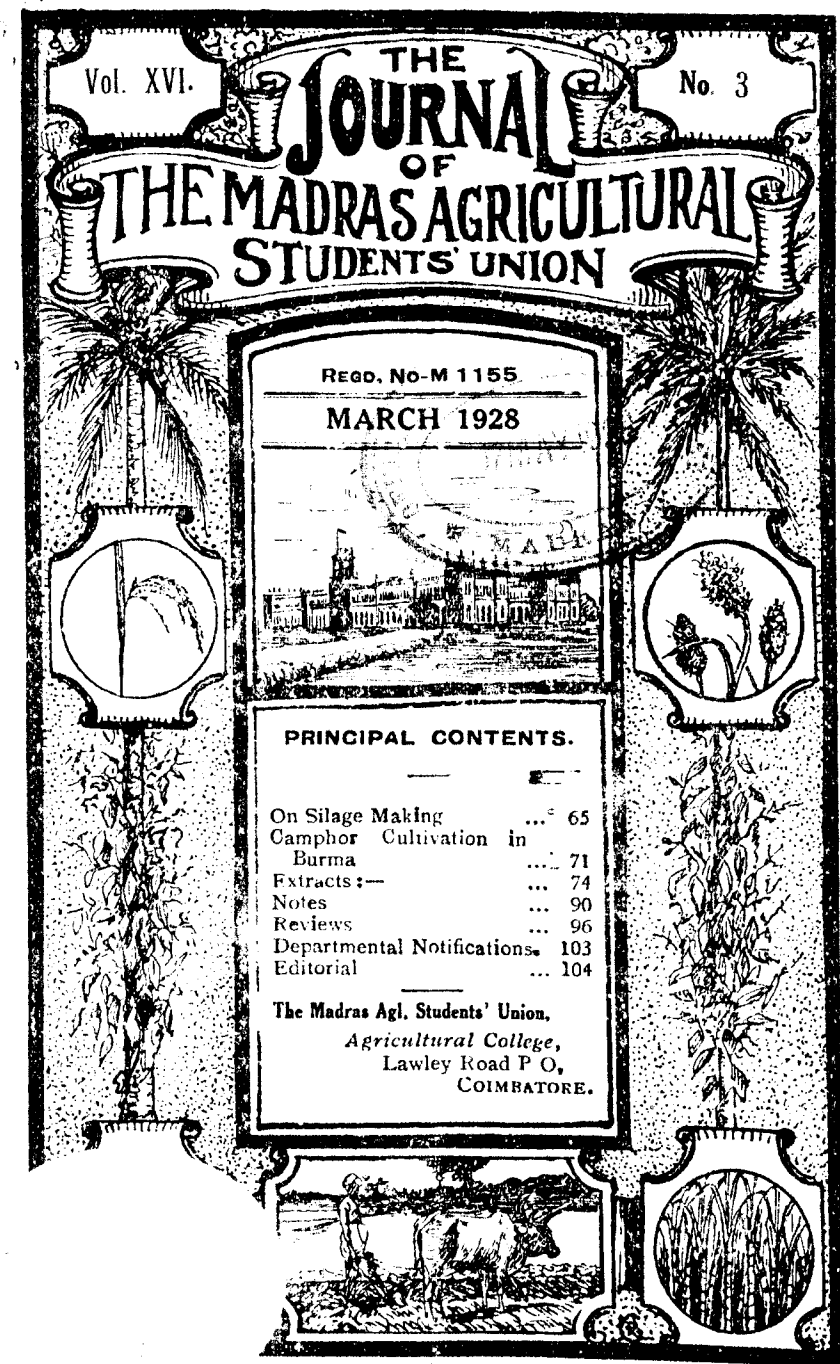


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Farming will never be a success unless the farmer
had more voice in the disposal of
his produce—P. Merrel.

THE JOURNAL

OF

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Vol. XVI]

MARCH 1928.

[No. 3.

On Silage Making.

By A. K. ANNASWAMI, B. Sc. Ag.

Silage making is the art of preserving green fodder in a succulent state for a considerable length of time. It is usually a provision against green-fodder scarcity during summer. During the hot weather in parts where irrigation facilities are not on hand to enable fodder crops like cholam, maize, etc., to be grown owing to the absence of wells or water in tanks, the only way in which a farmer can manage to feed his stock with succulent material is by having recourse to silage.

2. It is almost impossible to keep up the condition of the farmer's stock, especially the milch cattle, during the hot weather with feeding of straw or hay or both. Unlike other seasons, the cattle require for maintaining their condition some green fresh fodder or other succulent bulky material in addition to the hay or straw which are usually given in many parts of the Presidency. It is only in a few places like Coimbatore and parts of Tinnevely and Deltaic tracts, that ryots are able to grow fodder crops during summer by irrigation from wells and feed them green to cattle. In such places, silage is not a necessity. But in places where rain-fall is uncertain and the summer severe, it would be advantageous for a ryot to grow as much fodder crops as possible during seasons

of rainfall and cut them and preserve them in pits as silo, to be used during summer when green fodder is generally not available. Thus, the object of silage making, it would appear, is to replace green fodder where this cannot be grown in summer by a suitable succulent fodder material grown during the seasons of rainfall and preserved in pits.

3. This green fodder preserved in pits as succulent material is a very good substitute for actual green fodder freshly cut. With regard to the feeding value, there is practically no difference between green fodder as such and the silage prepared out of it. In the chemical sense the nutritive value in a fresh green fodder may be a little higher than silage prepared out of it. But there are certain points in favour of the latter, viz., its softness and palatability and its aromatic smell which induces the animal accustomed to silage to show a certain amount of partiality towards it exclusively sometimes.

4. The need for silage or other succulent fodder is most felt by stock owners of high class milch cows which have to be carefully looked after during summer. It has often been the experience of many ryots that when once the milk yield of a high class cow is brought down by careless management and bad feeding it is almost impossible to bring it back to its normal again even by the most strenuous and scrupulous attention to feeding. So dairy stock owners would do well to continue to feed their dairy stock with ample succulent fodder during summer also and this is possible in places of green fodder scarcity at such times by having recourse to silage. Heavily worked drought animals also require special attention during summer and silage feeding in the absence of fresh green fodder will not only maintain their condition even under over worked conditions, but also improve their appearance.

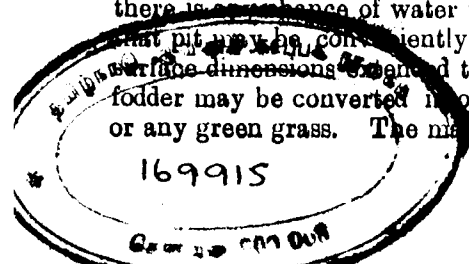
The site for digging silage pits must be a fairly high level ground so that the portion is well drained without any chance of water-logging. The shape of the pit may be rectangular or circular (the sides must be as far as possible vertical to facilitate close packing of material). The pit may be dug to any depth, provided there is no spring or water percolating through the sides. If there is a chance of water percolating, say below 5 feet depth, that pit may be conveniently dug up to 4 feet or less and the surface dimensions enlarged to increase the capacity. Any green fodder may be converted into silage, viz., cholam, maize, cowpea, or any green grass. The maize forms the best silage. It is pre-

ferred to cholam chiefly because of its high yielding capacity. A rain-fed cholam crop under good conditions gives an acre yield of 10,000 to 15,000 lbs. whereas a maize crop gives 25,000 to 30,000 lbs. Whereas we can half fill a pit with cholam from a given area, we can complete the pit with maize grown from the same area. Secondly, maize is of shorter duration in the field than cholam and hence the preference to it.

The crop for silage must be cut green while it is in the flowering stage, or just about the milk-stage. It is at this stage the fodder is supposed to be rich in valuable nutrients; if cut earlier, the full weight of crop is not obtained; if cut after the flowering stage, all the valuable ingredients are transported from the stalks to the seeds, and the stalks are not very valuable for feeding. In the case of maize, the milk stage is usually a pretty long period and as such the cobs may be allowed to develop for sometime. At any rate, the grains should not harden. They must be in the milk stage. The cobs should not be removed from the stem while pitting but should be cut wholesale and put into the pit.

With regard to the size of the pit it must be designed according to the number of head of cattle in stock. It must be of such dimensions that the material from it may be fed to cattle and exhausted in a period of 2 to 3 weeks. Ordinarily a pit, $25 \times 15 \times 8'$ will hold 55 tons of cholam material which evenly pressed tight and after conversion into silage will just fill in the pit and thus occupy the volume of the pit; in other words, 1 cubic foot of compressed cholam silage will weigh roughly 30 lbs. (This weight will differ somewhat with different crops.) Thus for every 100 cubic feet of the pit we may require roughly 3,000 lbs of fresh green material to fill in. Thus, an acre of fodder cholam grown under rainfed conditions and estimated to have an yield of 12,000 lbs., will fill a pit whose capacity is 400 cubic feet ie, a pit $12' \times 8' 4' \times 16'$ will suffice. The size of the pit can thus be judged according to the area of the crop or rather the quantity of stuff available.

Method of Filling :— The crop may be cut and put as whole plants or chaffed into bits and then thrown into the pit. The latter is preferred because it ensures good packing. Also greater quantity of stuff may be put into the pit. Sometimes the silage is chaffed after removal from the pits, since it is always advantageous to feed chaffed material instead of whole plants.



The silo pit must be filled as quickly as possible, but due caution must be observed to see that every fresh layer we put in gets a little heated before a succeeding layer is put on. This ensures a certain amount of fermentation and the heating of the stuff which seems to be a necessary preliminary process before the whole stuff is covered with earth. This heating of the material is caused by a certain amount of regulated air which oxidises it. If the stuff is well pressed and little or no air is admitted, fermentation is slow and the stuff gets heated leisurely and as such the process of filling can go on slowly. This is generally the case with Guinea grass and other grasses with high percentage of moisture which settle evenly and tightly and allow little aeration. Here the stuff can be filled slowly. If in this case the material is filled quickly, the silage resulting from it is a little too acid in taste and is sometimes slushy and the material goes by the name of 'sour-silage.' If, on the other hand, as in the case of cholam where packing is not so even as in Guinea grass, the material gets heated very quickly, it would mean that too much of air is being admitted and as such the material should be filled in quickly and every layer should be pressed as compact as possible, either by driving in cattle or by engaging a gang of dozen men to walk over the material. If filling is delayed, silage gets charred in some portions and is not valuable. If the required quantity of air is admitted, just to heat the stuff to the required degree, and not over-heat it, we get what is known as 'sweet silage.' The amount of heating that is taking place during the process of filling, can be ascertained by fixing an iron rod about 5 feet long (a long crow-bar will do) into the material and raising it as layer after layer is being put up. The heat may be felt by the hand and it must be only to such an extent that one can bear without pain. The rod is kept up throughout the process of filling and is a sure guide as to the rapidity or slowness with which the material is to be filled in.

