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TOBACCO PLANTING IN CEYLON.

At the meeting of the Ceylon Agricultural Society, held in Colombo on September 10th last, the Hon'ble Mr. A. Kanagasabai asked whether the Director of Agriculture had decided upon any definite line of action in the future with regard to the subject of tobacco cultivation in Ceylon. It will perhaps be opportune briefly to examine the case for a renewed trial of tobacco growing by the Government or by the Society.

The Tobacco "Expert."

One of the difficulties to be encountered is that of securing a competent man and we take this opportunity of saying that we are not sure that one describing himself as an "expert" would necessarily prove to be the man we require. This word in our opinion is not well adapted to describe those who have specialized in the cultivation of tobacco, rubber, cotton or any other particular product. A man may be appropriately called expert at cigar wrapping or rubber tapping or at any other mechanical work at which he is particularly skilful; but a successful tobacco planter must have many other qualities besides that of skill in planting. We have known men who have proved unsuccessful in other pursuits, after visiting a few rubber estates and attending an exhibition describe themselves as rubber "experts," a designation never completely assuring. A man who has specialized in tobacco planting must have devoted more of his life to planting tobacco than to anything else; but the word "specialist" is as a rule used to describe those who have made a study of a particular branch of surgery. An experienced tobacco planter needs describing in no other terms than briefly a tobacco planter. No one as far as we are aware is expert at tobacco planting in Ceylon, meaning thereby that he knows how t plant and cure tobacco in Ceylon and compete successfully in the world's markets. We must seek a thoroughly experienced man—one not merely to prescribe but to produce.

The Position in Jaffna.

Jaffna smoking tobacco is being shut out of Travancore; not entirely but to a great extent. This will mean a serious financial loss to the district unless some other market can be found, as tobacco is the

most paying crop from there. Jaffna cigars, though beloved of the people of Jaffna, are not popular in other parts of the island and even if they were the local market could not probably absorb all the tobacco that Travancore rejects. It would seem, therefore, that if they are not to suffer a set-back in prosperity the Jaffna cultivators must make a bid in an outside market, namely the European. To effect an entry into the European market new types and new methods of curing will have to be introduced. But, it is said, the Jaffna people are so conservative and so wedded to their present methods that they will never come to adopt new ones. That to our mind is an argument that at present carries no weight. It must be first demonstrated that tobacco for the European market can be successfully produced in Jaffna. If and when that has been done and the Jaffna cultivator does not follow the lead given him he cannot complain afterwards about being left behind. We do not believe it of him. But in any case the Government or the Society will have done its duty by him.

Operations, if successful in Jaffna, would soon come to be imitated in other parts of the island, but the question of the suitability of Ceylon for growing cigarette tobacco, for example, would not be finally disposed of if Jaffna proved unsuitable.

THE DURIAN.

(*Illustrated.*)

Durio zibethinus (*Malvaceæ*). Durian; Civet-cat Fruit.—A very large, handsome pyramid-shaped tree, of the Malayan Archipelago, and commonly cultivated in the Straits, Burma, Java, &c., for the sake of its celebrated fruit. The latter is produced on the older branches, varies somewhat from round to oval in shape, and usually weighs from 5 to 7 lbs. or more. It is armed with thickly set formidable prickles about half inch long; when ripe it becomes slightly yellow, and possesses an odour which is intensely offensive to most people, especially on first acquaintance with it. The cream-coloured pulp surrounding the seed is the edible portion; this is most highly prized by the Malays and other oriental people, and is also relished by Europeans who acquire a taste for it. Firminger described it as "resembling blanc-mange, delicious as the finest cream," whilst Mr. Russell Wallace considered that "eating durians is a sensation worth a voyage to the East." The large seeds may be roasted and eaten like chestnuts. Pounded into flour, they are said to be sometimes made into a substance like "vegetable-ivory." The Durian tree thrives in the moist low-country of Ceylon up to 2,000 feet elevation, and luxuriates in deep alluvial or loamy soil. In Peradeniya Gardens, there are magnificent specimens well over 100 feet in height. They usually flower in March or April, and the fruit is ripe in July or August. Durian fruits are variable in size, shape, flavour and quantity of pulp, according to variety. The trees also vary in productiveness, some varieties being almost barren. Selection and high cultivation should, therefore, be practised in order to obtain the best fruits. The tree is readily propagated by seed if sown fresh; the seed is of short vitality and germinates in seven to eight days.—(*Macmillan.*)

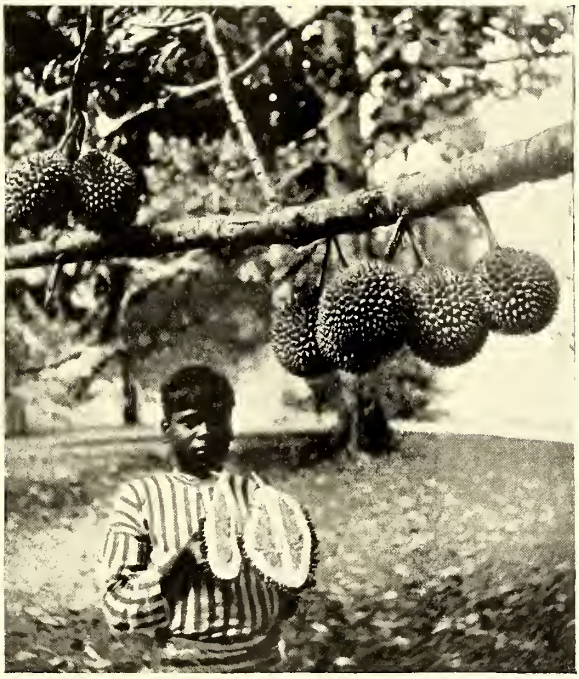

Photo by H. F. Macmillan.

DURIAN FRUIT.

THE INTRODUCTION OF *HEVEA BRASILIENSIS* INTO THE EAST.

[Notes on the history of rubber cultivation in the East are in course of preparation. It has been considered advisable to publish the following extract in the *Tropical Agriculturist*, as it raises points of immediate interest.]

After the successful introduction of Cinchona into India and the East, it occurred to Clements R. Markham that something of the same kind might be done with rubber-producing plants. The consumption of rubber was steadily increasing, and owing to the destruction of the trees by native methods of tapping it was anticipated that the demand would soon exceed the supply. The chief rubber tree of India, *Ficus elastica*, was being destroyed wholesale by the collectors, who felled them in order to tap them more easily; and consequently the establishment of plantations under proper control was being strongly urged by the Forest Department of that country. Under these circumstances, the Indian Government were persuaded of the advisability of taking steps to ensure the permanence of the industry, either by adopting the proposals of the Forest Department or by introducing other rubber-yielding plants.

Before embarking upon any expensive operations, Markham entrusted Mr. J. Collins with the task of collecting all the available information concerning rubber trees, in order to determine in what direction efforts should be made. Collins published an exhaustive report in 1872 from which it was concluded that " the establishment of plantations of *Ficus elastica* should immediately be undertaken in Assam; but that the caoutchouc from the Heveas and Castilloas of South America was superior to that of the Ficus and that consequently those trees should be introduced into British India."

It was soon evident that little was to be expected from *Ficus elastica*. The establishment of plantations proved more difficult than was anticipated; and it was stated that although *Ficus elastica* would grow with undiminished rapidity and luxuriance in stations remote from the hills it failed to yield caoutchouc. In all probability the latter statement was inaccurate.

It is not easy at the present day to understand why such difficulty was experienced with this species. The propagation of *Ficus elastica* is an operation which is successfully performed by the humblest nurseryman, and King asserted that it could readily be grown from seed sown in soil. But the same fate befell similar experiments in Ceylon. At the instigation of the Home Government, Thwaites attempted the cultivation of *Ficus elastica* in 1874, but in 1875 he reported that the experiment had met with very little success; in 1876, seeds were obtained from Assam and a few plants raised, but with the advent of other species of rubber trees the experiment appears to have been abandoned. It is however to be noted that flourishing specimens of *Ficus elastica* were already in existence at Peradeniya, the famous row along the front dating from 1833; and although one may feel thankful that *Ficus elastica* did prove a failure, yet it may be surmised that the lack of success was not altogether due to difficulties of cultivation.

First Introduction of Hevea.

The introduction of South American species was undertaken by Kew at the expense of the Indian Government. At first, attempts were made to import seeds of *Hevea*, but it was found that these deteriorated rapidly and very few reached England alive. In 1873, Markham forwarded to Kew seeds of *Hevea brasiliensis* which had been obtained from the Amazons, and from these about a dozen plants were raised. A note by Trimen on the Peradeniya copy of the Kew report states that these seeds were obtained by Farris through Collins. In the same year, Dr. King, then superintendent of the Calcutta Botanic Garden, took out six of these plants with him on his return to India, and from these others were raised by cuttings; but the climate of Calcutta proved unsuitable for *Hevea*, and in the following year King expressed doubt that the plant would ever thrive there. In 1876, he reported that it had failed both in Calcutta and Sikkim. There is no record that Calcutta distributed plants of this consignment to other countries, though they were propagated there by cuttings.

Second Introduction of Hevea.

The transmission of seed in the ordinary way having been found impracticable, Mr. Robert Cross was sent out to South America to obtain plants. At the same time, a commission was given to Mr. H. A. Wickham, who was then resident at Santarem, to collect seeds at the rate of £10 per thousand. Such a commission must, at the time, have been considered somewhat of the nature of a forlorn hope, scarcely possible of realisation, as indeed the absence of any stipulations or conditions would appear to indicate. But Wickham, fortunately for the East, found a steamer, at the very time the seed was ripe, about to return to England without a cargo, and chartered it "on behalf of the Indian Government." Seeds were immediately collected "in the forest covering the broad plateaux dividing the Tapajos from the Madeira rivers," and placed on board. They were cleared at Para as botanical specimens for Her Britannic Majesty's Royal Gardens at Kew, and were safely out of the country before anyone had time to realise the true meaning of the enterprise. As an example of colossal "nerve," the whole proceeding would be hard to beat.

Wickham reached England in June 1876 with 70,000 seeds, arriving at Kew on June 14th. The following day the seeds were sown, and about $3\frac{3}{4}$ per cent. subsequently germinated, some as early as the fourth day after sowing. As it had already been demonstrated that *Hevea* would not thrive in Calcutta or in any of the readily accessible Botanic Gardens of India, Ceylon was chosen as the centre where the plants should be established and whence they might be transmitted to different parts of India. In the following August, 1919 plants were forwarded to Ceylon in charge of a gardener, and about 90 per cent. arrived in good condition.

In addition to the main consignment to Ceylon, small parcels of plants were sent to Africa (West coast), Burma, Dominica, Jamaica, Java, Queensland, Singapore, and Trinidad. "In the case of Singapore the result was unfortunate. Owing to the delay of the India Office in paying the freight, the cases did not come into the hands of the Superintendent of the Botanic Gardens until the plants were nearly all dead." Ridley states that none of these plants survived; but that is evidently a mistake, since in the Kew Report for 1877, an extract from a letter from Murton

(September 6, 1877) is quoted, to the effect that the *Hevea* sent last year (*i.e.*, 1876) were making good progress.

All the plants consigned direct to Burma died; but later in the year Duthie took out another case to Calcutta, of which one third were sent to Assam and 16 to Burma (1877). The survivors of the latter, eight in all, were planted in the Forest Office compound at Mergui.

Third Introduction of Hevea.

Cross sailed from Liverpool on June 19th, 1876, and on July 15th arrived at the port of Para, which he made his headquarters during his stay in Brazil. After exploring the surrounding districts by short excursions from Para, he began, on August 2nd, to collect seedlings, and by August 10th had accumulated about 2,000. Some of these were rejected, and the remainder, over 1,000, were planted in decayed leaves mixed with wood ashes in special cases. He returned to England in November 1876, bringing 1080 seedlings, of which scarcely 3 per cent. were saved. These were propagated by cuttings, about 100 plants being subsequently sent to Ceylon (September 15,1877), while small parcels were sent to Singapore, Java, Queensland and Mauritius. This made a total of 2019 plants sent to Ceylon "for subsequent transmission to India."

The number of plants sent to Singapore was 22. They were despatched on June 11th, 1877. It was probably nine of these which Murton planted in Perak in October, 1877.

Other Introductions of Hevea Brasiliensis.

In the Report of the Forest Department, Singapore, for 1891, it is stated that seeds were obtained from Kew in that year. There is no record of any such consignment in the Kew publications, and Ceylon was then supplying seed to Kew for transmission to the West Indies. It seems highly improbable that Kew ever supplied Hevea *seed* to any Botanic Garden in the East; but in the *Agricultural Bulletin* of the Malay Peninsula (1898), p. 230, Ridley, in a discussion of earlier records, stated "seed has been successfully sent from South America *via* England, though usually with much loss." Further information on this point is desirable.

The Species Introduced.

During recent years, it has on several occasions been suggested that the *Hevea* introduced into the East is not the species which yields the Fine Hard Para of commerce, the idea being in nearly all cases based upon the alleged inferiority of some grades of Plantation rubber. And a somewhat similar question has compelled the attention of the rubber planter, namely, whether all the introduced *Hevea* trees belong to the same species. The inferiority, real or supposed, of plantation rubber is in most cases capable of explanation in other ways, more especially by the age of the tree; but the planter certainly has good grounds for questioning the identity of all the *Hevea* trees on his estate. He sees enormous variation in the size of the leaf, well-marked differences in the character of the bark which appear to be related to latex-yielding capacity, and variations also in the type of seed. It is usual to attribute these variations to the effect of a new environment; and they are perhaps not more numerous than might be expected to occur when so many thousands of plants are brought under new conditions of growth. Whether these variations breed true has not yet been determined, nor has it yet been decided whether any particular types of leaf, seed, and bark are constantly associated with one another. Experiments have been instituted, but a considerable time must elapse before any definite information is obtained,

It has been customary to meet all such doubts by the statement that Wickham collected the seeds of one species on the Tapajos, and from those seeds all the cultivated Heveas are descended. But it will be seen from the details already set forth that this answer does not meet the case. Wickham's was certainly the main consignment, and was distributed to Ceylon, Singapore, and Burma; but Cross's plants, which were obtained within easy walking distance of Para, were also sent to Ceylon and Singapore, while both Burma and Singapore received plants or seeds from Ceylon subsequently, nearly all the old trees in the Singapore Gardens being from Ceylon seed. Cross's contribution was small, but his plants nevertheless formed five per cent. of the total sent to Ceylon, and apparently a greater percentage of those sent to Singapore. There does not appear to have been any distinction made between these consignments, though one group of trees at Peradeniya is practically certainly part of Wickham's collection, and so are, presumably, those in the Forest Office compound at Mergui, if they still exist.

In addition to these two consignments there was the earlier batch of seed obtained in 1873 from Cameta, near Para. Six of the seedlings raised were sent to Calcutta and need not trouble us further; but from the remainder, plants were propagated by cuttings at Kew (Kew Report 1875), and it would seem quite probable that these would be distributed. In that case, though the bulk of the plants were derived from the Tapajos there are at least two other sources to be considered, and under the circumstances it is apparent that a systematic examination of the plantation *Hevea* of the East is more desirable than has hitherto been supposed

T. PETCH.

THE PREPARED MIND.

Science of June 21st last reproduces an address by Dr. Pearce of the University of Pennsylvania delivered on May 21st at Syracuse University.

He takes as his text the words of Pasteur "In the fields of observation, chance favours only the mind which is prepared" and goes on to preach on the value of research work.

The mind which is trained to observe the details of natural phenomena, and to reason concerning the bearing of known laws on such phenomena, is the "prepared mind," that is to say, it is a class of mind which, because it is endowed with a peculiar faculty, best described as a scientific imagination, grasps the significance of a new observation, or of a variance of a known sequence of events, and thus establishes a new law or invents a new practical procedure.

The preliminary education of the individual is the first and in many ways the most important consideration, and a knowledge of the scientific principles of chemistry, physics and biology is invaluable to our youth. The value of biological training was emphasized by Huxley many years ago, and that of physic and chemistry has recently been emphasised by Frederich Muller in his memorandum to the Royal Commission on University education in London.

Dr. Pearce deals with his subject in relation to medical education, but the need for a scientific grounding and the "prepared mind" is as urgent in this as in other lines of study (whether Medicine, Agriculture, or Botany) if education is to aid the human mind in the direction of originality, investigation, invention and discovery.

FUNTUMIA RUBBER IN SOUTHERN NIGERIA.

The following extracts are by the *Agricultural News* (July 20) from an interesting report by the Provincial Forest Officer, Central Province, Southern Nigeria, on the tapping of Funtumia rubber in Benin City Communal Plantations, in 1910.

The plantations are formed by the village people under the supervision and encouragement of the Forest Staff. It has been, and is still, the practice each year for the Forest Staff to collect seed from the forest, take it to the villages and make nurseries with the help of the village people. Later in the year the Forest Staff supervises the planting out into the plantations, the labour for all operations being supplied by the villages and utilized under the direction of the Forest Staff. In each village there are one or more 'Ogas' or headmen who are told off to look after the plantations, and whose duty it is to see that they are kept weeded, etc. These Ogas are usually exempted from other work.

Tapping.

Tapping was commenced on June 8, the greater part of May having been taken up in building a drying shed at Benin City for the reception of the rubber when it came in from the plantations. The trees were tapped on the full herring-bone system, to a height of 10 feet, and halfway round the tree.

Coagulation.

This was done by boiling, as it was thought unwise to introduce acids or chemicals of any description for the purpose. My opinion is that all the operations should be done in a way that the natives can easily imitate. It was a matter of some experiment before we arrived at the correct quantity of water to use, when cooking, to prevent burning; but it was eventually gauged to a nicety, and I think I may say that after the first month there was not a single buscuit spoiled by burning, whereas at first quite 50 per cent. were burned.

The boiling was done in enamel-lined saucepans holding about 3 pints, putting in about 1½ pints of water to a quarter of a pint of latex; the water was brought to boiling point before the latex was put in. It was found necessary to get the proportion of water to latex fairly correct as too little water results in burning, whilst too much causes the whole thing to overflow and thus waste the rubber. During the coagulation the rubber is kept off the sides of the vessel with a clean stick, and the mass is cooked until the remaining liquid becomes quite clear.

A point worth mentioning here is that fresh latex, that is that just taken from the trees, cannot be cooked satisfactorily. It is impossible to get the water clear, and in the efforts to do so the rubber becomes overcooked and too tough to roll out. If taken out whilst still soft enough to roll there is necessarily a large amount of rubber left behind in the water, and this of course is wasted. On the other hand, if the latex is allowed to stand for twelve hours, the water is cleared without excessive cooking; the rubber is in a pliant state capable of easy rolling, and there is no waste. Evidently some mechanical change takes place in the latex whilst standing, which makes the globules cohere more readily.

