Photo by H. F. Macmillan.

FLOWER GARDEN AT QUEEN'S COTTAGE. NUWARA ELIYA.

ELEVATION 6,240 FEET. ANNUAL RAINFALL 94·03 INCHES. AVERAGE TEMPERATURE 58·4°

THE

TROPICAL AGRICULTURIST

AND

MAGAZINE OF THE

CEYLON AGRICULTURAL SOCIETY.

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Agricultural Tools.

With the increase in cost of living that is universally going on, with the great extension of rubber planting, and with the increasing demand in other countries of the tropics for his services, more especially in the Federated Malay States, where the chief industry is rubber, which can afford to pay higher rates, there must in all probability come a time when the wages of the Tamil coolie employed upon estates will rise, thus making a great difference to estates planted in comparatively unremunerative products like tea, cacao, or cardamoms.

This, with other causes, will stimulate the wish to find agricultural tools other than the mamoti which can be profitably employed upon estates to the saving of labour. Were it not for such tools, farming would be, comparatively speaking, impossible in the thinly-peopled Western United States and in many other countries. In the rice fields of Texas, one man, aided by machinery, can till 80 acres, a somewhat startling contrast to the state of affairs in Ceylon or India.

It is absurd to suppose that complex American tools can be suddenly introduced to a population of poor villagers, who cannot find the money to buy them, who do not understand them, and cannot repair them if they break, and who are quite unaccustomed to their use. Yet this is the rock upon which all attempts at the improvement of native implements have in the past been shattered. One official, for instance, endeavoured to improve the ploughs in vogue in Ceylon by introducing good English ploughs. These of course penetrated the plough-pan which exists in most paddy fields, and let the water escape in consequence. The result, or one of the results, is a prejudice among the villagers against improved ploughs which will probably last a century or more.

On estates, again, though they are under European management, the labour has to be performed by ignorant Tamil coolies, and matters are further complicated by the hilliness of most places, which handicaps or prevents the use of the majority of American tools, which are constructed for level ground.

The individual who endeavours to go rapidly in improving tropical—or any other—agriculture is, as a general rule, certain to fail, and the worst point of his failure, in the tropics more especially, is the prejudice against improvement that is thereby created.

The proper way of procedure is the scientific one, advancing by very gradual steps. It may be illustrated by a recent performance on the Pennsylvania Railroad. Thousands of men are there employed in cleaning out the roadside gutters with

spades. It occurred to an Engineer of the Company that a spade was not a spade for this sort of work, as in some places the soil to be removed was heavy and in others light. He accordingly tried in each kind of soil all sizes and shapes of spades, to get the best results in each place, and now the man who is digging gravelly soil at one place uses a different spade from the man who is digging clayey soil at another. So great was the saving thus brought about that 1,000 men fewer were needed for the upkeep of the gutters.

Somewhat similar is the way to proceed with agricultural tools in Ceylon. We must first study carefully all the various kinds of native implements for doing any particular kind of work, and endeavour to get at the reasons for their construction in such or such a way. Then we must study the best modern implements used for the same or similar purposes, and endeavour to get at the reasons of their construction in particular ways. Then we may return to the native implement, and modify it *very slightly* in the desired direction, making only such a modification as will improve it in cheapness or efficiency and yet not render it unfamiliar to or not to be repaired by, the ordinary villager, nor make it appreciably more expensive. Then the new tool should be carefully and exhaustively tested against the old, and only when it has definitely proved its superiority should it be introduced to the notice of the villager.

Once the new tool has become established, further improvement may be taken in hand, and so on, but we must be very careful not to try to go too rapidly, nor to make large steps.

On estates, of course, progress may be a little more rapid, as expense comes less into consideration, and the supervision is European, but even here we must go slowly.

Already the American "cultivator," or multiple small plough, is coming into use in the Madras Presidency in a very much modified form, consisting of small wooden plough blades fastened to a central beam and tied together with string. But the use even of this simple tool results in a considerable saving of labour.