The bottom of the pit is usually spread with some dry straw or waste hay or even weeds to act as a bedding for the fodder to be put in. The material intended for silage must be evenly spread on this bedding and filling in the early stages should commence along the sides of the pit all round, rather than the centre. After the stuff occupies to about three-fourths of the pit, the centre should be filled up and well pressed. This pressing at the centre in the later stages secures good packing of the material against the sides. At the stage a breeding bull or other heavy

working animal may be allowed to walk into the pit. This operation will greatly compress the material and ensure good packing and thus minimise aeration. But great care should be taken while walking the animal to see that no urine or dung mixes with the fodder whenever animal passes urine or dung. The urine must be collected as often as it is necessary in a small tin vessel and the dung also collected along with a portion of the fodder on which it has dropped and thrown away.

When the material rises flush with the ground level, it should be extended 6 inches extra on all sides and filling of material should commence again, above the ground level. This extra 6 inches is intended to allow for lateral shrinkage, which would otherwise cause air to enter and turn the silage mouldy. The material should be raised up as far above the ground level as it is below it. After it rises 2 feet above ground level it will not be possible to allow cattle to walk over and over and in that case packing may be done by getting people to walk over. The whole material is arranged in the form of a stack or a semi circular dome and then covered with dry straw or waste hay first, and then with green leaves and finally with earth.

The earth should be thrown loose to a layer of about $2\frac{1}{2}$ ' minimum and shaped like a roof. This will act as weight and press the material within sufficiently well to keep it air-tight. In the course of a few days, the material inside will sink and the top surface of the earth will in turn go down and cracks will be formed in places. The pit should be watched at least thrice a week, for the first month and the cracks worked over with mammuties and closed and the surface smoothened. The surface is never mud plastered as with the shrinkage of material within the cracks will be induced greatly. Once a fortnight or so, cattle may be driven over the pit and any undue depressions or sinking covered over with fresh earth. This treading by cattle is important because, there is usually a hollow created between the roof of the earth and the compressed material within, and this hollow will contain air which is detrimental to the silage. If air is admitted the silage turns mouldy.

The silage fermentative process is supposed to be over within 3 weeks and we may safely take it that the silage is ready for opening at any time after two months. But it is usually kept until the next dry season and never opened earlier. It is opened only when necessity arises.

The pit is never opened wholesale. The top surface, to the extent of roughly one square yard, is removed and the silage is dug out to the very bottom. Only such portion of the top is uncovered as would give stuff just necessary for one day's consumption. If the pit is kept opened for more than three weeks there is every chance of the remaining silage getting mouldy and unfit for feeding.

Feeding:—The silage may be fed to cattle long or chaffed and then given to them. For cattle unaccustomed to silage, it is better to feed them chaffed silage mixed with hay or straw. At first the cattle may not have a fancy to silage, but can soon be trained to take to it. When once the animal picks up silage though in small quantities at first, it very soon acquires a greedy habit of eating the stuff so much so that after sometime, it shows a certain amount of partiality for it to the exclusion of even some good succulent fodders.

Work cattle, not only maintain their condition by taking silage, but also improve in appearance. There is a shining and attractive appearance of coat which is rarely seen by feeding with any other fodder.

For sheep during summer, when generally grass is not available, it forms a very valuable substitute for grass. So also for horses. In the latter case, it may not exactly replace green grass or hay but is a valuable addition to them.

"Camphor Cultivation in Burma"*

By K. VENKATARAMAN, M. A.,

Assistant Paddy Specialist, Aduturai.

Introductory:— "*Cinnamomum Camphora*", the source of natural camphor is an evergreen tree belonging to the family of Laurels. In its native habitat it grows up to be a very handsome tree attaining a height of 100 feet, with large and spreading branches and a trunk of 2 to 3 feet in diameter. The tree is indigenous to the Eastern coast of China and the islands of the Japanese Archipelago. It is particularly abundant in Formosa, which produces nearly one-half of the world's supply of camphor.

The adaptability of the camphor-tree to varying conditions of soil, climate, and altitude, is said to be considerable and successful cultivation of it has been accomplished in Jamaica, West Indies, California, Texas, Florida, Ceylon, Federated Malay States and East Africa.

Cultivation in Burma:— In Burma, the success that has attended the experimental plantations of the Forest Department, has established beyond doubt the commercial possibility of camphor cultivation nearly all over upper Burma at suitable elevations. Camphor plants were successfully raised from seed in Myittha, Katha, Bhamo and Myitkyina. The tree is reported to grow well at Mogok Maymyo (3500 feet), and Lawksawk (3000 feet). It does not, however, thrive above an elevation of 3500 feet. At Taunggyi (4700 feet) it appears to get nipped by frost.

At Yatsawk (3200 feet) there is a large private plantation "The Burma Camphor estate" over 650 acres in extent, devoted to the cultivation of camphor. The soil here is a deep, stiff, light-brown clay gradually changing on the higher ground into a sandy loam.

Details of cultivation:—For commercial purposes the method of propagation by seeds is recommended, since attempts at vegetative propagation by cuttings have often proved unsuccessful. Camphor-seeds may be obtained from any nursery company of good repute in Hongkong or Yokohama. The seeds take a long time—often as long as three to six months—to germinate, and the

* Paper read at the M. A. S. U. Conference in July 1927.

germination is usually poor, so that great care has to be taken in making sure of a supply of absolutely fresh seeds for sowing. Camphor seeds are said to ripen in Japan in the month of November and the seeds received in January and sown immediately produce the best results.

(a) *Preparation of nurseries*:—Great care is essential in the preparation of seed-beds, which should be clean, free from weeds and of good tilth. As the seeds take a long time to germinate, sand should be added in order to make the soil sufficiently porous and prevent the seeds from rotting. It is necessary to water and shade the seedlings carefully. The sudden removal of nursery shades might involve the death of the seedlings.

(b) *Method of sowing*:—The seeds should be soaked in water for 24 hours before sowing. The soaking of seeds facilitates their germination, and separates the heavy seeds from the light. The heavy seeds sink to the bottom and they are by themselves sown in rows 3 inches apart each way and about $\frac{1}{4}$ of an inch below the surface. The light seeds may be sown broadcast as only very few among them will germinate. Four pounds of seed are stated to provide sufficient plants for planting 1 acre.

(c) *Transplanting*:—The seedlings grow to a height of 12 to 18 inches during the first year. Two-year-old plants are ready for being transplanted, and transplanting operations should be commenced in the rainy season. The planting is done at intervals of 10 feet and care taken to keep the young plants free from weeds. In planting out, the leaves and small twigs should be removed, the tap-root cut back, and the small lateral roots removed, and the plants carefully planted by hand. The roots should be protected from exposure to the sun, in transit from the nursery. The seedlings should be planted in holes dug 2 feet deep and 2 feet in diameter, the earth removed from the pits being allowed to weather.

(d) *Care of the plantation*:—The subsequent cultivation requires little attention. The soil immediately round the plants should be well-worked and finely divided. Between the lines, the ground may be ploughed with a 'disc' plough in two directions at right angles to each other, and then gone over with a disc-harrow in order to get rid of the dense growth of high grass. The grass which has not been removed by the plough should be dug out. The camphor tree appears to thrive on even poor soil, provided it

could be well-drained. The plants will not exhaust the land, as the prunings after distillation could be returned to the soil and used as mulch, so that practically no mineral matter is removed from the soil.

Yield:—The trees could be pruned for the first time when they are three years of age.

Camphor-content of leaves and twigs:—The proportion of camphor in the leaves is said to increase as the leaves mature, young leaves containing more oil which is commercially less valuable. There is a slight decrease in the camphor-content of leaves after maturity. Air-drying of the leaves has no detrimental effect on the yield of camphor provided the direct sun is kept off. The leaves yield about 1.5 per cent by weight of crude-camphor, while the stem yields about 0.2 per cent of camphor. The yield from old twigs is less than that from young twigs, due to the fact that camphor is present chiefly in the bark and not in the new wood. The prunings should be taken to the still shortly after cutting, since exposure to the sun or rain causes a loss of camphor. Fallen leaves also may be used for distillation since their collection is easy, and camphor-content considerable.

Distillation of camphor:—In Japan and Formosa the distillation of camphor is carried out by very crude methods, using a simple barrel, a flat kettle or boiler, and a wooden condenser. The crude camphor that is obtained is subsequently purified. The time required for distillation of a ton-charge is not more than 3 hours with a moderate quantity of stem. Any suitable still, fitted with an air-tight removable lid may be used. Metal stills also are used, and the camphor is subsequently purified by re-sublimation. The ordinary type of 'tube' or 'coil' condenser is found unworkable, as the passages get blocked by solid camphor. A suitably-designed galvanised-iron condenser has proved satisfactory.

Refining:—The camphor is first separated from the oil in a centrifugal machine, using warm water to remove the last traces of oil. The final stage is a process of sublimation in which the camphor is usually mixed with charcoal and lime, the sublimed product appearing in the market in the form of cubes, cakes and domes.

Uses of camphor:—The greater part of the world's supply of camphor (70 per cent) is used in the manufacture of celluloid (xylonite), while the remainder (about 30 per cent) is used for medicinal, pharmaceutical and sanitary purposes.

EXTRACTS.

ON HOME.