After cooking, the rubber is thrown on to a table or other flat surface and rolled out into thin biscuits with a wooden roller. The side of a box and a bottle answer the purpose quite well, in the absence of more convenient apparatus.

Cooking was in each case done in the plantation; the rubber was then brought into Benin City and washed. It was found necessary to wash it for a whole day in the same way that one washes a photographic plate, in order thoroughly to get rid of the serum. After washing it was placed in the specially built rubber-drying shed.

This building is 54 feet long by 20 feet wide, and is constructed of squared timber and corrugated iron, the sides being made to open for ventilation. Internally it is fitted with a series of wire netting shelves to receive the rubber biscuits, it being found impracticable to handle them.

Drying and Cause of Tackiness.

It takes a long time to dry the rubber thoroughly, and it is doubtful if it is possible to bring it to the requisite state of dryness during the wet season without the aid of artificial drying apparatus. During last season small fires were kept going in the shed most of the time, but even then the June rubber was not considered sufficiently dry to sell before October, and the whole was not ready for shipment until December.

There is one interesting point in connexion with the drying of rubber which I should like to mention, and that is the cause of tackiness. As is well known by anyone who has had to do with rubber (Funtumia rubber at any rate), it frequently happens that some of the biscuits become tacky; that is to say, they become sticky on the outside, and the whole mass gradually becomes converted into a gum-like substance which sticks to everything and cannot be got rid of. This occurred with several of our biscuits last year, and for a long time I was at a loss to account for it. I found on experiment that it was only on the outside of the shed, where the rubber was exposed to the morning or afternoon sun, that the tackiness occurred. This, of course, would have been noticed before had it not been for the fact that the biscuits were constantly turned to accelerate drying. and in the operation the positions were altered.

After the discovery I erected palm leaf shades on either side of the shed, and since then there has been no tacky rubber.

Results.

The season's operations comprised the tapping and thinning of eighty-four plantations, the total number of trees tapped, that is trees 18 inches in girth and over, being 4,706, yielding 413 lb. 12 oz. of dry rubber. The total number of trees tapped to exhaustion and cut out was 28,815, yielding 608 lb. 4 oz. of dry rubber. The total yield of dry rubber was 1,022 lb. The loss of weight in drying was 37·7 per cent. The average yield per tree of tapped trees, that is 18 inches in girth and upwards, was 1·4 oz. The average yield per tree of thinned trees, that is tapped to exhaustion, was 0·3 oz.

The rubber was sold by Messrs. Figgis & Co. in London, in March. It was put in three lots and realized the following prices, finest plantation Para at the same date fetching 6*s.* 11*d.* per lb.: lot 1, 470 lb., 6*s.* 6*d.* per lb.; lot 2, 466 lb., 6*s.* 1½*d.*, and lot 3, 60 lb., 5*s.* 6*d.* per lb. This is an average of nearly 6*s.* 1*d.* per lb.

Lot 2 was composed of slightly thicker biscuits than lot 1, whilst lot 3, was partly composed of the tacky rubber previously mentioned.

The gross sum realized was £302 12*s.* 9*d.*, whilst brokerage and other charges amounted to £5 11*s* 7*d.* making a net result of £297 1*s.* 2*d.*

CO-OPERATION IN AGRICULTURE.

History of Progress.

There has recently been published a collection of monographs* which trace the history of the Co-operative movement in the principal countries of the world. The volume is commended to the attention of those to whom agricultural interests appeal. It is a revelation of the power of a new economic force which has its beginnings in remotest history.

To the ordinary Englishman the word Co-operation suggests vaguely a form of urban shop-keeping. In Great Britain co-operative methods have made little headway outside the towns. The country is still one of large holdings farmed by men, individualist by instinct, who have not yet felt the need of combination. If the movement towards small holdings, inaugurated by the act of 1907 and officially blessed by both parties, develops, it will shortly be found that an effective co-operative organisation is an indispensable condition of success. But for the present we must look to Ireland and to foreign countries in order to see what co-operation in agriculture can effect.

These monographs tell the story; it is a plain tale of facts and figures, all the more remarkable because it covers a period of little over 50 years. Last century was one of awakening and activity in every branch of human affairs. The strain and competition and the progressively centralising tendency of commerce and industry reacted on the agricultural world. The stress of life grew steadily harder: a growing population demanded more intensive cultivation and a more productive soil, and these could be obtained only by utilising the costly improvements of technical science; while the increasing opposition of the commercial world and the growth of outside economic concentration compelled the closest attention to the interests of agriculture. Had the small farmer clung to his isolation he would have gone to the wall. Fortunately, when the economies and saving power of association for common ends were demonstrated to him, he developed a genius for it. The amazingly rapid development of co-operation is the one great fact of recent agricultural history in Europe; it extends not to one or two countries to certain branches of agriculture, but to every country where the small holder exists and to every department of rural economy. And the movement has been wholly for good. In towns association is to some extent a dividing force, applied to the defence and assertion of sectional and class interests at the expense of others. But in rural areas it is more purely utilitarian and is generally a bond uniting all classes.

Co-operative work in India.

India, short though her co-operative history is, occupies a serious place in this volume. The inclusion of her monograph is useful, because it brings her methods and lines of work and results into prominent contrast with those of other countries. The comparison is instructive, and those who are interested in the Indian movement will find the volume suggestive and illuminating.

* *Monographs on Agricultural Co-operation in various countries*, published by the International Institute of Agriculture, Rome.

Of all the points of variance by far the most prominent is the relation of the state to the co-operative movement. The uncompromising opponent of State assistance in any form will find no support in these monographs. There is no country which does not accord more than mere legislative recognition to the co-operative idea. The aid is rendered variously in different states, in the form of legal privileges, assistance in propaganda, financial facilities, direct subvention and otherwise. One may hold that the State aid is often unnecessarily and sometimes injudiciously given. One could prove that where the movement is strongest dependence on the state is lightest. Yet on the other hand it is not be denied that the help of Government has been of great service in most countries and especially to certain branches of co-operative work, and that but for that help co-operation would not be the vigorous growth that it is today. State aid is not a principle to be condemned or approved in the abstract. There is a time to give and a time to withhold aid. Like every other principle it is relative, and must be applied with direct reference to the circumstances of each country and people and the requirements of each form of co-operative activity.

State Aid—Where possible.

But the writers of these monographs hold no brief for State aid. Their straightforward narrative ought to convince the straightest theorist that there are circumstances in which such assistance is permissible and even advisable, and that it is a matter on which a man may not dogmatise. But no attempt is made to uphold State aid as a good thing in itself. On the contrary, the inference everywhere is that a completely self-reliant movement is the ideal, and that Government assistance is only a means to that end—it can never be a substitute for popular inspiration and direction. The essential thing to notice is that in Europe the initial impulse has invariably come from the people. The co-operative idea was evolved to meet changing economic conditions by those who actually felt the pressure of them. Only when that idea had been put to the test of practical working and its efficacy proved did the State come forward with its assistance, an assistance which was not always gratefully received. First and above all things the movement in Europe is a self-conscious and popular one, deriving its impetus from private enterprise and dependent upon its appeal to the people's sense of interest.

Unique Position in India.

It is here that the Indian movement occupies a position by itself. The writer of the monograph on India sums up the progress made as "an illustration of State aid effectively administered rather than of organised self-help." We reversed the normal process by beginning at the top. Government not only introduced the idea to India but appointed official Registrars to make it known and to organise and guide a co-operative movement. It was the only possible course. The condition of agricultural India obviously called for co-operative societies, although the people had not thought the matter out and there was no conscious demand for them. The great danger of the arrangement was the possible officialisation of the movement. Every Registrar on his appointment at once becomes an enthusiast. He is convinced, and rightly, that a widespread co-operative system would mean the regeneration of the rural population. But he finds that the educated classes, the natural organising agency, are apathetic, and the temptation to form societies by official means is strong. The reports show that in most provinces this temptation has been resisted.

In India, as in every other country, the teaching of experience is that excessive artificial fostering produces a weakling growth. Government has shown the way. There are in every province the beginnings of a healthy movement, which grows more self-conscious every year, and which is gradually attracting the interest of the educated classes. The future rests with the people of India. An officially run movement on a wide scale is a thing unthinkable. A popular movement, appealing consciously to the interests of the agricultural classes, under general official guidance, but supported by the energy of numbers of local organisers, is eminently practicable. That is the ideal aimed at. It is certain that without that propelling popular force the movement can never have vitality or spontaneity.

India is Predominantly an Agricultural Country.

Agriculture in its many phases is by far the most important interest, and merits the greatest share of attention. Much has been done and more attempted to improve the situation, but the picture is still dark enough. The agriculturist, the pillar of the State, is paradoxically its weakest member. To the Mahajan's credit one may, almost without exaggeration, apply the celebrated phrase attributed to Louis XVI. that it "supports agriculture as the rope supports the hanged." From first to last the ordinary ryot is dependent on that credit; he is scarcely even a free agent. His methods of cultivation are primitive and often wasteful, and in disposing of what crops he gets he can only accept such prices as the middleman chooses to offer. Weak and isolated, he is in no position to improve his fortunes. And the economic conditions are rendered harder to assail by the conservatism of centuries and the improvidence that accompanies blank poverty. The picture has been painted a hundred times.

Co-operation a Factor for Unity.

It is possible that four years' work in connection with co-operative societies affects one's sense of proportion. But there is no one who has taken part in the work who does not regard co-operation as incomparably the most promising means of attacking the agricultural problem. And a perusal of these monographs confirms that conviction. To compare agricultural Europe of the present day with the same Europe of the early 19th century is to gain fresh hope for India. If rural India is backward and her outlook discouraging, there was a time when continental Europe was little better. In the change, astonishing both in its magnitude and rapidity, that has taken place in the West co-operation is probably the most important factor. Rural credit has been reorganised. The co-operative society enables the small farmer to cultivate scientifically, to get good seed and manures and agricultural machinery at cheap rates, to sell his crops to the best advantage while avoiding the profit of the middleman, to manufacture his dairy produce and sell it in the best market, to improve the breed of his livestock and to insure his possession against all risks. These are only a few of the directions in which the co-operative principle has been applied. The movement encourages agricultural education and reaps the benefit in improved cultivation and a stronger and more intelligent force within itself. The societies form practically a huge unpaid agency for making known and bringing into practical use in all parts of the country the improvements of agricultural science and economy.

Unless such a development is regarded as attainable in India our present work is meaningless. We are still a long way off it, and before

it is reached there is much to be done in the way of education and the breaking down of old prejudices and habits. But the instinct of association is deeply implanted in the people and the success that has attended the first experiments in co-operative credit offers the promise of greater things in other directions. Hitherto the departments of agriculture and co-operation have worked independently. In future their orbits must increasingly converge. When the scientific department has demonstrated the value of a particular method of cultivation or of an improved implement, the co-operative society ought to supply the channel, so greatly wanted, by which these improvements will be carried down to the ryots. Even now some use is made of the societies in this direction, and more might be done. If the two departments so work together, and if, most important of all, the people themselves and especially the more enlightened classes co-operate, the history of the next fifty years will have much to tell of improvement in the lot of the Indian peasantry.—*Agricultural Journal of India*, July 1912.

WEST AFRICAN COCOA AND NEW METHODS OF CURING.

The *Imperial Institute Bulletin* of July 1912 deals with reports on cocoa samples submitted from Sierra Leone and the Gold Coast.

Sierra Leone. It would appear that the chief fault in the beans is their deficient fermentation. The valuations made by brokers range from 46*s.* to 49*s.* per cwt at Liverpool (March 1910), and from 53*s.* to 57*s.* per cwt. ex quay Liverpool (October 1911).

Gold Coast. The samples sent from here were of two kinds, clayed and unclayed. The brokers valued the samples at 51*s.* per cwt ex wharf. They expressed the opinion that unclayed cocoa would sell more readily than clayed.

With regard to the contention that claying prevents mould by the clay absorbing moisture, it is pointed out that thorough drying after fermentation is the best means of avoiding mouldiness.

Among new methods that have been suggested for curing cocoa without fermentation is that of Dr. Fickendey, Victoria, Kamerun, who advises subjecting the bean, after removal of the pulp, to change of temperature either by heating to 122° or 140° F. for 24 hours or keeping at a temperature of 32° to 33° F. for three hours.

Fickendey's method was tried in the Gold Coast at the suggestion of the Imperial Institute, and samples so prepared were received in January, 1911. Brokers, as well as manufacturers, regarded the fermented cocoa as superior to the unfermented; but of the latter, the samples treated according to Fickendey's process (both with heat and cold) were valued at a higher figure than those which were merely washed and dried, since they (the former) were found to have undergone to some extent that change in colour and flavour which is usually attributed to fermentation. This result would appear to support Fickendey's contention that fermentation could be dispensed with, provided that some means are adopted (heat or cold) to kill the embryo of the seed without destroying the enzymes responsible for the changes in colour and flavour.

On the whole it is thought that this new method of curing cocoa is deserving of further trial.

AGRICULTURAL COLLEGES FOR THE TROPICS.

The Editor of *Tropical Life* (Mr. H. Hamel Smith) has contributed the following letter to the *Westminister Gazette* on the above subject :—

"The chief producing centres in the tropical Colonies of this country are sadly in need of facilities for encouraging the higher agricultural education of those who are in a position to go to the Tropics as planters. The colleges would repay their cost, for if men on this side were as carefully and thoroughly trained to develop and extract the visible wealth out there as they are to exploit the minerals underground, the benefits would be very substantial. They would, in the aggregate, far exceed any benefits that we, as a nation, have obtained even from mining.

"Organised agricultural science in the Tropics, culminating in one or more agricultural colleges, would not only directly benefit the students passing through them, but by attracting and concentrating attention on the subjects taught on the spot, would greatly increase our ability to add to the national wealth, and increase and assure the supplies of our raw material from overseas. This, in turn, would augment the purchasing power of the producing centres, whose much larger orders for machinery manufactured goods, provisions, &c., would keep our factories busy and our people employed.

"The very fact that one or more agricultural colleges have been established in the Tropics would attract the attention of an energetic, ambitious, and extremely useful class of capitalist to those centres as channels for investment and trade. These at present hold aloof because they see no reliable means of training themselves for such a life. With many fathers of families having sons to place out in the world, or younger men with capital, once they can see their way clear to obtain a good return on the labour and money they are willing to expend on one or other of the tropical agricultural industries, a very large number, with only a few thousands to invest, would be willing to pay for their training first at an agricultural college on this side on general principles, and then at the College in the Tropics to specialize.

"It has been suggested that the would-be planter can obtain the desired instruction at existing institutions. I believe I am right in saying that it is not so.

"The future leadership of the world lies with the nation owning the most fertile and well developed land, as through these it will own the heaviest purses ; individual and national wealth will decide who is to lead. We must, therefore, not neglect to train men to develop the surface wealth of the Tropics, as we do others to exploit the minerals. We must train men to go abroad and increase the resources of the Empire to the utmost degree possible.

"The island of Trinidad, W. I., which almost needs a magnifying glass to find on the map, annually ships just over £1,000,000 sterling of cocoa. Its best friends have to own that this amount should have been doubled or trebled ten years ago. Had the planters had the benefit of an

agricultural college twenty-five or thirty years ago where they could have learnt to keep disease away and realize full crops, this loss would not have been sustained; and if this is true with one centre, it is, or can be, with all others unless prevented. One careless or ignorant planter spreads disease and trouble like lightning over the land in hot countries."

TOBACCO CULTIVATION IN JAVA.

In the course of a paper on the cultivation of cigar tobacco, the *Imperial Institute Bulletin* has some interesting remarks with regard to soil and method of cultivation,

Not a little of the success of the Java industry is due to the peculiar character of the soil. The upper layers are chiefly made up of very fine sand and clay, the result of the washing down of volcanic dust. The deposits are composed essentially of an andesite, a rock which usually contains from 5 to 1·34 % of potash, so important an element in tobacco soils. An analysis of the volcanic ash shows that it is rich in lime (7·6 %) and potash (2·1%) and moderately rich in phosphoric acid (·3).

In Java each piece of land is only cultivated every other year and is allowed to go under peasants' crops, usually rice, for the intervening period. As rice only occupies the land for about a hundred days, three crops are obtained between every two of tobacco. The distribution of crops is somewhat as follows;—January to May, 1st rice crop, June to October, 2nd rice crop; November to March, 3rd rice crop; March to August, preparation for tobacco; August to December, tobacco crop.

The estimated yield of rice is given as 100 piculs (1 picul=136½ lb.) per bouw (1¾ acres). This, taking 45 lbs. to the bushel, is at the rate of about 170 bushels per acre. The tobacco crop is given as 20 piculs per bouw, equivalent to 1554 lbs. or nearly 14 cwt. per acre.

These excellent yields, remarks the *Bulletin*, are due in the first place to the depth and richness of the soil, and also to the careful and thorough methods adopted by the Javanese peasants in preparing the soil. The rotation of the two crops may also have a specific influence.

The rice crop is not manured but the irrigation water is generally rich in organic matter of manurial value. Where the water supply is deficient for wet paddy, maize, soy bean, groundnut, or dry rice is grown.

Water being of such importance in tobacco culture, the available supply is carefully conserved and utilised by means of reservoirs and channels.

TELFAIRIA SEED.

The seeds are the product of a perennial climbing cucurbit indigenous to East Africa and Zanzibar, and are the source of an edible oil, which according to analysis made at the Imperial Institute constitutes 56·9% of the kernel,

The oil is non-drying, pleasant and sweet to the taste. While suitable for soapmaking, the possibility of using it for edible purposes depends entirely on the discovery of a cheap and efficient means of husking the seeds. The husk contains a bitter principle which must be kept out from the oil and the cake, the latter being suitable for cattle food. So far no suitable machine has been found.

Even if this difficulty is got over, it does not seem likely that large regular shipments of Telfairia seeds could be guaranteed as required by the trade.—*Imperial Institute Bulletin.*

LOCAL BODIES AS AGENTS IN AGRICULTURAL IMPROVEMENTS.

In the organisation of agricultural advance in any country or under any conditions whatever, it has ultimately had to be recognised that the bulk of the work must be done by the farmers or cultivators themselves. A government, an agricultural department, a body of state servants, may point the way, may suggest the lines—but until the people can be interested and become enthusiasts themselves, the advance will be slow, will be looked upon with suspicion, and will be more apparent than real. The condition of things has prevailed in almost every country where changes have taken place as the result of the action of a state department. It has been, perhaps, more strikingly the case in the United States of America, where the state action has been greater than anywhere else, but where, until comparatively recently, most farmers looked on the work of Government with amused interest and little more.