There seems no reason to suppose that the labour of cultivating low-country estates, at any rate, could not be considerably reduced by the employment of simple tools.

To devise really useful tools for a high upcountry estate, where the plants are growing on what in England would be considered as precipices, is of course a matter of great difficulty, but for lowcountry estates which are comparatively level, and in which the soil is comparatively free of stones, it should not be difficult to devise simple cultivators, seed-drills, and other such instruments which would result in a great saving of coolie labour, and consequently a reduction in the number of coolies employed, a matter which may any day become of very great importance.

GUMS, RESINS, SAPS AND EXUDATIONS.

Rubber Culture in the Philippine Islands.

By W. I. Hutchinson.

(*Forester, Philippine Bureau of Forestry.*)

One of the great problems to be solved in the development of every new country, apart from principles of government, is, what products are best suited to the climatic and soil conditions at hand.

So important is this matter that every civilized nation maintains numerous agricultural stations and farms, not only at home but throughout its foreign possessions, in order that by careful experiments some light may be cast on this all important subject.

To the business man and the farmer of the Philippine Islands, this question is a vital one. A considerable amount of capital is usually required to further a large farming project, and it is but natural that the first question that those whose money is involved should ask, is, what returns may we expect, and how long will it be necessary to wait before the first crop can be gathered?

Coconuts, hemp, and sugar cane have been planted in these Islands for many years, so that the profit that may be secured from these products is generally well known. One reads daily, however, of the large returns received from cultivation in the East, of tropical species other than those mentioned, and on comparing their gross proceeds with those from coconuts or hemp, is surprised to find that the species planted to the greatest extent in any country, are not always the ones that yield the largest income.

It was undoubtedly on this account that rubber was first introduced into the Philippines, or perhaps it would be more accurate to say, into the Island of Mindanao, as it is in this section of the Archipelago that the greatest amount of planting has been done, through official channels.

Up to the present time Para rubber seed has been secured either from Sandakan, Borneo; or Singapore, through the Bureau of Forestry at Manila and the Government of the Moro Province, Island of Mindanao. A few private ranch owners have also obtained small shipments of Ceara and Castilloa from Ceylon.

On account of the different methods of treatment, growth, etc., of these various species, they will be considered separately.

PARA RUBBER (*Hevea Brasiliensis*).

During 1905 several small lots of Para seed were received in the Philippines. Early in the year the Moro Government obtained 1,000 seed from Sandakan, Borneo, which were distributed among ranch owners and government officials throughout Mindanao, but of these seed few germinated, due without doubt to their infertility and the lack of knowledge as to the proper methods of planting.

In October, 1905, the Bureau of Forestry at Manila received 5,000 seed from Singapore, 2,500 of which were sent to the Island of Mindanao, where they were planted in seed-beds at the Moro Government Experimental Farm, located on the Zamboanga Peninsula. Although every care possible was given the seed, which were planted within a month from date of shipment, only about 400 of the total number sprouted. The average rate of growth of these nursery plants was about 18 inches in 50 days, seeds unfiled when planted.

In January of the present year the Moro Government again made a purchase of 6,000 seedlings, which had been raised from seed at the Lamao Forest Reserve, Bataan Province, by the Bureau of Agriculture. One thousand of these seedlings were distributed to farmers in the vicinity of Zamboanga, and the remainder placed in seed-beds to await a favourable season for planting.

It is the intention of the Provincial Government to distribute a number of these seedlings among the principal towns of the Island, in order to ascertain which section of the country is best suited to rubber growing. A plantation will also be established on the Government Farm at an elevation of 25 feet above sea level, with sample plots in the surrounding mountains at different altitudes up to 1,200 feet.

CEARA RUBBER (*Manihot Glaziovii*).

As far as is known to the writer, there are only two rubber plantations of any size in the Philippine Islands, and these are located on the Island of Basilan, Moro Province. These plantations are situated at 200 and 500 feet elevation, and contain 2,500 and 1,000 trees respectively. The soil of both of these areas is a well drained, rich, heavy loam, with a small amount of volcanic gravel intermixed.