Were there no oxen feeding in the stall,
 The crib were clean ;
 But without oxen harvest would be small,
 House keeping lean ;
 Wherefore we may not be too prim and nice ;
 There is no good that doth not cast a price.
 Were there no children in the house, it were
 Dainty and trim ;
 But without children lo! the hearth were bare,
 And cold and dim ;
 Better their laughter than a chamber neat,
 For only in their mirth is home complete.
 (Nancy, in *Scottish Farmer*, August 1927).

Denmark as it is.

During the past three or four years three of the great London dailies have devoted usual attention to the plight of Agriculture. First *The Times* led off with a remarkably well-informed review of the situation in England, written mainly from the standpoint of the corn grower, that is to say, specially the man who grows wheat and believes that unless wheat growing be prosperous farming is ruined. The *Daily Mail* more recently followed suit; and conducted an investigation which, so far as we can learn, was anything but well-informed. It was simply what has come to be known as "stunt" and we have seen it remarked somewhere that it would have been better for Agriculture had the *Daily Mail* left the question severely alone. The report now under review is the sequel to the correspondence which took place in the *Daily Telegraph* during August, 1927, under the title "Can Farming Pay?" In the course of that correspondence it was suggested that Denmark was one of the countries in which farming paid, and therefore it was considered by the conductors of the newspaper that it might be worth while sending a commission to Denmark to discover the facts. The Commission consisted of Mr. James R. Bond, M. C., M. B. E., who is not unknown in Scotland and three

English farmers. Mr. Bond is the chief Agricultural officer to the Derbyshire Country Council, and has held lectureships in Edinburgh and Bangor, North Wales. The three farmers were respectively from Norfolk, Evesham, in Worcester, and Marton-in-Cleveland, Yorkshire. The first farms 1700 acres. The first specialises in sugar beet, dairying and general farming; the second in fruit and vegetables; the third in dairying. It is said that he is the biggest produce retailer of Grade A milk in the North of England. Obviously a committee of enquiry so composed was at least competent

The result of the inquiry was to establish the position that the Danish farmer shares the British farmer's verdict that under the existing conditions farming is not a paying proposition. The halcyon period of the Danish farmer came to an end in 1925, three years later than the collapse in prices with the British farmer. The Danish farmer's profit as calculated (not estimated) on 200 typical farms, in 1924-25 worked out at 9 per cent, interest on the total capital invested in the farms. In 1925-26 the net return was only 1.5 per cent, and in 1926-27 it was only one per cent. The Danish farmer is content with what he has done, because he can do no better. His whole method, the report before us says, indicates strict attention to the business of food production, with no consideration for sport. Work is a man's chief recreation, and his own little farm is his hobby. Small farms prevail, but there are also in Denmark some very big farms. About one-third of the total agricultural land is in holdings of from 37 to 75 acres; another third is taken up by farms of from 75 to 150 acres; and the remaining third is about equally divided between small holdings and very large farms. The Danish farmer is an occupying owner to the extent of over 90 per cent, of the total. The average value is about £ 45 per acre. Generally there is upon the farm a mortgage of about £ 25 per acre, and one small holder visited paid over 14 sh., per acre in rates, while another paid over 20 sh., per acre in rates per annum. Nor is the labour cheap. On large holdings the actual cost works out at £ 4 per acre.

The feature in Danish agriculture surprising to these English farmers was its combination of intensive arable farming with dairying. How this works out readers can learn by purchasing the booklet for themselves. The proportion of non-progressive farmers in Denmark is small. Even the ten to twenty-acre men

were found to be well versed in such matters as seed varieties, chemical fertilisers, and balanced rations. In other words, these Danish farmers know their own business; they give heed to extension lecturers, to agricultural colleges, to scientific results as applicable to food production in a country with soil and climate not unlike those of Great Britain. Withal they are content because they have to be with their main product, milk for manufacturing purposes, into butter and bacon at 9d. to 11d. per gallon. A specific case is quoted on page 21, that of a small farm carrying 27 Red Danish cows and heifers, 26 of them in milk. Their last year's average milk yield was 810 gallons per cow at 3.74 per cent., butter fat. The price realised was 8½d., per gallon at the local co-operative creamery, of which of course the dairy farmer was a share holder or a member. He expected a possible 3d., per gallon more, if the profits of the creamery were as favourable as in the previous year. Another farm with a stock of 150 Jerseys had a return of 510 gallons at 5 per cent., butter fat. Milking was at 4 a. m., and 4 p. m. The product was what we would call Grade A (T. T.) milk. The price was 15d., per gallon delivered in Co-penhagen. The report says 'A good price in Denmark would be a bad price in England.'

(From the Scottish Farmer February 18, 1928.)

Milk-Recording in Europe.

The years preceding the Great War showed a remarkable development in milk-recording, especially in north European countries, as the following figures show:—

	First Society Formed.	Approximate number of Societies in 1914.
Denmark	... 1895 ...	633
Sweden	... 1898 ...	799
Germany	... 1897 ...	792
Norway	... 1898 ...	140
Finland	... 1899 ...	200

During the same period, the movement also developed considerably in the old Russian Empire, in Austria-Hungary, and in Holland.

Turning to the post-war period, we find that Denmark had no fewer than 1,228 milk-recording societies in the year 1924-25, and the total number of cows on record was 430,000, or close on 31 per cent., of the entire national herd.

Sweden had only 424 societies at work in 1919, and the number of controlled cows had fallen to 115,000 as compared with 220,000 five years earlier. Since then however there has been an upward tendency and the number of societies at the close of 1925 was 606, with 200,000 cows, or about 11 per cent., of the total national herd.

In Norway too there has been considerable growth of recent years. During the war the number of societies had fallen very low, and in 1919 only 73 were at work. In 1923-24 the number had risen to 248, with over 50,000 cows, and for 1925-26 the number of societies is estimated to be 330, with 67,000 cows, or about 9 per cent., of all cows in Norway.

In Finland development has been more slow, but the number of milk-recording societies in 1924 was 379, with 115,000 cows or 9 per cent., of the total national herd. The average milk yield per cow was better than 477 gallons with 3.92 per cent fat. Women are extensively employed as recorders.

Of the societies which existed in Germany in 1914 over one-half were dissolved during war. The movement showed a rapid recovery after the conclusion of hostilities, and in 1922 no fewer than 1,058 societies were at work. This figure had increased to 1,610 in 1925, with altogether 581,000 cows. The movement is most general in East Prussia, where 24 per cent of all cows are on record, but it has made but little progress in Southern Germany, so that, for the Empire as a whole, barely 7 per cent., of all cows are included in the movement.

In Holland where the first society was started in 1900, considerable progress has been made. The number of breeding and milk-recording societies in 1924 was 553, with 183,000 cows.

Poland founded her first society in 1904, but all societies were dissolved during the war. In 1926, 79 societies were reported to be at work in the vicinity of Warsaw.

France has only recently begun to take an interest in milk-recording, but the movement to found societies is progressing rapidly there during the past couple of years.

(From the Agricultural Journal of Victoria February 1928.)

Co-operative Marketing.

Importance of Marketing :—With the Royal Commission on Agriculture in session, interest has been naturally aroused in various aspects of agriculture but unfortunately the problem of marketing has not received the attention it deserves. So long as the cultivator is in the present unhappy position of asking "what is the price" at the time of buying as well as of selling, so long as he has to effect his purchase dear and his sales cheap, there can be no appreciable improvement even if his out-put is better in quality and bigger in quantity. Of the purchase and sale again the latter is in the worse position, especially in India.

Difficulties of Marketing in General :—As a matter of fact, the marketing of agricultural goods is a very difficult affair all the world over. It is much more difficult than the marketing of manufactured products. For one thing, agriculture is dependent on the uncertainties of nature in the matter of temperature and rainfall. For another, even a promising harvest may be suddenly spoilt by the depredations of tiny pests like boll-weevil, blackrust or phylloxera. Apart from these one cannot regulate production in accordance with demand even by international agreements. The Rubber Restriction Scheme of Britain, the Coffee Valorisation Scheme of Brazil, the Cotton Restriction Scheme of the U. S. A., etc., have been found to be much more difficult in operation, than say, the International Steel Combine. Seasonal production and bulky and perishable nature of the goods, etc., also raise complex issues absent in the case of manufacturing industries.

Special Difficulties in India :—(1) Small Holdings. Over and above these, there are special difficulties in India. It is not possible to generalise for such a big country with its different parts in such widely dissimilar economic conditions, but the following points may be noted. India is a land of small holdings and the produce of each has to be marketed separately. If goods are not bulked, adoption of up-to-date marketing methods is clearly impossible. Expert grading and packing, efficiency in the matter of transport, finance, insurance and warehousing,—in fact any of the indispensable features of modern commerce,—cannot even be thought of. Yet it should not be forgotten that archaic methods of marketing detract considerably from the value of modern farming. Bigger and better crops by themselves will not improve matters unless they fetch better prices. As has been pointed out by a competent authority, the fertility of the soil is of much less importance than the fertility of the brain controlling the soil and its produce. The former kind of fertility is, and may remain, a capacity only the latter is an energy."

(Dr. H. Sinha in the Indian Journal of Economics Vol. VII, Part 3. Serial No. 30).

(To be continued)

FEBRUARY RAINFALL IN MADRAS.