It is this fact that has made most of the far-seeing leaders in the development of agricultural departments in India very insistent on the necessity for developing local bodies composed of cultivators themselves or of others interested in agriculture—who should be committed to advanced methods, should show them in action on their own land, should act as local emissaries of whatever in changed methods has been proved to be good. How to bring about the formation of vigorous local bodies for the purpose has been a matter of great difference of opinion. But that such bodies must exist, that there must be local centres doing what an agricultural department itself could never hope to do—on this point, there has been little difference of opinion.

Results of Organising Local Bodies.

The results of endeavours to organise such local bodies have, however, as would be expected, been extremely varied. In the Central Provinces, on the one hand, they have become, and tend to become even more, the main link between the agricultural department and its investigators, and the people. On the other hand, in Madras they have been, as hitherto organised and carried on, of very questionable value, and it has been recommended that, in their present form, they may well be wound up. In other provinces, very varying success has been attained. But it is impossible not to recognise that there has been a great amount of local energy, public spirit, and enthusiasm devoted to these associations even where they have apparently been of the least value—and this, put into the right channels, will be of very great assistance in development in coming days.

The amount of experience gained in India has now been, I think, sufficiently great to warrant a short statement of the conditions which have led to success in the organisation of local bodies for popularising and encouraging genuine agricultural improvements. This matter was, in fact, considered by a strong committee at the last meeting of the Board of Agriculture, and the present article is, in essence, a summary of their report.

Local Bodies Essential for Success.

India stands in such a very special position in respect to the character of the vast mass of its cultivators and the greater part of its agriculture that it might be, and has indeed been often asked by men of small or limited experience, whether under the special circumstances of the case, it is either necessary or advisable to encourage such local bodies as we are discussing. Cannot the Agricultural Department communicate directly with the cultivators? Is not such communication with, and help given to, individuals of equal value to work done by and through a local association or any kind whatever? While this can be done, while it is possible to deal direct with every cultivator in the districts, it is becoming more and more clear that this is not generally the best or most economical way of proceeding. A local organised body is a far more efficient agent for the introduction of improvements than the few officers of the agricultural department, working individually, can ever be, for, being a body of local men, it carries considerable local influence if composed of the right people, the members can and do mutually encourage one another while its educative value in combined work and co-operative effort is, if properly organised, greater than can be realised. Even if the same end can be gained, so far as the introduction of an improvement is concerned, without a local association, a better final result can often be attained if a local body, as such, takes a share in the matter; as tending to increase the co-operative spirit of the people and hence the likelihood of permanent advance.

Success Depends on Definte Lines of Action.

Success with such associations can, however, only be reached by following certain lines which can now be laid down with some approach to certainty. However organised, it is necessary that (1) every local association should have a definite work to do, and the members should feel responsibility for taking a share in it. In the past it has not been at all unusual for an association to fail because the members have not been responsible for any work. Again the first question by a local body, however got together, is "What shall we do?" Unless the organisers of every single association, generally the agricultural department, have definite work which can be placed in the hands of the members, within their capacity, it is extremely unwise to attempt any organisation whatever,

(2) A local association should be composed of men who are really interested—and practically interested—in agricultural improvements in the area in question.

Associations have perhaps more often failed on account of the neglect of this matter than for any other reason. The members had but an academical interest in the subject, became members because of social or other reasons, and did not take its work seriously.

(3) The work of a local association should be regularly inspected, examined, criticised, and the association called together. Great stress must be laid on this matter, and it is probable, for instance, that a considerable part of the increasing efficiency of the system in the Central Provinces has been due to the care which is taken in this matter. It undoubtedly involves on the part of the agricultural department (or a central body of some sort) a considerable expense for inspecting officers, but without this, it may be stated with certainty that the result will not be a success except in rare cases.

(4) The members of a local association must, even apart from inspection, be made to feel that the Agricultural Department is interested in them and their work. It is wonderful how regular correspondence, prompt attention, and general evidences of interest and support encourage both the individuals and the associations of which they are members. If local agricultural associations are to be a success, this must be arranged for at any cost.

How Success is Attained.

With these principles accepted and in full operation, there is every chance of success: without these there is very little likelihood of local associations being or doing what they are capable of. The actual type of association may be very different—and very different types of association have succeeded,—but success in every case involves a frank recognition of the principles laid down. And it is hence of the highest importance that associations should not be encouraged or organised unless these points can be arranged for. In times past there has been in some cases a tendency to encourage or form associations when there were no definite lines of work to take up; when the men of whom they were composed were not men really interested: when no regular inspection could be arranged for, and when they were left for long months without any attention. It is not wonderful that such associations died or became moribund.

Passing on from general principles to successful applications, it may be noted that success has been attained by following several lines. In the Central Provinces, where perhaps the most valuable work has been done, the associations are bodies composed of nominees, limited in number, of the district officers for each district. These, say for instance, to the number of thirty, are called together to a convenient centre, appoint a secretary, and are met by a senior officer of the Agricultural Department, usually the Deputy Director, who has a number of pieces of work suitable for their district, ready to suggest to the members to take up. These are not experiments, but consist in carrying out some introduction of new seed, or the demonstration of better methods of cultivation, and the like, in using their land as a seed farm, in distributing sulphate of copper for treating Juari seed, in acting as agent for ploughs, or in making arrangements for marketing and similar things. Each man is then supplied at once with the material he needs and, thereafter, is visited by an assistant once a month, and by the superintendent of the farm in that circle several times a year. Six months later all the members meet again: the Deputy Commissioner is in the chair; the Deputy Director is again present: the work done is discussed, causes of failures made out, accounts of success recorded, and a new lot of work arranged for, for the ensuing period. Once a year, the members of all the district associations in a tract are called and meet at a common centre, generally a farm of the agricultural department, when experiences can be discussed among a larger collection of cultivators, selected outsiders being invited. All the proceedings, in these larger meetings, as well as in the district associations, are in the vernacular.

Care in the Constitution an Important Factor.

Over and above the points already insisted on, the success in this case may be attributed to the careful selection and nomination of members by the local authorities, to the small number of members who thus esteem

membership an honour, and to the lines of work being drawn up and carefully arranged beforehand by the Agricultural Department.

The committee of the Board of Agriculture whose report is being summarised did not wish to suggest that the method of organisation just described is the only one which will succeed or which is even the best one under all conditions. It is possible, perhaps even probable, that this type of organisation is most suitable where the type of agriculture is backward or at any rate where there are large numbers of fairly obvious improvements capable of giving large and immediate results. In other cases it may be more advisable to have other units than a district, sometimes even as small as a village. It may (and the method has been successful in parts of Bombay) be wise to have much more independent bodies than those of the Central Provinces. It may be advisable to have regular hierarchy or associations from those representing a very small area to one representing a whole province, and so on for many other variations which can only be determined locally.

But however organised, the principles which have been laid down are essential. The time is now past when the agricultural associations can be created in every district in a province heedless as to whether there is work for them or whether they can be instructed and encouraged, If there is work laid down for each association and its members to do; if they are composed really of the men to whom agriculture is a vital interest; if they can be regularly inspected and meetings held; and if the association and its members can be made to feel that the Agricultural Department or some central body is continually interesting itself in the work going on and ready to give assistance, then it is almost certain that, provided the local circumstances are properly taken into account, a local body will be created of extreme value for the development of the industry.—*Indian Agricultural Journal.*

LONG STAPLE COTTON FOR DRY AREAS.

According to an official bulletin by Mr. O. F. Cook, recent trials made in the United States have gone to indicate that there are certain new types of Upland cotton well adapted to conditions of dry farming and irrigation, and should prove suitable for the tropics.

The variety called Durango is said to be superior to the old long staples. It is described as early and prolific, and producing larger bolls than Allen and Sunflower. The lint, if not as long, is more abundant and uniform in length—about 1¼ in. under favourable conditions. Other advantages stated are that the bulk of the crop could be gathered at one picking, and that the plant is decidedly drought-resisting.

With the soil of the right texture and a supply of moisture through irrigation it has been found possible to grow long-staple cottons such as this variety in a dry atmosphere.

Too free irrigation is to be deprecated, and given good tilth and a wet season for the germinating of the seed, it is found better to resort to irrigation only to protect the maturing crop against injury by too severe drought.

DUMBARA AGRICULTURAL SOCIETY.

The Tobacco Industry.

A meeting of the Dumbara Agricultural Society was held in the Government School-room at Teldeniya on Saturday the 24th August, 1912.

The Government Agent, Central Province, Mr. G. S. Saxton presided, and there were present Mr. R. N. Lyne, Director of Agriculture, Mr. M. Kelway Bamber, Government Agricultural Chemist, Mr. C. Drieberg, Secretary, Ceylon Agricultural Society, Dunuwille Dissawa, Ratemahatmayas Paranagama and Teldena, Mr. C. Rasanayagam (Secretary), Mr. W. Molegode, Agricultural Instructor, and a large attendance of members of the Society.

The Secretary having read his report for the year, the Government Agent distributed the medals and certificates awarded to exhibitors from Dumbara at the recent All-Ceylon Exhibition held in Colombo. The largest number of these went to the Teacher of Mediwaka Government Boys' School (Mr. G. D. Banda) who was also awarded the prize for the best sample of cotton in the Show.

At the request of the Chairman, Mr. Lyne addressed the gathering. He said that he should like to speak to them on a variety of subjects connected with the agriculture of the district, but as his present visit was in connection with the tobacco operations being carried on under the auspices of their Society, he would confine his remarks to tobacco. It was he thought a mistake to adopt a foreign variety right off as seemed to have been done in this case. The proper procedure was to select a number (say 20 or 30) of the likely varieties for the object in view, and in growing them to eliminate those that failed to do well, till ultimately the number was reduced to 2 or 3. This took a little time, but it was a necessary preliminary if there was to be success. Again, it was important to determine beforehand the market they were going to exploit: whether the European or the Colombo market, because it would be necessary to accommodate their methods accordingly. He wished to say a word to the headmen who were present. They must not expect Government to do everything; the people would have to co-operate in any action Government might take for the benefit of the district, and it was for them to assist the authorities in, for example, trying to find out in the manner indicated the best variety of tobacco to grow. If the tobacco industry of Dumbara was made a thorough success it meant that they would prosper.

Mr. Drieberg, being called upon, spoke a few words of encouragement to the members, and commended the steady good work the Society was doing.

The meeting terminated with a vote of thanks to the Chair proposed by Paranagama R. M.

THE GOLD MEDAL CINNAMON.

Mr. Alexander Edward Rajapakse, Mudaliyar, has presented to the Museum of the Royal Botanic Gardens, Peradeniya, the 10 samples of cinnamon quills and the sample of chips which won the Gold Medal at the All-Ceylon Exhibition. They are the products of the Alexander Estate, Jaela.

PRESENTATIONS OF EXHIBITS AT THE ALL-CEYLON EXHIBITION

TO THE MUSEUM, ROYAL BOTANIC GARDENS, PERADENIYA.

PRESENTED BY MUDALIYAR A. E. RAJAPAKSE.
ALEXANDER ESTATE, JAELA.

Cinnamon.

Grade No. 1. Fine. 0
Grade superior. 00
Grade Superior Fine. 000
Grade Extra Superior, 0000
Grade Extra Superior 00000
Grade No. 1.
Grade No. 2.
Grade No. 3.
Grade No. 4.
Grade No. 5.
Chips

Coconut Products.

Coir Bag for Copperah
Coir Bag for Copperah (Small)
Coconut Coir Bag for Feeding Horses
Coir Net for Fishing (Ma-dela)
Coir Hand Bag
Coir Rope
Coir Rein for Cattle
Coir Hanging Bracket
Coconut Coir Scrubber for Horses
Coir Fibre Yarn
Bundle of Coir Fibre
Coconut Ekel Basket
Basket made of Coconut Leaf Stalk
Coconut Milk Strainer made of Coconut Ekel

Coconut Products.—*(Contd.)*

Water Bowl made of Coconut Shell
Water Bowl made of Coconut Shell with Handle
Sweet Basket made of Coconut Ekel
Fruit Stand made of Coconut Ekel
Mat made of Coconut leaves
Bag made of Coconut leaves
Betel Bag made of Coconut leaves
Money Purse made of Coconut leaves
Basket made of Coconut leaves
Spoon for Kitchen use made of Coconut Shell with handle
Spoon Holder
Neck String for Cattle made of Coconut Coir
Spittoon made of Coconut Coir
Broom made of Coconut Ekel
Leaf Broom made of Coconut leaves
Desiccated Coconut
Coconut Poonac Cake
Model of a Cart
Brush for White Washing with handle, made of Coconut Fibre
Spoon made of Coconut Shell with handle for table use
Spoon made of Coconut Shell with handle, used when making Native Sweet Cakes

PRESENTED BY MR. R. S. PEIRIS.
THORAWETIYA ESTATE, MARAWILA.

Cocos Nucifera.

Coconut Var: with Husk. Dikiri-pol Dikiri-pol, Husked
Coconut Var: with Husk. Pora-pol Pora-pol Husked
Stalbless variety with Husk

PRESENTED BY D. N. SILVA & Co.
UDUWARA, NEBODA.

Tea Plucking Baskets made of Rattan
Rubber Scrap Collecting Baskets made of Rattan
Rubber Supply Baskets made of Bamboo
Rubber Protecting Baskets made of Bamboo
Tea Supply Baskets made of Bamboo
Cocoa Supply Baskets made of Bamboo
Albizzia Supply Baskets made of Bamboo.

TWO IMPORTANT COMPETITIONS.

"Vegetarian Diet" and "Evils of Animal Diet."

Shri Jiva Dayâ Gnân Prasârak Fund, Bombay, invites competitive prize essays from the Medical Graduates including the Medical Graduates of the National University of Calcutta and the Veterinary Surgeons, on

"THE EVILS OF ANIMAL DIET."

Four prizes to the value of Rs. 500 will be awarded to the first four candidates whose essays will be selected as eligible for prizes by the Council of Examiners.

The following gentlemen of the general Council of *The Order of the Golden Age, London*, have kindly consented to examine the essays:— Sidney H. Beard Esq., Sir William Earnshaw Cooper, C.I.E., Dr. Josiah Oldfield, D.C.L., M.A., L.R.C.P., M.R.C.S., Dr. Robert Bell, M.D., F.R.F.P.S., &c., Percy E. Beard, Esq. The prizes will be awarded in the following order:—

First	prize	consisting	of	Gold	Medal	and	Cash to the value of Rs. 200
Second	,,	,,	,,	,,	,,	,,	,, 150
Third	,,	,,	,,	,,	,,	,,	,, 100
Fourth	,,	,,	,,	,,	,,	,,	,, 50

The text books prescribed for these essays are:—

(1) "The Living Temple, or the Miracle of Life" (the title given to the latest edition of The Living Temple) by Dr. J. H. Kellogg, M.D., Price Rs. 4-8-0. (2) "Diet and Food" by Dr. Alexander Haig, M.A., M.D., F.R.C.P. Price Rs. 1-8-0. (3) "The Cancer Scourge and How to Destroy It,' by Dr. Robert Bell, M.D., F.R.F.P.S. &c. Price Rs. 0-12-0.

The text books can be had directly on payment of cash, or by V.P.P. from the undersigned,

The essays should be written on one side and should not consist of more than 100 foolscap sheets.

The candidates are requested to send in their essays to the undersigned on or before the 1st of March, 1913.

The results will be published in the beginning of the month of July, 1913, and the Medals will be awarded in the month of September, 1913.

The manager reserves the right of publishing any of the essays.

Essays are also invited from all English knowing persons on the advantages of

"VEGETARIAN DIET.'

Ten prizes of the value of Rs, 500 will be awarded to the first ten candidates in order of merit, whose essays will be selected as eligible for prizes by "The Council of Examiners."

The following gentlemen, who form the Council of Examiners, have kindly consented to examine the essays.

(1) Rao Bahadur Dr. N. B. Naik Dandekar, L.M. & S., J.P., &c. (2) Prof. Louis Peltier, B.A., B.Sc. (3) Mr. Jahangir J. Vimadalal, M.A., LL.B., Solicitor, (4) Dr. Husseinibhai A. Nakhoda, L.M. & S.,J.P. (5) Mr. Purushottamrai T. Mankad, B.A., LL.B., Solicitor, (6) Mr. H. E. Bryning, Ag.

Manager, Messrs. Thacker & Co. (7) Dr. Kalliandas J. Desai, B.A., L.M. & S. (8) Mr. Nawrosji H. Cooper, B.A. (9) Prof. Viccaji E. Vakharia, G.B.V.C. (10) Mr. Manilal H. Udani, M.A., LL.B., F.LL.C. (11) Dr. Tribhuwandas L. Shah, L.M. & S. (12) Dr. Nanchand K. Modi, L.M. & S.

The prizes will be awarded in the following order :—

First prize consisting of Gold Medal and cash to the value of	Rs.	100
Second prize consisting of Gold Medal and cash ...	,,	75
Third ,, ,, Silver Medal and cash ...	,,	60
Fourth prize consisting of Silver Medal and cash to the value of	,,	55
Fifth prize consisting of Silver Medal and cash to the value of	,,	50
Sixth prize in cash	,,	45
Seventh prize in cash	,,	40
Eighth ,, ,, ...	,,	30
Ninth ,, ,, ...	,,	25
Tenth ,, ,, ...	,,	20

The text books prescribed for these essays are :—(1) "Diet and Food in relation to strength and power of endurance" by Dr. Alexander Haig, M.A., M.D., F.R.C.P. Price Rs. 1-8-0.

(2) "The Cancer Scourge and how to destroy it" by Dr. Robert Bell, M.D., F.R.F.P.S. &c. Price Re. 0-12-0.

The text books can be had directly on payment of cash or by V. P. P. from the Manager.

The essays should be written on one side and should not consist of more than 35 foolscap sheets.

The candidates are requested to send in their essays to the Manager on or before the 31st of December, 1912.

The results will be published before the end of January, 1913, and the prizes will be awarded in the month of February, 1913.

English knowing ladies are also entitled to compete.

The manager reserves the right of publishing any of the essays.

Address: 309, Shroff Bazaar, Bombay No. 2.

COTTON CROP OF THE BOMBAY PRESIDENCY.

DECCAN DISTRICTS ONLY, INCLUDING NATIVE STATES, FOR THE SEASON OF 1912-13.

Note.—On an average of the five years ending 1910-11 the area under cotton in the territory to which this forecast relates represents some 7·7 per cent. of total area under the crop in whole India.