The following figures on the annual rainfall of the Island were furnished by the Weather Bureau sub-station at Port Isabela, Basilan:—

Year.	Total rainfall.
1903	65·30 inches.
1904	74·25 ,,
1905	42·43 ,,

The Ceara seed, after having been *en route* for eight months, were filed and planted directly to stake. At the lower elevation 2,500 out of 3,000 seed germinated, while at 660 feet something over 1,000 plants were obtained from 1,500 seed.

The following measurements made by the writer will be of interest to all rubber growers, and as far as is known compare favorably with the growth of other trees of the same species and age, planted in the East:—

Ceara Rubber.

Elevation 500 feet.		Planted 15 × 15 feet.
Age.	No. trees measured.	Average height.
7 mo. 5 days.	43.	12 ft. 5 in.
	Maximum height 17 feet.	
Elevation 200 feet.		Planted 15 × 15 feet.
Age.	No. trees measured.	Average height.
5 mo. 15 days.	65.	9 ft. 9 in.
	Maximum height 13 feet.	

CASTILLOA RUBBER (*Castilloa Elastica*).

A small Castilloa plantation, containing some 400 seedling trees irregularly spaced, has recently been set out on the Island of Basilan at an elevation of about 50 feet above sea level. The soil on this situation is a rich, heavy loam which has been washed down from the surrounding mountains, and contains but a small amount of gravel.

The measurement of 45 plants in the seed-bed, which are slightly larger than those set out in the plantation, gave the following results:—

Castilloa Rubber.

Age.	No. seedlings measured.	Average height.
4 mo. 25 days	45.	17 inches.
	Maximum height 29 inches.	

After watching the growth of Para and Castilloa seedlings in nursery beds, and Ceara trees in plantations, it is the Forester's opinion that all of these species are well suited to the climatic and soil conditions as found in the Island of Mindanao.

RAMBONG (*Ficus elastica*), the other great rubber producing species under cultivation, has been planted singly in private grounds in many towns in the Islands. All seem to thrive well.

Which of these four species will give the greatest yearly returns per acre in these Islands is a question which time alone can solve. Almost every large ranch owner in the eastern part of the Island of Mindanao will plant more or less rubber this year. Plans are being made to try all the principal kinds of rubber trees, and it is hoped that the species best adapted to the Philippines may be determined in the near future.

With the ever increasing demand for rubber, the limited areas suitable for its production, and the rapid exhaustion of the jungle product, it will doubtless be many years before the supply will even in a small measure be able to meet the demand.

In this new country we have been slow in starting to plant rubber but the first step in the right direction has been taken, and the day may not be far distant when the Philippine Islands will be reckoned as an important factor among the rubber producing countries of the world.

THE CEYLON RUBBER SHOW AT PERADENIYA.

This proposal is taking shape; and, as it will meet a keen public demand, its realization is practically assured. The show is not to be held in the busy month of February, however; and consequently September is now named as a suitable time. We understand that a representative stock of machinery for dealing with rubber in its first manufactured stages has been ordered from home, whereby Mr. Herbert Wright will be able to extend the scope of his experiments, and by September these will all be on view and working. Thus, with all local patentees in the field with their particular exhibits, and the Royal Botanical Garden's staff working at full pressure, with the Peradeniya laboratory thrown open, showing what is being done in the matter of latex experiments, the treatment of various forms of disease, &c., &c., besides competitive exhibits in the various classes of dry rubber, it will be at once conceded that there will be ample material for a very attractive and useful show. We have already spoken of the Kuala Lumpur and Penang shows; but the Peradeniya one would surpass these, and be the best thing of its kind dealing with rubber which has been held anywhere. It must be held inside the Peradeniya grounds, because the trees, laboratory and new machinery will also be there. For this reason it is supposed that an entrance fee would be impossible, as such has never been charged at Peradeniya; but, even if some parts of the grounds must be kept open, there can surely be an enclosure, not only to prevent too much crowding by people whose only interest in the affair would be a "free show," but also to provide something towards the expenses. The suggestions made by one or two interested in seeing the proposition taken up include the proposal that the expenses be shared by the Government and the Ceylon Planters' Association. The sum will not be a large one, and doubtless the C. P. A. funds, though limited, could meet the moiety all right; but there can be no doubt about the Government's direct interest not only in the show but also in the new industry; for it must have already netted several lakhs of rupees this year over land sales more than would have been the case if rubber

