

The Viceroy—Lord Reading—on Cotton Trade Prospects.

It gives me the greatest pleasure to take part in this inaugural ceremony today for several reasons. In the first place I am enabled to express my high appreciation of the value of technological and other forms of research connected with cotton with which this ceremony is primarily concerned and, in addition, there is the wider subject of the activities of the Central Indian Cotton Committee and the general question of the cotton industry in India as a whole, in which I take the warmest interest and to some aspects of which I desire to draw the attention.

The Indian Central Cotton Committee lost no time after their formation in carrying out the recommendations of the Special Indian Cotton Committee of 1919 regarding the appointment of a technologist and the erection and equipment of laboratory and experimental weaving installation in which accurate tests can be made and correct judgments concerning the value of varieties of cotton sent for test can be reached. The spinning test represents the main avenue to all technological research in cotton and the experimental spinning plant erected here now enables the most satisfactory method of ascertaining the value of cotton by actual spinning test to be carried out under expert control. These tests will be supplemented by other scientific processes directed towards classifying the properties of various types of Indian cottons and these results will be correlated with the results from spinning tests. The properties of fibre and yarn are also to be investigated. For some of these processes a laboratory will be required where physical, chemical and microscopical examinations can be conducted. A building has been designed and begun for these purposes, but, meanwhile, thanks to the kindness of the trustees of the Victoria Jubilee Technical Institution, the actual laboratory tests have not had to wait upon the completion of the building and are already being carried out in the premises of the Institution. I need not emphasise

the great value of this work. Its effect in assisting in the selection of the most suitable varieties of cotton for growing and in placing facts before the producers and consumers of first importance in the marketing of cottons cannot be over-estimated. I heartily congratulate all those concerned in the successful start made in technological research work here and I also felicitate the public interested in cotton on the possession of an institution designed for scientific tests, which I am confident will be of the greatest value in the history of this most important industry.

WIDER ASPECTS OF THE PROBLEM.

It may appear to Bombay unnecessary to dwell upon the wider aspects of the work of which the experimental spinning plant is only a part, though a very important part, for Bombay is the great cotton centre. Not only does the Presidency grow large areas of cotton, but much of the prosperity of Bombay City itself is bound up with the cotton industry and large numbers of persons are directly concerned with the purchase, marketing and export of cotton and with the spinning and manufacture of cotton cloth and yarn. The question of cotton supply has accordingly a direct reaction on the general conditions of the financial, commercial and industrial prosperity of this city, but this lively interest is not universal outside Bombay and, perhaps in some quarters in India, men's minds are apt to dwell in some perplexity on the problems of financial stringency and of the needs for social, administrative and economic improvements of various kinds without realising, as keenly as I do and as many, I feel sure, in Bombay also do, that the cure for many of these difficulties and defects lies in increase and improvement of production. The effect of increased production in assisting directly and indirectly to State revenues and in enhancing the prosperity of the producer, the manufacturer and the industrial labourers will, I am confident, show the way of escape from many of those difficulties and problems for which at present no easy solution can be found. One of the more obvious means of improving production in India lies in concentration on the improvement of the cotton crop.

India is vitally interested in cotton. Many parts of the world can produce foodstuffs, but the favoured areas which have conditions suitable for the production of cotton lints for use for clothing and numerous other purposes are limited. India, however, has the priceless heritage of a climate and soil favourable for cotton production and it would be madness to neglect or squander that fair inheritance or to fail to use every effort to improve it by wise stewardship. India consumes a large quantity of cotton goods, it

has an extensive cotton export trade, it is keenly interested in the manufacture of goods both through well-established and efficient spinning mills in which much capital has been invested and which give employment to large numbers of workers and through widespread cottage industries which produce large quantities of hand-woven yarn and cloth. It must be remembered that India is not only the largest cotton producing country in the British Empire, but is also the second largest cotton producing country in the world. Moreover America, the largest producer, is itself now yearly subscribing to an increasing extent to its own produce. For this reason not only in the interests of India itself but in the interests of Empire supply and world supply, the cotton industry of India holds the most important position and India offers the greatest possibilities for a considerable increase in the supply of cotton in the near future.

INCREASED SUPPLY OF COTTON.

The possibilities of increase in India lie in various directions. There is the question of the expansion of the area under cotton which is largely connected with the extension and improvement of irrigation and the exploitation of new areas suitable for cotton cultivation. Another aspect of the case is the possibility of securing a better average yield per acre in the existing cotton areas by selection and stabilisation of the better varieties of cotton or by the introduction of new kinds. There is also the question of the prevention and cure of diseases and pests to which the crop is peculiarly liable and which cause a considerable volume of the loss of each year. There is also need to study the export and mill demand more closely and to aim at improvements in the production and marketing of the desired varieties in commercial demand for the cotton trade with the mills in India or other countries. This includes the prevention of adulteration, deterioration and admixture and the stabilisation of the supply of various types in demand in various markets. As an illustration of the great scope for improvement I may note that the Cotton Committee in 1919 stated in their report that the average yield of Indian cotton was only 85 pounds of lint to the acre as compared with 200 pounds in America and that there was, in addition, defective marketing resulting in losses for Indian cotton of 10 per cent more in the blow room as compared with American and Egyptian cottons. The Committee also found that before the war Lancashire, the best available cotton market, took little Indian cotton owing to the short supplies from India of staple cotton approximating the commercial inch standard.