(Estimates up to 1st August.)—Information incomplete. Sowings unfinished. Reported area 1,334,000 acres in British districts and 2,800 in Natives States, 7 per cent. below corresponding area last year but to same extent above decennial average at same date. In places larger area devoted to jowari and bajri owing to scarcity of fodder experienced in season just closed. Rains commenced late and general sowing delayed a fortnight to month. Delay continues in south. Sowing began in 1st week of July in north and 2 to 3 weeks later elsewhere. Young crop thriving in north though damage by present continuous rain is anticipated in places. Elsewhere the crop just germinating.

CALF-REARING METHODS.

So many calves are slaughtered young nowadays that the problem of the future supply of cattle is quite a serious one, and if not given the immediate attention it merits is certain to lead to excessive prices, and, after recent experiences, the Irish supply may not be thought so much of or be so free of restrictions as in the past. In their own interests dairy farmers especially should contrive to rear a larger proportion of their stock, and how else can they hope to effect those wonderful improvements in milk yield which we know to be possible?

The Royal Agricultural Society, as becomes the premier farmers' society, is giving a valuable lead at the present time by conducting an important experiment in calf-rearing at Woburn. It is still in progress, and the results may be different later on, but the position after nine weeks is extremely interesting. Twenty calves are divided into five lots of four each, the several lots having been differently fed from the time of their purchase at two or three days old. One lot has had whole milk only: another lot, separated milk and cod-liver oil; a third, separated milk and a purchased calf meal; a fourth separated milk and gruel (linseed and oatmeal); and the fifth lot, separated milk and crushed oats. The calves are now turned out into the yard, and are all receiving a little linseed cake with crushed oats and hay. Their subsequent development, as affected by the earlier feeding, will be the subject of observation.

The results dealing with the period of nine weeks bring out the following points:—

Description.	Average cost per calf per week.	Average gain in lb. per calf per week.	Average cost in pence per lb. gain.
Cod-liver oil. ...	2s. 8 19*d.* ...	9·66 ...	3·33*d.*
Calf meal. ...	2s. ...	8·66 ...	2·77*d.*
Gruel. ...	2s. 4·77*d.* ...	8·29 ...	3·47*d.*
Oats. ...	2s. 10·88*d.* ...	13·30 ...	2·62*d.*
Whole milk. ...	5s. 9·22*d.* ...	12·83 ...	5·39*d.*

Whatever else this proves it clearly demonstrates the well-known fact that the use of whole milk is prohibitive on account of expense, except in the rather unlikely case of there being the surplus milk to spare during the first few weeks of the calf's life. The gain with crushed oats, while being greater even than with whole milk, represents actually less than half the cost. The original arrangements for the experiment did not include this unusual method of feeding, and it was evidently added as an after-thought. It will be extremely interesting to see if it continues to prove so profitable.

SUGARCANE CROP IN THE BOMBAY PRESIDENCY, FOR 1912-13.

Information incomplete. Reported area 30,000 acres in British Districts and 17,000 acres in Native States, 25 per cent. below corresponding area last year. Owing to deficient rains last year which reduced level of water-supply in wells and tanks at planting season which extends from November to June, cultivation considerably restricted in Gujarát and Karnátak. Elsewhere area about same as last year. Crop generally thriving everywhere.

This forecast represents some 2·4 % of the total area in British Territory.

BURNING QUALITIES OF MAHA ILUPPALAMA TOBACCO.

Effects of Chlorine.

Samples of the tobacco grown and manufactured at Maha-iluppalama on irrigated and unirrigated land, were analysed to ascertain why the former would not burn, while the latter burned readily, leaving a good ash.

The analysis clearly shows the cause of the non-burning quality, as the ash of the irrigated tobacco contained 17·7 per cent. of Chlorine against only 2·8 per cent. in the un-irrigated. The presence of an excess of Chlorine entirely prevents a tobacco burning and is often caused by the use of cattle manure or manures containing Chlorine. The high proportion in the irrigated tobacco in this instance is due partly to the irrigation tank water which always contains Chlorine as common salt. This increases in proportion as the supply becomes concentrated towards the end of the dry season. A certain amount is also present in the soil, which at Maha-iluppalama contains from ·039 to ·027 per cent. of Sodium chloride.

The irrigation tank at Maha-iluppalama never becomes so low as most of the tanks in the North-Central Province so that the concentration is below the normal. Special care would have to be taken for future experiments where the tobacco is to be irrigated to ascertain the proportion of Chlorine in the water during the drier months of the year, as it is useless growing a well developed leaf as in the present instance, if it will not burn when made into cigars or other form for smoking.

M. KELWAY BAMBER,
Government Chemist.

ANALYSES OF TWO SAMPLES OF TOBACCO LEAF, A. & B.
GROWN WITH AND WITHOUT IRRIGATION—THE FORMER BURNING BADLY AND THE LATTER WELL.

	A. Burns badly.	B. Burns well.
Moisture	19·5 per cent.	16·5 per cent.
Organic matter	62·5 ,,	65·1 ,,
Ash	18·0 ,,	18·4 ,,
	100·0	100·0
Nitrogen (total)	2·6 ,,	3·8 ,,
Nitrates as Nitrogen	1·09 ,,	1·35 ,,
Ash Analyses.		
Lime	23·6 ,,	23·6 ,,
Magnesia	6·5 ,,	5·9 ,,
Potash	25·9 ,,	24·5 ,,
Soda	7·0 ,,	4·0 ,,
Phosphoric acid	7·2 ,,	7·4 ,,
Sulphuric-Anhydride ...	4·1 ,,	3·6 ,,
Chlorine	17·7 ,,	2·8 ,,
Carbon di-Oxide	0·9 ,,	4·5 ,,
Insoluble in Hydrochloric acid...	15·3 ,,	17·7 ,,

CEYLON AGRICULTURAL SOCIETY.

MEETING OF 10TH SEPTEMBER, 1912.

A meeting of the Board of Agriculture was held at the Council Chamber at 12 noon on Tuesday the 10th September, 1912.

His Excellency the GOVERNOR presided.

The others present included :—Sir HUGH CLIFFORD, Sir S. C. OBEYESEKERE, Sir SOLOMON DIAS BANDARANAIKE, The Hon'ble Mr. BERNARD SENIOR, The Hon'ble Mr. P. ARUNACHALAM, The Hon'ble Mr. A. KANAGASABAI, The Hon'ble Mr. J. N. TISSEVERASINGHE, The Hon'ble Mr. R. B. HELLINGS, Mr. R. N. LYNE (Director of Agriculture), Mr. J. HARWARD, Mr. M. KELWAY BAMBER, W. DUNUWILLE DISAVA, Mr. J. H. MEEDENIYA, R. M., Mr. JAMES PEIRIS, Mr. TUDOR RAJAPAKSE, Gate Mudaliyar, Mr. G. HARBORD, Mr. F. L. DANIEL and Mr. C. DRIEBERG (Secretary). As visitors : Mr. S. FREUDENBERG and a few others.

The minutes of the last meeting held on May 9th, 1912, were read and confirmed.

The Progress Report (No. 60) was adopted on the motion of Mr. JAMES PEIRIS, seconded by Mr. TUDOR RAJAPAKSE. The Hon'ble Mr. KANAGASABAI referred to the possibility of growing and curing tobacco in Jaffna for the foreign market and enquired whether anything had been decided about the matter. Mr. LYNE, Director of Agriculture, replied that he had the matter under consideration but had made no definite recommendations to Government as yet. DUNUWILLE DISAVA wished to be informed what were the duties of the Agricultural Instructors. Mr. DRIEBERG, the Secretary, replied.

His Excellency the PRESIDENT enquired whether any call had been made by the All-Ceylon Exhibition on the guarantee vote of Rs. 15,000. The SECRETARY replied that from all he could gather no call was likely to be made. Sir HUGH CLIFFORD stated that the final meeting of the Exhibition Committee was to be held within a week when it would be definitely known how the finances stood.

The Hon'ble Mr. ARUNACHALAM proposed " That meetings of the Board be held quarterly instead of every alternate month, and that each meeting be followed by a General Meeting of the Society so as to admit of members of the Society taking part in the discussion of the paper or lecture of the day." Sir SOLOMON DIAS BANDARANAIKE seconded, and the motion was unanimously adopted.

Mr. W. A. DE SILVA read his paper on " Seed in Paddy Cultivation," which evoked considerable interest. Mr. BAMBER read a note by Dr. LOCK, and the DIRECTOR OF AGRICULTURE summed up the discussion, dealing with the points brought out by the paper.

HIS EXCELLENCY, in thanking Mr. de Silva for his very interesting paper, remarked that he was one of those active members of the Society who was always ready to come forward and give others the benefit of his study and observation. His Excellency also thanked the Director and Dr. Lock for their interesting remarks.

MR. J. HARWARD, Director of Public Instruction, moved "That the Board do record a vote of thanks to the Hon'ble Sir Hugh Clifford, K.C.M.G., on his retirement from the office of Vice-President, for his services to the Society and offer him its congratulations on his appointment as Governor of the Gold Coast." He added: "It has been suggested to ask Sir Hugh Clifford to allow his name to remain on the Board as Honorary Vice-President, and I feel sure that the members of the Society will be glad that his name should be permannently associated with the Board." Seconded by MR. KANAGASABAI, the motion was unanimously adopted.

SIR HUGH CLIFFORD acknowledged his thanks.

THE QUESTION OF SEED IN PADDY CULTIVATION.

PAPER BY MR. W. A. DE SILVA.

For the successful raising of any crops three elements are admitted to be essential, viz. the preparation of the soil, the use of fertilizers, and the selection of seed. Seed selection, the importance of which is hardly recognized by our native cultivators, is an operation that requires very little expenditure of capital and energy, if only the method of doing it is understood. The cultivation of rice being the most important of village agricultural industries the remarks here made in regard to seed selection should be generally considered to refer to the rice crop. It is to be noted that nearly 700,000 acres of land in Ceylon are under rice. The industry is almost wholly confined to the small cultivator, whose resources as regards capital, enterprise, and knowledge must be admitted to be scanty. The rice crop, however, is of greater importance to the Island than any other crop grown here, for two reasons: first, because it is the main source of the food supply to the inhabitants; and secondly, because the price of the grain forms an index to the general standard of the wages of the working man. The higher the price of rice, the higher should be the scale of wages in other industries. Seed selection may be conveniently considered under four different heads, viz:—(1) Selection by sorting the grain, (2) "Change of seed." (3) The selection of varieties to suit special condition, and (4) The production of new and better varieties of seed.

The only precaution which the cultivator takes is to winnow his grain with a view to getting rid of chaff and dirt. It would be greatly to his advantage to go a step and separate the heavy seeds from the light by use of the same winnow. Trials have been made in Mysore with seed selected by the Japanese method of immersing the seed in a saline solution, and the results have proved very satisfactory. For ordinary purposes a solution of salt consisting of one seer of salt to two seers of water is made and the seed paddy put into it. All seeds that float in this solution are rejected, and those that sink to the bottom are taken for sowing purposes. The cost of this process of seed sorting is insignificant, and would consist of a few cents for the salt used, but the benefit derived is represented by an increase of the crop from 18 to 36 per cent. The next method mentioned above is change of seed. This is seldom practised or recognized in Ceylon. It has been found, as the result of many experiments in America and elsewhere, that the change of seed from one district to another has in-

variably resulted in a large increase in the yield of the crop. This increase is not due to the mere transfer of the seed itself, but to the fact that plants grown for long periods under similar conditions of soil and climate adapt themselves to their environments and go into what may be described as a quiescent state. With a change of conditions a new activity is manifested, the result of which is a benefit to the cultivator. The increase in crop often reaches from 15 to 25 per cent. In Ceylon rice is grown practically all over the Island, and each district has more or less distinctive characters as to soil and climate. Seed paddy from Batticaloa, Anuradhapura, Kandy, Tissamaharama and the Western Province can easily be exchanged, with advantageous results. This work can hardly be effected by the individual efforts of the village cultivator, whose means and knowledge are limited. It can, however, be carried out effectually and without very much capital cost by means of co-operative and other organisations, and for that reason deserves the attention of this society. The third method referred to, viz., the selection of varieties to suit the season and the soil, is one that is fairly well understood by the Ceylon cultivator. In Ceylon there are over two hundred recognized varieties of rice; some of which are poor yielders, others give heavy crops, some grow on comparatively dry lands, others require a good deal of water, some yield a crop in sixty days, and others take from five to six months. The standard grain is the one that grows with an ordinary supply of water in muddy lands and yields a maximum crop in about four months. A sixty days paddy yields a poor crop, hardly a half or a third of what is obtained from a standard grain, such as Ma-vi or Devareddiri; but where rain, irrigation water, the supply of cattle, or labour fails, the cultivator is obliged to select a late short-lived variety of rice like sixty days, the yield of which is better than no crop at all. The real object of selecting a short-lived variety is often lost sight of, and instances are not rare where the cultivator has been required to grow a sixty-day crop in preference to the five-month standard variety when the conditions did not warrant such a course. Similarly a variety of paddy that grows on compartively dry soil yields a small crop, but when the cultivator has no choice, he uses this variety, and gets a small crop rather than none at all. It is wrong to argue that because there are varieties of paddy that grow on comparatively dry soil that the cultivator must select them and to charge him with wanton waste of irrigation water, because he can grow a crop with a certain variety of seed with a lesser quantity of irrigation water. The fact is lost sight of that with this latter variety of seed he gets a poorer yield.

Dry-Ploughing.

Then there is the question of dry-ploughing with reference to which the cultivator is generally accused of conservatism and folly; but in spite of the fact that agricultural science founded on Western experience favours the exposure of the soil to sun and air, one must not fail to appreciate the fact that puddling and mud-ploughing have been adopted by the rice grower as the result of the experience of generations, and that he is convinced he will get the best result thereby. A series of experiments conducted in Mysore in 1909-11 by Dr. Coleman, the Director of Agriculture, has brought out the fact that puddling and mud-ploughing are more suitable to the requirements of the rice plant; in fact, the experiments resulted in a clear victory, in increased yield, for

wet-ploughing. The result is attributed to the alteration in "Bacterial content" of the soil, the wet cultivation helping the beneficial bacteria.

Breeding Improved Races.

The last method I have referred to is the breeding of improved races of seed possessing the best qualities as regards yield, disease-resistance, suitability to special localities—high or low, dry or wet, &c. This is work for the scientist and not for the general cultivator, and it is most gratifying to find from a note published in the *Tropical Agriculturist* that this matter is now receiving the attention of the scientific staff of the Agricultural Department.

SUPPLEMENTARY NOTE BY DR. R. H. LOCK.

The following supplementary note by Dr. R. H. Lock, Assistant Director of Botanic Gardens, was read by Mr. M. Kelway Bamber :—

I have been asked, as a student of plant improvement, to make a few remarks on the subject of the paper which has just been read. Mr. de Silva has properly pointed out that seed selection is an operation which requires only a small expenditure of capital and energy if only the method of doing it is understood. Mr. de Silva has described four important methods of seed-selection. To anyone who has followed the developments of scientific agriculture during the last twelve years it is a truism that these methods, important as they are, are of subsidiary value in comparison with a fifth method which Mr. de Silva has not mentioned. This method is the selection of seed from the best plants regarded as seed parents. Mr. de Silva states that increase of crop by as much as 36 per cent. can be got by simply sorting the grain by a mechanical method. I have no personal experience of this method, but it is clear from general principles that any improvement obtained in such a way can only be temporary. The method must be repeated in every generation with every bushel of paddy used for seed. As regards change of seed the method requires to be tried experimentally with rice in Ceylon before it can definitely be said to apply to rice in Ceylon. It is, of course, highly important to choose a variety which is suitable for the particular soil and district in which it is to be grown. To a considerable extent this is doubtless already done. The breeding of improved races of the kind referred to by Mr. de Silva is an elaborate and uncertain process, and, considering the large number of valuable races already existing in Ceylon, little stress need be laid on this until other methods of improvement have been exhausted.

Seed Parent Selection.

The fifth method, that of seed parent selection, although based on the scientific knowledge, is not a scientific process in the sense that any special training is required in order to carry it out. The process is perfectly simple and not very laborious. I have myself, by an expenditure of time amounting to not more than six working days of nine hours each, obtained in two generations in a transplanted crop an improvement in yield estimated at 50 per cent. This strain is now being grown for seed, and in two more generations enough can be raised to sow a whole province. The Essence of the Process Employed is to select from among a number of the best plants those whose seed when sown gives rise to the largest crop. For this purpose all that is necessary is to sow the seed from each plant separately, and after trans-

planting each batch of seedlings into a separate plot to gather the crop and measure or weigh the grain obtained from 100 plants of each lot. Only the largest crop is to be retained for further sowing. In this way the parental plants are tested by their performance—by the power of their grain when used as seed to yield a good harvest. This is the essential quality which we desire to get in seed, and we can only get it if we select for it. We cannot ensure the presence of this quality in the seed by selecting the heaviest individual grains or even by selecting the heaviest yielding plants, because a heavy yield from a particular plant may be due to the accident of soil or situation. What we want to do is to pick out those plants from the seed of which we shall get the best average crop under ordinary conditions. We can only do this by sowing the seed and finding out what crop is actually given. Although an ordinary paddy field looks so uniform there is great variation among the plants in cropping power. In quite a small experiment the crop obtained from the seed of the best plants was 50 per cent. better than the average crop. Finally the improvement thus obtained is comparatively permanent, whilst the whole of the improvement possible is got at a single step if the selection is carried out on a sufficiently large scale. The seed should continue to give good crops for several seasons without any further selection.

Transplanting in Relation to Seed Selection.

The method here described is of special importance in connection with transplanting in paddy cultivation, in fact the full benefit of it will only be obtained if transplanting is adopted. By using seed which transmits the tendency to tiller well, good crops can be got when transplanting is carried out at distances of 12 by 12 inches or even more, whereas if the plants tiller badly they must be transplanted much closer in order to furnish a satisfactory yield. Where transplanting is adopted it will be found that good tillering and a good yield are qualities which are closely associated in the same plants, so that the selection of many-tillered plants will increase the yield and vice versa.

REMARKS BY THE DIRECTOR OF AGRICULTURE.

Mr. R. N. LYNE: Your Excellency, I think we owe a debt of gratitude to Mr. de Silva for the interesting and instructive paper he has read on this important question of rice and paddy cultivation in Ceylon, and to Dr. Lock for his illuminating observations. There are one or two points I would, however, wish to refer to. Mr. de Silva referred to the fact that an increased yield had been obtained through selecting seed by a process of floating off the light seeds, and Dr. Lock states that he has no experience of this method and he does not think it will lead to any permanent importance. What I think Mr. de Silva must have meant was that this was merely a mechanical selecting of seed for good germinating power, and sowing only those seeds which have their vitality maintained. It is obvious that if you take a bushel of seed and sow it, if only 50 per cent. have any germinating power you will get a very much poorer crop than if the whole of your seeds had germinating power, or say 80 or 90 per cent. which is a reasonable percentage to expect from properly selected seed. At the same time no doubt it is a fact, that strains of wheat have been improved by such a system of selection only and not by selecting from large and better producing plants as Dr. Lock would first do and which, of course, is a much more direct and easier way. Then Mr. de Silva refers to the advantage which we may expect from a

change of seed from one part of Ceylon to the other, which I think, is an excellent suggestion and one which those interested might take up, working through the Branch Societies and through the Agricultural Instructors.