had not "caught on" in Ceylon. Two or three thousand rupees expended on such a representative exhibition would consequently be but a small acknowledgment by the authorities of favours past in the matter of good prices of land and of many more to come! Early notice of the show widely made would ensure exhibits from the Malay States, and elsewhere in this part of the world, of various kinds of rubber—besides, there is its washing machine!—and in addition Mr. Wright might get a representative collection of American and African samples of rubber such as none of us have ever seen.—*Times of Ceylon.*

WASHED RUBBER FROM THE FAR EAST.

There seems to be a diversity of opinion as to the wisdom shown in preparing rubber as it is now coming from the Far East—that is, rubber in what is known as the "washed" form. To-day the market receives two kinds of washed "Para" from Ceylon and the Federated Malay States, one of which is known as "crêpe" and the other as "worm" rubber. The physical shape of these two types is due to the machines through which the latex passes in the process of coagulation and in getting rid of the water. The special objection that importers and brokers have against rubber in this form is their fear that the manufacturer will look upon it as a partially manufactured product; that it has been handled on rolls similar to those that they use in compounding, and, therefore, that it may be adulterated. On the other hand, he planters find that they can handle the latex much easier and more rapidly, and have apparently determined to deliver it in one or both of these forms. The chances are that unless some better method is discovered, the planters will triumph.

Samples of the rubber that have been examined by the writer are excellent, and it can easily be proved whether adulterants are present or not by very simple tests. Further than this, there does not seem to be the slightest fear that any of the Far Eastern planters will adulterate their rubber. The tendency has been from the start to make just as good a product as possible, and to identify whatever is sent out with the plantation where it is grown. It is possible that the customs offices in "protection" countries may at first classify such rubber as a manufactured product, but there is little doubt but that such decisions could be reversed if the matter were put before the proper officials in the right way. What is needed more than anything else is to get out more rubber, and whether it is "crêpe" or "worm" or "pancake" or "sheet" it is bound to find a good and profitable market, and in the long run the simplest method of coagulation and handling is that which will prevail.—*The India Rubber World.*

REVIEW OF PARA PRICES FOR 1905.

Early last January, hard, fine sold at 5*s.* 0½*d.*, soft 4*s.* 10½*d.*, scrappy negro-head 3*s.* 9*d.*, Cameta 2*s.* 9½*d.*, Caucho Ball 3*s.* 3½*d.* Prices soon advanced 2½*d.* and again 2*d.* in February, and the highest price of fine hard was paid in March, fine hard 5*s.* 9*d.*, soft 5*s.* 7½*d.*, scrappy 4*s.* 3*d.*, Island 3*s.* 6*d.*, ball 3*s.* 7¾*d.* By the end of March prices declined 2*d.*, but recovered in April, and in May 5*s.* 9*d.* was again obtained for fine hard (5*s.* 8½*d.* soft, being scarce), but only 3*s.* 1*d.* for Island against 4*s.* 1*d.* paid for scrappy and 3*s.* 4*d.* to 3*s.* 6*d.* for ball. By the middle of July values declined 4*d.*, hard 5*s.* 4¾*d.*, soft 5*s.* 3¾*d.*, scrappy 3*s.* 9*d.*, Island 2*s.* 9½*d.*, ball 3*s.* 4½*d.* During August we advanced 2*d.*, and the sinking of the "Cyril" early September pushed up values to 5*s.* 8*d.* fine hard, 3*s.* 11*d.* scrappy, 2*s.* 11*d.* Island, and 3*s.* 9½*d.* ball. Values fell constantly from 5*s.* 6*d.* end of September to 5*s.* 2¼*d.* for hard, end of October, ball 3*s.* 9*d.* to 3*s.* 6½*d.* forward. In beginning of November large receipts caused a decline to 5*s.* 1¾*d.* hard, 5*s.* 1¼*d.* soft, 3*s.* 10¼*d.* scrappy, 2*s.* 11*d.* Island, but ball, being very scarce and over-sold,

