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THE JOURNAL

OF

The Madras Agricultural Students' Union.

MARCH & APRIL—1926.

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

THE JOURNAL

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The Madras Agricultural Students' Union.

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Marketing of Plantains.

By N. R. Rajagopalan.

The cultivation of plantains in a Trichinopoly Village was described in the M. A. S. U. Journal Vol. X No. 3. An account is now given of their marketing.

Plantain is preeminently a crop the disposal of which necessitates intimate co-operation between the planter and the trader. Realising that in union lies strength, a few traders in Madras have organised themselves into definite groups. Of these, Messrs. Raghavalu Nayadu and Sons of Bunder Street are prominent. The shareholders in this group have invested Rs. 3,000 each and one of them works as manager.

Forward contracts are entered into with the cultivators in July—August and such places are selected as command facilities of quick transit by rail. A few villages which answer this description are Kattuputhoor, Mohanur, Nerur, Lalapet, Thottiyam, Velur,

Pandamangalam, Mullikarumbu in the Trichinopoly district, Tiruppapuliyur, Panruti and Pondicherry in the South Arcot district. During this season POOVAN is the only variety for which contracts are made. Agreements are made either for the whole crop in a plantation or for bunches of known size and quality. An average bunch is counted as such if it contains 12 hands. Depending upon the size of the bunches the rates vary from Rs. 40 to Rs. 90 per 100 bunches. An acre carries 800 bunches.

Contracts for Rasthali and Pachchavalai are entered into in January and February.

Commission agents in the villages transact all business for the trade and get a remuneration of Re. one for every cartload of 35 to 40 bunches that leave the plantation. There are few instances in which the commission agent is dispensed with. In such cases, the ryot allows the firm a discount of 12 annas per 100 fruits of Pachchavalai and Rasthali and Rs. 10 for 1000 bunches of Bangala. In addition he bears all incidental charges for cutting, loading and transport. All this may go up to Rs. 100 for a wagon load from Perugumani or Kattalai station on the S. I. R. But the firm bears all this expendifure if a commission agent consigns a wagon.

A railway wagon with 7 to 9 tons tare can hold 81 to 160 maunds and a covered bogie of 16 to 20 tons, from 120 to 320 maunds. Unit or B. C. G. wagon are charged 8 or 9 annas per maund from Perugumani to Madras. Bunches from one wagon fill 5 cartloads. The usual rate from the Egmore station to Bunder street is one Rupee per cartload. Any over-ripe fruits are disposed of among the fruit stall owners in the station. Fruit stalls are located in Madras at Triplicane, Mylapore, Chintadripet, Egmore, Purasawakam, Choolai, Perambur and Washermanpet. Orders are also booked from Guntur, Tenali, Ongole, Bapatla, Kavali, Nellore, Gudur, Nayadupet. in the North-east line, Tiruvellore, Arkonam, Renigunta, Cuddappah, Guntakal. in the North-west line. Unripe bunches are transported to godowns. These have compact airtight compartments and spacious showrooms. Here, after 3 in the afternoon, the unripe bunches are closely packed one over another and smoked. When smoke permeates the whole atmosphere in the room, doors and windows are shut, crevices, [illegible] and holes are plugged and plastered over

with cow-dung so that no smoke can escape. The next morning, the doors are thrown open for a time and the bunches examined. Bangala will be found quite yellow and ready to be disposed of immediately. Pachchavalai is partly green and can keep for 8 days more during which it finds a slow sale. The bunches are then taken out and are arranged vertically in regular rows with their butts turned above. In each row there are 6 bunches. The front bunch is very prominent by its elegant and big-sized hands, the other bunches gradually shrink in height and size. Six such bunches form what is called a *"thundu"* in Tamil and contain nearly 1,000 fruits. Only wholesale trade is carried on. Pachavalai, Rasthali, Bonthan. and Pachanadan are disposed of to merchants in units of a thousand. Big bunches of Bangala with 200 fruits in a bunch are sold at 7 to 10 Rs. per 1,000. The price is always fluctuating and it goes up sometimes to 12 Rs. Small Bangala bunches containing 75 to 150 fruits are sold from Rs. 3 to 6. Pachavalai and Rasthali are sold from 7 to 13 Rs. per 1,000. Bonthan is sold at 1½ Rs. per 100. Raja fruits come occasionally and are sold at fancy prices. Fruits are graded into 3 classes:—(1) Bunches of big sized hands, (2) Small-sized hands and(3) Broken and wounded fruits. Rates are fixed according to quality at 4 to 6 Rs. per 1,000 of the small-sized hands and at 7 to 10 annas per 100 fruits of the broken quality. The firm also maintains a stall in Kothavalchavadi where the gumastahs sell the fruits for commission.

In the godown, there are 6 permanent labourers, a few casual labourers are also attached to it whose services are given when called for. Accredited customers either pay cash or carry on credit transactions but cash payment is always insisted on in the case of new customers. Transport of bunches is done in carts. Each cart can accommodate 5 to 6 thundus of Bangala and two to four thousand Pachavalai fruits and the charges vary from 2 to 4 annas per 1,000 fruits carried. Bills are paid within one week of their presentation but no security, advance or deposit is obtained from customers before supplying them with fruits. The stallman usually complains that fruits were thrust into the stalls in slack seasons, and the trader equally complains of overdues.

The firm maintains a staff of clerks who keep careful accounts of both the incomings and the outgoings. The profit and loss account is closed every month and checked half-yearly. Almost

every day the company's transactions do not fall short of two wagon loads of bunches the total value of which in a year may go up to Rs. 36,000. Charges per month in the shape of rent, establishment, allowances and contingencies run up to Rs. 500 a month or Rs. 6,000 a year.

With a starting capital of Rs. 8,000, the expenses for a year are :—

Interest at 12 per cent.	...	Rs.	1,152
Income tax	...	,,	300
Profession tax	...	,,	50
and establishment charges	...	,,	6,000
		Total Rs.	15,502

The value of the produce contracted is Rs. 36,000 ; total expenses Rs. 15,502. Net profit realized is Rs. 20,498 or roughly Rs. 20,000. Briefly the profit is sometimes estimated at Rs. 20 for every wagon of fruit obtained.

If planters could combine into a co-operative society, it is just possible that this trade becomes more steady and stable and the profits that find their way into the pockets of the middlemen reach the cultivator directly and considerably ease the situation of indebtedness even if it cannot enrich him.

Work of the Paddy Breeding Station, Aduturai.*

By M. Anandan, L. Ag.

It is only by a proper appreciation of fundamental facts that a scientist can visualise, before he begins any work, its possibilities nay, more than that, its limitations. The most important of these facts are:—

(1) that the paddy plant is as much a living organism as any one of us.

*A paper read at the ryots' conference at Aduturai.

(2) that it reacts to its environment, that is to say, it is influenced by its surroundings, such as sunlight, heat, cold, rain, wind and other climatic factors. as well as the soil and the quantity and quality of food in it. It is subject to attack by animals as well as disease producing germs. A warning is necessary against the dangers and the disastrous consequences to the plant population of underfeeding, overcrowding and illventilating and the illeffects of these conditions are as pronounced as on the human population and finally

(3) that most of the visible and invisible characters of plants are inherited and are handed down from generation to generation. To give concrete examples height, various colours met with in plants, period of maturity, size of grain, number of seeds on a plant, power to resist, or susceptibility to diseases and a score of other characters both useful and useless for man, are inherited. As no two children of the same parents are alike, either in their physical get up or their mental traits, so also no two individuals in a variety of plants are exactly similar. There are definite laws governing the inheritance of characters in plants but the time at my disposal is not enough to explain them in any detail. It may however be stated here that it is by taking advantage of these laws that scientists in various parts ef the world have been able to combine valuable characters in plants, so much so, that plant breeding work has assumed enormous importance in all highly organised agricultural countries, as the results obtained in various directions by this method have been most gratifying. Plant-breeding work on paddy in this Presidency was first started about the year 1913 at Coimbatore by Mr. F. R. Parnell. Now in his place there is Mr. R. O. Iliffe, as Paddy Specialist, for directing work on the various breeding stations of this Presidency. The work carried on at the Paddy breeding station at Coimbatore lies in two main directions. (1) the isolation of strains from existing varieties on crossbred progenies, and (2) the study of the inheritance of characters of the paddy plant to find out their economic relationship in breeding work. Several strains of paddy were evolved at Coimbatore, which found their way quickly into various tracts but it was soon evident that these strains when introduced into tracts with divergent climatic and soil conditions, did not always give encouraging results. Evidence of such behaviour began to accumulate and pointed unmistakably to the fact that we have to take into account the effect of varying environ-

ments on these strains and that it is always risky to recommend, in such cases, one and the same strain for universal adoption by the ryots of this presidency with any degree of confidence. It is the recognition of this very important aspect of the problem that led to the establishment of sub-stations, like the one we have here, in the chief paddy growing centres, for evolving strains of paddy from the existing local varieties either by single plant selection or hybridization of suitable individuals to get improved types.