No. of Stations	Districts	First Half.	Second Half.	Mean average month.	No. of rainy days.	Mean average rainy days.
16	CIRCARS—Ganjam (Littoral.)	0.01	...	0.67	0.1	1.1
17	Vizagpatam (Do.)	0.15	0.02	0.54	0.4	0.9
14	East Godavari Plains ...	0.04	0.05	0.27	0.03	0.5
8	West Godavari	0.16	...	0.08	0.3	0.1
13	Kistna	0.04	...	0.29	0.1	0.5
16	Guntur	0.17	0.04	0.23	0.6	0.4
15	DECCAN—Kurnool	1.64	...	0.15	1.1	0.3
11	Bellary	1.68	...	0.12	1.8	0.2
14	Anantapur	1.30	...	0.14	1.4	0.2
11	Cuddapah	1.59	...	0.13	1.7	0.2
16	CARNATIC—Nellore	1.35	...	0.23	1.3	0.3
14	Chingleput	0.95	...	0.39	1.4	0.5
1	Madras	1.12	...	0.30	2.	0.5
17	South Arcot	1.18	...	0.56	2.2	0.7
13	CENTRAL—Chittoor	1.43	...	0.20	1.8	1.4
16	North Arcot	1.35	...	0.29	1.9	0.5
21	Salem	1.30	...	0.28	2.2	0.5
20	Coimbatore	1.72	...	0.54	2.5	—
1	Kollegal	0.90	...	0.17	1.	0.3
16	Trichinopoly	2.13	...	0.38	2.9	0.6
11	Pudukota	4.03	...	0.44	3.5	0.7
26	SOUTH—Tanjore	3.03	...	0.59	4.0	0.8
15	Madura	1.91	...	0.49	4.2	0.8
21	Ramnad	4.34	...	0.61	4.3	0.8
21	Tinnevely	3.29	...	0.90	4.2	1.4
6	HILLS—Ganjam Agency	...	0.22	0.86	0.4	1.7
11	Vizag Agency	0.04	0.01	0.40	0.2	0.9
5	East Godavari Agency.	...	0.01	0.49	—	0.4
1	Kodaikanal	6.33	...	1.44	6.	2.1
1	Yercaud	4.37	...	0.59	6.	0.9
11	The Nilgiris	5.51	...	1.06	5.8	1.4
1	Anamalais	4.72	...	—	5.	—
10	WEST COAST—Coorg	2.84	...	0.20	3.8	0.05
11	South Kanara	0.99	...	0.07	2.1	0.1
25	Malabar	2.67	0.14	0.27	3.6	0.4
6	Cochin	3.05	0.05	0.39	3.7	0.6
9	Devikulam	3.26	...	0.96	4.3	1.5
14	Kottayam	3.66	0.01	0.56	4.6	1.2
21	Quilon	2.48	0.11	1.06	4.0	1.6
31	Trivandrum	1.04	...	0.49	2.2	0.9

AGRICULTURAL COLLEGE, COIMBATORE.

METEOROLOGICAL OBSERVATIONS.

March 1928.

Date.	Barometric pressure reduced to 32° F inches.	Wind velocity per hour (Miles.)	Maximum shade temperature.	Minimum shade temperature	Rainfall in inches.
1	28.578	4.2	93.2	60.0	
2	28.584	2.5	93.7	62.1	Nil.
3	28.546	1.7	94.9	68.2	Nil.
4	28.522	2.7	95.7	69.7	Nil.
5	28.514	2.7	95.7	69.5	Nil.
6	28.476	2.2	96.0	66.5	Nil.
7	28.515	3.4	94.8	68.8	Nil.
8	28.516	2.8	95.2	70.1	Nil.
9	28.530	2.9	97.6	65.7	Nil.
10	28.551	4.4	96.0	65.5	Nil.
11	28.479	3.5	95.5	67.0	Nil.
12	28.545	2.8	94.5	60.5	Nil.
13	28.575	3.6	97.0	63.5	Nil.
14	28.608	3.5	95.5	65.3	Nil.
15	28.605	2.8	91.0	66.5	Nil.
16	28.563	2.6	92.0	68.0	Nil.
17	28.640	3.7	93.8	71.0	Nil.
18	28.615	2.9	94.7	72.5	Nil.
19	28.575	3.1	95.6	71.8	Nil.
20	28.562	2.7	97.6	70.1	Nil.
21	28.570	2.9	97.8	66.4	Nil.
22	28.537	2.9	98.6	70.4	Nil.
23	28.527	2.4	97.2	73.5	Nil.
24	28.528	3.0	98.0	74.5	Nil.
25	28.520	3.4	99.4	71.8	Nil.
26	28.544	2.9	99.5	73.3	Nil.
27	28.534	2.5	97.4	73.2	Nil.
28	28.518	3.9	96.4	70.0	0.25
29	28.481	2.7	94.9	74.2	—
30	28.504	2.9	94.7	72.7	Drizzle.
31	28.508	3.5	96.3	70.3	0.81

DEPARTMENT'S WORK.

Official Digest number 64.

OCTOBER 1927.

Weather.

Exhibitions :— At Dharakota (Ganjam district), Rajah of Dharakota organised an exhibition to which the Anakapalle Experiment Station sent several exhibits mill ploughs, seed drills, a cane mill and samples of paddy, ragi and sugarcane. The Deputy Director also attended the show and delivered an address.

At Samalkota a meeting of local ryots was held to honour the retiring agricultural officer Mr. Neelam Sitaramaswamy Naidu Garu, at which the Deputy Director was present and described the work done by the department in the past.

At Gobichettipalayam, (Coimbatore District) the Elementary Teachers met in a conference at which two lantern lectures were delivered by the agricultural demonstrator. On the occasion of the cattle-fair at Kulian iron ploughs and mhothe wheels were exhibited.

Waltair circle :— The weather was exceptionally dry and had an ill effect on paddy and canes. The water supply in the Varaha river continued to be short. The district officers were advising the ryots to take up again the cultivation of "punasa" crops which the ryots had largely given up. They were also asked to grow green manures in rotation.

Guntur circle :— In the Nellore district, where the soils are poor and transplanting was unknown, demonstration in economic planting were raising green manure crops and the use of manures attended with success. Green manuring with kolinji has caught on and some 10,000 acres are annually sown with green manures. 86 villages were visited by the staff.

Bellary circle :— In Markapur, the work was mainly in introducing new canes, improved methods of cane cultivation and preparation of jaggery. New varieties of paddy were also introduced.

On lands under the Cumbum tank work was concentrated on canes and cane cultivation.

At Hagari cholam was sown in the dry land area. Hot weather prevailed in this circle during the month and helped the

hingari crop, but groundnut on light soils did suffer. At Amara-vati an interesting experiment in reclaiming saline land and sowing it with paddy was started. The district officers visited 110 villages.

Madras circle :— The weather in this circle was most unfavourable, groundnut and semidry paddy suffered, planting of samba was delayed. 175 villages were visited and 123 ploughing demonstrations were given. 119 light iron ploughs were sold. Two fungus diseases one of which proved very serious in the betelvine plantations in and around Poonmallee were investigated by the Mycologist and the ryots were advised to adopt a system of rotation which is common for this crop in other important parts of the presidency.

Trichinopoly circle :— Reduced seed rate and the economic planting were advocated. 178 villages were visited.

Madura circle :— The rainfall in this circle was below normal but sufficient for dryland sowings. Cotton and cereals were sown. 223 villages were visited, and demonstrations given and sales of seeds and manures effected. Attention was also paid to seed farms, and seed unions, the former, in the Tinnevely area and the latter in Ramnad. Work on paddy was concentrated in Rajapalaiyam,

West Coast circle :— Rainfall here was normal. Transplanting of second crop was in progress. Second crop nurseries in Kottayam were timely saved from the insect pest *Spodoptera* by following the curative methods, (i) flooding the fields temporarily, (ii) kerosining the water, and (iii) hastening the lifting and transplanting the seedlings. 198 villages were visited.

Coimbatore - Salem circle :— The weather was disappointing in this circle. After a favourable South West Monsoon the North east made a bad beginning. Cotton sowings were delayed while standing crops on dry areas suffered from lack of moisture. The district officers visited 166 villages, selected areas for seed farms and sowed them. 169, 889 lb. of cotton seed was distributed. The spreading practice of using green manure for improving garden lands in Udumalpet was noted.

Cattle Farms :— At Coimbatore a pit filled with 18352 lbs. of green cholam on 12th August was opened on 27th. October and gave 13,600 lbs. of good silage. At Hosur 2 pits of spear grass silage containing 34 tons of green stuff and 267 tons of green fodders were laid down.

An attempt to shear sheep at Hosur twice a year gave in the first clip this month an average yield of 1 lb. 7 oz. from a flock of 160 sheep against the annual one clip average of two pounds, 1 ram gave even 3 lb. The availability of a dairy demonstration set for use at public conference, fairs and shows was notified.

Miscellaneous:—The Director of Agriculture toured in the Tanjore District, presided over the annual meeting of the Co-operative Manure Society at Nidamangalam and over a ryots, conference at the same place. He paid a visit to the demonstration farm of the Tanjore Agricultural Co-operative Society.

His Excellency Viscount Goschen and Viscountess Goschen visited the coconut demonstration plot in the compound of the Mudabadri Traveller's Bungalow and themselves planted one coconut seedling each before they left. This demonstration plot is, it may be noted, typical of several small and large areas planted under the "dry" system.

Water-lifts:—Under this head the department was introducing wherever desirable galvanised mhote buckets and the "Roll Easy Mhote Wheel."

Veterinary:—Rinderpest which was severe in Chicacole, Rajahmundry and Peddapur taluks was brought under control. The cattle disease act was introduced in Chicacole.

Arrangements were made to conduct Serum simultaneous inoculations among cattle in Parlakimadi and Anakapalle taluks against Rinderpest during the month.

UNIVERSITY IN MADRAS

B. Sc. Ag. Degree Examination, 1928.

PART I.

Engineering] Wednesday 28th March. [7—10 a. m.

[N. B.—Answer any six questions including III which is compulsory].

I. Plot the accompanying extract from a field book (Plan A) and find out the distance of the tower mentioned in it from Station C. Scale 50 feet to 1 foot.

II. Find the area of a field of the form in plan B. The ordinates from the long side are taken at equal intervals.

III. Draw the section of Engine house and circular well. The well is 8 feet in diameter. The Engine house is 12 feet long and 8 feet wide (internal dimensions). The distance from the centre of the well to the centre of the Engine house is 15 feet. The walls of the Engine house are 9 feet high and the roof is of corrugated iron sheets on teak wood purlins. The centrifugal pump is bolted on to wooden beams 6 inches $\times$ 3 inches placed 6 feet below the ground level and the Engine room floor. The level of water in the well is 20 feet below ground and the depth of water in the well is 10 feet. Mark the dimensions of the details as well.

IV. Take out the quantities of masonry and plastering inside of the well and the shed in the third question.

V. A 50 gallon bucket in a mhote is lifted by weights placed on a trolley running down on rails laid on the bullock ramp of the mhote. The inclination of the ramp is 2 horizontal to 1 vertical. Assuming an efficiency of 60 per cent for the arrangement, find the weights to be put on the trolley to move the bucket up.