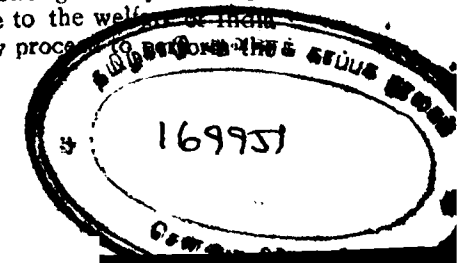
The time at my disposal does not permit me to do more than indicate in the broadest manner the great importance of the field open to the labours of the work on which they are engaged and the

numerous problems, of which I have only enumerated a few salient points, remaining to be solved by their efforts and advice, but if in my brief sketch I have been able to communicate even in some degree the keen interest which I feel in their work and my deep appreciation of the importance of their labours in the interests of the progress of India and the prosperity and welfare of the people of India, I shall have been amply rewarded.

CENTRAL COTTON COMMITTEE.

The Central Indian Cotton Committee has been set up as a result of the report of the Special Cotton Committee of 1919. Broadly speaking, apart from formal activities, the Committee is a central body charged with the promotion of all measures which will tend to further the improvement of the cotton-growing industry in India. The personnel consists of a fully representative body including the Agricultural Adviser of the Government of India as President and as members, the Directors of Agriculture and other experts of the Agricultural Departments in the cotton growing provinces, the Director-General of Commercial Intelligence, the representatives of the Chambers of Commerce and commercial associations, commercial representatives specially nominated by the local Governments, representatives of the Co-operative Credit Societies of the cotton-growers and of the Indian States. The representative character of the committee specially qualifies it to advise the Central and Provincial Governments in all matters concerning the industry and affords a common ground on which all sections of the cotton trade, the producers, the traders, the manufacturers and the agricultural and other experts of the Central and Local Governments can meet and discuss difficulties and take joint action to promote objects which are alike the concern of the Government of India, the local Governments and the Indian States. With the passing of the Cotton Cess Act, the Cotton Transport Act and the active consideration of a bill for the regulation of gins and presses, the machinery for extending the operation of the Committee is in the process of being perfected. The Committee has already excellent achievements to its credit and great results are to be expected from the schemes of the Committee for the production of an agricultural and technological research. The Committee can rely on my warm sympathy and on the support of the Member of my Council, Sir Narasimha Sarma, in their operations and I know that the Ministers in charge of Agriculture in the cotton-growing provinces keep in very close touch with their work. I commend the work of the Committee to the public generally because I am convinced that it is of primary importance to the welfare of India and to the prosperity of her people. I will now proceed to perform the inaugural ceremonies.

J. G. MALING
N 20



The old year to the new.

"Alas! Alas! The span of life
Is filled with striving, stress and strife!
And when to love one would incline,
Impelled by thoughts on things divine,
The world intrudes and orders all
To honour every worldly call,
Enthroning self, enslaving truth,
Degrading Age, corrupting youth,
Until the Soul with anguish riven
Escapes, and wings its way to Heaven.
But, stay, fair youth, the worst I have told,
Men cannot always worship gold.
For somewhere in the mind of man
Is laid the Great Creator's plan,
By which through years of toil and pain,
Man's better self will rule again,
Exalting Right, overthrowing wrong,
Each matin prayer a triumph song.
And when the theme swells forth in praise,
"I Will announce the promised days
Of Love and trust, of mirth and cheer
A never-ending glad New year.

RALPH FLEESH,
(*The Scottish Farmer.*)

Association between reaction times in the case of different senses.

BY PROF. KOGA AND G. M. MORANT,

The authors investigated the relative extent to which a short reaction time depends on the acuteness of the sense concerned and on mental briskness. With this end in view they measured (1) acuteness of hearing with Galton's whistle (2) acuteness of sight by the capability to read diamond type at regulated distances (3) reaction time to sound (4) reaction to sight, the last two were measured by Galton's simple pendulum chronograph (5) age. These deductions were arrived at from records of 3379 males.

Age and highest audible pitch. The correlation was negative and substantial, indicating that the power to appreciate high pitches decreases rapidly with age. The regression was sensibly skew.

Age and acuity of vision. The correlation was negative and fairly high in magnitude. The regression is far from linear. These data brought out that the maximum acuity of vision is not reached till the age of 21 when the average value is 19.56 inches by the test. This differs from acuity of hearing. In the case of sight the youthful eye is not so keenly acute as that of the young adult although far more acute than that of the aged. The fact that hearing in man reaches its maximum acuity before sight, suggests some evolutionary importance.