Dry vs. Wet Cultivation.

Lastly, there is that rather controversial subject of dry cultivation and wet cultivation. I have here Dr. Coleman's experiments on paddy cultivation which Mr. de Silva referred to; and in working through it I do not find that it touches our case very much because he does not explain what he means by dry cultivation. For instance here, in one place, he talks about ploughing four months before sowing. Does he mean that he is going to plough the land and leave it alone for four months in a hot country and then sow it! Whatever chemical changes might be expected to take place in the soil during that period, that land will have to be ploughed again if any planting is to be done. Until he shows us that the method he advocates is advantageous it does note help us. The point with regard to this dry and wet cultivation is clear. Do you mean to plough and leave it? Do you mean to plough and leave the soil to be ærated by air so that the bacteria of nitrifaction can work properly? There is no doubt, whatever people say, that the nitrifying bacteria can only work in the air, and that when you plough and leave the land the soil will be ærated and the bacteria will do their work. But if you leave it in that state and sow your seed after four months it does not mean you will get a large crop. You will have to re-plough that land. I do not know whether this question of chemical changes in wet land has been thoroughly investigated; but judging from Mr. de Silva's experience there is something in this wet ploughing. In my opinion, if the cultivator were to abandon that method of wet cultivation, he will be let in for a tremendous amount of trouble in his land. Anybody who has taken the trouble to carefully examine those sloping paddy fields and the wonderfully regular way in which the terraces follow the contours of the land will agree, they call for a great deal of admiration for the goiya for doing what we should require instruments of precision to do. How is he able to do that?—By ploughing the land in a liquid state, when the liquid mud will find its own level. If he does that in a dry condition it will take about ten times longer. Therefore this wet and dry ploughing requires a great deal of enquiry before we can say that dry ploughing should be adopted. (Applause.)

PERADENIYA EXPERIMENT STATION.

On September 13, the day following the meeting of the Committee of Agricultural Experiments, a number of leading planters paid a visit to the Experiment Station at Peradeniya to examine principally the various systems of rubber tapping under trial. A dynamite cartridge was exploded in the ground to test the efficacy of this method of holing for rubber: It is estimated that the expenditure will work out at 20 cents per hole including the cost of cartridge, detonator and fuse—a great saving of labour being effected. The authorities at Peradeniya, it may be explained, cordially welcome planters and all interested in the planting industry who can find time to visit the station at any time and inspect the plantation.

FLUE CURING TOBACCO.

In the Flue Curing-Process the open fires are replaced by flues conveying hot fire.

This American system has been successfully adopted by Mr. H. W. Taylor, who has installed at the Rustenburg Station in the Transvaal a model curing-house based on this principle and which proves particularly useful in the preparation of the light yellow leaved tobacco. The yellowing of the leaves is an improved method which should only be applied where it can be carried out in its entirety with all the care necessary to ensure the production of a tobacco that will fetch the high prices in view of which the method has been devised. Thus for its complete success all the special instructions, of which the chief deal with the choice of the variety of tobacco, topping, and the gathering of leaves, must be followed.

The varieties which in the Transvaal have given the best yellow leaves by the flue curing-process are: Yellow Pryor, Bullion, Hester, Blue Pryor, and Boyd 1269. The tobacco intended to be flue-cured must be cut low, leaving only 12 to 16 leaves having about the same degree of maturity. The harvest is carried out in three times, beginning with the lowest leaves which are the first to ripen. They must be separated from the stem in the field and conveyed to the curing house in large flat baskets.

The Flue House.

The curing house must be small, and divided into four chambers able to contain 480 laths bearing the tobacco of 3,360 plants. Each curing house may be refilled three times per month, so that 10,080 plants may be cured in the course of a month. Each chamber in its turn is sub-divided into five floors, of which the lowest is the loftiest to prevent the tobacco in it being injured by too high temperatures. A flue in which hot air circulates runs all round inside the house at about 2 feet from the walls and issues at a level about 3 feet higher than its starting-point at the fire-place situated about 2 feet above the earth.

The Process.

In flue-curing there are four stages through which the tobacco passes: the yellowing, fixing the colour, drying the leaf and drying the central rib and stalk. A moderate fire is kept up at first, and gradually increased up to about 89·6° F.; after 10 hours the temperature is raised to 100·4° F., when the tobacco begins to turn yellow; the temperature is still further raised to 119·3° F. and kept up till the leaf is completely yellow. The colour is then fixed by heating gradually up to 131° F. and then sinking to 125·6° F., at which temperature the tobacco is kept until the leaf is practically dry. In order to cure completely the leaf and the central rib the temperature is raised in two hours to 131° F. and kept at this for six hours; by successive stages of six hours each the temperature is raised to 135·5° F., to 143·6° F. and at last to 159·8° F. at which it is kept during 8 or 10 hours until the stalk is completely dry. Mr. H. W. Taylor recommends that fire be extinguished as soon as the operation is ended and the curing house allowed to cool down; after which the ventilators

are to be closed and the floor and the walls under the tobacco watered. This moisture is to be kept up for one day, then a small fire is lit in the fire place and some wet sacks are placed on the flues so as to produce the steam necessary to soften the leaves sufficiently to allow of their removal. When the central rib is soft enough to be bent without breaking, the leaves are removed, sorted and made up into parcels of twelve to fifteen leaves each.—(*Journal d'Agriculture Tropicale*, No. 131, pp. 129-133)

TERMITES OR WHITE ANTS.

Mr. Bainbrigge Fletcher, Entomologist to the Government of Madras, contributes a paper on the above subject to the July issue of the *Agricultural Journal of India.*

The author confines his remarks chiefly to the common mound-building species, the life history of which he fully describes.

Referring to the lack of information on the subject, he says:—"It would naturally be expected that we should have a good knowledge of at least the different kinds of Termites which occur in the Indian region, but it is a regrettable fact that this is by no means the case. Although India is the habitat of many species whose habits delight the observant naturalist and others which interest the systematic worker, in the strangeness of their structure or the peculiarity of their geographical distribution, the Termites of India and Burma seem to have suffered a strange neglect at the hands of collectors and observers of insects. A certain amount of work has been done, especially within the last few years, on the Sinhalese species, of which over thirty distinct forms are now known to Science, whilst only about a score are known at present from the whole of the Indian Peninsula (including Burma), although it is probable that at least one hundred distinct forms really occur."

With regard to their relation to agriculture, Mr. Fletcher remarks that the damage done to crops is not so apparent to the casual observer as that done to buildings, but the latter is really insignificant in comparison with the former. Not only are cereals attacked but valuable crops such as sugar-cane, poppy, groundnut, khorasami, fruit trees, castor, jute, peas, sunflower, &c. The annual loss caused by termites attacking crops in British India alone is estimated at over £20,000,000.

THE BANDARAGAMA GARDEN.

This garden is almost exculsively devoted to fruit culture, chiefly citrus fruits and pineapples: but other good varieties distributed by the Society have also found a home there. A small section is devoted to the growing of vegetables.

A couple of years ago a circuit bungalow was erected in the garden, and in front of it an ornamental plot of ground has been laid out.

The garden was started with the assistance of Mr. Conroy, C.C.S.; and Mr. Plant, C.C.S., his successor, is greatly interested in its success.

It is under the direct supervision of Mr. J. A. Wirasinghe, the energetic Mudaliyar of Rayigam Korale, and is visited periodically by an Agricultural Instructor.

The garden should in time prove a most useful centre for the extension of fruit cultivation in the Kalutara District. (See Frontispiece for illustration.)

WELL IRRIGATION.

[From an Address by Mr. Alfred Chatterton at Coimbatore.]

Addressing an audience, the majority of whom are Coimbatore agriculturists, it is unnecessary to dilate upon the importance of well irrigation in this district. That this is fully recognised is disclosed by the fact that, whilst at the beginning of the last century there were about 20,000 wells in this district, there are now nearly 80,000 and they irrigate in a normal year about 300,000 acres. These wells represent the accumulated labour of generations of ryots and are an asset of great value. In the Coimbatore District Manual, prepared by Sir Frederick Nicholson, and published in 1887, he writes:—"During the past 30 years about 26,000 new wells have been dug, representing a capital of, say, Rs. 65 to 70 lakhs." This indicates an average expenditure of Rs. 250 per well. During the scarcity of 1891-92 advances to the extent of Rs. 8 lakhs were made for digging wells and upwards of 5,000 wells were then dug, from which it would appear that the average expenditure on each well was Rs. 160, but this probably does not represent the total expenditure in labour or money that was incurred on these wells. It is practically certain that the average well in the Coimbatore District could not now be dug for less than Rs. 500, and it is equally certain that they are fully worth that amount to the cultivator. We may therefore assume that the wells of Coimbatore are an asset which may be valued at not less than Rs. 4 crores. It is well to pause and consider what this vast sum means. Invested at 6 per cent. the rate charged by Government for *takkavi* loans, it would yield a return of Rs. 25 lakhs a year, equivalent to a net profiit of Rs. 8 per acre per annum on the area dependent on the wells. These figures, however, give a faint idea as to the real value of water for garden cultivation in this district.

The Cost of Lifting Water.

A short time ago I published some data tending to show that the cost of lifting water for an acre of land averaged Rs. 70, but to this the officers of the Agricultural Department took exception, and we discussed the available data very carefully, with the result that my original estimate was not materially discredited. The conclusion we came to may be briefly stated in the following terms. The lifting of water for the 300,000 acres under the wells in the Coimbatore District roughly costs the ryots in some form or other the equivalent of between Rs. 1½ and Rs. 2 crores. Whether the higher or the lower estimate be accepted, it will be admitted that the burden is an exceedingly heavy one and can only be met by the unceasing toil of the ryot on what is naturally a rich soil, and which is kept in a very fertile condition by a highly developed system of culture. It is the object of the Agricultural Department to assist the ryot to still further improve his methods of cultivation, and it is the object of the Pumping and Boring Department to endeavour to reduce the expenditure which the ryot must incur before he can make use of the water which drains into his well. One Department is endeavouring to increase the gross yield of the land and the other to diminish, as much as possible, the cost of supplying water. The efforts of the Agricultural Department will, probably, in some form or other, be of benefit to every cultivator of

the soil, but in the immediate future I can hold out no hope of doing anything to assist the majority of the ryots who are lifting water from wells.

Engine-driven Piston Pumps.

We are endeavouring to introduce mechanical methods of lifting water in place of those which involve the necessity for employing cattle. For a long time I have been trying to introduce mechanical working on a smaller scale than is economically possible with centrifugal pumps, and this year I have induced Messrs. Massey & Co., of Madras, to exhibit the results of our joint labours. It consists of a 3½ H. P. oil engine driving through suitable gearing a pair of loose piston pumps. Each pump is 6 in. in diameter, and the pair are capable of lifting about 6,500 gallons of water per hour from a depth of 40 ft. The pump is the largest of this type we propose to make, as it is not intended to supersede centrifugal pumps when the quantity of water available justifies their employment. They are 5 in. in diameter and are driven by a 2 H. P. engine and on a lift of 29½ ft. They discharge 4,140 gallons of water per hour. Recently I tested a pair of 4 in. pumps which were working on a lift of 33 ft. and discharged 1,900 gallons per hour. It can be worked on a well of considerable depth, and can deal with comparatively small quantities of water in a fairly efficient way. It is necessary that these pumps should be placed above the higher water level, and the level of the water in the well must not be more than about 25 ft. below the level of the pump, as the pump cannot suck water from a greater depth. If therefore the water level fluctuates more than 25 ft. either the pump must be shifted to a higher level during the rainy season or it must be fitted up in a water-tight chamber. Either alternative is unsatisfactory, but the difficulties can be got over completely by using drowned centrifugal pumps, which are placed at the bottom of the well; the runner revolves in a horizontal plane and is driven by a vertical shaft which can be carried to the top of the well. The objection to this type of pump is mainly the expense, but it also requires more careful supervision in the running than does the ordinary type of pump which we now employ. The double piston pumps are entirely free from these disadvantages, and in a deep well it is only necessary to use a longer piston to obtain the same degree of efficiency in working as when the lift is small. A pair of cattle working a mhote cannot be expected to work on an average more than six hours a day, but a double piston pump may be run the whole day through, and a pair of 5 in. pumps may be considered equivalent to four mhotes, whilst a pair of 6 in. pumps will easily do as much work as six mhotes. The cost of lifting water by these pumps works out roughly at about one-half the cost when cattle power is employed.

Comparative Statistics.

With oil engines and centrifugal pumps the cost of lifting water decreases per unit as the quantity to be lifted increases, so that the larger the supply of water the greater is the saving in substituting mechanical methods for those which have hitherto been used. Where the water-supply is large, this is already tolerably well recognised by the ryots, and there is no necessity to refer to it here. The advantages of very small installations, however, are not so apparent, and it seems desirable to show how matters really stand. Let us assume that we have a well which will yield 50,000 gallons of water per day and that the vertical lift is 30 ft. This involves doing useful work to the extent of 5,000,000 foot pounds a day, and the cost of lifting water by cattle will

come to about Rs.3-12-0, five pairs of cattle being required. The same work can be done with a 3 H.-P. engine and a double 6 in. pump in about eight hours. The fuel for the engine will cost annas 12 a day and the other expenses, including driver's wages and 12½ per cent. for interest and depreciation, will make the total slightly under Rs. 2 a day; that is to say, the cost of irrigation will be reduced by Rs. 1-14-0, equivalent to at least Rs. 375 in a year allowing for only 200 working days, and assuming that the cattle can be usefully employed on other work during the rest of the time. Now a saving of Rs. 375 capitalised at 6¼ per cent. amounts to Rs. 6,000, but the cost of an engine and a pair of these pumps on a 30 ft. lift is Rs. 1,535 in Madras, and in most places they could be provided with an engine house and erected at the site of the well for less than Rs. 2,000; that is to say, there is a clear saving in the transaction equivalent to 6¼ per cent. on Rs. 4,000 a year. The value of a well is not what it will cost to sink, but depends upon the quantity of water which it will yield, and no matter what it is worth to start with, its value is increased by Rs. 6,000 if the cost of lifting water is reduced from Rs. 3-12-0 to Rs. 1-14-0.

DR. SCHIDROWITZ ON RUBBER LATICES.

Chemical and Physical Properties.

Dr. Philip Schidrowitz delivered the second of the special series of lectures on Rubber arranged by the Imperial College of Science and Technology in the Chemistry-Lecture Theatre of the Royal College of Science. The lecture dealt with the chemical and physical properties of rubber latices, with the theory and practice of coagulation, and, finally, with the commercial preparation of various types of crude rubber. The lecturer pointed out that no single theory could be formulated which would cover all the remarkable phenomena attending on coagulation, the reason being that latices from different species varied most markedly in regard to their physical and chemical properties, and even within the same species considerable essential differences occurred. These facts were of very great practical importance, and the neglect to appreciate them in the past had been the cause of the loss of much time and money. Even now, the facts were not fully grasped by many of those engaged in the plantation industry, and the result was a greater variability in regard to quality than was either necessary or desirable. Much work remained to be done before it would be possible to state with certainty that the Plantation manager could produce from any given batch of latex the best possible result in regard to quality and quantity of rubber, but considerable progress was being made, and students of the Royal College of Science would be glad to hear that good work was being done on the plantations in this direction by several gentlemen now graduates of this College and but lately their fellow students. A fair proportion of plantation rubber was, in his opinion, already superior to any other rubber produced, not excluding "fine hard" Para, and there was very little doubt that at no very distant date it would replace the latter as the standard of quality. As chemist, Dr. Schidrowitz thought they might be particularly interested in the high grade rubber produced by a chemical process from a very low grade raw material—namely, jelutong. Specimens of the latter, as well as of various grades of plantation rubbers, crude rubbers, and of latices, were shown, and the lecture was further illustrated by lantern slides.—*The Rubber World.*

AGRICULTURAL PROGRESS IN UGANDA.

The Report of the Agricultural Department of Uganda for the year ending 31st March, 1912, records steady progress with cotton and the extension of the planting industry.

Cotton Cultivation.

With regard to cotton we read that the seed distributed to natives by Government amounted to 207 tons compared with 133 tons and 70 tons in the two preceding years. The transport facilities are being strained to their utmost to deal with the present output. The Protecorate is still a very long way from reaching its limit as a cotton-producing country. The most important work which the Department of Agriculture is engaged upon is the improvement of the quality of cotton—both staple and grade. The seed farms originally established with this object have been given up as failures, and a plant-breeding station established where seed selection is being carried on with a view to improving both staple and yield. The newly-introduced long-staple varieties are found to give a much larger yield. "Allen's" and "Sunflower" varieties have proved immensely superior to the Egyptian. "Allen's" produces a strong silky staple averaging about 1⅛ inch in length and is valued at from 9·25*d.* to 9·50*d.* with American "Middling" at 5·93*d.* and "fully good fair" Abassi at 10⅜d. "Sunflower" did not produce so long a staple nor fetch so good a price. These two varieties gave well over 1,000 lbs. of seed cotton per acre, and on ginning yielded an output of from 30 to 32 per cent lint. Thus the yield of lint per acre is well over 300 lbs.

Rubber.

The cultivation of Rubber (chiefly *Hevea*) is extending rapidly, and though the growth is inclined to be rather slow, the trees are healthy. The most suitable land is within the Sleeping Sickness area. Several estates are favouring Ceara rubber in view of the advantages of a quicker return and the extreme ease with which it can be propagated. Ceara is being cultivated with considerable success in German East Africa, where several large estates are devoting their attention to *Manicoba* rubber with results that appear to be eminently satisfactory. The method of tapping which is promising is the system of vertical pricking with the multiple pricking knife.

Castilloa and Funtumia, which have been planted to some extent in the past, are of little importance as plantation crops.

Ceara in the Government plantation has been planted 13′ × 13′, but planting at various distances (12′ × 12′, 14′ × 14′, and 16′ × 16′) is also being tried. Tapping is being done on the half herring-bone system to half the circumference, paring and pricking immediately afterwards. The height tapped is 4′ or 5′, the lateral cuts being 1′ apart at an angle of 45°. No chemicals were used, but in some instances a dilute solution of ammonia was placed in the cups to prevent coagulation, with satisfactory results. The coagulant known as Purub was employed with advantage. The tapped trees are quite healthy.