The Aduthurai Paddy breeding station was started only in the year 1922 but the great amount of preliminary work done on the Manganallur farm in previous years enabled us in these few years to put out seven strains from the important varieties of the Tanjore district like Red sirumani, White sirumani, Kuruvai, Nellore samba, and Ottadan. The incrased yields of these strains range from 10 to 25 % over those of the original unselected varieties, as the following table will show.—

No.	Variety.	Duration in days.	Percentage of increase over original variety.
Aduturai 1.	Red Sirumani.	180	16
Aduturai 2.	White „	165	10
Aduturai 3.	Early Kuruvai..	95	Advantage of earliness.
Aduturai 4.	Ordinary „	105	12
Aduturai 5.	Nellore Samba.	185	25
Aduturai 6.	Red Ottadan	210	13
Aduturai 7,	White „	210	13

These strains have other valuable characters such as earliness, freedom from red rice and uniformity in growth and maturity.

It is indeed a source of gratification for us to see that the demand for the several strains has been several times the quantity that could be grown on the limited area of the station, thereby showing clearly that the superiority of these strains has been well established and the demand is certain to increase day by day. To take as an example, the demand for the two kuruvai strains, for the next

season's sowing, has, by now, exceeded 30,000 lbs. but the quantity that is available for distribution is only 8,000 lbs., thus leaving an unsatisfied demand, even, now af 20,000 lbs. You will readily admit that it will not be possible, with so many experiments to conduct for the limited area of this station to meet the ever growing demand for seed, and that, if we are to realise our hope of seeing the one million acres of Cauvery delta cropped completely with improved strains of this station, within the shortest possible period, some organisation or agency should come into existence for large scale multiplication and distribution of such seeds. There should be either Government managed seed farms or preferably private gentlemen to act as seedsmen like Suttons of England or Vilmeria of France. The ideal would be to have Agricultural Co-operative Societies like the Sivagnanam Society of Lalgudy for multiplication and distribution of seed. Signs are not wanting that there are in this district gentlemen who are unostentatiously working like Suttons and Vilmorins. Some of the outstanding names in this connection are those of Rao Bahadur K. S. Venkatarama Aiyar of Negapatam, Messrs. Rajagopala Aiyangar of Titte, G. R. Muthuswami Aiyar of Ganapathy Agraharam, Nemam Natesa Aiyar, Regupathy Rao of Elanthangudi, Kunnam Subramania Aiyar, Kasturi Ranga Mudaliar of Thrizhandur, Mulangudi Gopalakrishna Aiyar, Ambal Meenakshisundram Pillai, and Nageswara Aiyar of Anakuppam. These gentlemen, taken together, crop about 1,300 acres with the Aduturai strains and distribute seed to their neighbours. Even supposing that only 50 % of the produce of these 1,300 acres is used for sowing, the area covered with their seed would be not less than 250,000 acres in the coming year. If every village can contribute a Rajagopala Aiyangar or a K, S. Venkatrama Aiyar or a Meenakshisundaram Pillai, none would have to wait many years, to realise one's hope of seeing every acre of wet land cropped with improved strains of Paddy. So an appeal is made earnestly to the leading mirasdars that are assembled here to, at least, grow for trial some of the Aduturai strains and if found successful, to multiply the seeds and distribute them later on to their less enlightened brethren in their villages. If leading mirasdars of different taluks come forward to grow these strains in large quantities for distribution to others, it might be possible to come to an agreement by which fresh seed of these strains is yearly supplied to them from the breeding station, in preference to the claims of others.

The strains under trial on the station at present include selections from Korangu samba for blast resistance, a small sized Nellore samba strain for Trichinopoly District, selections from progenies of white sirumani crosses with round grained varieties for increased yield and earliness. Besides these, a large number of single plants from Java x Sirumani crosses, Anaikombanx Sirumani crosses. Poonkar, Chitrasali, and second generation of korangu samba crosses with Nellore samba and sirumani are being studied for final selection of suitable strains from them.

In conclusion, attention may be drawn to one important point. How is it that the paddy plant in Spain is able to produce an average of 6,000 lbs. of grain per acre while in the Cauvery delta the average is only 1,800 lbs.? Is it not within the possibility of Indian ryot to raise this average? It will be possible to double the average yield per acre for the Cauvery delta if one goes about one's own business in a systematic manner. This delliberate statement is made because, the Central farm at Coimbatôre has been able within the course of the last 15 years to raise the yield of paddy from the low figures of 2,500 lbs. to some where about 4,500 lbs. an acre by steadily building up the fertility of the land by systematic manuring and use of iron ploughs in the cultivation of the land, and growing selected strains of paddy. By spending on an average of Rs. 12/- per acre on manuring and using iron ploughs like meston and konkan, on this breeding station, and in spite of the fact that the major portion of the area is devoted to experimental work, the average yield per acre has been raised from 1,800 lbs. to 2,400 lbs. during the past three years. This season's crop is still on the ground and you have had an opportunity of seeing it this morning. A higher average yield is expected this season than in previous years. As far as the nature of the work would permit, exactly the same cultural and manurial treatments as the agricultural demonstrators are persuading you to adopt in your own lands are being followed here, the output of paddy from the one million acres in the Cauvery delta can be doubled, if all the mirasdars consent to take to the improved methods advocated by the department. And then they can take legitimate pride in having been instrumental in bringing about such economic prosperity to the country at large.

EXTRACTS.

Cattle Breeding and Dairy Industry.

(From page 38 February issue.)

Feeding of Cattle.

How to provide sufficient food of a wholesome nature for milch cattle is another problem which is receiving close attention on Government farms. No matter what potentialities have been bred into a cow, she will fail to give a big yield of milk if given too little or unwholesome food. In India generally there are no pastures worthy of the name, and fodder crops as such are not commonly grown. In most parts of the country, moreover, many useless cattle are kept which get a share of the very limited supply of fodder available to the detriment of those that are deserving of better treatment. Under these conditions no great improvement can be effected by better breeding without first improving the food supply; better feeding is as important as better breeding in short. On Government dairy farms much attention is being paid to this question of cow feeding: luscious fodders unknown in India 20 years ago such as Berseem (Egyptian clover) have been introduced and methods of storing green fodders in silos adopted. The question of how to make silage most economically has been discussed at great length at meetings of the Board of Agriculture and in some provinces the making of silage in kutcha pits is now being demonstrated in the districts.

At the Imperial Institute of Animal Husbandry and Dairying at Bangalore accurate information regarding the digestibility and the feeding value of different cattle foodstuffs is being collected. Facilities have also been afforded at this Institute and at the Agricultural Institute at Allahabad, for the thorough training of young Indians in the science and technique of animal husbandry and dairying. These young men should in course of time play an important part in organizing the industry on scientific and business lines.

Co-ordination of activities.

With a view to stimulating and to some extent co-ordinating the efforts being made towards cattle improvement, the Government of India have established a Cattle Bureau the control of which is vested in the Imperial Dairy Expert and his headquar-

ters are at Bangalore. The main duties of this Bureau to commence with will be (1) to collect and disseminate information concerning cattle breeding and allied subjects, (2) to assist in the disposal of surplus pedigreed stock available on Government cattle-breeding farms, (3) to standardise breeding records and methods of milk recording, (4) to maintain general herd-books of breeds or of milch cattle as distinct from specific breeds found in more than one province or State, and (5) to keep the officers in charge of cattle breeding in provinces and Indian States in touch with each other.