Influence of age on reaction time to sound. The regression is skew and of a peculiar kind. The reaction time is very large in childhood, decreases to a minimum at about 25 years of age and then slowly increases with old age. The reaction time of a baby at birth is indefinitely great. It does not respond to light and sound. Delay in executing an order by a child is often treated as disobedience, when it may well be only a very long reaction time to the sound signal. It will thus appear that the maximum of mental alertness is reached at a later stage than the sensory maximum acuities. A man reaches his sense prime before he reaches his mental prime. Before a man has reached his highest mental alertness, he has begun to lose the highest grade of sensory acuity.

Influence of age on reaction time to sight. The regression is again skew. The minimum reaction time to sight occurs at 25.25 years of age. It is thus half a year later than the age at which the minimum reaction time to sound occurs i. e., 24.75. The reaction time to sight is, except in childhood always greater than that for sound. The mental response is also variable from man to man.

6. On the association of sensory and mental characters after correction for age.

1. Reaction times depend very little on the sensory acuteness.
2. Variability in reaction time depends in the main neither on sensitiuity nor age but on some other factors probably mental.
3. Acuity of hearing becomes slightly less as reaction time increases. On the other hand, as the highest audible pitch increases from 4,000 to 10,000 vibrations per second the reaction time falls very rapidly and then from 10,000 hardly falls at all i. e. increased acuity of hearing beyond 10,000 vibrations per second is not accompanied by any real gain in reaction time.

(From *Biometrika*, Vol. XV, 1923).

GLEANINGS.

Golden Rules for Farm Machinery.

1. Keep all nuts well fastened.
2. Give sufficient lubricating oil and see that it reaches the right spots by keeping all oiling apparatus in good order and opening up all little oiling holes.

3. Put fresh paint on when and where necessary.
(Dep. Agr. S. Afr. March 1924.)

Live stock of India. It is estimated that there are over 34,900,000 sheep and 31,500,000 goats in India, and about 143,000,000 cattle. Horses number only about 2,100,000, while there are about 1,500,000 asses and 80,000 mules. The main draught animal is the buffalo, which numbers about 36,000,000, and there are over 500,000 camels.

(The Scottish Farmer Nov. 1924.) S. N.

Value of Vegetables. Eat lettuce and onions for worn nerves. Beet and turnips give Iron to the blood. Tomatoes stimulate a torpid liver. Celery is good for rheumatism. Beetroots are nourishing and laxative. Carrots cleanse the blood and clear the complexion. Asparagus is beneficial to the kidneys. All kinds of greens in spring help to cleanse the blood and regulate the system.

(The Scottish Farmer Nov. 1924.) S. N.

Pest Act Enforcement against Water Hyacinth. The Government of Madras have directed the extension and application of the Madras Diseases Pest Act of 1919 in the District of Madura till August 13th, 1925, in order to adopt measures for the destruction of water hyacinth which has proved a serious pest, productive of illness in its neighbourhood.

Silk Cotton in Java. Of the kapok gathered in Java most comes from trees planted originally for other purposes. The greater part of the crop is only a by-product, for the trees are planted on either side of the road to protect cacao and coffee plantations. Even when planting is done for the sake of the tree itself, the main purpose is to use the trees as a prop for pepper plants. The export of kapok from Java is estimated at about 10,000 tons a year, and of this quantity 9,400 tons are furnished by kapok trees planted to shelter and prop other plants. The Silk Cotton tree from which kapok is derived is a common species.

South African Association for the Advancement of Science. The 22nd Annual Meeting of the South African Association for the advancement of Science was held at Cape Town on July 7-12 under the Presidency of Prof J. A. Wilkinson, Professor of Chemistry in the University of Witwaterstrand, Johannesburg. More than 80 papers were read. The Presidential address was on "A Review of some Development in Chemistry during this Century."

The next Annual Meeting will be held at Oudtstorm under the Presidency of General J. C. Sunde in July 1925.

(Nature Nov. 29, 1924).

Ceylon Journal of Science. The Ceylon Journal of Science has been established by the Ceylon Government for the publication of scientific and other researches. In the first instance the journal will consist of seven sections, Botany, Zoology and Geology, Medical Science, &c. Each section will be a separate publication with its own editor, having its own pagination and appearing independently of other sections. For the purposes of general administration the Journal will be controlled by an Editorial Board, consisting of a chairman (Joseph Pearson D. Sc. F. R. S. E) and 15 other members.

Australasian Association for the Advancement of Science. The Seventeenth Meeting of the Australasian Association for the Advancement of Science was held in Adelaide, South Australia on August 25 to 30 inclusive. Sir John Monash—the President—gave his inaugural address on the evening of August 25th, the subject being "Power Development".