VI. Calculate the width of a rectangular masonry channel to carry 4 c. ft. per sec. with 3 feet depth of water. The fall of the bed of the channel is 1 in 100.

VII. Describe with sketches the working of:—

(a) A bullock sugarcane crushing mill with 3 rollers.

(b) A power driven sugarcane mill with 3 rollers.

VIII. Discuss in short notes the scope for the use of the following:—

Baling basket, Picotah, Mhote and a centrifugal pump driven by a crude oil Engine.

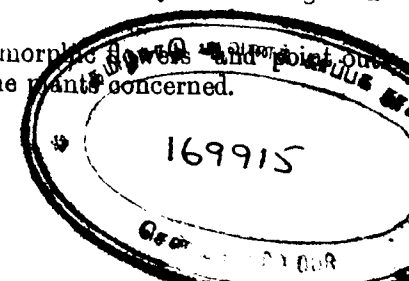
Botany]. Wednesday 28th March. [1—4 p. m.

[N. B.—Answer three questions in A and three questions in B. Questions I and VIII are compulsory. Write answers to questions in A and B in separate answer-books].

A

I. Describe with sketches the secondary thickening of a dicotyledonous root.

Give a brief account of 'Zygomorphy' and point out the advantage of Zygomorphy to the plants concerned.



III. What is meant by a 'Natural System'? State the characters of any two of the following families, Myrtaceae, Asclepiadaceae and Aroideae and mention three plants belonging to each of the two families selected by you.

IV. Write notes on:—Chromosome; Perisperm; Haustorium; Monochasial cyme; Heterophylly; and Resting bud.

B

V. What is Callus? How is it formed and of wild honey harmful to the planting districts in Madras?

VI. In what way is the unrestricted collection of what use is it to the farmer?

VII. Mention six harmful weeds on the Central Farm. Explain how they spread and how they can be eradicated.

VII. Does the study of 'Native Flora' in a locality give any indication as to the methods of farming to be adopted? If so, how?

Chemistry.] Thursday, 29th March. [7—10 a. m.

[N. B.—Answer three questions in A and three questions in B. Questions III and VI are compulsory. Write answer to questions A and B in separate answer books.]

A

I. Mention the points of similarity and points of difference in the chemical behaviour of nitrogen and phosphorus and their important compounds.

II. What are saline soils, how are they formed and by what methods may they be ameliorated?

III. Discuss the various factor affecting the retention of the important manurial constituents in different types of soils.

IV. Write short notes on any four of the following:—

(a) Asparagine, (b) Camphor, (c) Oil of bitter almonds, (d) Aniline, (e) Acetone, (f) Urea, (g) Piperidine and (h) White of egg.

B

V. Two simple organic compounds have the same molecular formula and the following percentage composition;—24.24 per cent of carbon, 4.04 per cent of hydrogen and 71.72 per cent of chlorine. Name them and write their constitutional formulae. Explain how they can be prepared and how distinguished.

VI. How would you prepare lactose from milk? Explain its constitution and state how it resembles and how it differs from two other carbohydrates having the same molecular formula.

VII. What are phenols? What classes of paraffin compounds do they resemble and how do they differ from them? Give two examples each with their names and constitutional formulae of monohydric, dihydric and trihydric phenols.

VIII. Explain the isomerism of the tartaric acids and show how this differs from the isomerism exhibited by the lactic acids.

Zoology]. Thursday, 29th March. 1—4 p. m.

[Answer three questions in A and three questions in B. Questions IV and V are compulsory. Write answer to questions in A and B in separate answer books].

A

I. Give a short account of the class Arachnida with special reference to its economic importance.

II. Describe the mode of respiration in the following:—

(a) Earthworm, (b) Prawn, (c) Insects and (d) Frog.

III. Describe the various types of mouth parts met with in insects. Give diagrams to illustrate your answer.

IV. Write a short account of Sericulture as it exists in South India.

B

V. Describe with reference to local conditions, alternate host plants and other relevant factors the problem of controlling the Rhinoceros beetle in South India.

VI. Give an account of the more important pests of Paddy in South India and of the remedies recommended against each.

VII. What is Calcium Cyanide? Discuss the possibilities of its use in India.

VIII. How would you control the following:—

(a) Tobacco Aphis, (b) Cockchafers attacking the Rose plant, (c) Cockroaches, (d) Field rats and (e) Mango fruit fly.

Agriculture I]. Friday 30th March. 7—10 a. m.

[N. B.—Answer three questions in A and three questions in B. Questions IV or V and VII are compulsory. Write answers to questions in A and B in separate answer books.]

A

I. What reasons underlie the practice of growing 'mixed' crops common in many parts of the Presidency? State what crops are grown in this manner, giving the usual proportion of the main crop to the 'mixed' crop in each case—what may be said to be the drawbacks of this system?

II. In what ways do the soils under channel irrigation often tend to deteriorate? Describe how you would prevent such deterioration.

III. Explain what causes the variation in the duty of water for a crop like paddy in different parts of the country. Assuming a duty of 40 for this crop during an irrigation season of 200 days, calculate the area irrigable with a storage of 500 million cubic feet. By what cultural or other methods can the duty of water be increased for a crop like Sugarcane?

IV. Describe fully the characteristics you would consider important in a good breeding bull of the Kangayam breed and state the points you would assign to each in a total score of 100 points. Work out the cost of a year's keep of a bull standing for service giving details of the rations you suggest calculating cost at Coimbatore prices.

V. What is the nature of the improvement sought in crossing local sheep with Merinos? Describe the results of any work in this direction carried out in South India.

What is the object of dipping sheep? Describe how it is carried out.

B

VI. Describe any standard iron plough and explain what structural features or adjustments determine

(a) The width, depth and shape of furrow slice.

(b) The angle of inversion and the degree of breaking and pulverisation.

VII. The general practices of dry cultivation in the Ceded Districts and the Tamil Districts differ considerably through the crops grown are similar to a very great extent. Explain what these differences are and why such differences exist in the two tracts.

VIII. Jonna (sorghum) was harvested in January this year on a black cotton soil field which is under three course rotation—cotton, a pulse crop, and jonna—in the Nandyal farm and it has to be sown with cotton in the next season. Explain the various operations necessary till the time of sowing and estimate the labour required for each operation on an acre.

IX. Define the following briefly (a) Sedimentary rock, (b) Pore space, (c) Stalagmite, (d) Light soil, (e) Warping, (f) Marl (g) Peat and (h) Sedimentary soil.

Agriculture II (Animal Hygiene)

Friday, 30th March

1—4 p. m.

[N. B. :— Answer Three questions in A and Three questions in B. Questions I and VI are compulsory. Write answers to questions in A and B in separate answer books.]

A

I. Describe with the aid of a diagram the circulation of blood in an ox.

II. Give the actions, uses, and doses of the following drugs in the ox :—

(a) Magnesium sulphate.

(b) Pulvis nux vomica.

(c) Bin-iodide of mercury.

III. Explain the process of rumination in cattle.

IV. What are the symptoms of Dystokia in a cow? Name the several abnormal presentations you are likely to meet with in Dystokias.

B

V. State briefly the main principles to be observed in regard to the maintenance of health of cattle.

VI. What are the symptoms of—Rinderpest, Anthrax and Blackquarter? What measures will you adopt in an outbreak of any one of these diseases?

VII. How will you treat the following :—

(a) Fracture of the horn.

(b) Mammitis.

VIII. What is Liver rot in sheep due to? What are its symptoms? How will you deal with an out-break in a flock?

NOTES.

A dream realised :—When the manager of a sugar plantation in Hawaii, decided to fight weeds by covering the field with a heavy waterproof paper through which the tips of the growing cane would penetrate and when, later, a similar device was attempted for pineapple, the practical man laughed and said it was all a dream. Three years' research and the persistent efforts of the dreamer have now revealed that one of the ordinary garden crops respond to this treatment with a heavily increased yield. During the 1927 season results varied from 11 per cent with garden peas to 516 per cent with spinach, between which extremes some crops more than doubled, some trebled and a few quadrupled.

Will maya keep out legitimate help?

It is a common observation that those who have never sought the assistance and have been successful without any special aid have greater difficulty in securing help when it is needed than those who have been more or less dependent upon others. The man who habitually pays cash and discounts his bills has more trouble in getting credit than those who are habitual borrowers and who dodge creditors. The American Chemical Society seems to be in such a predicament, notwithstanding the enormous amount of work it has done for the nation with little or no outside help and the largest number of members it has on its rolls. Its success and its reputation so far should not make people think that in the very laudable work it has rightly under-taken of continuing to publish the very informing and useful "Chemical Abstracts." It has large funded resources at its back. The appeal for liberal donations for this piece of work which the Editor of the "Industrial and Engineering Chemistry" makes in the February number of that Journal will, we hope, meet with a ready response.

Restriction on export of sugar :—From the 'International Sugar Journal'. We understand that Colonel Tarafa's deputation to Europe on behalf of Cuba last November and his negotiations with the sugar exporting countries led to a conference in Berlin in January between the three countries, Czecho-Slovakia, Poland and Germany. These countries have come to an agreement among themselves fixing their quota of export in each case

and imposing elastic additional conditions depending upon any short output in any of the three countries or upon the agreement which these countries will have to come to with Cuba in the Autumn next year. We wish how our countrymen profited by the business instinct which characterises the three countries named.

Agricultural research in the sugar industry :—We are glad that in the matter of sugar cane as of cotton, British Empire has had to turn to her sons working or who have worked in India for help. This time, the Empire Marketing Board had, of all workers, to request Dr. C. A. Barber for help and advice in the matter of agricultural research in the sugar industry. Dr. Barber's work in this country, especially in Madras is well known to us and the admirable survey of the present position of tropical Agricultural research which he seems to have prepared for the Board would, we are sure, help them in this line considerably. With the sound and safe lines on which we fancy Dr. Barber has developed his subject the Board should have no hesitation in taking up research and profiting by it at no very distant date.