Cacao.

Cacao is being planted to some extent, and it is expected that the crop will become of greater importance in years to come. In the Government plantations at Kampala the trees are planted 13′ × 26′ and interplanted with Para 26′ × 26′. The trees, though still young, have made remarkable progress, though they have suffered damage from the cacao night beetle (*Adoretus hirtellus*) which is being much reduced by spraying with Paris Green. Trees under shade (generally of bananas) seem to suffer less than those exposed to bright sunlight.

Coffee.

Coffee is fast attaining to a position of first importance. There is a great increase in the number of European planters, while the cultivation is being very popular among the natives. Arabian coffee does extremely well, frequently coming into bearing in two years and giving yields which are probably not exceeding in any other country. Coffee is being planted as a catch crop with Para rubber, but the tendency now is to plant it as a pure crop. *C. robusta* is cultivated only to a small extent. The indigenous coffee (a variety of Robusta) is a very strong growing plant, and the beans though small are of good quality.

Other Cultivation.

Of other crops wheat does well at elevations of over 6,000 feet. The natives do seem to take to rice. Tobacco cultivation has so far made little progress. Plantains, being the staple food of the natives, are largely grown, some varieties being used only for beer-making. Next to plantains as a food crop comes sweet potatoes: some tribes string them sliced and dried for an idefinite period for flour making. Ground-nuts are extensively cultivated and form an important item of export. Sem-Sem is widely grown and extensively used by the natives. In the drier districts millets furnish both a food and a beverage. Maize is a subsidary food crop. Cassava is widely cultivated, but sugarcane only to a small extent. Chillies, though not systematically cultivated, form an important item of export.

A system of agricultural instruction for natives is being established, and the employing of travelling instructors has proved very useful particularly in connection with cotton cultivation.

GROUNDNUT CROP IN THE BOMBAY PRESIDENCY,

INCLUDING NATIVE STATES, FOR 1912-13.

(Estimates up to 1st August.)

Information incomplete. Reported area 65,000 acres in British Districts and 36,000 acres in Native States, 24 per cent. below corresponding area last year but nearly double the decennial average at same date. Rain commenced late and sowings which have been delayed a fortnight to month still continue in places. Crop generally good. The area in British Territory in this forecast represents some 15·7 % of the total crop in British India.

CAMPHOR FROM DRIED CAMPHOR LEAVES.

In our Report of October 1910 (p. 27) we discussed a paper by Lommel on the preparation of camphor at Amani. A second paper from the same author contains some interesting data on the distillation of dried camphor leaves of which a synopsis is given below. The author first deals with the distillation of leaves which had been spread out for drying in a small cinchona plantation shortly before the setting in of the rains, but which were not yet quite dry. The camphor yield from these leaves was too small to make it worth while estimating it, and the experiment was set down as a failure. For a subsequent distilling experiment a plantation was subjected to moderate cutting, when a quantity of dry fallen leaves was found on the ground between rows of plants. These were first distilled and only yielded 0·06 per cent. of crude camphor and 0·19 per cent. of camphor oil, showing that they had lost almost the whole of their volatile constituents during the long time they had been lying on the ground drying, exposed to the alternating effects of rain and sun.

Next the green leaves were dried on previously cleaned ground under the shade of cultivated cinchona trees. In the course of about a fortnight they were dry enough to be readily stripped from the branches and, collected in sacks, they were carried to the still. The experiment gave a thoroughly satisfactory result; the yield being 1·55 per cent. of crude camphor, and 0·49 per cent. of camphor oil. The result would certainly have been better still, but that on one occasion, in the course of the distilling process, the condensing water became heated, and a not inconsiderable quantity of camphor was thereby lost.

In view of the fact that present experience of the effects of cutting upon the growth of the trees shows it to be a pretty well established fact that it is possible to cut the trees twice a year, it is reasonable to expect a five year old plantation to yield about 8,400 lb. of dry leaves per acre. This would be equivalent to an output per acre of about 325 lb. of camphor, and about 103 lb. of camphor oil.—*Schimmel's Report, April, 1912.*

FIRST FORECAST OF THE COTTON CROP FOR 1912.

[THE UNITED PROVINCES REPRESNTING SOME 6·4 PER CENT. OF THE TOTAL AREA UNDER THE CROP IN INDIA.]

In canal districts sowings of cotton began about the usual time in May with the help of irrigation, and the area thus sown up to the end of June 1912 amounted to 221,391 acres as compared with 213,994 acres in the previous year. Elsewhere sowings commenced rather late in the second week of July when copious rain was received in almost all districts. The crop is reported to have germinated satisfactorily and weeding is being actively carried on.

The cotton area of the province is expected to substantially exceed the area of the last year when sowings were greatly restricted in consequence of the scanty rain in July and August. Except in Bundelkhand, where continuous rain interfered with sowings, the rainfall has so far been favourable and prospects of the crop are good.

KAPOK.

With the exception of Java, where some regular plantations have been laid out, kapok trees are seldom seen growing together in any number. In the Philippines (according to the *Agricultural Review* for August) attempts are now being made to grow the tree on a large scale and in a systematic manner.

The export of kapok cotton from Java has risen from 1125 tons in 1889 to about 8,000 tons; that from the Philippines was in 1905 only 4 tons and has now risen to about 100 tons.

From observations made by the Philippine Bureau of Agriculture, a conservative estimate of the annual yield of cotton per tree may be placed at from 1½ to 2½ kilos for trees under 7 years, after which age the yield increases to 3½ kilos and more. From 300 to 500 pods is considered a fair annual yield from one tree under 7 years, after which a yield of 1,000 pods has been known, though this is much beyond the average. As the pods vary in size it was found that the number required to produce a pound of clean cotton varied from 60 to 120 and even more. The weight of the seed may be taken to be about double that of the fibre.

The chief market for kapok is Amsterdam. Australia comes next as a buyer. In Holland the fibre is sold under three grades: extra cleaned, good cleaned (or prime Java,) and cleaned. The latest quotation for the first grade is reported to be 50 cents (Dutch currency) per pound.

The export from the Dutch East Indies in 1910 was 1,800 tons to the United States, 2,370 tons to Australia, and 3,550 tons to Holland.

Kapok is employed almost exclusively for stuffing cushions, for upholstering generally and also for filling buoyant articles which formerly required cork. Another suggested use for Kapok is as a filler for surgical bandages, for which it posseses all the requisites: lightness, elasticity, dryness and suitability for dry sterilization.

These facts will explain the rise in the price of the cotton from the kapok tree of which planters should encourage the growth wherever possible. It may here be mentioned that suitable machinery for cleaning kapok has been installed by Messrs. Freudenberg & Co., (the local Agents for the British Cotton Growing Association) at their Kotahena Mills.

In the United States the price quoted varies from 14 to 18 cents (American) per pound laid down in New York or St. Francisco. Kapok enters the U. S. A. free of duty.

SOCIETY MEETINGS.

We invite the attention of members of the Ceylon Agricultural Society to the change determined upon at the last Board Meeting. In future, after the Board has concluded its business, all members of the Society will be free to enter and listen to, and take part in the discussion following upon, any paper or papers read. It is hoped that the members will show their appreciation of the change by taking advantage of it.

DRIED MANGO.

An observer in North Queensland thus describes a method of drying mangoes that is carried out successfully in that part of Australia. The description appears in the *Queensland Agricultural Journal* for February, 1912:—

The mango is picked just before turning colour. It is then cut up with a large knife in chips or small slices some 2 inches in length, 1 inch or so wide and perhaps ½ inch thick. These slices are laid in the sun to dry, and become dry enough to store in three or four days. Sheets of galvanized iron (roofing) are used with sheets of paper laid on them. Cloth was not found satisfactory, and the paper could not be dispensed with, as the acid juice of the fruit turned the product a dark colour if in direct contact with the iron. The fully dried chips are of a very pale-yellow or brownish-white colour, and if only cut into similar shapes could hardly be distinguished in appearance from the best dried apples. These chips when thoroughly dry are stored in air-tight receptacles and may be packed quite tightly in them. The best receptacles are large earthenware jars. Hermetical sealing is very necessary and is generally done with ordinary beeswax.

When cooked, the dried fruit darkens in colour a little and is not so decided in flavour as is the typical fresh mango—in fact, to one who did not know what it was; it tastes somewhat like a mixture of dried apples and apricots. It makes excellent tarts and pies, and could equally well be used for jams or chutneys.

OSTRICH FARMING IN AUSTRALIA.

According to a recent consular report, ostrich farming in Australia has not made any marked progress during recent years. The number of ostrich farmers has remained almost unchanged, and the number of birds has increased to a smaller extent than would be supposed. Yet experiments made during the period in question seem to show that ostrich farming in Australia is remunerative, provided that a cheap supply of the essential green food (chiefly lucerne) is available throughout the year, and if the stock is improved by the introduction of fresh blood. Since the birds flourish only in the dry inland regions, the question of food often presents serious difficulties during the hot and rainless summer months; but it appears that these can be obviated, at least in New South Wales, by establishing ostrich farms in the region under the great dam of the Burrinjuck, where a sufficient supply of green food can be raised under irrigation. The Australian ostriches are descended from a comparatively small number of imported birds, the consequent inbreeding has therefore reduced the quality of the feathers; and owing to the prohibition of the export of ostriches from South Africa, the expense of importing new stock has become too great for the farmer to incur. The Minister for Agriculture of New South Wales has appointed a Commission to visit South Africa, Morocco and Egypt to study ostrich culture and to buy a number of good stock birds. By that means, it is expected that ostrich farming will be improved and will soon show a marked expansion.

MAIZE.

Mr. R. H. B. Dickson, Assistant Director of Agriculture, Mozambique Company, has written an instructive Bulletin on the cultivation and production of Maize.

Storing in Cribs.

Cribs for storing maize must be built in such a position that they can be filled and emptied with the least delay. Weevil being destructive to stored maize, it is advisable to construct cribs so that they can be made practically airtight and to treat the crop with carbon bisulphide. Ventilation, to allow the excess of moisture to evaporate before shelling, is required and must be arranged for. Shutters to fit over the ventilators when disinfection is being carried out must also be provided. The eaves should extend well over the sides of the crib to keep out the rain.

Yields in America.

Lack of proper cultivation and clearing may reduce the yield. It is said that on a very rich farm in Rhodesia 22 bags per acre have been harvested, while in the maize belt of America nothing less than 14 bags is considered satisfactory by up-to-date farmers. In 1909 the State of Ohio produced over 4¼ million tons, the average yield for the State exceeding 11¼ bags per acre. Illinois produced over 10¼ million tons with an average acre yield of 10¼ bags.

Selection of Seed and Judging.

Seed should always be selected in the field, taking the best ears from the best stalks. Ears holding kernels of a wrong colour must never be used for seed. Seed ears should be stored where they will not be exposed to damp. It is good practice to test the vitality of each doubtful ear by removing two kernels and germinating them between damp sheets of blotting paper. The following are the points and score of the judging cards used in the State of Illinois :—

	Perfect score.
Uniformity of exhibit	5
Shape of ear	10
Length of ear	10
Circumference of ear	5
Tips of ears	5
Butts of ears	5
Kernel uniformity	5
Kernel shape	5
Colour in grain and cob	10
Space between kernels at cob	5
Space between rows	5
Vitality or seed condition	10
Trueness to type	10
Proportion of shelled grain to cob 85% to 90% ...	10
	100

Flint Maize.

This is largely composed of flinty material containing but little starch. It matures early. The best known of the Flint varieties are :—Canada

Early yellow, King Philip, Longfellow, Long Yellow Flint, Vilmorins Early, Yellow Cango, Thorough-bred White Flint and White Cango.

Dent Maize.

There are 300 odd varieties composing this class and the starchy substance occupies the entire centre and cap of the kernel. The "dent," from which these varieties obtain their name, is formed by the shrinkage of the top part of the kernel in drying at maturity. Wherever dent varieties can be grown they are more profitable than any others, except of course under special conditions. The length of the growing season varies from 90 to 150 days. Two cubic feet of maize in the ear will produce, if sound and dry, one bushel or 56 lbs. of shelled maize.

A NEW DISEASE OF TEA.

In the *Botanical Magazine* for August 1912, Messrs. Ito and Sawada describe a new leaf disease which has been recently discovered in Honshu and Formosa. It is caused by a species of *Exobasidium* (*Exobasidium reticulatum*), and in that respect resembles the well-known "Blister Blight" of Northern India. In Honshu, it is said to be one of the most serious diseases with which the tea planters have to deal. It appears early in the season, when the leaves are just unfolding, and in some districts has caused a loss of twenty per cent. on the first picking; some plantations were affected to such an extent that scarcely any of the young leaves were free from disease spots.

The first indication of the disease is a small pale yellow spot on the surface of the leaf, which, when held up to the light, is seen to contain a network of darker lines. The spot is not clearly limited in outline, is irregular in shape, and increases until it attains a diameter of two or three centimetres, though sometimes it covers the whole of the surface of the leaf. The colour of the upper surface gradually changes to brown, and finally to dark brown, while the under surface assumes a gray, dusty appearance. As the spots mature, the dark reticulated lines are slightly raised above the leaf surface, which finally splits and discloses a white network of fungus tissue. This tissue gradually turns brown from the centre outwards, and the affected area of the leaf becomes dry and shrivels up.

The disease differs from the Indian Blister Blight in the colour and shape of the spot, the absence of any "blistering," and the presence of the white reticulation on the under surface.

T. P.

RAINFALL IN THE CENTRAL PROVINCES, INDIA.

There was a decrease in the rainfall in the month of June. The fall in the West and East of the Central Provinces was one-seventh and one-quarter, respectively, with the result that sowings of cotton were restricted somewhat. Good rain fell over the Provinces in July.

RUBBER IN TRINIDAD.

The Editor of the *India Rubber World* is contributing a serial account of Trinidad and its Rubber to his journal, from the second article of which we cull the following notes.

He refers to the beginning of things some thirty years ago when a few rubber trees were planted in Port of Spain Botanic Garden, probably by its late Superintendent, Mr. J. H. Hart. Later on followed Mr. J. B. Carruthers with his Ceylon experience and a determination to develop a rubber industry : but his career was cut short by a sudden and untimely death. Now the work in this direction is being carried on by Mr. Freeman, under Professor Carmody's direction.

Castilloa would appear to be the most favoured rubber-producer, and it is estimated that there must be considerably over half a million trees. The tree is said to be uneven in growth and irregular in production, but there is a record of a tree 30 years old in the garden which gave nearly 5 lbs. in two tappings a month apart. The general experience, however, is that *Castilloa*, though it will grow anywhere, only produces profitably under the most favourable conditions.

Of *Funtumia* some 20 to 30 thousand trees have been planted, but the yield has not proved satisfactory.

Hevea Brasiliensis is represented by about 100,000 trees, and the scientific officers of the Department are giving their attention to the technical questions connected with the profitable cultivation of this rubber.

The present system of tapping *Castilloa* consists in placing an enamelled cloth apron round the base of the trees to catch the latex which is liberated by horizontal incisions made with a 2-inch chisel and mallet about a foot apart up to 30 feet from the ground.

The *Funtumia* is tapped according to the herring-bone system. *Hevea* is first smoothed down with a spoke-shave and then tapped by the full or half herring-bone method. Newey's secure knife and Sculfer's tapping tool are in use, and the rubber is cured by smoking, dried ants' nests being employed as fuel.

Fifteen 13-year old Para rubber trees at the Experiment Station were tapped from July to December, 1911. Their girth varied from $20\frac{3}{4}$ to $36\frac{1}{4}$ inches, and the produce from slightly over a lb. to $6\frac{1}{4}$ lbs.

Six trees of the *Hevea confusa* type, of the same age, were tapped in the same manner and for the same time. Their girth varied from $31\frac{3}{4}$ to $36\frac{1}{2}$ inches, and the produce from $\frac{1}{4}$ lb. to $1\frac{1}{2}$ lbs.

It was Mr. Hart who tried *Castilloa* as an annual crop ; it was found, though, that the rubber was of inferior quality and that only 8 or 10-year-old trees can be depended upon to furnish good rubber. The produce of young trees is resinous and sticky and no chemical process has been devised which will improve the quality. In the case of *Funtumia*, trees $4\frac{1}{2}$ years old produced rubber of excellent quality, and the latex, which was easily and immediately coagulable by heat, was found to contain 50% by weight of solid rubber.

Mr. Frank Evans conceived the idea of tapping *Castilloa* by means of a great number of punctures spread over the surface of the tree to a height of 8 or 10 feet. This system, though it had the merit of giving a good yield, which varied from $\frac{3}{4}$ to $2\frac{3}{4}$ lbs. dry rubber per tree at a single tapping, resulted in damage as the wounds showed a rough edge and healed badly. Another object was the cost of manual labour which, it has been suggested, might be overcome by using a small portable engine worked by compressed air and connected with the tool by rubber tubing.

It is thought that the tapping of the future is likely to be effected by the aid of steam or electrical apparatus.

THE SUGAR CONVENTION.

The English Government have notified the country that they intend to give notice in September of their withdrawal from the Brussels Sugar Convention in September, 1913. It will be remembered that this Convention bound the then Government in 1902 to impose a special duty on sugar imported from foreign countries, or to prohibit the importation of bounty-fed sugar. The agreement was renewed in 1907 for a further term of five years subject, however, to the provision that Great Britain was from September 1st, 1908, to be relieved from the obligation to impose a special sugar duty or prohibit the importation of the bounty-fed article. The withdrawal will, it is hoped, remove one of the obstacles to the abolition of the existing import duty on sugar. The continental consumption of sugar has increased to 54 per cent. since 1902 when the Convention was signed: the decrease in consumption in Great Britain has fallen to 3 per cent. The average increase in the cost of sugar since the establishment of the Convention has been about $\frac{3}{4}d.$ a pound.

Those in favour of withdrawing from the Convention quote the following figures showing how disappointing the results have been to the industry in the West Indies where so much was expected.

In 1902 the production of sugar in the islands was 3,599,914 cwt., in 1910 it was only 2,883,972 cwt. though once in 1906 it had reached 3,663,725 cwt. In British Guiana the production in 1902 was 2,402,533 cwt: and in 1903 2,518,989 cwt. In 1910 it only reached 2,019,691 cwt.

The question of Tea Duty which Sir J. D. Rees proposed should be lowered from 5*d.* to 3*d.* was another product which was discussed in the House of Commons.—*Tropical Life*, August 1912.

SUGARCANE CROP OF THE PUNJAB FOR THE YEAR 1912.

[Eighteen districts are dealt with.]

On an average of five years ending 1910-11, the area under sugarcane in the Punjab has represented some 15·7 per cent. of the total area under sugarcane in British India.