The Eighteenth Meeting will be held at Perth, Western Australia in August 1926, the President being Sir Thomas R. Lyle, and the Government of Western Australia has promised £. 1200 mainly towards the Expenses of defraying the cost of the publication of the Proceedings.

The Nineteenth Meeting will be held at Hobart, Tasmania in January 1928 with the promise of financial support from the Tasmanian Govt.

(Nature, p. 877. 13—12—1924.)

Symbiosis of Seeds and Bacteria. Gilbert J. Fowler and Miss. R. K. Christie writing in the Journal of the Indian Institute of Science, Vol. VII, Part XIII, pages 253-272, on "Studies relating to the symbiosis of seeds and Bacteria" observe that (1) Every seed so far examined has been associated with specific bacteria, either within

the seed (poppy), within the husk (rice), attached to the seed by the mucilage coat (*Cassia tora*) or residing on the testa (indigo-seed). (2) No part of indigo-seed by itself is capable of fermentation. (3) All poppy-seeds so far examined (field, garden and market) contain bacteria. (4) So far poppy and barley are the only two types of seeds found to contain bacteria; others have them on the outside. (5) Bacteria associated with the seed are not essential to its germination. (6) They are helpful to growth of seedling. (7) They break down seed-proteins, converting them into simpler substances assimilable by plants. (8) This property is not restricted to particular seed-proteins but is extended to those of quite different types. (9) Every seed so far examined has a specific extractive, removable by water or other suitable solvent and having a well-defined basic or glucosidic nature. (10) Extracts of seeds are not always of an antiseptic nature but in very small doses act as stimulants to growth. (11) Washed indigo-seeds germinate better than unwashed ones owing to presence of toxic substances in the latter.

Some Curious Practices and Beliefs re-Sugarcane Cultivation. A piece of bear-skin is in some places suspended in the water channel as a check against white ants.

A mixture of camphor and asafoetida tied in a bag is in some localities suspended in the water channel as a remedy for the borer.

Leaves of the wild Fig tree are sometimes put into the juice-collecting pans as they are supposed to be useful in keeping the juice sweet.

A piece of pepel or doeum pepel (*Shorea cochinchinensis*) or the bark of *Shorea-robusta* (Indian Damar, Kungilya Maram (Tamil), Guggilam (Telugu) is also said to keep the juice sweet.

The juice from Kajli or Kali of Bengal and Kusari of Orissa is reported to contain medicinal properties and to be used in the treatment of insanity and of brain and eye diseases.

A cane called Mani is believed to be poisonous. When small pox prevails, some low caste people in Baroda are reported to dedicate it to the Goddess to cure the sick.

K. K. RAO.

Come sets for planting. From the Louisiana Planter of the 13th instant, we learn that an Australian has patented a new method of treating cane before planting. This consists in soaking the freshly

cut sets in a lime bath for 12 to 36 hours and planting them out while they are still in a quite wet and swelled condition. It is claimed that this process prevents the newly made cuttings from going sour while sets not treated become sour and if much rain falls, they ferment and the eyes turn black and die. The treated sets swell and the eyes become prominent and shoot earlier. The borers and the insects are destroyed and the young seedlings make rapid growth, hoeing coming on earlier. The treated cane has a much stronger stalk, keeps an upright position and being healthy, and sound, it is decidedly sweeter.

A. U. M.

Honey as a stimulant. Honey sweet is a combination of glucose and levulose in nearly equal parts, two of the several different kinds of vegetable sugar existing in nature.

Levulose is a fruit-sugar that has real medicinal value, being readily tolerated in diabetic tendencies, or even decidedly beneficial. It is the only form of sugar that can be assimilated into the blood without any preparation. All other sugars must be converted by digestive processes before they are used by the human system.

Honey, then, is the only sugar supplied by nature in a form ready for instant use. It is a quick and lasting stimulant in cases of exhaustion and nervous collapse, as well as extreme fatigue. A teaspoonful of honey in half a glass of water, either hot or cold, will restore exhausted energy wonderfully, with only a beneficial reaction. No "dull gray dawn of the morning after" follows the use of honey, either as stimulant or food.—Better Fruit.

(Agricultural Gazette, N. S. W., Nov. 1, 1924).

Time interval between births of Children. BY E. C. RHODES
BIOMETRIKA VOL. XV 1923.

The material was taken from the records of the Whitney Family.

It was seen that the mean interval between births on the whole increased with the date of marriage.

The average number of children born in a fixed length of time from the date of marriage decreased. There is a gradual lengthening of the interval between births as more children are born. Thus when there are 6 births in the period, the interval between 1st and 2nd births is less than that between the second and third which in turn is less than that between the 3rd and 4th, which is less than that between the 4th and 5th, which finally is less than that between fifth and sixth

The sex of a child has no influence on the length of the interval from its birth to the birth of the next child.
V. R.