Until and unless the milking qualities of our Indian breeds can be improved by selection, it will be difficult, if not impossible, to make cattle breeding pay, except in backward tracts where grazing is cheap and plentiful. There is no reason why draught and milking qualities should not be combined in the same breed. This aim is in fact now constantly kept in view by agricultural departments, and efforts are being made in several provinces to evolve dual-purpose breeds by selective breeding and cross breeding or both. The Thar Paskar breed the improvement of which has been taken up by the Imperial Department of Agriculture and the Nellore breed which is receiving the attention of the Madras Agricultural Department are examples of potential dual-purpose breeds, the improvement of which may go far to solve the draught and milk problem in this country.

The Milk Problem.

The milk problem in this country is bristling with difficulties. The problem is being now studied by a small but well trained band of enthusiastic Government officials; but though the harvest is ready, the workers are few. Milk in our cities is not only dear but of very poor quality. The supply is far short of the demand and infantile mortality is deplorably high. Rural areas are being drained of their milch cows and buffaloes which are not given a chance by the town *gaolie* of propagating their kind; for thousands of these good milch animals are being slaughtered every year because it does not pay the owners to feed them when they are dry. This drain on the milch stock of rural areas is forcing up the price of milk and the products both in urban and rural areas. The milk problem can, we believe, be solved only by producing

milk in rural areas where cattle food is relatively cheap and transporting it to urban centres by rail or road. This, however, will never be done very successfully so long as the industry remains entirely in the hands of those more or less illiterate *gaolies* who control it at present and who are not capable of organizing any such system of milk production and distribution. With a view to demonstrating the possibilities of transporting milk from rural areas where it is relatively cheap to urban centres where it is dear, milk is now being supplied daily from Pusa to Muzaffarpur a distance of 22 miles. In Bengal the Cooperative department has successfully organised at Calcutta the sale of milk produced in villages in the surrounding districts. An up-to- date sterilizing plant has been set up on the Imperial Cattle Breeding and Dairy farm at Karnal in the Punjab and sterilized milk is now being sent from there to Calcutta a distance of over 1000 miles. Should these and other experiments now under trial prove a success and capable of expansion they will open up a vista of great possibilities for the dairy industry in India; for milk costs about three times as much as in our larger towns as it does in rural areas within easy reach of these towns. The Imperial Dairy Expert is giving valuable assistance in preparing dairy schemes suitable for urban centres and the Imperial Dairy farms at Bangalore and Wellington are being run as model farms of their kind.

Misdirected Agitation.

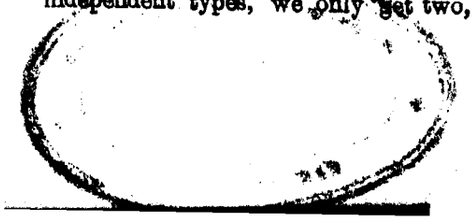
There has long been an agitation against the slaughter of cows, but the agitators, unfortunately, have failed to face the real problem which is an economic one. They would for religious reasons prevent the slaughter of cows even though the owner suffered financially in consequence; to solve the problems on practical lines they have up to date made no serious attempt. The department of agriculture is tackling the problem in the only way it can be tackled with any hope of success, by training young Indians in science and technique of animal husbandry and dairying and by demonstrating how the milk required by urban centres can be produced under sanitary conditions in rural areas. When produced in such areas it pays to retain the cows when they go dry and to have them served by a bull of good milk pedigree.

being like their immediate parents (heterozygous); you get also one red, and this will breed true (being homozygous).

There are many elaborations and complications of this. A simple application in fowls is rosecomb, which is dominant to single. Another is the Blue Andalusian; here the black is not completely dominant. The mating of black by white gives blue. These blues give one black, two blue, one white. And so the subject gets more complicated, but one idea remains, *viz.*, the inter-action of two factors.

The Mechanism of Heredity. We must, then, find some mechanism that will explain this. Looking under a microscope at the germ cells we find in them rod-shaped things called "chromosomes." These go in pairs. And, further, when the cells divide so as to form a reproductive cell, the egg in the female, the sperm in the male, we find that only one of each pair goes into the egg or sperm, which thus have only half the usual number. The joining of the egg and sperm is called fertilization, and restores the full number of chromosomes. Each pair is again complete, and is composed of one chromosome from each parent. Here, then, we have a mechanism that corresponds exactly with the observed facts of inheritance.

I want to introduce to you the fly Drosophila Ampelophila, which is the martyr of this science. He has four pairs of chromosomes. Sometimes he has vestigial wings, and this character behaves exactly as rod in cattle. Let us put the factor for this one to one pair of chromosomes. Another characteristic is an ebony body colour. We put this on another pair. Another is the absence of eyes. We place this on a third pair. Yet another is a white eye. This goes on to the fourth pair. But there is still another, black body. What shall we do with it? Where can it go? All the four pairs of chromosomes have already got characters connected with them. This fifth character must therefore go along with another on the same pair. Let us place it on the same pair as vestigial wings. Now let us make a mating of a normal long-winged grey and a vestigial black. The first generation is normal long-winged grey. Back cross this to a vestigial black female, and instead of getting in the next generation the four independent types, we only get two, the normal and the vestigial



black. In other words the factors for vestigial and black have clung together. This supports our idea that they are lodged in the same pair of chromosomes.

Supposing now, that we mate this heterozygous vestigial black to a vestigial black male. We find that we get 41·5 per cent. normal long-winged grey and 41·5 per cent. vestigial black, the two parent types. In addition, we get 8·5 per cent. long-winged black and 8·5 per cent. vestigial grey. Together they make 17 per cent. of unexpected types, for the factor of black has lost its connexion with that for vestigial. How does this happen? Looking at the chromosomes through a microscope, we see that before they separate they wind themselves round each other, and occasionally they break and the bottom half of one gets attached to the top-half of the other of the pair. If the linkage is broken very seldom, we assume that the factors are very close to each other. If it is broken frequently, we assume that they are far apart at different ends of the chromosomes. In Drosophila there are four, and only four, great groups of characters which tend to be inherited together, and there are four pairs of chromosomes. Another proof that the chromosomes are the bearers of hereditary factors.

The Mechanism of Sex. If the chromosomes are the mechanism by which ordinary characters are inherited, have they anything to do with sex? Let us take a look at them and see. Why, there is a difference between the chromosomes in the male and in the female. Not a big one but it is there. The female in Drosophila has two pairs of long, slightly curved chromosomes; so has the male. The female has one pair of very short chromosomes; so has the male. The female has a fourth pair of straight, medium length chromosomes, so has the male; but one of the chromosomes of this pair has a small hook at the end of it. We call this chromosome the Y chromosome, The other straight one without the hook we call the X. The female has two X chromosomes, and her constitution is thus XX. The male has an X and a Y, and his constitution is XY.

Looking down the microscope again, we find that the eggs given off by the female are of one kind, X; while the sperm given off by the male contains 50 percent which are like the female,

i. e. X; and 50 percent which have got the hook on the end are Y. When an X sperm fertilises an egg, the result is a female. With an Y sperm, it is a male. Thus, in a way, sex determination rests with the male. If you can manipulate and control the two types of sperm you will be able to control the sex of the offspring.

Certain characters are inherited by means of factors on these sex chromosomes. Therefore we would expect certain characters, to be linked to certain sexes. This is the case. Cross white-eyed male and a normal red-eyed female. You get normal red-eyed offspring. In the next generation you get three reds to one white. This was expected. But, all the white-eyed ones are males. Make the opposite cross of a white-eyed female and a normal red-eyed male. Here all the females in the progeny are like their father, red-eyed, while the males take after their mother being white-eyed. To explain this in detail would take more time than is available. Here again you have a very definite proof that the chromosomes are the mechanism by which characters are inherited.

This fact has been made of economic use in fowls. Here, as regards sex, the position is reversed, the hen gives two types of eggs, X; and Y; the male only one type, X. Cross a black cock such as the Leghorn, Orpinghton, Rock, Minorca, or Langshan with a barred hen such as Barred Rock, Scots Grey, or Cuckoo Leghorn, and you get all the cockerels barred and all the pullets black. As the barring can be distinguished at birth, it is possible in this way to eliminate the cockerels as day-old chicks.