The area sown with sugarcane is 295,800 acres compared with 341,600 acres estimated in the first forecast and 292,300 acres finally reported last year. This means a very nearly average crop; which is generally in good condition. The district reports call for no special remarks.

THE ALL-CEYLON EXHIBITION.

We are holding over an account of the All-Ceylon Exhibition, till a balance sheet has been issued and the Committee had finally would up all the affairs, but in the meantime we should like to make some preliminary observations and to put forward some suggestions for the future as the public will certainly look to the Society to follow up its success of July last. That success was due in the main to the great natural resources of Ceylon and the industry and intelligence of the native cultivator. But there is one natural advantage of which no opportunity was taken, namely, the geographical position of Colombo. Some producers in India did express their desire to exhibit, but were refused on the grounds, we believe, of the danger of the exhibition growing to unmanageable proportions. After the success of this year that is an apprehension that need weigh with us no longer. It is merely a matter of organisation with plenty of time in which to prepare. We think, therefore, that Ceylon should contemplate the expediency of from time to time holding an All-East Exhibition instead of only an All-Ceylon.

The Time.

The opinion was freely expressed that the time was not well chosen for such a large show though, happily, the weather was particularly kind and held up during the critical week. By holding the Exhibition in January the organisers would be relieved of all anxiety on that score and would themselves be spared much exposure. The lesson of three Secretaries being knocked up is not to be ignored. January being the height of the passenger season, gate money might be expected to gain greatly in volume and the country in advertisement.

Exhibit Fees.

The introduction of the system of charging exhibit fees should, we also think, be considered to provide the means of awarding money prizes. A small exhibit fee of say 25 cents in the case of peasant cultivators would be set off by the chance of winning a first, second or third money prize of, say, five, three and two rupees. In the case of all other exhibitors the fee should perhaps be one rupee and the prizes higher in proportion. Medals and Certificates of Honour could then be reserved as additional awards for exhibits of particular merit. Under such a system properly financed no grant-in-aid would probably be necessary, especially if the time were changed to January.

Scope of the Exhibition.

There were in all 695 classes (referred to as sections in the Catalogue) embracing almost every variety of product grown, manufactured and mined in Ceylon, collected together in one large Pavilion. In addition certain Provinces built their own pavilions to illustrate their peculiar types of architecture, arts and crafts but products for competition were not exhibited in these, it being necessary both for judging and display that they should be grouped together. Each of the leading European firms erected its pavilion in which to show machinery—principally rubber manufacturing—and other articles of trade and commerce. One or two Government Departments also had their pavilions, the Ceylon Agricultural Society of course and other Societies, Associations, districts and, in one or two cases, individuals. On the other side of the road the Horse Show was being held. Thus all Ceylon was in truth collected in.

Measure of Success.

The success of an Exhibition is to be measured by three conditions, the first being the volume of entries. In this respect unstinted praise may be meted out as exhibits overflowed the available space, many of them being accommodated on the grass outside, while the enclosure itself proved too small for the number of buildings. It showed the appreciation of the producer of the value of exhibitions; his enterprise in securing representation in them. We believe that those European firms who went to the expense of erecting pavilions of their own were not disappointed in the amount of business which resulted. Incidentally this reflects upon the buoyancy and vitality of the planting industries of Ceylon.

When we examine the attitude of the general public for the second measure of success we are equally gratified. So popular did the show prove that people returned again and again to the ground. The attendance indeed astonished those responsible for arrangements.

The financial point of view is the least important among those we have been considering, with a national Exhibition such as this which was not expected to pay its way. The Ceylon Agricultural Society, to secure it against financial disaster, had promised a contribution of £1,000 and the Committee are to be congratulated that it will call upon the Society for little if any portion of this promised contribution.

To What and to Whom Due.

It is a delicate task when all classes of the community have combined to make an event a success to single out individuals for particular notice and we do not propose to undertake it except to mention Mr. Denham of the Ceylon Civil Service; Mr. Macmillan, Curator of the Royal Botanic Gardens, Peradeniya; and Mr. Drieberg, Secretary of the Ceylon Agricultural Society, the three Organising Secretaries to whose efforts the success of the Exhibition was chiefly due. But there were certain prime factors, besides the Society, at work that it will be as well to refer to. The influence of His Excellency the Governor was a controlling one as without his encouragement and lead the different departments and communities of the island would certainly not have rallied for the effort in the manner they did. We have no hesitation in saying that to the personal influence of the Governor more than to anything else the success of the exhibition was primarily due. The co-operation of the Government Agents and their staffs is an indispensable condition for the success of any show in Ceylon and in this case it was loyally rendered. The influence of this branch of the service extended much deeper down than might at first sight appear because in organising local agricultural shows all over the island the Government Agents and Assistant Government Agents have been educating the villagers for years and when the time came for a great effort such as this the people were found prepared.

Great demands were naturally made upon the staff of the Department of Agriculture and those demands all agree were fully met. All efforts of the Committee would, however, have been in vain had not the ladies of Ceylon responded to its invitation and come to its assistance in arranging and working up certain classes which they alone were competent to do. In such an Exhibition as the All-Ceylon the public must themselves undertake some of the duties of judging, otherwise the amount of work involved could never be got through in the limited time allowed. All Ceylon will, we feel sure, unite with us in gratitude to those members of the public who undertook this task.

EGG-LAYING COMPETITION.

The *Agricultural Gazette of New South Wales* for July publishes a full account of the results of ten years' work at Hawkesbury College in connection with this competition organised by the *Daily Telegraph.*

The Poultry expert (Mr. D. S. Thompson) reports that where there was one poultry keeper at the beginning of these tests who made egg-production a definite object by breeding from tested layers; there are now hundreds. He adds that the poultry man has been encouraged to breed birds in which standard requirements and productiveness are combined, so that the utility breeder has been instrumental in modifying the ideals of the fancier and bringing about more harmony in the type of show bird and egg-producer.

The following gives the comparative results as regards breeds with three-year hens:—

	Eggs per Hen.		Value per Hen.	
	First Year.	Second year.	First Year.	Second Year.
102 White Leghorns ...	187	167	18/3	15/1
18 Langshans ...	176	136	17/2	13/7
6 Brown Leghorns ...	169	117	16/4	10/7
18 Silver Wyandottes ...	177	122	17/7	13/4
30 Black Orpingtons ...	159	104	15/1	9/7
6 White Orpingtons ...	128	112	12/5	11/4

The following statement indicates the financial aspect in the case of third year hens. Cost of feeding:—

Wheat £6-3, Maize £3-15, Bean and pollard £5-5, Meat £1, Shell-grit 10s., Green feed £1-2-6. Total £17-15-6. The market value of the eggs laid was £34-16-5, leaving a profit of £17-0-11.

Second and Third Year Laying.

Results show that there is a margin of profit in carrying a number of hens into the third year, if they have proved good layers in their first and second years, especially if they are competently dealt with and wisely culled. Should they stop laying at any time they should be promptly marketed on the eve of moulting in their third season. A good many of the hens in the test could have been marketed before the end of February, and the feed bill saved on some forty-five birds for five or six weeks. The laying of the third-year hens was much in advance of last year, the total of 1,013 eggs by J. Waugh's White Leghorns being a wonderful record.

This is the fifth of the series of second-year hen tests, and the conclusions drawn from the previous tests have been fully verified, viz., that while still profitable to keep, the profits are considerably reduced as compared with pullets. The mortality is no greater in the second year than in the first, and with abnormal heat in the height of summer, the old hens are no more affected with apoplexy than are the pullets.

The First-year Hens.

The average laying of the pullets has again advanced. Last year we said that the average production could still be raised over 181 per bird,

but it was more likely to come from the bottom pens than the higher ones. This has been shown to be the case, though there is still a great improvement possible among the lower pens. This is not expected so much from the individual pens as from the individual competitors. A good many of the birds sent forward were not matured. The owners state they are up to the age required by the rule, viz., seven months; but if they were so by the calendar, they are by no means so in maturity, and breeders can assist in maintaining a high average by sending matured or none at all.

We commend these facts to the attention of local Poultry Club which should be in a position to do a great deal for the improvement of the local egg industry if it works on the same lines.

SESAMUM CROP IN THE BOMBAY PRESIDENCY FOR 1912-13, (INCLUDING SIND AND NATIVE STATES).

[Estimates up to 1st August.]

Information incomplete. Sowings still continue. Reported area for British Districts 194,000 acres and for Native States 172,000 acres, 2·5 per cent. over corresponding area last year but 11·6 per cent. below decennial average at same date. In Gujarát early crop sown in second fortnight of June in Káthiáwár and other places where rains favourable. Elsewhere sowings delayed a fortnight to month owing to heavy rain in July. Crop damaged in places by excessive rain and by caterpillars in Kaira. Elsewhere good. Late crop not yet sown. In Deccan and Karnátak crop sown in July a fortnight to month late for want of early rains. In places larger area devoted to jowári and bájri owing to scarcity of fodder experienced in season just closed. Crop good in North and West; elsewhere fair and in need of further rain. Konkan crop sown seasonally in second fortnight of June and is doing well. In Sind rain for sowing favourable, in Karachi but low inundation at commencement curtailed area elsewhere. Sowings began in latter part of June as usual and still continue in places. Crop doing well at present.

This forecast represents some 8·9 % of the total area in British India.

VANILLA NEWS.

Reports from Reunion show that 51 tons of vanilla were exported from that Island in 1911, against 51 tons in 1910, 39½ tons in 1909, 70 tons in 1908, and 48½ tons in 1907.

The price of the first qualities varied between 33 fr. 50 c. (£1 6*s.* 6*d.*) and 40 fr. (£1 12*s.*) per kilo (2·21 lb.), depending on the condition and from what plantation. The inferior vanilla varies between 27 fr. (£1 1*s.* 7*d.*) and 32 fr. (£1 5*s.* 7*d*). The outlook for vanilla is more hopeful this year than last, though until the number of plantations throughout the world has been reduced to the number required by the demand for this product, not much profit can be expecfed from a pure vanilla plantation, though as a secondary product it is very paying. The great risk in confining one's plantation to this creeper is that the planter is at the mercy of a cyclone. One bad cyclone will undo the work of several years, besides annihilating the year's crop.—*Tropical Life*, July, 1912.

A SOLOMON'S JUDGMENT.

The Native Court was in a grave quandary. It had gone down one lane of evidence and found that it ended in a *cul-de-sac* and up another only to find that it opened out into a trackless jungle. Wherefore the Court heaved a deep sigh, pushed its spectacles into its forehead and slowly scratched its head. And whether it was this that gave birth to inspiration or not, I cannot tell (although I like to think it was, for indeed it is upon such little things as these that our lives depend); but anyhow light came, and Solomon in all his wisdom might well have envied.

The case was a dispute as to the ownership of a young buffalo; I have tried more than one myself and know that it might well have puzzled an abler and more legal mind than Orang Kaya Museh's. Procedure is usually as follows: the plaintiff calls six unimpeachable witnesses who swear imperturbably that they have been on intimate terms with the calf since its birth, that they have seen it every day of its life and that owing to its having a wart under the left ear it is undoubtedly the plaintiff's. The defendant then produces half a dozen equallay veracious (and no less imperturbable) witnesses who have known the buffalo even more intimately and from a small scratch on the off foreleg can swear positively that it is (and always has been) the defendant's. And as I knew that the evidence of all these excellent gentlemen never broke down in any particular I wondered a little at the light I had seen dawning in Museh's eyes.

For a moment it seemed as though the case was going to end literally in a Solomon's judgment, for Museh arose and commanded that the young buffalo should be brought; "And," said he to the plaintiff and the defendant, "bring each of you the buffalo that you say is the mother of the calf;" and they, wondering, obeyed.

Museh the chief came to me in great glee with all the triumph of genius in his smile and my question "Was he going to cut the calf in two?" put him into a higher good humour still, for he regarded it (I was rather relieved to see) as a very good joke on my part. Museh, you see, has never heard of Solomon.

Then the lady buffaloes arrived and I watched proceedings. The whole Kapong had turned out by now and amid much shouting and laughter the two mothers were tethered in front of the Court, about 50 yards apart, the calf being placed half way between. Then I realised that the old saw "It's a wise child that knows its own father" (if father, why not mother) had some counterpart in Malay legislation. The calf was let loose, ambled about for a little, and then made a bee-line for the plaintiff's buffalo. The test was, however, that it should *chium* or kiss its mother and we all held our breath. "Belum lagi tentu," said Museh, "It is not yet proved."

Now in the name of all that is art I would fain end my story here but truth prods me on. I should like to tell how the defendant was put to shame, and the six veracious witnesses run in for perjury, by the calf knowing and kissing its own mother, but that is just what it did not do. The devil entered into the heat of that baby buffalo and he went systematically

from one mother to the other, gamboling round each of them for some half hour, much to the excitement and delight of the spectators, who took a whole-hearted interest in the entertainment. The Malay is a patient being but I am not, and amid shouts of "Belum lagi tentu" and the bleating of that baby kerbau whose scul could not rise above the gallery, I departed homewards to my tiffin.—*British North Borneo Herald*, September 2nd, 1912.

HURRICANES.

An interesting article on the above appears in the *Agricultural News* for August 1912. A hurricane is a cyclonic storm; that is to say a storm in which the wind swings round in a circle. The origin of such storm is in the region of the Equator. North of the Equator, the circular movement is always in direction opposite to that taken by the hands of a watch because, as was discovered by Ferrel, the rotation of the earth causes all moving bodies in the northern hemisphere to swerve a little to the right, and this movement of all the particles causes a general counter-clockwise motion. In the southern hemisphere, the swerve is the reverse and cyclones rotate with the hands of a clock.

Warning Indications.

Before a hurricane, the barometer is somewhat higher than usual, with cool, very clear, pleasant weather. The sky is covered with a quantity of light feathery cirrus clouds radiating from a point on the horizon. If the cirrus plumes are faint and opalescent in tint, fading gradually behind a slowly thickening haze or veil, the approaching storm is an old one, of large area. If of snowy whiteness, projected against a clear blue sky, it is a young cyclone of small area but great intensity.

As the storm approaches, the following unmistakable signs display themselves. The barometer falls rapidly; halos are seen around the sun and moon; the ocean swell increases; the weather becomes hot, moist and oppressive, with light variable winds; a heavy mountainous cloud bank on the distant horizon indicates the position of the approaching storm.

Indications useful to those encountering hurricanes on land can be made from what has been said. In any part of the storm area, if an observer faces the wind, the storm centre is on his right in the northern hemisphere; and if the direction of the wind remains constant, and there is an increase in violence accompanied by a falling barometer, it means that he is directly in the track of the hurricane; and his experience in such a case will be that these latter conditions will be emphasized until the centre or eye of the cyclone arrives, when there will be a short calm, followed by a change of the wind to exactly the opposite direction and a return of the stormy conditions, usually with increased violence.

COTTON CROP OF ASSAM, 1912-13.

FIRST FORECAST

The estimated area under cotton this year is 31,900 acres against 36,300 acres last year, the decrease being due to unfavourable weather at the beginning of the sowing time. The present prospects of the crop are fair. Assam represents some 0·2 % of the total cotton area in India.

AGRICULTURAL INSTRUCTION AND DEMONSTRATIONS.

The Editor of the *Philippine Agricultural Review* deals with this subject in an editorial in the August issue of that journal. He refers to the initiative of the U. S. A. Department of Agriculture which sent out no less than 600 agents for giving instructions, who are reported to have given instruction to 100,000 farmers in thirteen different States.

The object of agricultural demontration work is to furnish a means of reaching and influencing the cultivator, particularly the man in the remoter parts in whose way very little in the way of agricultural information ever comes.

The essential feature of the work is that the agent comes in personal contact with the farmer, and that the cultivating hands themselves participate in any demonstration.

Demonstration work is popular for the reason that it is practical. The result of proper demonstration work is larger and better crops.

At the last meeting of the Ceylon Board of Agriculture one of the members present raised a question as to the duties of the Agricultural Instructors on tour, and the Secretary in replying summed up their work by saying that they constituted the connecting links between the Society and the cultivators. The appreciative reference to the work of the Instructors by the retiring Vice-President (Sir Hugh Clifford) went to indicate that the Government valued it.

RABIES VIRUS.

The *Lancet* declares that in spite of the opinion of a small minority, the value of Pasteur's prophylactic treatment for rabies has been established beyond the possibility of cavil.

Up to the present the difficulty has been to preserve the activity of the virus for any length of time, and hence it is necessary for patients to make long journeys to institutions where there are special facilities for keeping fresh supplies. This means delay which if possible should be avoided.

In a recent paper by Mr. D. L. Harris, published in the *Journal of Infectious Diseases*, the author describes a method of preservation which should make it possible to despatch the virus to the homes of the patients to be treated, without danger of its losing its potency.

The following description of a new preparation of the virus is taken from the *Veterinary News* of August 10 :—The brain or cord of the rabid animal is ground to a paste with water and, mixed with carbon dioxide "snow," is frozen hard. This is ground to powder with more of the snow and placed in a beaker with a vessel of concentrated sulphuric acid within a vacuum jar half immersed in a freezing mixture of ice and salt. After thorough drying in 36 to 40 hours, the powder is sealed up in glass tubes. Injections of 1,000 minims can be borne by a man without ill-effect. Harris claims that at the low temperature no loss of virulence occurs,

INTERNATIONAL ASSOCIATION OF TROPICAL AGRICULTURE AND COLONIAL DEVELOPMENT.

The attention of members of the Ceylon Agricultural Society is drawn to the following notice of the formation of a British Section of the International Association of Tropical Agriculture and Colonial Development and the invitation to join the British Section will we feel sure appeal strongly to many. The privilege of having a room reserved for Members of the Section and the use of the General Library and Reading rooms at the Imperial Institute, the Mecca of all Tropical Agriculturists within the Empire, is no slight one; while the *Bulletin of the Imperial Institute* takes foremost rank with the magazines of Tropical Agriculture, collecting within its pages the views and experiences of leading authorities with whom it is in constant touch.

British Section.

The International Association of Tropical Agriculture and Colonial Development was founded at the close of the first International Congress of Tropical Agriculture held in Paris in 1905.

The object of the Association is the promotion of the scientific and practical study of all questions connected with tropical agriculture and the development and utilisation of the natural resources of the Colonies. The first President of the Association was M. de Lanessan, formerly Governor-General of Indo-China and Minister for the Colonies in Paris, who held that office until May, 1910, when he was succeeded by Professor Wyndham Dunstan, LL.D., F.R.S., Director of the Imperial Institute. The Association has its headquarters in Paris and is governed by an International Board, from which an Executive Committee of from five to seven administrators is selected.

Several of the European countries have formed sections for facilitating the work of the Association locally and a British Section has now been constituted in London.