PAVLOV—the great Russian Physiologist. On Sep. 27, '24, Ivan Petriovitch Pavlov—the great Russian Physiologist—completed his 75th birthday. After different ideas had been suggested by his pupils, Pavlov smiled and said, "Well, from my experience, the problem seems very simple, although hard to perform. There is only one method: concentrate all the powers of your soul and body on one idea, which you investigate. Stick to it for many years, think of it daily and dream about it during your sleep. That's all." The results of Prof. Pavlov's work in the three departments of physiology he has studied are brilliant.

During 1920 and 1921, he and his family suffered badly from lack of food. He was obliged to spend valuable time in domestic work and in searching for food and fuel. In spite of this, Pavlov continued his work, at that time in unheated laboratories, hungry himself with hungry pupils, giving an example of a truly great man, who lives for one thing only—the pursuit of truth.—*Current Events and Topics*

(Extracted from *Nature* Oct. 4, 1924).

Psychology in Dairying. Dairy cows form very strong habits, and if the dairyman makes use of this trait much of the routine work becomes simplified and easier. Regularity in systematic operations is essential. Irregularities worry cows and undoubtedly affect the milk-yield, milk production is largely a matter of nervous force. Ordinarily cows are milked twice a day at regular intervals, morning and evening. High-producing cows, however, should be milked more frequently. Whatever the periods, the milking should be done punctually and regularly, quietly and thoroughly, by intelligent, capable, cleanly and kind milkmen. If possible, milkmen should always milk the same cows; cows resent strange milkers. It is a good practice, supported by cow psychology, to let the milkman remove her calf and feed her a tempting ration of bran mash—she will adopt him and yield her milk to him willingly and liberally.—P. J. V. D. H. Schreuder, in the South African Journal of the Department of Agriculture.

(Agricultural Gazette, N. S. W. dated Nov. 1, 1924.)

Magnesium sulphate as a preservative. As a result of tests of the value of magnesium Sulphate crystals as compared with naphthaline against silver-fish (*Lepisma*) in linen cupboards it was found that the former was far more effective. At the end of five months the cup-

boards under naphthaline were much infested and the naphthaline had deteriorated. Even after 12 months those under magnesium sulphate were not infested, and only a little deterioration had occurred. The conclusion arrived at was that magnesium sulphate is of far greater efficiency than naphthaline for protecting linen and other materials against such pests as moths and cockroaches in closed spaces, but that it deteriorates rapidly in the open—P. Mitchell in "Health" II, No 3, pp. 84-85—Melbourne May 1924.

(Rev. App. Ent. Vol. XII Ser. A, pt. 8)

The Adaptable Dutch Farmer. There is ample evidence that what chiefly set Dutch farmers to use all their wits, and to seek and value scientific and commercial instruction, was the gracious pinch of foreign competition. While in the 1881-90 period the Dutch grew 86,000 hectares of wheat a year, by 1907 they had cut down to 54,000 hectares a crop which they realised was being grown in competition with areas overseas more advantageously situated. On the other hand, in response to new opportunities, mangels and beet areas have been enormously increased. A district to which a guide-book a few years old would send visitors in order to see cheese-making has devoted itself for some time to market gardening. Elsewhere fishermen as well as farmers have become nurserymen. At a recent agricultural exhibition of Dutch produce in this country a Briton was heard to complain of the perfidy of the Dutch in putting cheese on the market at a time of the year when high prices are paid, "and then at a low time of the year doing something else." Just so. Three years after the Dutch agricultural commissioner in London advised Dutch farmers to produce cheddar I found one province alone marketing £40,000 in a twelve month.—J. W. Robertson Scott, in the Scottish Journal of Agriculture.

(Agricultural Gazette of N. S. W. No. I, 1924).

Causes of Anger in Bees. There are three things that may cause anger in bees, says the American Bee Journal in reply to a correspondent's query on this subject. First, the ill-disposition natural in some breeds; second, improper handling; and, third, unfavourable conditions.

Langstroth laid it down as a principle that when bees are filled with honey they are like a man who has eaten a hearty meal and little disposed to sting. Not only are they satisfied, but the filling of their honey sac causes the body to be distended and makes it inconvenient to curve their abdomen as they do when stinging. So, during a good crop, bees are likely to be good-natured; nor will the entrance guards be so irritable as when robber bees are constantly about.

Bees are frequently angered by mis-handling—by knocking the hives so as to disturb them when they are quiet—by leaving the hives open during a dearth so that robbers are encouraged—by neglecting to use a little smoke when handling—and by making quick motions when in their vicinity.

There are breeds and sometimes special colonies which are readily angered; they are usually powerful colonies, often hybrids of different races. The angry disposition of bees that have been carelessly handled may persist for quite a long time. "We have often removed the queen and replaced her with a queen of gentle breed when they appeared to have lost their gentle disposition," adds the journal.

(Agricultural Gazette of N. S. W. Nov. 1, 1924)

Is Sodium Arsenite Injurious to Soils. The question of possible injury to soils and to crop growth from the continued use of sodium arsenite used for seed destruction was investigated by the Hawaiian experiment Station in 1915, and as a result of these experiments it was ascertained that small quantities of arsenic stimulate plant growth, the crops tried being millet, buckwheat, and cowpea.