There are many other proofs of this hypothesis that the chromosomes are the mechanism. One of the best is that any aberration in chromosome behaviour is followed by aberration in the characters affected. Accidents will happen even in the best regulated families. Sometimes one of the chromosomes forgets to separate and sticks by its brother in the pair. If, in Drosophila this occurs to the X-chromosome of the female, then, although the egg be fertilised by a Y-chromosome, the sex is that of a female for the genetic constitution is XXY. This is called non-disjunction.

It has not been possible to explain fully all the proofs of this hypothesis. There are many more. That they have been largely proved by work in plants and small animals such as flies, rats and

guinea pigs, does not mean that it does not equally apply to our larger farm livestock. From what knowledge we have gained, we have proof that it does. It is our duty to apply this work along practical lines and thus "mak' siccar." (From the Scottish Farmer dated 14th November 25.)

Agricultural Education in the United States

During the last half-century the importance of agricultural education has been increasingly recognised in America, until now every state has one or more Agricultural Colleges, forming a group of institutions occupying a prominent position in the field of education. During the decade 1910–20 development was extraordinarily rapid, and very large sums of money were appropriated in many states for the provision of new agricultural buildings, the purchase of land, and the endowment of educational programmes. The colleges have had a long struggle for recognition, but have demonstrated their value and are now in such a position, financial and otherwise, that their future usefulness is assured. The immediate need is for trained teachers, investigators, and administrators, and in response to this, graduate work in agriculture has developed with amazing rapidity during recent years, though in certain colleges it is still seriously handicapped by lack of funds and accommodation. At present the full agricultural course extends over 4 years, but there is a suggestion to extend this to five in some cases for the purpose of specialised training. In many colleges the curricula have been steadily changed in order to keep abreast of the modern requirements of agricultural education, though there are still some in which the work is too largely restricted to methods of production, resulting in a narrowed outlook.

The field of work covered is very wide, ranging over at least a dozen branches, which, however, are not rigidly separated but devetail into one another to some extent. All branches have developed from small beginnings shaping themselves according to the needs of the time, with the result that some subjects which were originally an integral part of one branch are now dealt with more fully and adequately by others. Agronomy was initially defined as covering that part of the general field of agriculture devoted to climate, soils, fertilisers, and farm crops, but it now tends to deal with the more fundamental and far-reaching problems of soil phyics and chemistry, plant physiology and plant genetics. It is

claimed that the instruction in agronomy has had much to do with securing the improved crop production of the United States in recent years. Horticulture has almost always had a separate existence in the colleges, but with the growth of various interests, certain branches have developed until now they are treated independently, pomology and vegetable gardening being notable examples. With the better recognition of the importance of the forests to the nation, the instruction of forestry has advanced from exclusive concern with questions of afforestation to consideration of the vital problems of the proper protection, management, and perpetuation of existing stands of timber. The land grant colleges recognise their opportunity and responsibility to train the leaders with the necessary technique and with the broad outlook which will enable them to develop some public policies of dealing with the forests and to establish right standards of practice. The general scheme of education keeps in view both the scientific and practical aspects of agriculture, and endeavours to emphasise the entire interdependence of the two. In addition to the branches already mentioned, special sections are devoted to soils, and fertilisers, plant pathology, entomology, animal-dairy- and poultry husbandry, veterinary education, and agricultural engineering. It is recognised that the four year college course is not sufficient to supply the demand for trained workers on the land, partly because so large a percentage of graduates draft off into other occupations, as teachers, country agents, scientific workers, etc., and partly because a large proportion of those intending to farm cannot afford the time or money for a full college training. To meet the needs of the latter class, various types of short courses have been developed covering the various sections of the community concerned. The older boys and girls are catered for by special agricultural schools, farmers are provided with short courses extending over a few weeks only, at the slackest time of the year, and short schools are held for training specialists in such subjects as dairying, cotton culture, and ice-cream manufacture. In addition, courses in agriculture and horticulture are run for one, two, or three years, primarily for young men and women who intend to make farming their life work. Many problems have arisen in the development of these short courses, and special endeavours are made to solve them in such a way as to render the courses an integral and valuable part of the whole educational scheme.

During recent years a very marked development has taken place with regard to the professional training of teachers in agriculture. Special legislation has provided grants from Federal funds for the purpose, on the condition that equal sums are found by the States participating. The expenditure in this respect increased from 121, 244 dollars in 1918 to 651,702 dollars in 1921, the growth of the work being so rapid that it was difficult for the land grant colleges to secure adequately prepared instructors for the purpose. Still more recently a demand has developed for courses in education designed to meet the needs of college instructors, and there seems little doubt that this part of the work will increase in relative importance. The same may be said of the agricultural extension work, which has steadily increased until in 1921 more than 18 million dollars were expended thereon, directly aiding the improvement of the farm and home practice of more than two million workers directly connected with the land, the whole of the extension work in 1920 costing 75 cents for each 1000 dollars of gross returns from agricultural production in the United States.

(From "Nature' dated January, 30, 1926.)

Personnel of the Royal Commission on Agriculture in India.

Chairman:—Marquess of Linlithgow, D. L.

Members:—(1) Herbert Calvert, C. I. E; M. L. C; I. C. S; Registrar of Co-operative Societies. Punjab.

(2) Prof: Nagendranath Gangulee, Professor of Agriculture and Rural Economy. Calcutta University.

(3) Dr. Lodi Karim Hyder, M. L. A; Professor of Economics, Aligarh Uuniversity.

(4) Balakrishna Sitaram Kamath, Member of the Bombay Agricultural Board.

(5) His Excellency Sir Henry Staveley Lawrence, K. C. S. I; Ag. Governor of Bombay.

(6) Sir James MacKenna Kt. I. C. S; Late Development Commissioner. Burma.

(7) Sir Thomas Middleton, K. B. E; C. B; Commissioner under the Development and Road Improvement Funding Act.

(8) Raja Sri Krishna Chandra Gajapathi Narayana Deo Garu Rajah of Parlakimedi, Madras.

(3) Rai Bahadur Sir Gangaram, Kt. C. I. E; M. V. O; late of the Public Works Department.

NOTES.

Tanjore-Trichy Mirasdars at Aduthorai.

The departmental officers met the Tanjore-Trichy mirasdars at a conference for a second time this year in January. In response to invitations, over 250 rich landowners assembled at the Aduthorai Paddy-Breeding station at 8 A.M. on the 10th. They were shown round the farm by Messrs. N. S. Kulandaiswami Pillai, the Assistant Director in-charge and M. Anandan, Assistant in charge of the Station and the work in progress was explained.

A small show and demonstration was arranged for the occasion. Several paddy types evolved at the station, varieties of groundnut, cotton and samples of artificial and chemical manures were on view. Methods of seed selection and the modes of attack of pests and diseases were described with the help of charts. Neat little sheds made of bamboos and coconut leaves showed on one side the cheapest method of preserving cattle dung whether under the loose-box system or the dry system. In another part, in one field, the iron plough was working side by side with the country-plough and showed itself superior.

After dinner, the conference met at 1-30 P.M. under the Presidentship of M. R. Ry., Rao Bahadur C. S. Subramanya Ayya Garu, a rich landholder and an ex. M. L. A. Mr. R. O. Iliffe, Paddy Specialist also attended. Mr. N. S. Kulandaiswami Pillai welcomed the guests, dwelt on the need for improving agriculture and vividly set forth the many obstacles in the way of adopting improvements. In the course of his speech, the President appealed on the one hand to Government to allot more funds for agriculture and to appoint more agricultural demonstrators and veterinary assistants to help the ryot and on the other he pleaded with the ryot to adopt the improvements advocated and exhorted young men to go back to the land and to take to the plough.

The following resolutions were then passed by the meeting :—

(1) This conference requests the Government to provide larger amounts for agricultural work in the budget for 1926-27.

(2) This conference requests the Government to establish veterinary dispensaries at each taluk head-quarters.

(3) This conference reiterates its request to Government for arranging for the prohibition of the export of bones and fish-guano

out of India and for the imposition of an export duty on oil-cakes, cotton seeds and other fodder and manurial substances.

(4) This conference requests the Government to establish bone-crushing installations or to give liberal aid for co-operative undertakings and existing installations.

(5) This conference requests the Government to arrange for the keeping of a service bull at the Veterinary Dispensaries.

(6) This conference requests the Government to establish an agricultural middle school in the district.

(7) This conference requests Government to provide more demonstrators to this (5th) circle, as there are only 10 demonstrators for 11 taluks.