Noel Deerr on Sugar industry in India :—Our readers may remember that Noel Deerr who has specialised in the sugar line was brought out by the Tatas from the East Indies to be the Technical head of the Sugar Concerns they were developing in India. Dr. Deerr has now been in this country for a few years and is now President of Sugar Technologists' Association in this country. He has toured all over and studied the sugar problems in India, the results of which he has given us in the form of an address entitled "a short history of sugar in India" which has been published in the International Sugar Journal for February. We would invite our readers for a perusal of this interesting article.

Why stored and transported vegetables get rotten :—Ray Nelson, Michigan State College, records that certain non-parasitic diseases including black leaf speck, and heart of lettuce and cabbage and surface rotting of potato tubers, are traceable to inadequate supplies of oxygen in the storage chambers, or to temperatures which prevent the utilisation of the oxygen present. He suggests that the ultimate cause of these diseases is the liberation or accumulation in certain cells of some toxic substance resulting from the interaction of hydrolytic enzyme and a glucoside

due to the deficiency of oxygen, one of the results of such interaction being an oxidation process causing the pigmentation characteristic of many of those breakdown diseases. But at Cambridge it has been found that a regulative atmosphere containing a constant 10 per cent., of oxygen and a corresponding increase in carbon-dioxide give the best results.

As research stands at present there seems to be an optimum concentration of oxygen which slows up respiration sufficiently to give increased longevity to storage fruits and vegetables, but if decreased it may give rise to various pathological symptoms incidental on suboxidation.

Wheat situation :—"Wheat is one of the most important crops of the world," says J. C. Brunnich in the Queensland Agricultural Journal for March. It is the principal foodstuff for the white race. In 1925 the world produced and consumed 165,000,000 tons of potatoes, 113,000,000 tons of maize, 90,000,000 tons of rice, and 104,000,000 tons of wheat. The consumption of wheat per head of population and of its production in several countries are as below :—

Country.	Consumption Bushels 1922.	Production Bushels 1925.
United States	6.1	5.7
Russia	1.4	5.0
Canada	5.4	43.3
France	6.9	8.1
Argentina	...	19.3
Italy	6.6	5.9
Australia	5.2	18.8
Germany	2.0	1.9
United Kingdom	5.7	1.2
India	0.9	1.3

The United Kingdom is the chief importer of wheat in Europe as she produces very little and consumes a fairly large quantity. From all parts of the world a stream of wheat flows into England and Australia contributes about one third of her requirements. India, though her production per head is small, exports also large quantities to the United Kingdom.

The Democracy of the Ancients. "Equal justice; equal opportunity for the service of the State; the spirit of reverence for the laws the people enact, for the unwritten laws founded in human nature; the education that trains men to think before they act, and then to act, that teaches them to enjoy and what to enjoy to love beauty without excess and wisdom without inefficiency, that gives the power to the individual to meet every aspect of life with ready grace, whether wealth or poverty, life or death; the passionate love of country that will inspire a man not only to die for his city, but to live the utmost for it, developing every faculty nature has given him that he may consecrate all his gifts of speech and sense, taste, wisdom and the open mind, to the good of his fellow citizens; these are no ideals of the barbarians nor of the half civilised lands we know. Where is the motive, where the transforming power to make our common clay the true citizens of such a Democracy? Nowhere I think but in one who talked no politics and drew no republic, but understood better than Pericles the greatness of man and better than Plato the Kingdom of God."—Mr. T. R. Glover, in "Democracy in the Ancient World."

Mosaic disease of Tobacco :—Recently the question of Mosaic disease on sugar-cane has been a subject of inquiry and investigation by the Govt., Mycologist. The same disease seems to do severe havoc on tobacco and take toll of a considerable percentage of the crop every year in Rhodesia. Mr. A. C. F. Hopkins, the Mycologist, Rhodesia, thinks that it is due to a filterable virus which is present throughout the sap of the entire plant and is of a highly infective nature. There is the possibility of the disease being harboured in the seed. It is likely to make its appearance at any time of the year. Leaves affected by this disease however cure out well, being as a rule of a good bright colour, but affected leaves are smaller and of thinner texture than normal ones resulting in a loss of weight and quality which affects the selling price.

The army worm :—Rhodesia reports that this pest has made its appearance in a few localities and advises farmers to be vigilant as the pest attacks not only maize or other cereals but also ground-nuts and potatoes. The two natural enemies which are two species of storks, namely, the white stork (*Ciconia alba*) and the white bellied stork (*Abdimia abdimii*), might, it is stated keep the pest in

check though spraying and other preventive and curative methods are suggested.

Bees and pollination of fruit trees:—"The burden of pollinizing California's million and a half acres of fruit and vegetables is upon the bee industry," says the Monthly bulletin, California. The honey bee as a pollination agent exceeds all native agencies by hundred to one as visitors to the blossoms at time of pollen maturity. The presence of the honey bee increases over all other agents, the set of fruit of the almond, apple, cherry, pear plum and prune from 300 to 3000 per cent. The advantages which the honey bee possesses are many and they are both of a physical and biological nature.

The Sun flower:—This useful annual crop is not much grown in this country. Its uses as affording oil and fine food for cattle have been brought to the notice of the farmer time and again. It was successfully grown on the Hebbal Farm and is being raised on the Cotton Station in Coimbatore with good results. This very useful plant seems to have gone into general cultivation in Rhodesia and have proved superior to maize. Being a short duration crop sunflower can be grown successfully when the season is too short or the rainfall too light even for maize. The sunflower silage is very palatable and is consumed with great avidity by cows, calves and working cattle.

Tractor Demonstration:—Reports appeared in the Madras "Daily Express" some weeks ago that certain tractor demonstrations were made in Tinnevely. This month Messrs. Volkart Brothers, by previous arrangement, with the Director of Agriculture and the Principal Agricultural College, conducted trials on 20 acres of land (black soil) on the central farm, Coimbatore. The tractor used was one of the several types manufactured by the International Harvester Co., of America. The cost of fuel of ploughing per acre for a depth of 10" was Rs. 3-10-0. Fuel for the tractor was kerosine oil. In this connection we are reminded of the suction or produce gas-driven tractors in which the fuel is charcoal and not oil, put into the market by the Parker Producer Gas Plant Co., England a demonstration of which at Ealing, North London was so satisfactory that a wooded country like Rhodesia is introducing them for cultivating her lands. Which will work in India better is a matter for trial?

Plantain wilt disease:—During the month the Mycologist was, we understand, on a visit to Arappalayam village near Madura to examine and investigate the disease which was reported to be severe on plantains. On examination of the crop and the soil and on enquiries of the plantain growers on the spot he came to know that the disease had appeared only recently and that in the first crop of bunches it was visible here and there but had established itself in the second crop. A diseased plant shows the following symptoms:—the outer-leaf blades yellow down, the leaves wilt quickly and the leaf stalk breaks; Later the whole bunch of leaves hang down, the pseudo stem rots and drops. This may happen even before flowering but if the disease attacks after the bunch is formed the fruits ripen irregularly and prematurely. This disease he at once put down as due to a fungus. As in Madras we have more than 120,000 acres under plantains, not in appreciable areas but chiefly in small packets of land scattered all over the presidency the owners must carefully note the symptom and soon after they appear communicate with the Mycologist at Coimbatore for advice, and preventive or curative measures.

REVIEWS.

Some Diseases of Cattle in India:—The present is the enlarged edition of the popular handbook published in 1871 for the use of cattle owners and revised in 1883, 1903, and 1916. "Advances in our knowledge of the diseases of animals and the increase of interest now taken in live-stock problems in India have," says Dr. J. T. Edwards, "demanded a complete redrafting of the text, with much extension." All the diseases found amongst livestock on the farm cattle chiefly are dealt with in this book in a popular manner. Each disease is described fairly fully, symptoms are given along with preventive measures. From the most insidious rinderpest down to the easily detectable but often neglected skin diseases of cattle they are dealt with in a manner in which no previous publication has done in so small a compass. The information contained is fully up to date. The author has prefaced with instructions as to how to maintain cattle in proper health. He gives a list of plants commonly used for poisoning cattle and concludes the chapter with an account of diseases communicable from cattle to man. The two appendices one giving the prescriptions and the other the vernacular names of the diseases would be found very helpful by those who cannot get professional assistance immediately. We are not sure whether vernacular editions have been published or in contemplation. We would very much wish that they were, though such might be free renderings of the originals and in which may be omitted many scientific terms. No cattle owner in India can be without this book unless he wishes to suffer the annual toll he is giving to diseases, which he can with some precaution keep out of his herd.

The book is priced at Rs. 1-4-0 and can be had of the Government of India, Central Publication Branch, Calcutta.

Dairy Cattle in India:—By K. S. V. Naidu, Zamindar of Kangundi.

This booklet of 45 pages has been lying on our table for some time. The author is a zamindar in Chittore District and is one of the very few who manage the estates very well and who really takes an interest in agriculture and especially in cattle. He has toured in Northern India, visited many principal private and Government cattle farms as Karnal, Hissar, Jehanghirabad, Poona etc. and seen the well known breeds in Western and Upper India

in their native homes. He has carefully noted their characteristics and performances. This information he has condensed in the form of a booklet for the use primarily of any agriculturist in the Madras Presidency who may desire to introduce any of these breeds for dairy and breeding purposes. Descriptions of each breed, the milk yields and details about lactation, besides other useful details are a special feature of this booklet. The tables at the end which furnish the trading results of a cow at the end of the fifth year, cost of feeding a calf for five months, the feeding scales for cows, in milk and when dry give interesting particulars. The Zamindar is maintaining good types of animals and is an enthusiast, holding cattle fairs and exhibitions now and then in his headquarters. In all this work he is helped by Mr. R. Ramachandran, an old Vet.

The price of the book is annas four and copies can be had of the author. This little book should be in the hands of every agricultural student.

Occurrence of Trichomonad:—Flagellates in the blood stream of Fowls:—Pusa Bulletin No. 173 of 1928:—Messrs. Hugh Cooper, M. R. C. V. S. and Amar Nath Gulati M. Sc. have exhaustively dealt with two cases of invasion of blood stream by trichomonads and observations on the incidence of trichomonas infection in fowls. The authors state by reference to previous literature that Trichomonads flagellates, though of common occurrence in the intestines of man and animals, would appear to have been observed only exceptionally to invade blood stream but one such instance was recorded in man while in lower animals these organisms were found in the blood of snakes, mice, rats, birds and pigeons. In the bulletin the authors describe the results of the examination of the disease. The description of the parasite, though highly technical, would seem to indicate the very insidious nature of the parasite in attacking fowls, which form a very remunerative portion of livestock of every farmer.