advanced to 3*s.* 9¼*d.* spot—large sales forward down to 3*s.* 6½*d.* During November and December we had a quiet market at 1*d.* over these values till the close when short receipts caused buyers to pay up to 5*s.* 5½*d.* for fine hard, 5*s.* 4*d.* for soft, 4*s.* 0¼*d.* scrappy negrohead, 3*s.* 3½*d.* Island, and 3*s.* 10½*d.* Cancho ball spot, closing easier.

Active demand, enlarged consumption, especially of Fine Rubber, and rather frequent fluctuations of prices have been the features of 1905 in Europe. "Motors" of all descriptions rapidly increase: as yet nothing found reliable for tyres except rubber. But all Caoutchouc manufacturers have been busy, and the increased supply has been consumed—we estimate the world's total supply of Rubber fully 60,000 tons. The price of fine Para at one time showed 8*d.* advance, but closes 4*d.* per lb. over a year ago, Negrohead 2*d.*, Caucho ball which has been in great demand, 6*d.* higher.

The supply of mediums rather increased again, West Coast African about the same, say 17,500 tons, against 18,000 tons in 1904, and supplies from the Belgium Congo are stationary, though quality is improving.

Visible supply 1st January, 1906:—

		1906.	1905.	1904.	1903.	1902.
Of Para and Peruvian ...	tons	2,874	2,666	3,262	3,365	4,618
Including America ...	,,	1,600	1,830	1,430	1,365	2,105
For the whole year Brazil increased (from the Amazonas)			31,420	30,385	31,070	28,590
This includes Peruvian and Cancho *via* Iquitos and Manaos ...	,,		6,100	4,390	4,050	3,160

The fine, generally, has been well selected, and should be cut and sorted carefully before shipment. Quality of the Cancho Ball and Slab was good. Bolivia sent more, Mollendo less; both sell readily. Venezuela *via* the Orinoco, moderate parcels sold at good prices, also some of Mangabeira descriptions. Ceara was in small supply and realised high prices. Larger quantities of Manicoba sold very high, except low, dirty lots. Small parcels of thin sheet, clean, "Plantation" Manicoba sold from 4*s.* 6½*d.* to 5*s.* 2*d.* Pernambuco and Assare in moderate supply realised 4*d.* advance. We had less Mangabeira, but a larger proportion of good qualities, and prices 3*d.* to 4*d.* higher. Mattogrosso was not always as clean as formerly, but 240 tons sold at very high relative prices, also Mangabeira, which was much liked.

Cental America and Mexico increased (total C. A. probably 3,200 tons); prices have ruled high. Colombian in decreased supply and middling quality, price 4*d.* to 6*d.* higher. Fine clean hard would command a very high price. Carthagena, Ecuador, Tumaco, etc., in small supply and about 3*d.* to 6*d.* per lb. higher. All clean Rubber from the Canca, Magdalena, Nicaragua, or Mexico, will bring high rates. We expect some "Plantations" in these regions will produce soon; we hope of good, clean, hard Rubber.

	1905.	1904.	1903.
West Coast African	17,500 tons	18,000 tons	15,000 tons
Including Benguela and Mossamedes...	1,650 ,,	1,600 ,,	1,450 ,,
Price advanced 5½*d.* Loanda... ...	800 ,,	950 ,,	980 ,,
,, ,, 12% Congo	5,650 ,,	5,800 ,,	5,600 ,,

The quality has been good and prices higher. Increased supplies from Niger, Gold Coast, Accra, Lagos, etc., sold fairly. Small quantities of nice quality from the Cameroons, Sierra Leone, Gaboon, and Conakry, brought higher prices. French Sudan *via* Senegal 1,250 tons against 1,200 in 1904. Quality liked and demand excellent at high prices. Liverpool landed of West African 4,700 tons against 5,080 tons in 1904, 3,830 tons in 1903.