(8) This conference requests Goverument to provide labour saving machines for ploughing etc., at Aduthorai or any other suitable place.

and (9) This conference requests the Government to take early steps to establish a Mortgage Bank in the district.

Mr. Anandan then read a paper on the work done at the station. (This appears in this issue of the Journal.)

The programme ended with a magic lantern exhibition at 7 P.M. when short lectures were delivered on agricultural improvements suited to the district.

The success of the meeting was due as much to the geniality and alertness of Messrs. N. S. Kulandaiswami Pillai, M. Anandan and their staff as to the kind cooperation of the enlightened mirasdars of the district.

The maximum Population of the World.

Sir. George H. Knibbs in Scientia gives various estimates of the possible population ranging from 2,942 millions if the existing population increased in ratio of O. R. Banker's estimate of possible increase in the U. S. agricultural area to 9,792 millions if all existing arable land in the world could support three persons an acre and a final maximum of 13,440 millions if an average of a person per 2½ acres applied to the whole land surface of the world. Sir.

George considers it doubtful whether the population will ever reach the 5,000 million limit. If man better coordinates his efforts so as to involve less expense in non-productive effort, then, possibly science may enable the 7,000 million limit to be reached. The friendly study of universal economic conditions and of adjustment of all territorial and economic relations together with advances made through systematised knowledge would perhaps make possible a population of 9,000 millions which may leave very little area per individual.

(From Nature dated 16th January 26).

The British Association.

The annual meeting of this association will be held at Oxford on August 8 to 11. The Presidential address by H. R. H. The Prince of Wales, will, it is understood, deal with relations between scientific research, the community, and the State, both in Britain and the Overseas dominions. Among the subjects to be dealt with in sectional addresses on Economics and agriculture are "the economic development of British Tropical Africa. Inheritance as an Economic factor, Economic aspects of the Financial and labour outlooks, Vegetative propagation, Agricultural education, Cultivation methods, and Dairy problems."

A Missing Link.

A writer in a recent issue of the Scottish Journal of Agriculture, pointed to the fact that his own country made the first winnower in the latter part of the eighteenth century on the model of the one surreptitiously obtained from Holland where it had been in use about a hundred years. He records that a tradition was current in that country that the Dutch themselves were indebted to their colonies in the East for this useful piece of farm machinery. It might therefore be presumed that each country in the East had perfected its farm implements and machinery suited to its local conditions. From the sample of a wooden plough with a mould-board which Mr. H. C. Sampson brought with him from Cambodia and added to the collections in the Central Farm, one might infer that Java and Cambodia were using implements which but for the material used, compared favourably with the improved implements of the west, in the principle of construction.

As Java and Combodia were the outposts of old Indian civilization and as the implements in the Deccan have extorted the admiration of unbiased observers it is difficult to account for the absence of the mould-board plough and winnower in India. Will any student of history or archaeology be able to solve the problem?

Mechanical Tree Felling with a Saw-Plane.

A French Engineer has invented a new machine for the felling of trees by machinery, also plank sawing, etc., which is giving very interesting results. This machine weighing 270 lbs. called "Saw-Plane" by its inventor, has just been adopted by the French Ministry of War, and by most of the French Timber and Forestry concerns. The process of cutting is quite *sui generis*, the sawing is done per medium of a cutting chain, which encircles the tree and turns at a lineal speed of 7 metres per second. Trees may be cut level and square with the ground. The chain is composed of links bearing each two tracing knives and a plane, hence the name of Saw-Plane. The sawing speed is about one second per inch of thickness for soft wood and about two seconds for hardwoods.

A poplar hole of 40 centimeters diameter is cut in thirtyfive seconds, oaks measuring 90 centimetres, in two minutes. The biggest oaks measuring 1½ metre take 12 minutes. It is worthy of note that the machine fells trees of any diameter with the same facility and passes from one diameter to another without loss of time.

As the sawing goes on the tree sags on the saw-line without jambing the cogs and it finally falls on the opposite side of the machine. The sawing of a tree with a saw-plane does not entail the use of ropes or of a jack and reduces felling expenses by 75 per cent.

(From the Queensland Agricultural Journal Vol; XXV. March 26.)

Rainfall and Temperature of C.U.B.A.

A conspicuous feature of the rainfall in Cuba is its degree of dependability during the usual crop growing months from May until November. Since 1900 the average rainfall has never been

less than 2½ inches for any month during the period from May to November and the rainfall has averaged 5·6 inches for the driest month.

During the 25 year period 1899-1924, the greatest rainfall for the entire island was 68·26 inches in 1906 and the smallest 38·71 inches in 1907 showing a ratio between the extremes of rainfall of 1·8. It is considered that a ratio of 2 for annual rainfall is satisfactory and Cuba's extremes are within this limit. The ratios for the seasons naturally show greater variations, that for the summer is placed at 2·4, autumn 2·2, winter and spring showing more variable rain. The winter season shows a variation of 34 per cent of the normal, spring 21 per cent, summer 14 per cent and autumn 16 per cent.

The distribution is comparatively even, there were heavier rainfalls in the western provinces than in the eastern. All provinces have a minimum rainfall in January or February with a steady increase to maximum in May or June, followed by a decrease in July, with a secondary maximum in September or October.

Normal annual temperatures are reported as 76·4 F., with the lowest in January of 71·1 and the highest in August of 80·7. August showed the highest maximum mean temperature of 5·6 and January the lowest of 79·7. In the minimum temperature January showed the lowest 62·6 and July the highest 73·9. (The Planter Octr. 3)

Edward DeMille Campbell.

"WHERE THERE IS A WILL, THERE IS A WAY."

On September 18, 1925, the scientific world lost Prof. Edward DeMille Campbell whose life was a typical realisation of the old time saying: "Where there's a will, there's a way."

Professor Campbell was born in Detroit in 1863. At the age of twenty-six, he was appointed Assistant Professor of Metal-Lurgy in the University of Michigan. After barely two years in

this position, he lost his eyesight as the result of an explosion that occurred while he was experimenting on the cause of the hardening of steel. Ten days after the unfortunate accident, he resumed his teaching work.

"His life soon became ordered to the new conditions—a daily hour of physical exercise in the gymnasium, hours when assistants read to him the preparation of notes written by himself with the Brail typewriter, and many hours of planning. It was this latter element which permitted him to obtain his remarkable success as an investigator, utilising the hands and eyes of those who were frequently merely undergraduates. No resarch problem was undertaken unless it could be planned so that the variables could be measured quantitatively and little be left to the uncertain judgment of the experimentor. He developed his memory marvellously. He would take the results of experimental work day by day, make approximate mental calculations and visualize the trend of a series of tests in a way which was extraordinary. He once said that he himself aimed to know more about each student's work than the student did himself and he did."

In spite of his serious handicap, Professor Campbell remained in the University of Michigan until his death. He published no leas than seventy-seven research papers. In 1902 he organised the course in chemical engineering and since 1905 was Director of the Chemical Laboratory. He also served in the Senate of the University.

"No one possessed of his normal faculties can fail to find encouragement in the thought that here was a man, blind since 1892 who nevertheless continued steadfastly in a profession where progress would seem to be impossible without eyesight, and achieved the distinction of becoming chairman of a great department in a great University.

"If one so handicapped could be cheerful, productive in his work, and constructive in his thinking, how can the average man complain of his lot and be satisfied with less than his best."

F. O. SANTOS.

How To Kill An Association.