The work of the Association consists in promoting investigations into questions of special importance to tropical agriculture, in publishing the results of these enquiries, and in organising International Congresses for the discussion of the problems of Tropical Agriculture and Colonial Development.

In May, 1910, the Second International Congress of Tropical Agriculture and Colonial Development, organised by the Association, was held at Brussels. At this Congress reports on various enquiries initiated by the Association were read and discussed.

These reports and papers are now in course of publication and a large number of important papers on various subjects connected with tropical agriculture and colonial development were contributed. A short account of the proceedings of the Congress, with abstracts of the reports and papers read by British members, is published in the "*Bulletin of the Imperial Institute*," Vol. viii, 1910, No. 2, from which it will be seen that much useful work was accomplished and that the international enquiries conducted by the Association are already yielding results which are likely to be of the greatest importance to those interested in tropical agriculture and colonial development in the British Empire

British participation in the Brussels Congress was arranged for by a British Committee, and at a meeting of this Committee, held at the close of

the Congress, it was decided to take steps to hold the next Congress in London, in accordance with the unanimous desire expressed at a General Assembly of the International Association. A British Section of the of the International Association has been formed, which will be responsible for the organisation of the Congress in London in 1914.

The work of the Association is not only of interest to Departments of Agriculture and Forestry throughout the Empire but also to planters, and to merchants and manufacturers who are concerned with tropical and colonial raw materials.

It is essential that a large membership should be secured for the British Section in order that the London Congress may be successful, and it is hoped that all those interested in tropical agriculture and development throughout the Empire will join the British Section of the International Association.

The annual subscription for members of the British Section is one pound, payable on the 1st January in each year.

Members of the British Section will have the privilege of taking part in the London Congress without further special payment. They will also receive the publications of the International Association as these are issued. In addition, the quarterly "*Bulletin of the Imperial Institute*" will be supplied to them free of charge. A reading and writing room will be reserved at the Imperial Institute for use of members of the section when in London, and members will also be entitled to make use of the general library and reading-rooms of the Imperial Institute.

Subscriptions may be paid by crossed cheque or money order, payable to the Secretary, British Section, International Association of Tropical, Agriculture and Colonial Development, and,—in the case of money orders should be drawn on the General Post Office, London.

Letters and subscriptions should be addressed to "The Secretary, British Section, International Association of Tropical Agriculture and Colonial Development, Imperial Institute, London, S.W."

DIETIC VALUE OF SUGAR.

Professor Metchnikoff, the famous savant, speaking before the Academy of Sciences, stated that, as the result of long experiments, he had discovered that senility was caused to a great extent by poisons which were set up by the intestinal bacteria. These poisons, originating in the intestinal flora, were chiefly responsible for the production of lesions (injuries) in the liver, brain and arteries, and produced an effect which was practically the same as old age.

Experiments showed that vegetables which were rich in sugar, such as dates, beetroot and carrots, produced none of these poisons. Professor Metchnikoff's object, therefore, was to create a sugar-producing centre in the large bowel, where the fight between the healthy and unhealthy microbes takes place. As sugar consumed in the ordinary way is practically all absorbed before reaching the large bowel, he decided to form it by means of a microbe.

The necessary microbe was discovered in the flora of a dog. Experiments made on human beings with this microbe, which Professor Metchnikoff calls the Glyco Bacter, have had most conclusive results. A diet of two meals a day, consisting of 4¼ oz. of meat, 17¾ oz. of sour milk, and vegetables and fruit, to which were added Glyco Bacteria, reduced these intestinal poisons to a minimum which had never before been attained with any diet.--*London Produce Markets' Review.*

THE FERTILITY OF THE SOIL.

The following is taken from a discourse delivered by Mr. A. D. HALL, F.R.S., before the Royal Institution on May 24th last:—

Definition of Fertility.

The fertility of the soil is best defined as that property for which a man pays rent. Nitrogen is the main factor determining fertility because, in the first place, it is one of the necessary and most expensive elements in the nutrition of the plant, and, secondly, because its amount in the soil is subject to both gains and losses from causes which are more or less under the control of the farmer. It can be taken as settled nowadays that the plant itself can make no use of nitrogen gas but must draw combined nitrogen in one of its simpler forms from the soil.

Duration of Fertility.

The question of the duration of the fertility of the land under continual cropping is exciting attention at present as the United States has begun to take alarm at the reduced reproduction of some of its most fertile lands. As a rule all virgin soils are not rich and the system of cropping alternately has reduced great areas to such a poverty-stricken condition that it has been allowed to go derelict.

Experiments on wheat, Broadbalk Field, Rothamsted.

AVERAGE PRODUCE OF GRAIN, FIRST 8 YEARS (1844-51) AND THE SUCCESSIVE 10-YEAR PERIODS, 1851-1911.

Plot.	Manure.	Averages over			
		8 years, 1844-1851	10 years, 1852-1861	10 years, 1862-1871	10 years, 1872-1881
		Bush.	Bush.	Bush.	Bush.
2	Farmyard manure...	28·0	34·2	37·5	28·7
3	Unmanured ...	17·2	15·9	14·5	10·4
		10 years, 1882-1891	10 years, 1892-1901	10 years, 1902-1911	60 years, 1852-1911
		Bush.	Bush.	Bush.	Bush.
2	Farmyard manure...	38·2	39·2	35·1	35·5
3	Unmanured ...	12·6	12·3	10·9	12 8

The results of this plot show two principles at work:—The tendency of the land under an unchanging system of farming to reach a position of equilibrium when the only variations in the crop are those brought about by seasons; and, secondly, that regeneration of the nitrogen stock in the soil is possible by natural causes alone.

Over Manuring.

We now turn to one of the other plots which receives an excess of farmyard manure each year. The manure supplies about 200 lb. of nitrogen per acre, the crop only taking away about 50 lb. so that naturally the land is increased in its fertility.

Broadbalk wheat field.—Nitrogen in soil, lb. per acre.

In soil 1865.	In soil 1904.	Gain or loss in 39 years.	Added in manure.	Added in rain.	Removed in crop.	Unaccounted for.
		Plot 3.—Unmanured.				
2,850	2,290	−560	...	150	600	−110
		Plot 2.—Farmyard manure.				
4,470	4,970	+500	7,800	150	1,990	−5,460

The soil has been getting richer for the last 20 or 30 years, and the greater part of the nitrogen is wasted because bacterial action sets the nitrogen free as gas. There is another principle illustrated here; that in very rich land the wasteful agencies are so speeded up as to prevent any continued accumulation of fertility out of the unused residues of the manures put on. Higher fertility means a higher level of waste.

How Nature Accumulates Plant Food.

We will now take another plot on the same field to illustrate its recuperative actions.

This is a part of the field that has been allowed to run wild since 1881. The difference between the two plots lies in the fact that on the land running wild the vegetation is never removed but allowed to die naturally. Hence not only is the nitrogen taken out by the crop returned to the soil, but also a large stock of carbonaceous matter, and this carbonaceous matter furnishes a bacterium present in the soil, *Azotobacter chroococcum*, which will enable it to fix atmospheric nitrogen :—

Broadbalk Field, Rothamsted.

Land allowed to run wild. Nitrogen in Soil, lb. per acre.

	In soil to 27 in.		Added by rain.	Gain in soil per annum.
	1881	1904		
Broadbalk ...	5,910	8,110	90	92

This plot gives us a clue to the source of the vast accumulations of nitrogen in the old prairie soils.

Heating the Soil.

By putting the soil through various processes of partial sterilisation, such as heating or treatment with antiseptics, we can eliminate certain organisms which keep in check the useful bacteria in the soil. Heating the soil to the temperature of boiling water for two hours will double its productivity and such a process has been found to be commercially profitable in the case of green house soils. The partial sterilisation processes restore and even enhance its fertility by eliminating its injurious organisms. At present the processes have not been extended to the open field but progres is being made in that direction and gives some promise of a method by which ultimately the unseen fauna and flora of the soil will be domesticated, the useful races encouraged and the noxious repressed just as the larger flora and fauna have been reduced to our service since the days when primitive man first turned from hunting to agriculture.

MARKET RATES FOR TROPICAL PRODUCTS.

(From Lewis & Peat's Monthly Prices Current, London, 14th August, 1912.)

	QUALITY.	QUOTATIONS.
ALOES, Socotrine cwt.	Fair to fine ...	65s a 70s
Zanzibar & Hepatic ,,	Common to good ..	50s a 82s 6d
ARROWROOT (Natal) lb.	Fair to fine .	8d a 9d
BEES' WAX, cwt.		
Zanzibar Yellow ,,	Slightly drossy to fair ..	£7 a £7 2/6
East Indian, bleached ,,	Fair to good	£7 17/6 a £8 2/6
,, unbleached ,,	Dark to good genuine ..	£5 17/6 a £6 10s
Madagascar ,,	Dark to good palish	£6 17s 6d a £7 5s
CAMPHOR, Japan ,,	Refined	1s 6d a 1s 8½d
China ,,	Fair average quality ..	155s
CARDAMOMS, Tuticorin	Good to fine bold	4s 8d a 5s 2d
	Middling lean	4s a 4s 5d
Malabar, Tellicherry	Good to fine bold ..	4s 11d a 5s 5d
Calicut	Brownish	4s 4d a 4s 9d
Mangalore ,,	Med brown to fair bold	4s 5d a 5s 8d
Ceylon, Mysore ,,	Small fair to fine plump	3s 8d a 5s 4d
Malabar	Fair to good ..	3s 7d a 3s 10d
Seeds, E. I. & Ceylon ,,	Fair to good .	4s a 4s 1d
Ceylon Long Wild ,,	Shelly to good ..	1s a 2s 9d
CASTOR OIL, Calcutta ,,	Good 2nds .	4d a 4½d
CHILLIES, Zanzibar cwt	Dull to fine bright ...	40s a 45s
Japan ,,	Fair bright small ..	28s 6d a 32s 6d
CINCHONA BARK.– lb.	Crown, Renewed	3⅝d a 7d
Ceylon	Org. Stem	2d a 6d
	Red Org. Stem	1¾d a 4¼d
	Renewed	3d a 5¼d
	Root	1¾d a 4d
CINNAMON, Ceylon 1sts	Good to fine quill	1s 3d a 1s 7d
per lb. 2nds	,, ,,	1s 4d a 1s 6d
3rds	,, ,,	1s a 1s 5d
4ths	,, ,,	1s a 1s 4d
Chips, &c..	Fair to fine bold	2d a 3d
CLOVES, Penang lb.	Dull to fine bright pkd.	11d a 1s 1d
Amboyna ..	Dull to fine	9d a 10d
Ceylon ..	,, ,,	7¾d a 9d
Zanzibar	Fair and fine bright	7¾d a 7⅞d
Stems ..	Fair	2½d
COFFEE		
Ceylon Plantation cwt.	Medium to bold	80s a 113s
Native	Good ordinary	Nominal
Liberian ,,	Fair to hold	75s a 85s
COCOA, Ceylon Plant. ,,	Special Marks	77s a 90s
	Red to good	69s a 76s 6d
Native Estate ,,	Ordinary to red	42s a 75s
Java and Celebes ,,	Small to good red	25s a 87s
COLOMBO ROOT ,,	Middling to good	10s a 15s
CROTON SEEDS, soft. cwt.	Dull to fair	70s a 80s nom.
CUBEBS ,, ,,	Ord. stalky to good	150s a 170s nom.
GINGER, Bengal, rough ,,	Fair	35s nom.
Calicut, Cut A ,,	Small to fine hold	82s 6d a 85s
B & C ,,	Small and medium	65s a 80s
Cochin Rough ,,	Common to fine bold	38s a 42s 6d
	Small and D's	37s 6d
Japan ,,	Unsplit	29s
GUM AMMONIACUM ,,	Ord. blocky to fair clean	40s a 72s 6d
ANIMI, Zanzibar	Pale and amber, str. srts	£12 10s a £14 5s
	,, ,, little red	£11 a £12
	Bean and Pea size ditto	75s a £9 10s
	Fair to good red sorts	£7 a £9
	Med. & bold glassy sorts	£5 a £8
Madagascar ,,	Fair to good palish ...	£4 a £8 15s
	,, ,, red ...	£4 a £7 10s
ARABIC E. I. & Aden ,,	Ordinary to good pale	35s a 45s nom.
Turkey sorts ,,		42s 6d a 65s
Ghatti ,,	Sorts to fine pale ...	25s a 35s nom.
Kurrachee ,,	Reddish to good pale ...	27s 6d a 35s ,,
Madras ,,	Dark to fine pale ...	27s 6d a 35s ,,
ASSAFŒTIDA ,,	Clean fr. to gd. almonds	£10 a £12
	com. stony to good block	50s a £9
KINO	Fair to fine bright	6d a 1s
MYRRH, Aden sorts cwt	Middling to good	52s 6d a 62s 6d
Somali ,,	,, ,,	50s a 52s 6d
OLIBANUM, drop ,,	Good to fine white	45s a 50s
	Middling to fair	35s a 40s
pickings ,,	Low to good pale	12s 6d a 27s 6d
siftings ,,	Slightly foul to fine	20s a 22s 6d
INDIA RUBBER lb.	Fine Para bis. & sheets	4s 9½d
	,, Ceara ,, ,,	4s 8d
Ceylon, Straits, Malay Straits, etc.	Crepe ordinary to fine..	4s 9d a 4s 10d
	Fine Block ..	4s 10d
	Scrap fair to fine ..	3s 6d a 3s 8d
Assam	Plantation ..	3s 11d
	Fair II to ord. red No. 1	3s 4d a 3s 9d
Rangoon	,, ,, ,,	2s a 3s

	QUALITY.	QUOTATIONS
INDIARUBBER. *(Contd.)*		
Borneo	Common to good	1s 9d a 2s 9d
Java	Good to fine red .	3s 4d a 3s 6d
Penang	Low white to prime red	1s 6d a 2s 8d
Mozambique	Fair to fine red ball ...	3s 10d a 4s 6d
	Sausage, fair to good .	3s 6d a 4s 5d
Nyassaland	Fair to fine ball ..	3s a 4s
Madagascar	Fr to fine pinky & white	2s 9d a 3s 4d
	Majunga & blk coated ..	2s a 2s 6d
	Niggers, low to good .	6d a 3s 3d
New Guinea	Ordinary to fine ball ..	2s 6d a 3s 6d
INDIGO, E.I. Bengal	Shipping mid to gd violet	3s 2d a 3s 8d
	Consuming mid. to gd.	2s 6d a 3s
	Ordinary to middling	2s 3d a 2s 6d
	Oudes Middling to fine	2s 6d a 2/8 nom.
	Mid. to good Kurpah	2s 2d a 2s 6d
	Low to ordinary	1s 6d a 2s
	Mid. to fine Madras	None here
MACE, Bombay & Penang per lb.	Pale reddish to fine	2s 6d a 2s 8d
	Ordinary to fair	2s 2d a 2s 4d
Java	,, ,, good pale	2s 4d a 2s 8d
Bombay	Wild	7d a 8d
MYRABOLANES, cwt	UG and Coconada	4s 9d a 5s 6d
Bombay ,,	Jubblepore	4s 10½d a 7s
	Bhimlies	4s 10½d a 7s 3d
	Rhajpore, &c.	4s 6d a 6s
Bengal ,,	Calcutta	4s a 5s
NUTMEGS— lb.	64's to 57's	10d a 1s
Singapore & Penang ,,	80's	7d
	110's	5½d
NUTS, ARECA cwt.	Ordinary to fair fresh	14s a 15s
NUX VOMICA, Cochin	Ordinary to good	9s 6d a 12s 6d
per cwt. Bengal	,, ,,	8s 6d
Madras	,, ,,	8s 6d a 9s
OIL OF ANISEED ,,	Fair merchantable	5s 10d
CASSIA ,,	According to analysis	3s 5d a 3s 8d
LEMONGRASS ,,	Good flavour & colour	4½d
NUTMEG ,,	Dingy to white	1½d a 1¾d
CINNAMON ,,	Ordinary to fair sweet	2½d a 1s 4d
CITRONELLE ,,	Bright & good flavour	1s 4d
ORCHELLA WEED—cwt		
Ceylon ,,	Fair ..	10s Nom.
Madagascar ,,	Fair ..	10s ,,
PEPPER - (Black) lb.	Fair ..	5½d
Alleppy & Tellicherry	,, to fine bold heavy ..	5½d a 5¾d
Ceylon ,,	Fair	5½d
Singapore ,,	Dull to fine	5½d a 5¾d
Acheen & W. C. Penang	Fair to fine .. .	8¾d a 9d
(White) Singapore ,,	Fair	8¾d
Siam ,,	Fair	8d
Penang ,,	Fair	9d
Muntok ,,	Ordinary to good ..	1s 11d a 3s 3d
RHUBARB, Shenzi ..	Ordinary to good ..	1s 8d a 2s 2d
Canton ..	Fair to fine flat ...	1s a 1s 2d
High Dried..	Dark to fair round ..	9d a 10d
SAGO, Pearl, large ..	Fair to fine	18s a 19s
medium .	,, ,,	17s a 18s 6d
small ...	,,	14s 6d a 15s
SEEDLAC cwt.	Ordinary to gd. soluble	45s a 60s
SENNA, Tinnevelly lb.	Good to fine bold green	5d a 8½d
	Fair greenish	3d a 4½d
	Commonspeckyand small	1¼d a 2½d
SHELLS, M. o'PEARL–		
Egyptian cwt.	Small to bold ..	95s a £10 7s 6d
Bombay ,,	,, ,, ...	62s 6d a £11 10s
Mergui ,,	,, ,, ..	£15 15s a £19 5s
Manilla ,,	Fair to good £	13 12/6d a £17 5s
Banda ,,	Sorts	57s 6d a 75s
TAMARINDS, Calcutta...	Mid. to fine bl'k not stony	9s a 12s
per cwt. Madras	Stony and inferior ..	4s a 5s
TORTOISESHELL—		
Zanzibar, & Bombay lb.	Small to bold ..	15s a 34s
	Pickings .	13s 6d a 25s
	Fair	22s
TURMERIC, Bengal cwt.	Finger fair to fine bold	24s a 26s
Madras ,,	Bulbs [bright	18s a 20s
Do. ,,	Finger fair .	20s
Cochin ,,	Bulbs ..	16s
VANILLOES— lb.		
Mauritius .. 1sts	Gd crystallized 3½ a3¾ in	13s 6d a 18s 6d
Madagascar ... 2nds	Foxy & reddish 3¼ a ,,	13s a 16s
Seychelles .. 3rds	Lean and inferior ...	12s 6d a 13s 6d
VERMILLION ..	Fine, pure, bright	2s 11d
WAX, Japan, squares	Goodhite hard ...	47s