The most surprising feature of the investigation as reported in the *Journal of Agricultural Research*, Vol. V. p. 459, was the influence on ammonifying and nitrifying bacteria. In one type of soil, ammonification was stimulated even by such excessive amounts as 1 per cent. arsenious acid (As_2O_3) in the soil. The results as a whole indicated that no fear need be entertained regarding any detrimental influences toward the organisms upon which the plants rely for their nitrogen, provided proper soil texture is maintained. Further more, it was found that the arsenic practically loses its toxic influence towards plants, forming insoluble compounds with iron and aluminum.

To give a concrete example, land was sprayed for five years for weed destruction at the rate of three applications per year, using 5 lb. arsenious acid (As_2O_3) per acre for each application. The surface 4 inches of soil was found to contain .0092 per cent. arsenious acid, and none was present below that depth. Only .00006 per cent. arsenious acid was soluble in water. Soils therefore possess strong fixing power for arsenic, and when a sodium arsenite spray is used for the destruction of weeds the arsenic will ultimately be deposited in the surface soil, there to remain in spite of the leaching effect of rains or irrigation.

ESTATE NEWS

Mr. K. Sakkarama Rao was given a send off by the Club on the eve of his transfer on promotion to Trichinopoly as Head clerk to the Deputy Director of Agriculture V Circle.

Mr. Oliver, a Dutch Planter of Argentina paid a visit to the Cane Breeding Station.

Mr. Balkishen, Registrar of Co-operative Societies, Ajmere and Mr. Labh Singh, Assistant Professor of Agriculture Lyallpur and H. G. Baluch, Asst. Prof. An. Husbandry Poona were on a visit to the College.

Messrs. P. T. Rajan, M. R. Seturatnam Iyer and Ponnuswami Naidu M. L. Cs., attended the pest act conference held at the college on 13-12-24.

Mr. G. T. H. Bracken, Development Secretary was in our midst on the 13th having come to preside over the Pest Act Conference.

Mr. D. Clouston, Agricultural Adviser to the Government of India spent the 14th here on his return from Wellington whither he had gone to inspect the Military Dairy.

Mr. Warth, the Physiological Chemist, Imperial Dairy Institute, Bangalore stayed with us about a week to confer with the Government Lecturing Chemist and Mr. P. V. Rumiath, M. A. B. Sc. on the animal nutrition experiments initiated and conducted by the latter with the help of the Superintendent, Central Farm.

STUDENTS' CORNER.

B. Sc., Class III students went on a day's excursion to Sundapalayam and Chitrachavadi.

B. Sc. III and short course class II were taken to Peelamedu to study the tobacco cultivation.

The Final University class (B. Sc. III) went on their second annual tour with the Professor of Agriculture. They began at Bommasamudram in the Chittoor district on the 23rd instant and finished at Bangalore on the 4th January. They visited Chandragiri, Cuddappah, Siddhavattam, Yerruguntla, Nandyal, Hagari, Hindupur, Maklidrug, Hebbal and Hosur and had instructive lessons to learn and interesting practices to observe.

The College was closed for Christmas on the 22nd instant.

EDITORIAL NOTES.

The Madras Irrigation Bill. The question of defining the limits to the rights enjoyed by cultivators, Zamindars and Government in regard to flowing water in rivers, canals, channels and distributaries, has been a matter of contention for several years. The Irrigation Cess Act of 1865 was found defective in several ways and the Irrigation Cess amendment Act passed in 1900 caused no little stir among the cultivators. The judgment of the Lords of the Privy Council in what is known as the Urlam case set the authorities a thinking and in 1923, the then Law Member the late Hon'ble Sir K. Srinivasa Ayyangar introduced a Government Bill, the main principles of which were, it was alleged at the time, based on rationalisation of all water sources and the utilization of the surplus for the benefit of the community. But the majority of the Elected Representatives in the Legislative Council found several defects and the bill was thrown out. Subsequently the present Law Member Hon'ble Mr. C. P. Ramaswami Ayyar reintroduced it early this year with considerable alterations to suit the wishes of the legislators. The bill was referred to a select committee which submitted its report with commendable expeditiousness. The Council discussed this threadbare in its sessions for four months and finally passed it this month. We hope it will in due course receive the assent of their Excellencies, the Governor and the Viceroy. We cannot however pretend that even as now passed the bill has no defects. We yet hope that remedies will be found as time progresses and the Act will confer lasting benefit to the toiling ryot population.