(1) Don't come to the meetings. (2) But if you do come, come late. (3) If the weather does not suit you, don't think of coming. (4) If you do attend a meeting, find fault with the work of the officers and other members. (5) Never accept an office, as it is easier to criticise than to do things. (6) Nevertheless get sore if you are not appointed on a committee; but if you are, do not attend committee meetings. (7) If asked by the Chairman to give your opinion regarding some important matter, tell him you have nothing to say. After the meeting tell every one how things ought to be done. (8) Do nothing more than is absolutely necessary; but when other members roll up their sleeves and willingly, unselfishly, use their ability to help matters along, howl that the association is running by a clique. (9) Hold back your dues as long as possible, or don't pay at all. (10) Don't bother about getting new members. Let the secretary do it. (11) When a banquet is given, tell everybody money is being wasted on blow-outs which make a big noise and accomplish nothing. (12) When no banquets are given, say the association is dead and needs a can tied to it. (13) Don't ask for a banquet ticket until all are sold. (14) Then swear you have been cheated out of yours. (15) If you do get a ticket, don't pay for it. (16) If asked to sit at the speakers' table, modestly refuse. (17) If you are not asked, resign from the association. (18) If you don't receive a bill for your dues, don't pay. (19) If you receive a bill after you have paid, resign from the association. (20) Don't tell the association how it can help you; but if it does not help you, resign. (21) If you receive service without joining, dont think of joining. (22) If the association does not correct abuses in your neighbour's business, howl that nothing is done. (23) If it calls attention to abuses in your own, resign from the associations. (24) Keep your eyes open for something wrong, and when you find it resign. (26) At every opportunity, threaten to resign, and then get your friends to resign. (26) When you attend a meeting, vote to do something and then go home and do the opposite. (27) Agree with everything said at the meeting and disagree with it outside. (28) When asked for information don't give it. (29) Cuss the association for the incompleteness of its information. (30) Get all the association gives you but don't give it anything except....(31) Talk co-operation for the other fellow with you, but never co-operate with him. (32) When everything else fails, cuss the secretary.

(From Scottish Farmer 16-1-1926).

Co-operation in Japan.

The co-operative movement in Japan dates from 1892. In 1900, a Co-operative Society Act was passed and this provides for four distinct classes of societies, namely (1) for supply of credit, (2) for sale of produce, (3) for purchase of supplies and (4) for the common use of land, buildings and machinery. There are 14,259 societies with a membership of 2¾ millions and a capital of 40 million pounds. Over 77 per cent of the members are agriculturists.

Duties of an Educational Institution.

" At the present time and particularly in technical institutions the vast majority of students have in view their future life and the need of earning a livelihood. Any educational institution, if it is to bear the well-being of such students in mind has a moral duty to see that only those are admitted who possess a reasonable prospect of finding employment after finishing their course. It is morally bound, therefore, to enquire the objects which a student has in mind when making application for admission and, if not actually bound to refuse admission in unsuitable cases, it is at least bound to point out the attendant dangers so that the student enters with open eyes. and there is a moral dnty incumbent on us to point out the facts to such applicants as, being without capital or influence, apply in the expectation that a course at the college will pave the way to profitable employment. To do otherwise would be, in our view, a breach of trust and neglect of moral responsibility."

Extract from the "West Indies-Tropical Agriculture." (November, 25.)

UNIVERSITY OF MADRAS.

B. Sc. Ag. Degree Examinatiot, 1926. Part II.

Agricultural Botany I. Monday, 12th April, 7 to 10 A.M.

(Answer only 5 questions. Questions 4 and 5 are compulsory).

1. Describe in technical language the fruit of the mango, tamarind, jack, pomegranate and sweet sop, giving their respective botanic names, with the families to which they belong.

2. Give an account of some flowering plants which have adopted a parasitic mode of living.

3. Mention 5 types of troublesome weeds known to you, giving an example of each. Explain how each is troublesome, and suggest methods of eradicating them.

4. Give a full botanical description of the various parts of a Cumbu plant (Pennisetum typhoideum). What other species of Pennisetum are you familiar with and how are they useful?

5. Describe the inflorescence and flowers of Ricinus communis and Arachis hypogaea and point out any special feature you note in them, with regard to pollination or fertilization.

6. What are the various ways of propagating plants other than by seeds? Discuss in full any two methods, stating what precautions you would take in each case.

Agricultural Botany II. Monday, 12th April, 1 to 4 P.M.

(Answer any five questions.)

1. How do plants obtain the energy needed for the performance of the different functions which are essential for their growth and development.

2. Explain how the different parts of plants respond to stimuli, namely, light, water and gravity. Also state why the parts respond in the manner you indicate.

3. What gases are needed for the proper development and growth of green plants? How do they obtain these gases and in what manner are they utilized.

4. Mention the various factors which constitute the environment of a plant and explain by means of well chosen examples how they affect the form and structure of plants.

5. State the laws discovered by Gregor Mendel bearing on inheritance, and explain them by means of examples,

6. Explain clearly how you would utilize the principles of Mendelism in the improvement of plants by selecting suitable examples.

Agricultural Chemistry. I. Thursday, 15th April, 7 to 10 A. M.

(Only 6 questions are to be answered. Questions 1 and 2 are compulsory.)

1. What do you know of artificial farm yard manure? How does it compare with natural farmyard manure. What are the changes which take place in each tending to preservation or loss of fertilizing ingredients? State how far any loss can be controlled in practice.

2. The first limiting factor for crop production is water, and the fertility of a soil depends as well on the movement of water in the soil as on the amount of water it can contain. Explain this statement and make your own comments on it.

3. Sulphate of ammonia, Chilian nitrate, and nitrolium, each of average good quality, are offered at the same price of Rs. 240 per ton. Compare the relative cost of nitrogen. What quantity of each will supply 100 lbs. of nitrogen? State with reasons, for what crops and under what conditions you will use and you will not use each manure. What harmful ingredients, if any, will you look for in each? what harmful effects, if any, may be produced by a continuous application of each.

4. What is the role of potassium in plant nutrition? Give a list of potash manures indigenous and imported. Discuss the importance of potash manures for South Indian soils and for particular crops.

5. Explain the chemical principles involved in the harvest of a sugar cane crop and in the boiling of cane-juice for jaggery and sugar.

6. Discuss the propriety of distinguishing between crude proteids and albuminoids with regard to a class of nutrients. How are they determined? Give the appropriate proportion of each in the following:—Wheat-bran, cholam fodder, cottonseed, potatoes, paddy straw, dholl husk, groundnut cake, and forest hay.

7. What factors would guide you in prescribing feeding standards for production of fat; milk growth and work? Show how you would arrive at a feeding standard for a cow yielding 30 lbs of milk daily.

3. What is butter? What should be the composition of good cow's butter? Why does butter sometimes become rancid, and can it be corrected? How can butter be distinguished from a butter substitute? Give a sketch of the apparatus used in the laboratory for the purpose.

Agricultural Chemistry, II. Thursday, *15 April. 1 to 4 p. m.*

(Only 6 questions are to be answered. Questions 1 and 2 are compulsory.)

1. What are the chief methods employed in the extraction and purification of enzymes? In what is the velocity of action of the enzyme Trypsin influenced by (a) acidity, (b) temperature, and (c) concentration of the enzyme?

2. Draw up a scheme for a manurial experiment to test the value of cynamide as a manure for cholam. Describe particularly the precautions you would take to eliminate errors.

3. What are the chief chemical changes taking place in the germination of a coconut? State what you know of the distribution of potash in the coconut tree at different stages of growth. ? How do you account for this distribution.

4. What is the function of a manure? Draw up a brief classificatiou of manures, giving specific examples.

5. A solution is believed to contain a mixture of starch, cane-sugar and levulose. How would you confirm this? Describe the successive steps you would take to estimate the amount of each constituent present.

6. Give a short account of the nitrogen cycle in the soil under dry and wet land cultivation.

7. How would you determine the digestive coefficient of a fodder? State in particular what precautions you would take to reduce the error of your determination.

8. Describe briefly the process of photosynthesis of carbohydrates with special reference to any recent work on the subject with which you may be acquainted.

Agriculture. I Friday, 16th April, 7 to 10 A. M.

(Only 6 questions are to be answered. Question I is compulsory.)

1. (a) What importance do you attach to the co-operative insurance of live-stock. Do you know of any such attempts that have been made in the Madras Presidency?

(b) To what extent and in what ways does the principle of co-operation suggest a better system of relationship between employers and employees in agriculture.

2. Joint stock methods are not suited to agriculture. The true principle of agricultural organization is that of co-operation. Examine this statement.

3. (a) How much seed would be required per acre for the following crops:—Wheat, groundnut, Karunganny cotton drilled, indigo, potatoes and cholam?

(b) How would you distinguish good seed from bad and what precautions would you take in preparing the seed for sowing in each case?

4. What number of coolies and bullocks would be required to cut, cart, and stack a ten-acre (dry) field of periamanjal cholam grown for fodder?

5. When inspecting a farm, what observations would you make to enable you to report whether it was well or badly farmed?

6. Discuss the principal varieties of cotton grown in the Madras Presidency. What are the characteristics of a good cotton sample? Explain why they are important and what factors control them.