Improvement of Indian Wheat:—By Albert Howard C. I. E., M. A., and Gabrielle L. C. Howard M. A., Pusa Bulletin No. 171, 1927. In this excellent bulletin those two indefatigable giant workers in plant breeding—Dr. & Mrs. Howard—condense the results of their work of investigations carried out at Pusa from

1905 to 1924 on Indian Wheat. The Howards are too well known as interested in breeding to need any mention here, but the account they have condensed in this bulletin gives a glimpse of the difficulties and obstacles they have had to encounter in the attempts to evolve types of wheat which are distinguished by the qualities of rust resistance, short straw, grain quality and high yielding power. This bulletin is in fact a record of development of work on wheat for twenty years.

Journal of the Madras University:—Vol. I No. I, March 1928:—

We welcome into the ranks of high class journalism, the first number of this magazine which is proposed to publish half-yearly. Under the editorship of Dr. S. Krishnaswamy Ayyangar who has long been connected with the University this journal should attract eminent contributors and contain excellent articles. A publication issuing under the auspices of the University has been a long desideratum but unless as in several university institutions of this kind the broad and high aim is kept in view of putting forth the results of researches done by the alumni of the university as the editor hopes to act this journal will suffer in popularity, and perhaps dry up the springs of contributions which are now flowing into the magazines run at present by several constituent and affiliated colleges of the University and which it is not desirable to sap. We are afraid the publication has been undertaken a little too soon since very little of research has been done by the university. Any researches made in literature, philosophy, history and such subjects should not alone be allowed to swell the contributions and give rise to barren disquisitions though by brightest and subtlest intellects. The present number contains very excellent articles. We would single out for special mention Prof. P. J. Thomas "Present position of economic studies" Prof. C. R. Srinivasachari's Kingdom of Sri Vijaya in Sumatra" Mr. P. V. Seshu Ayyar's Atman and the infinities of mathematics."

List of new books received in the Agricultural College Library during 1927.

Austen E. E. The House fly. 2nd edn. 1926, Bloodsucking flies, Ticks &c., 4th edn. 1924.

Bald Claud. Indian Tea-its cultivation and manufacture. 3rd edn. 1917. 4th. '19. Banks and Calcord M. Index of American Economic Entomology-Index 1. by Banks N. (1905-14) 1917. Index 11 by Calcord (1915-1919) 1921 and Index 111 by Calcord M. 1920-4) 1925; Bennett E. T. Outlines of Fungi and plant diseases 1924; Berg Leo S. Nomogenesis or evolution determined by law. 1926; Bhatia B. L. Elementary Text Books of Zoology. 1923; Blatter E. The Palms of British India and Ceylon. 1926; Borradaile L. A. Manual of Elementary Zoology. 5th edn. 1926. Bose J. C. Sir. Physiology of Photosynthesis 1924; Bourcart E. Insecticides, fungicides and weedkillers 2nd edn. 1926; Bower F. Plants and man. 1925; Brodetsky S. A first course in Nomography, 1925, Brooks F. T. Report of Proceedings of the Imperial Botanical Conference London July 1924; Bruce A. B. and Hunter H. Crop and Stock improvement '26, Buechel F. A. The commerce of Agriculture. '26, Campbell D. H. Outline of plant geography 1926; Campbell L. Rubber Research in Ceylon. 1918; Carver T. N. Elements of Rural Economics 1924, Chamberlain C. J. Methods in plant histology 4 Revised Edn. '26, Claremont C. L. A practical handbook on Rat destruction 1926; Clowes F. and Coleman J. B. Treatise on qualitative analysis 1920; Coatman J. India in 1925-26; Cohen J. B. Practical organic chemistry 1926; Cole A. J. The Changeful earth '25; Cole C. A. J. Rocks and their origin 1922, Collings G. H. Production of cotton 1926; Conn H. W. and Conn H. J. Bacteriology 3rd edn. 1926; Craib W. G. Flora Siamensis Enumeratio. Vol. 1 part 2; Cunningham G. H. Fungous diseases of fruit trees in New Zealand 1925.

Davidson J. List of British aphides 1925; Dixon H. H. Transpiration stream 1924; Douglas Cleark C. H. Basis of modern atomic theory 1926.

Elbourne E. T. The marketing problem—how it is being tackled in U.S.A. 1926; Ellis A. E. British snails '26; Ellis W. M. Irrigation, 1926; Eriksson Dr. J. Die Pilzkrankheiten der landwirts—chafhlichen kulturegewaschase 1926.

Fawcett H. S. and Lee H. A. Citrus diseases and their control '26;

Finlay G. F. Cattle Breeding. Proceedings of the Scottish conference 1925; Fisher A. Mathematical theory of probabilities. Vol. 1 2nd Edn. 1922. Foster L. F. Principles and practice of Farm Book-keeping 1925; Fryer J. C. F. Insect pests of crops in England and Wales. 1922-24.

Garnier R. Ceylon Rubber Planter's manual 1922. 2nd edn.

Harding and Moore J. P. Fauna of British India-Hirudinae 1927; W. A. Haviland M. D. Forest, Steppe and tundra. 1926; Heald F. De. F. Manual of plant diseases. 1926; Hill A. W. Index Kewensis, 6th supplement 1926; Hingston H. W. G. Nature lat the Deserts edge. 1925; Hume H. H. Cultivation of citrus fruits. 1926; Hutchinson J. Families of flowering plants—I. Dicotyledons. 1926; Huxley J. S. The Stream of life 1926.

Ibbetson W. S. Accumulator charging, maintenance and repair 1926. Ivan Waillian E. Symbionticism and the origin of species 1927.

Jameson L. Manufacturers Practical recipes Vols. 1 to 3 1903. Joly J. Surface history of earth 1925.

Keeble Sir F. Life of plants 1926; Keith Sir A. Engines of the Human body 1926; Kerr J. G. Evolution 1926; Kerr J. G. Zoology for medical students 1921; Kerr J. G. Text book of embryology Vol. 11. Vertebrate 1919.

Leeuwenn Reijnvaan and Leeuwen Dr. The Zoocecidia of the Netherlands East Indies 1926; Love H. D. Notes of lectures on elementary applied mechanics. 5th edn. 1921; Love H. D. Hydraulics 16th edn. 1926.

Maclean J. Graphs and statistics 1926; Macmillian H. F. Tropical gardening and planting. 3rd edn. 1925; Maldon W. J. Grassland farming pastures and leys. 2nd edn. 1926; Marryat E. L. P. W. D. Handbook Bombay Vols. I and II 1925; Marshall A. Principles of economics 8th edn. 1925; Mehat N. L. Notes on reinforced concrete structures. 1916; Mellor J. W. Comprehensive treatise on Inorganic and theoretical chemistry. Vol. VI and VII 1927; Mendel G. Experiments in plant hybridisation 1925; Mitra Dr. S. K. Canning and preserving 1926; Moir J. M. Groundwork

of modern science 1927; Molinali Trans. by Pope. Treatise on general and Industrial Inorganic chemistry Vol. 1 Inorganic 1920; Mookerji B. Rasajalanidhi Vol. 1 1926; Moppett H. J. Tea manufacture its theory and practice in Ceylon 1922.

Newbigin M. I. Tillers of the ground. 1925; Newstead R. Evans A.M. (& Potts W.H.) Guide to the study of Tsetse Flies. 1924; Nirody B. S. Flower gardening in South India. 1927.

Oliver N. T. Lee's priceless recipes. 1926; Orwin C. S. & Kersey H. W. Estate accounts. 1926; Orwin C. and Peel W. R. The Tenure of Agricultural land. 1926.

Paterson W. G. R. Farm crops Vols. 1 to 4 1925; Patvardhan G. B. Aid to the study of crop breeding. '27; Perotti Prof R. Proceedings of 4th International (General Secretary.) conference on soil science. Index. Vol. 1 to 3. Index 1926. Prewett. F. J. Marketing of farm produce. Part. 1. Livestock. Part. 11. Milk. 1927; Prothero R. E. English farming past and present, (Lord Ernle) 4th edn. 1927.

Reaumur R. A. F. Trans. (by Natural history of ants. 1926; Wheeler W. M.) Rideal E. K. Introduction to surface chemistry '26; Rendle A.B. Classification of flowering plants Vol. II Diocotyledons. 1925; Robbins W. W. The botany of crop plants 2nd edn. 1926.

Saccardo and Trotter A. Sylloge Fungorum Vol. 24 Sec. 1, 26; Saker G. Dora. Practical Dairying 1921; Savory T. H. British Spiders—their haunts and habits. 1926; Secrist H. An Introduction to statistical method Revised edition. 1925; Shull A. F. Heredity. 1926; Soraner's P. Handbuchder pflanzenkrenkheiten Band IV. Tierische Schadlings an Natzpflanzen (Erster Teil 1925, Sprott F. H. Practical coffee planting 1922; Stevens F. L. Plant diseases Fungi. 1925; Stile W. Photosynthesis. 1925; Subramanya Ayyar Sir. S. The stone age in India 1925.

Thom and Margaret B. Church. The aspergilli 1926; Thomson M. R. and Thomson J. A. Threads in the web of life 1926; Thomson J. A. Concerning evolution 1925; Thomson J. A. Ways of living-Nature and man 1926; Thorpe J. F. and Whiteley M.A. Student's manual of organic chemical analysis 1926; Thorpe E. Dictionary of applied chemistry. Vol. VI 1926; Thorpe E. Sir. Essays in Historical chemistry 1923; Tillyard R. J. Insects of Australia and New Zealand 1926; Toll R. De. Tillotsons Directory of Pedigree stock breeders and year book of breeding industry, '27.

Voelcker Dr. J. A. Green manuring Rothamstead conference No. III 1927.