Ryots' Conferences. It was a happy idea that struck Mr. Koil Pillai, Executive Engineer, Godavari Eastern Division, that he

should meet ryots and discuss with them certain irrigation matters. A meeting of this kind was, we learn, held on the 12th instant at Cocanada in the premises of the Taluk office where 300 ryots from the delta villages in the southern portion of the Cocanada Taluk were present and had a frank talk with Mr. Pillai. They gave their views on the question of acquiring land for private "bothies", or distributary channels in paddy lands. In regard to the crossbunding of drains for taking water during the second crop season as also for wetting sugarcane and other garden crops, the meeting suggested the abolition of the present unworkable system of applications for requests under this head being disposed of by the Superintending Engineer whose head quarters were at Waltair and pressed for vesting this right in the local officers—the Collector and the Executive Engineer. The unsatisfactory manner in which silt clearance is attempted to be done in the short period of four months during which canals are closed was brought to his notice and the very sensible proposal was made that once in five years main canals should be closed for longer periods say from February to June, so that thorough repairs could be effected. The Conference was of opinion that the men plying the ferries in canals and drains should be paid by Government as it was a legitimate charge to be met from the irrigation revenue of the Delta.

We congratulate Mr. Koil Pillai on the step he has taken, and are glad to note that he has been continuing to take interest in the ryot for several years now, for we need hardly remind our readers that it was this genial Irrigation Officer that worked heart and soul in introducing and popularising improved methods in paddy cultivation in parts of the Guntur District when he was a Sub Divisional Officer there.

A similar spirit is stirring cultivators in other districts and we understand that ryots under the Uyyakondan channel in Trichinopoly and those under the Nilayar channel near Tirupparankuran, Madura, have formed Associations to improve their irrigation facilities.

Lord Reading and India's opportunity. His Excellency the Viceroy paid a visit to Bombay on the 2nd of this month and amidst a heavy programme found time to open the Technological Laboratory and to lay the foundation stone for the Research Laboratory of the Central Cotton Committee at Matunga. The speech he delivered on this occasion is extracted elsewhere in this issue. His Excellency, has, it is evident, spoken from the standpoint of the British Empire and warned his hearers that a narrower outlook should not cloud the vision of Indians who stood to gain by accepting a policy of no isolation. His Lordship's statement however that (1) India has the priceless heritage of a climate and soil favourable for Cotton produc-

tion and it would be madness to neglect or squander that fair inheritance or to fail to use every effort to improve it by wise stewardship" is in our opinion liable to be misunderstood and would need to be qualified by the words "without prejudice to the adequate production of food grains to feed the population and without due regard to just distribution of agricultural incomes"

Agriculturist and Military Service. It is common knowledge that the flower of the army in any country is drawn from the rural classes and the ryot population supplies the finest material but the necessary limitations of culture impose obstacles in the way of an ordinary soldier rising to the rank of an officer of status and responsibility. If educated Indian youths from rural parts would enter the army and make themselves useful it would be so much gain to the country and relieve the overcrowded country side. We understand that Mr. Patel, son of Mr. P. C. Patel, Professor of Agriculture, Poona, has been selected for training at Sandhurst and we congratulate both the father and the son, on showing the way and hope that sons of the landed aristocracy in S. India will avail themselves of similar opportunities, in advancing the cause of the country and raising the status of the agriculturist.

Late Mr. E. S. Montagu and Dr. Sir Subrahmania Ayyar. During the month, it is our misfortune to lose Mr. E. S. Montagu, one of the great friends and benefactors of India, and Dr. Sir. Subrahmania Ayyar, one of the greatest of Indian Patriots.

The late Mr. Montagu as Undersecretary to Lord Morley and Secretary of State in the Lloyd Georgean administration did much good to this country especially to the agriculturist by creating ministerships for agricultural development and broadening the basis of election.

The late Dr. Sir. Subrahmania Ayyar was a staunch patriot right through his career whether as a non-official or as a judge of the High Court. His interest in the agriculturist was keen. He served as Secretary to the Committee appointed in 1885, to investigate into the working of the Saidapet College and did valuable work in this connection.

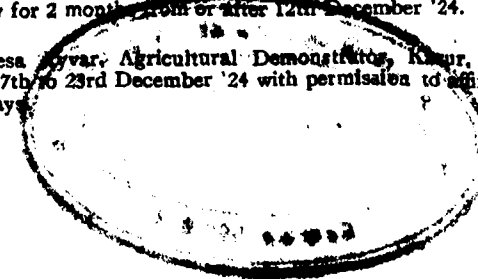
DEPARTMENTAL NOTIFICATIONS.

Appointment, Transfers, etc.