7. Explain the Law of Increasing and Diminishing Returns, and examine its application in agricultural production.

8. In looking for a dairy farm what main considerations would guide you in your choice?

Agriculture. II. Friday, 16th *April. 1 to 4* P. M.

(Only 6 questions are to be answered.)

1, A rectangular area 40 acres of black cotton soil is acquired for a cotton breeding station. (a) Make a sketch-plan showing the most economic lay-out of the area. (b) Draw up a rotation to give the maximum area under cotton annually. (c) State briefly the buildings and equipments you would consider necessary for such a rotation.

2. Explain why it is necessary to sterilize dairy utensils, and state what you consider is the best method of doing so. A sample of milk allowed to stand for 6 hours becomes acid and putrefies, state the probable causes and give any practical methods you would adopt to remedy the defect.

3. A ryot purchases 10 acres of garden land. He has a capital of Rs. 2500 for expenditure on buildings, live-stock and equipment. Explain in detail how this capital can be most profitably employed. Enumerate and value the articles of equipment you would consider necessary.

4. You are asked to organise and arrange the labour on a mixed farm in the Coimbatore district containing 50 acres of garden land, 150 acres of dry arable land, and 50 acres of grazing land. Give in detail (a) the rotations you would recommend, (b) the class, number, and wages of permanent coolies employed, and (c) additional casual labour you would require, stating the season and work for which such labour would be required.

5. *Either*, Enumerate the soil factors which affect the plant growth and explain how these can be regulated and controlled by agricultural operations *or*, It is easier for a ryot to lease land than than to buy it outright. Examine this statement and give briefly your own views on its accuracy, with reasons for your answer.

6. *Either.* Describe with the aid of sketches, an Alpha Laval Cream Separator. Explain what happens (a) if separated milk is passed through the separator, and (b) if the turning speed is increased to 70 revolutions per minute. Or irrigation water is available from a channel supply for single crop paddy land at a water rate of Rs. 20 per acre, Compare the cost of growing 5 acres

of paddy under this system with well irrigation where water is plentiful but has to be lifted 15 feet by mhotes.

Agriculture Essay. Saturday 17 April 7 to 10 a. m.

Write an essay on one of the following subjects :—

Either. The causes of poverty of Indian agriculturists. Can they be remedied? If so how? *Or*, The utilization of mechanical power in reducing cultivation expenses on a farm of 500 acres

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B. Sc. Ag. Degree Examination, 1926.

PART II

Botany Practical.

19th Apri 1926] Paper I [1 P. M. to 4 P. M.

1. Describe fully the specimen A and refer it to the family to which it belongs.

2. Identify the weeds B. C. and D. and explain the methods you would adopt in eradicating them.

3. Write critical notes on E. F. and G.

4. Oral Examination.

Botany Practical.

20th April 1926] Paper II. [1 P. M. to 4 P. M.

1. Make a detailed report on the sample of seed given.

2. Identify the slides A, B; and C and explain any special features in them.

3. Write short oecological notes on D. E. and F.

4. Oral Examination.

Agricultural Chemistry—Practical.

21st April 1926.]Paper I. [10 A. M. to 4 p. m,

Note:—Unfinished work, if any, may be completed next day, with regard to Questions I and II, but answer to Question III must be given on the first day.

I. Estimate the percentage of organic and ammoniacal nitrogen in sample of manure in mixture in small weight bottle.

II. Estimate the percentage of crude fibre in sample of feeding stuff in large weight bottle.

III (a) Prepare a normal solution of potassium chloride.

(b) Shake 100 grams of given soil with 250 c. c. of above solution for an hour in the shaking machine, and estimate the lime in 50 c. c. of the filtrate. Discuss the results of your experiment.

Agricultural Chemistrg—Practical.

22nd April 1926.] Paper II. [10 A. M. to 4 P. M.

Note:—Previous day's unfinished work, if any should be completed.

I. (a) Solution in flask is a solution of sucrose. Determine its strength.

(b) Add 5 c. c. of given acid to 200 c. c. of the sugar solution and report upon the progress of inversion at the end of ½ hour, one hour and two hours at room temperature.

II. Liquid in bottle is a sample of well water used for irrigation of a tobacco crop. Estimate the quantity of nitrogen present in parts per 100,000. Calculate the amount of nitrogen supplied per acre, if the irrigation water applied during the period of growth of the crop is equivalent to 5 inches of rain fall.

III. Oral Examination.

Agriculture—Practical.

23rd April 1926] Paper I (Dairying) [Begin 5-30 A. M.

1. Prepare butter from the quantity of cream given.
2. Prepare the butter worker, and other utensils to receive the butter.
3. Test the sample of milk given for butter fat.
4. Fit up the Separator and operate it.
5. Oral Examination.

General Agriculture.

24th April 1926.] Paper II [Begin 6-30 A. M.

1. Fit up a Gorru, set it to suit the crop for which it is intended and work it in the plot allotted. Cover the above plot with a Guntaka.

2. In a plot given, form with a plough the main irrigation channels required to irrigate a crop of Chitrai Cholam.

3. Fit up the parts of a junior hoe and fit it in a position to work it in the field.

4. Oral Examination.

EDITORIAL NOTES.

Coimbatore Betel Vine Station—Vellalur. The Betel Vine is an important crop in South India and is grown scattered in most districts of the Presidency. It is a delicate crop requiring ample shade and moisture and is cultivated with special care by different classes of skilled betel-vine growers. Owing to the nature of the crop and the intensive cultivation necessary which extends over the whole period of its growth it is planted only in small areas in any one locality. Nellimarla in Vizagapatam, Draksharama in Godaveri, Nellikuppam in South Arcot, Ayyampet in Tanjore, Singanallur in Coimbatore, are the most important centres, not to mention isolated plots in practically all other districts. The importance of this crop will be evident from the fact that during the past 30 years during which parcel traffic has become more brisk than ever before, baskets and baskets of green leaves are railed to places as distant as Agra, Allahabad, Cawnpore, Lucknow, both through the eastern and western arteries of the Railway system, to be sold at what would be considered fabulous prices in the centres of production. Rolls of single leaves encasing arecanut powder, spices, and chunam are sold under the name of 'paun' at one pice per roll.

About 10 years ago the crop was found affected with some disease which resulted in the progressive reduction of the yield from year to year so much so that during the past few years interpellations in the Council by one of the Coimbatore representatives in the person of Mr. C. V. Venkataramana Ayyangar focussed the attention of the Agricultural Department and especially of the Entomologist in trying to remedy the existing state of affairs. The earthworm present in the soil of the betel-vine gardens was considered the prime cause but investigation showed that the reduced yield might be due to other causes. It was suggested that eel worms found in the root system of the vine and the general physical debility of the vines might really be the contributing factors for the diminished yield. Proposals were made and several discussions took place until about the middle of last year, when Government sanctioned the opening of a trial station in Vellalur about three miles from Podanur Railway Station, in the heart of the Noyyal valley. Two acres of land were leased out and taken possession of with the standing crops, betel-vine being the chief, which has an advantage in that it could be included in the rotation trial immediately. This also affords opportunities for studying the vine even in the first year and starting the cultural and manuring experiments as occasion demanded. A small laboratory was built which was opened on the 11th of the month in the presence of a large number of cultivators, traders and educated men, by Mr. M. Sambanda Mudaliyar, ex-M. L. A. A scheme for the conduct of experiments was laid out under the joint responsibility of the Entomologist, the Agricultural Chemist, the Mycologist, and the Deputy Director of Agriculture. We guess the actual running of the station will be under the control of the Deputy Director, while the scheme of experiments will be laid out by the experts. For the present, the lands have been taken on lease for a period of 5 years and should the trial prove satisfactory the lease will be extended for a further period of 5 years. A trained agriculturist is in immediate charge of the station to look after the experiments and it is hoped that the station will solve the most pressing problems of the betel-vine grower in this tract.

A new enemy of Sugarcane:—Sugarcane was, in the nineties of the last century, subject to 'Redrot' which devastated whole plantations in the Godaveri delta. Recent enquiries have shown that a new enemy is in the field and canes have, in a

number of places, been observed to suffer from what is known elsewhere as 'mosaic' disease,

The characteristic symptoms are a peculiar mottling of the leaves due to innumerable whitish or yellowish linear patches on the leaf surface.