Wait W. E. Manual of the Birds of Ceylon. 1925; Willis Tayler A. J. Tea machinery and tea factories 1900; Watson J. A. S., Cameron J. and Gerrad G. A. Cattle breeder's hand book 1926; Wellhouse W. H. How insects live—an elementary entomology 1926; Whetham C. Dampier. Politics and the land 1927; Wieman H. F. General Zoology. 2nd edn. 1927; Wilkins V. E. Research and the land. 1926.

Yule G. M. Introduction to the theory of statistics. 7th edn. 1924.

DEPARTMENTAL NOTIFICATIONS.

Mr. M. Ananthan is confirmed as Assistant Paddy Specialist. Mr. T. Budhavidya Rao, Officiating Assistant Director, Live Stock, Chintaldevi, leave on average pay for two months from 5—4—28.

APPOINTMENTS, TRANSFERS, CONFIRMATION ETC.—

Mr. T. Paramanandam, L. Ag. is appointed Upper Subordinate, grade on probation and posted to Anakapalle. Mr. N. Pattathana, Certificate Holder, to be Lower Subordinate grade on probation, and posted to VII circle Messrs. C. Rajasekhara Mudaliyar Assistant V grade is confirmed, Mr. V. Suryanarayana, Farm Manager, Hosur, is transferred to II circle. Mr. C. S. Seshagiri Ayyar, Demonstrator VIII circle is transferred to IV circle on the expiry of leave. Mr. S. Mahadeva Ayyar, Demonstrator, Manapparai is transferred to Ariyalur on relief by Mr. P. V. Saneu Ayyar, Assistant Demonstrator. Mr. A. Venkatarangam, Demonstrator on the expiry of Special Duty to Chintaldevi Cattle Farm. Mr. A. Venkobachar, Assistant Manager on relief to II Circle. Mr. K. Manga Raju, Upper Subordinate from I Circle to IV Circle from 1st June 1928. Mr. R. Swami Rao Demonstrator on relief to III Circle.
Leave etc.—

THIRD CIRCLE :—Mr. B. Venkataramana, Assistant Demonstrator, Markapur, leave on average pay for one month from 2nd March. Mr. S. Varadarajulu Naidu, Assistant Manager, extension of leave on average pay for 11 days and leave on half average pay for 3 days.

FOURTH CIRCLE :—Mr. N. C. Tirumalai, Manager, extension of leave on medical certificate for seven weeks. Mr. S. Subramania Ayyar, Demonstrator, St. Thomas Mount, leave on medical certificate preparatory to retirement in September 1928 Mr. P. Janakiram Ayyar to relieve him. M. V. Kumaraswamy, Assistant Demonstrator, extension of leave on medical certificate for one month.

SEVENTH CIRCLE :—Mr. P. Abdullah, Assistant Demonstrator, Badagar, leave on average pay for 4 months from 1st April. Mr. P. K. K. Nambiyar Assistant Manager extension of leave on average pay for one month and 11 days.

EIGHTH CIRCLE :—Mr. S. Viravaradarajulu Demonstrator, Avanasi leave on average pay for one month from 5th March 1928.

LIVE STOCK :—Mr. A. Venkobachari, Assistant Manager leave on average pay for one month from date of relief.

P. S's. SECTION :—Mr. S. Dharmalinga Mudaliar, Assistant, leave on average pay for 10 days from 26th March.

G. L. B's SECTION :—Mr. S. Ramaswami Raju, Sub assistant leave on average pay for one month from 5th March.

G. M's. SECTION :—Mr. K. Krishna Menon Assistant leave on average pay for 17 days from 19th March.

G. E's. SECTION :—Mr. N. Krishna Menon, Sub-assistant extension of leave on average pay for ten days.

EDITORIAL.

Indian Economic Conference:—This year's Session of the Indian Economic Conference was as momentous as ever. Several papers were read which had a direct bearing on Agriculture. A few amongst them were (1) Co-operative marketing by Dr. H. Sinha (2) Agricultural credit by Dr. H. C. Seth. (3) Land mortgage Banking by Dr. J. Sinha (4) Double cropping in certain regions of over population by Mr. B. N. Gangooly. The next session of the Conference will be held in Mysore in January 1929 and the three subjects selected for discussion are (1) Land tenure, (2) Central Provincial and Local finance and (3) Marketing, and papers should reach the local secretary by the 31st October. We hope that as the Conference is held very near Madras a large number will attend and contribute papers.

Change in Ministry:—During the month Hon'ble Mr. A. Ranganatha Mudaliar who has always been a people's man has had to resign along with the excise minister Hon'ble Mr. G. Arogyaswamy Mudaliar. M. R. Ry. M. R. Sethurathnam Iyer, one of the biggest landholders in the Trichinopoly District and President of the District Board, was offered and accepted the post of Development Minister. Untrained in red tapism and untrammelled by preconceived ideas inevitable under long official routine, Hon'ble Mr. Iyer comes to his task with an open mind and will, we hope, to look at development problems with the eye of an Agriculturist.

Agricultural Budget:—The change of ministry during this month and the tense atmosphere in which the March Session of the local Legislative Council was proceeding raised some doubts as to the safe passage through it of the Agricultural portion of the budget. We are glad that, as has always been the case with the Local Council since 1920, sanctions sought for have been without any dissentient voice granted in "toto" which shows that in the matter of Development departments, especially agriculture, our legislatures, whether of one persuasion or another are quite unanimous. We think that, but for the cautious estimates of the Director much more sums would have been granted had other schemes been put forward. We hope that Development departments will continue to enjoy the increasing confidence of succeeding generations of Legislators.

Agricultural teaching:—The Agricultural College at Coimbatore was affiliated to the University in 1922 and the first batch of students sat for the Examination in 1923. The course of instruction and the syllabuses in each subject were largely based on the Diploma course and have undergone little modification during the succeeding five years. Considerable experience have been gained now. With a growing desire to bring up the standard to a state at which these examinations may be considered equal to those in Britain and other countries it seems necessary to revise the syllabus and alter the course of instruction. It is hoped that the recommendations of the Royal Commission which will issue in a few weeks time will throw light on the working of this institution and help the College authorities and Government in making such changes as may be considered necessary and suitable.

(v)

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(vi)

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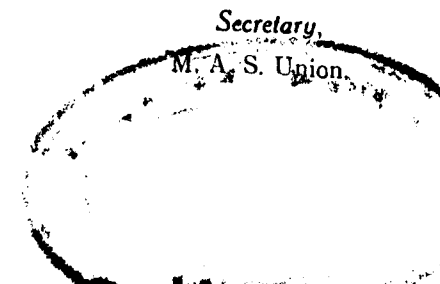
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and Standard Saltpetre Refinery,
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(vii)

The Ramasastrulu-Munagala Prize 1928.

1. The Prize will be awarded in July this year.
2. The Prize will be in the form of a Medal and will be awarded to the member of the Union who submits the best account, of original research or enquiry, carried out by him on any agricultural subject.
3. The subject matter shall not exceed in length twelve foolscap pages type-written on one side.
4. Intending competitors should notify the Secretary of the Madras Agricultural Students' Union not later than the 1st June the subject of the paper which they propose to submit and the paper should be sent in so as to reach the Secretary, Madras Agricultural Students' Union not later than the 15th June 1928, with a covering letter showing full name and address of the sender. The author's name should not be shown on the paper which should be entered under a *nom-de-plume*.
5. Four type written copies of the essays should be sent in.
6. The name of the successful competitor will be announced and the prize awarded at the time of the Conference.
7. The Union reserves to itself the right of publishing all or any of the papers.
8. All references in the paper to published books, reports or papers by other workers must be acknowledged.
9. Papers submitted will become the property of the Union.

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



(viii)

Amendments to the Rules of the Union

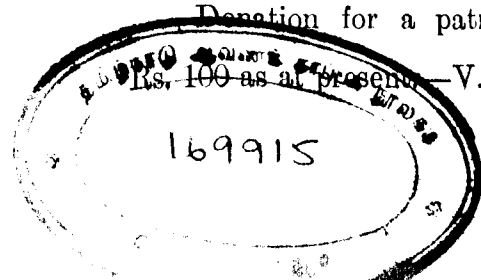
Members under old rules whose arrears to the Union exceed a sum equivalent to their two years' rate of subscription for the journal will not be eligible either to vote or to serve on any of the Committees.—M. Rajagopalan.

In rule 3 after the word "journal" insert the word 'quarterly.'—C. S. Krishnasami.

The title of the journal instead of as at present shall be "the Madras Agricultural Journal"—Organ of the Madras Agricultural Students' Union.—V. Muthusami Aiyer.

There shall be an editorial board of not less than five members ordinarily to represent one section, each of whom two namely the editor and one member shall be members of the working committee the Vice-President shall be the ex-officio member of the board.—V. Muthusami Aiyer.

Donation for a patron shall be Rs. 250 instead of Rs. 100 as at present.—V. Muthusami Aiyer.



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J. J. M. A. I.
N 28

OFFICE-BEARERS FOR 1927—28.

The Council (25 Members.)

President.

President (Ex-officio) Principal—C. Tadulingam F. L. S.

Vice-Presidents (4)

Resident:—T. V. Rajagopalachari.

Mofussil:—G. Rajagopala Nayadu, Periapalayam (via Ponneri),

„ K. T. Alwa, Coimbatore.

„ K. Unnikrishna menon, Tellicherry.

Members (20)

Resident: (10) M. C. Cherian, *Secretary*.

„ D. Srinivasa Rao, *Treasurer*.

„ V. Muthusami Ayyar, *Editor*.

„ T. R. Naganathan, *Manager*.

„ P. N. Krishna Ayyar, *Member*.

„ M. R. Balakrishnan „

„ S. Dharmalingam „

„ C. S. Krishnaswami „

„ M. S. Purnalingam „

„ M. Rajagopala Ayyar „

Mofussil: (10) A. V. Tirumuruganatham Pillai (Guntur).

„ K. T. Bhandari, (Hospet).

„ R. Swami Rao, (Kalahasti).

„ N. Parthasarathy Ayyangar (Aduthorai).

„ A. K. Ganesa Ayyar (Sankarankoil).

„ G. J. Balraj (Madura).

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