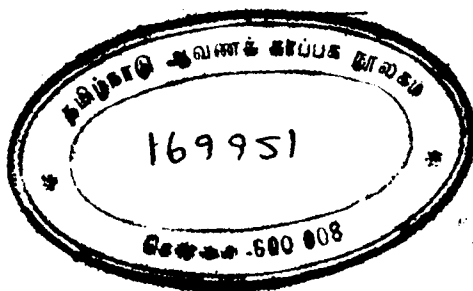
1. G. R. Hilson Esq., Cotton Specialist, appointed to act as Director of Agriculture, during the absence of Mr. R. D. Anstead on leave.
2. Mr. T. V. Krishnaswami Rao appointed as Upper Subordinate, V Grade, on probation, and posted to the Central Cattle Farm, Hosur.
3. „ A. J. Mascarenhas, Upper Subordinate, V Grade, on probation in Cotton Specialist's Section, confirmed with effect from 14th Oct. '22.
4. „ P. K. Krishna Nambiar, Assistant Farm Manager, transferred from Agricultural College Dairy, Coimbatore to the Central Cattle Farm, Hosur, to join on the forenoon of 16th December '24.
5. „ V. M. Ramunni Kidavu, Assistant Agricultural Demonstrator, VIII Circle transferred to Government Sugarcane Expert's Section.
6. „ T. A. Rangaswami Ayyangar, Assistant Farm Manager, Government Sugarcane Expert's Section transferred to VIII Circle.

Leave.—

1. Mr. M. A. Balakrishnayyar, Agricultural Demonstrator, Mayavaram, privilege leave for 3 weeks from 3rd December '24 to 23rd December 1924 with permission to avail himself of the Christmas Holidays.
2. „ V Ratnaji Rao, Agricultural Demonstrator, Nayudupeta, leave on average pay for 5 days from the 8th to 12th December '24 inclusive.
3. „ T. S. Ramsubrahmanya Ayyar, Assistant Government Agricultural Chemist's Section, leave on average pay for 6 days from the 15th December '24.
4. „ A. M. Muthayya Nattan, Agricultural Demonstrator, Virudhunagar, one week leave on average pay from 5th to 11th December '24.
5. „ D. Marudarajan, Assistant in Mycology, leave on average pay for 14 days from the 10th December 1924 with permission to avail of the Christmas holidays.
6. „ M. Mangesha Rao, Agricultural Demonstrator, Mangalore leave on average pay for 2 months from or after 12th December '24.
7. „ L. S. Natesa Ayyar, Agricultural Demonstrator, Koppur, privilege leave from 7th to 23rd December '24 with permission to avail of Christmas Holiday.



8. " J. Mascarenhas, Asst. to Cotton Specialist at Guntur, Leave on Medical Certificate, on average pay for four months from Nov. 19.
9. Mr. Gopala Chetti, Agricultural Demonstrator, Salem, leave on average pay for 9 days from 14th to 23rd (inclusive with permission to avail Christmas holidays etc).
10. " K. W. Chakrapani Marar, Farm Manager, Rubber Experiment Station Tenmalai, leave on average pay for two weeks from 3rd January 1924 with permission to prefix the Christmas holidays.
11. " M. P. Sankaran Nambiyar 2nd Agricultural Teacher, Taliparamba, leave on average pay on medical certificate, for one month.
12. " P. V. Subba Rao, Assistant Farm Manager Hagari, leave on average pay for 15 days from 3rd January '25 with permission to prefix Christmas holidays.
13. " T. V. Subramaniam, Assistant, Government Entomologist's section, leave on average pay for 2 days from 22nd December '24 with permission to suffix Christmas Holidays.
14. " K. M. Thomas, Assistant in Mycology, leave on average pay for 7 days from the 17th December '24 with permission to suffix Christmas holidays.
15. " V. Tirumal Rao, Assistant, Government Entomologist's section leave on average pay for 10 days from 14 December '24 with permission to affix Christmas holidays thereto.
16. " U. Vittal Rao, Assistant, Government Sugarcane Expert's section leave on average pay for 1 month from 6th January '25.
17. " I. Kurma Rao, Assistant Agricultural Demonstrator, Madanapalle, leave on average pay for one week from 17th to 23 December '24 with permission to avail Christmas holidays in continuation.
18. " T. J. Muthuswami Ayyar, Agricultural Demonstrator, Tiruvalur, leave on average pay from 3rd January to 12th January '25 in continuation of Christmas holidays.
19. " K. Ramanatha Ayyar, Agricultural Demonstrator, Bapatla, leave on average pay for 12 days from the 3rd to 14th January '25 inclusive with permission to prefix the Christmas holidays from the 24 December '24 to 2nd January '25 to his leave.



(v)

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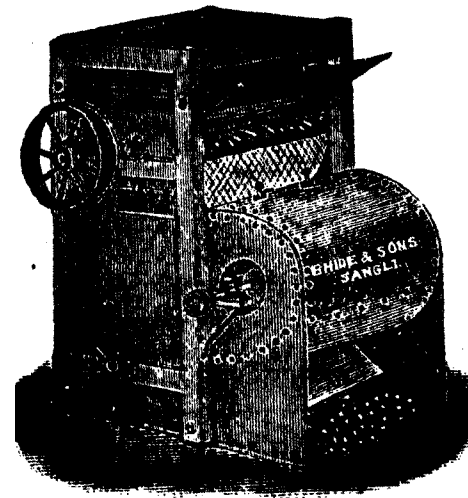
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