Experiments were devised by the Mycologist with a view to study this disease and to secure a variety or varieties which resist the onslaught of this new enemy. A small plot of garden land (about half an acre in extent) was selected in the Central Farm, Coimbatore, well-prepared and has been planted with 26 varieties of canes which are:—1. Java Hebbal. 2. Fiji C. 3. Red Mauritius. 4. Q 116. 5. Striped Mauritius. 6. Tanna. 7. B 208. 8. B 6450. 9. Butjan. 10. B 3412. 11. B 6308. 12. B 147. 13. Purple Mauritius. 14. D. 625. 15. Chittoor Poovan. 16. Namakabbu. 17. Local Poovan. 18. Vellai. 19. Saccharum Spontaneum. 20. M 55. 21. P. O. J. 2714. 22. J 247. 23. Q 813. 24. D 1135. 25. Fiji B. 26. [illegible] I31.

It is hoped that encouraging results will be obtained before the next planting season comes on.

Intermediate in Agriculture:—The Board of studies in Agriculture seems to have recommended, 2 or 3 years ago, the institution of a separate Intermediate examination in Agriculture. This was referred to one committee after another and in the end, the Academic Council resolved that it was not necessary to institute a separate Intermediate examination for the Agricultural college, as there was sufficient provision in the remodelled Intermediate course for selection of suitable candidates for admission to this College. The new Intermediate course consists of three parts:- Part I—English and Part II Second language—both compulsory for all. Part III consists of three sets of optionals, A. B. and C. Mathematics, Physics. Chemistry, Natural science, Geography including Physiography are included in A. Logic, Ancient History, Modern History, Indian History, a third language are included in C. of which Agriculture is one. A candidate who wishes to proceed to a Degree in Arts or Science must take at least two optionals in A or B, the third taken from A, B or C. A candidate who seeks admission to the B. Sc. Degree should have apparently taken two optionals from A, and the third from A. B, or C.

Our experience of the present group I or group II candidates limited as it is, only to three or four batches is not unfavourable; and the intermediate examination which is good enough as qualifying for admission to the Engineering and Medical colleges is apparently good enough for an agricultural course. At any rate the remodelled Intermediate gives a wider choice for the Principal of this college to choose his students from.

B. Sc. Ag. Further Attendance:—Regulation 9 of Chapter XXV, Vol. I of the University Calendar has been removed by the Academic Council, on the recommendation of the Board of Studies in Agriculture. The result is that students who fail in either part of the B. Sc. Ag. examination need not undergo a further course of instruction at the college. While a further attendance, involving an additional year's expenditure, is excused by the University, we hope that students who may fail in either part of the examination will realise that, in other own interests, it is best that they do rejoin, specially as the course is fully a practical one, and nearly as many marks are allotted for the Practical as for the Theoretical portion of the examination. It is well to remember that B. Sc. Ag. examination is not an examination which could be passed by a candidate cramming at home. After all, when a failed candidate does not rejoin the College, he rarely keeps up regular, and systematic habits of study.

The Madras Village Calendar 1926. The annual publication has kept up its standard of excellence. This year there is an agreeable assortment of popular articles and one special feature seems to be the very large number of contributions on co-operation from eminent co-operators and notes on the Industrial Engineering branch of the department of Industries, which will help people anxious to obtain information. The outstanding article is the one dealing with Land Mortgage Banks which needs careful perusal.

Departmental Notifications.

March Transfers, resignation, etc.—Mr. A. Gopalakrishnayya, Farm Manager, transferred from Hosur Cattle Farm to Ongole Cattle Farm from 1-4-26.

Mr. S. S. Katchapeswara Aiyar, Agricultural demonstrator, Ooty, transferred to Hosur district work in relief of Mr. T. A. Rangaswami Aiyangar, posted to Omalur for district work.

Mr. V. Narasimhamurthi, Assistant Manager, Third Circle resigned.

Leave:—First Circle:—Mr. V. Acyutharamayya Farm Manager. leave on average pay for 5 days in continuation of Easter Holidays,

Mr. I. Kurma Rao Assistant manager, Anakapalle, leave on average pay for 11 days from 1-3-26.

Fourth Circle :—Mr. K. T. Bhandary, Farm Manager, Palur, leave on average pay for one month.

Mr. S. R. Srinivasa Aiyangar, Agricultural demonstrator, leave on average pay for three months from or after 15-4-26.

Sixth Circle :—Mr. C. J. Balraj, Assistant Demonstrator, extension of leave on medical certificate for one month.

Mr. T. S. Venkatarama Aiyar, Agricultural Demonstrator extension of leave on average pay on medical certificate for 6 weeks.

Seventh Circle :—Mr. S. Krishna Nayak, Agricultural demonstrator, Moodbidri, leave on average pay for one month from 20-4-26.

Mr. C. Krishnaswami Sarma, Assistant manager, Kasargod, leave on average pay for 11 days from 22-3-26.

Live Stock:—Mr. T. Budhavidheya Rao Nayadu, Farm Manager, extension of leave on average pay for 15 days.

Mr. V. Narasimha Sastry, Assistant manager, extension of leave for 5 days.

G. L B's Section :—Mr. S. N. Chandrasekara Aiyar, Assistant, leave on average pay for two months from 15-4-26.

Paddy Specialists Section:—Mr. S. Muthuswami Aiyar, Sub-assistant, leave on average pay for three months from 10-3-26.

Mr. S. Jobitha Raj, Assistant, leave on average pay for 12 days from 8th April '26 in continuation of Easter Holidays.

Mr. R. Subbaya Goundan, Sub-Assistant, leave on average pay for 4 weeks in continuation of Easter Holidays.

G. M's. Section:—Mr. P. S. Suryanarayana Aiyar, Sub-Assistant, leave on average pay for one month in continuation of Easter Holidays.

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Agricultural Chemist in Mysore.

Subscription Rs. 3 per annum.

Mr. R. Narasimham, Sub-Assistant, leave on average pay for 10 days from 4-3-26.

April Postings and transfers :—Messrs. K. M. Jacob and K. W. Chakrapani Marar, Farm Managers, on reversion to British service and on expiry of the leave, are posted to VII Circle.

Mr. C. S. Madayya, Farm Manager on reversion from foreign Service, posted to Paddy Breeding station Pattambi.

Leave etc. First Circle:—Mr. P. S. Sambasiva Rao Nayadu, Assistant Demonstrator, leave on average pay for two months from or after 3rd May.

Second Circle:—Mr. K. Ramanatha Ayyar, Demonstrator, Bapatla, leave on average pay for one month from or after 1st May.

Third Circle:—Mr. B. Venkataramana, Assistant Manager, Hagari, leave on average pay for one month from or after 15th April

Mr. P. V. Subba Rao, Assistant Manager, Nandyal, leave on average pay for one month from or after 20th April.

Mr. A. Krishnaswami Ayyar, Demonstrator, leave on average pay for 15 days from 3rd May.

Fourth Circle:—Mr. K. M. Venkatachalam Pillai, Assistant Demonstrator, leave on average pay on medical certificate for 2 months.

Mr. M. Narayana Ayyar Demonstrator, leave on average pay for one month from 21st April.

Sixth Circle:—Mr. A. M. Muthayya Nattan, Demonstrator, Virudhunagar, leave on average pay on medical certificate for 4 months from 14th April.

Mr. T. S. Venkatarama Ayyar, Demonstrator, extension of leave for 6 weeks.

Seventh Circle:—Mr. G. Sakaram Rao, Demonstrator, Puttur, leave on average pay for 15 days from 6th May.

Mr. K. W. Chakrapani Marar, Farm Manager, leave on average pay for 3 months from date of relief.

Live Stock:—Mr. V. Suryanarayana, Farm Manager, Chintaldevi, leave without pay for 25 days from 1—4—1926 and on expiry of leave to, join Cattle Farm, Hosur.

Prof. of Agri; *Section*:—Mr. S. Narayana Ayya, leave on average pay for one month from 16—4—1926.

Mr. A. M. Richards, Veterinary Assistant, leave on average pay for one month from date of relief.

G. E.'s Section:—Mr. J. [illegible] Muliyil, Assistant, leave on average pay for two months from date of relief.

G. M.'s Section:—Mr. R. Narasimham, Sub-assistant, extension for 15 days.