East Coast African.—Zanzibar, etc., has decreased: prices have ruled very high, showing 4*d.* to 5*d.* advance. Nyassaland much less and very dear. Mombassa sent more Lamu, and got good prices. Uganda has supplied small but increased quantities, and though part rather softish it sold well.

Madagascar in small supply, and has been in very active demand at advancing prices; all fine, clean lots very dear. Rangoon less. Assam more and sold readily higher; good red 4*s.* 1¼*d.* to 3*s.* 9*d.* Some clean plantation sold as high as 5*s.* per lb. Penang rather increased 629 tons, 600 in 1904, 300 in 1903, and much mixed of undesirable quality was difficult to sell; clean lots sold readily. Java only shipped small lots, they sold well, and we expect plantations there will produce nice quality. From New Guinea very small supplies sold readily. Borneo much larger supply and high prices for good. French Cochin China and Tonkin greatly decreased supplies; clean red 5*d.* dearer. Pontianak has been abundant at times, and speculation maintained values to a high standard; closing price £17 15*s.* c.i.f.

Balata continued in good supply, but with large demand, prices improved, and close at the highest of the year. Block, good, 1*s.* 5½*d.* to 1*s.* 6*d.*, sheet 2*s.* to 2*s.* 0½*d.*

Gutta Percha has continued to sell at moderate prices, but more readily.—*The India-Rubber Journal.*

The Ceylon Rubber Exhibition.

The following circular letter has been addressed to rubber manufacturers and gentlemen interested in rubber in Europe and America :—

Royal Botanic Gardens,
Peradeniya, Ceylon,
February, 1906.

Gentlemen.—I am desired by the Committee to inform you that a "Rubber Exhibition," under authority of the Ceylon Government, will be held in the Royal Botanic Gardens, Peradeniya, Ceylon, from the 13th to the 27th September, 1906, and to invite you to contribute. This will be the first exhibition of its kind ever held, and should mark an epoch in the history of rubber.

2. You are probably aware, from seeing the market quotations and from reading the technical papers, that rubber is now being cultivated in Ceylon and the Federated Malay States, and though the exports as yet are inconsiderable, they are doubling annually and will, in about seven years' time, probably reach ten or fifteen million pounds and increase rapidly after that, in fifteen years from now probably exceeding the exports of Brazil.

3. Plantation rubber is cleaner and purer, and is at present selling at 7d. to 10d. a lb. more than that from Para. It is important that manufacturers should, as early as may be inform themselves as to "plantation rubber from the East," the modes of preparation, the cost of production, possibilities, and disadvantages, for the future lies with it, and wild rubbers will be driven off the market, excepting, perhaps, the Para rubber of Brazil, for which there is likely to be some use and a remunerative price for a long while yet.

4. Hitherto, owing to the small supply of cultivated rubber upon the market, two things have happened. Manufacturers have not made any special machinery to deal with it, but have mixed it with the dirty wild rubbers they have been in the habit of using, and planters have not adopted any special form in which to send it to market, but having started with the singularly inconvenient form of biscuits have gone on with these, though it is evident that they are absolutely unsuited to preparation on the larger scale which the expanding trade requires. To deal with the latter first, the planter must adopt some less cumbrous and expensive mode of preparation.

The manufacturers in England have objected to lace and crêpe on the ground that these are a form of scrap, and that adulteration will be easy. The well-established reputation of the Ceylon Planter in the preparation of tea and cacao and other products hardly renders this last apprehension deserving of serious consideration.

5. To see the different processes adopted in the East, and to assist in the development of the best methods for the preparation of rubber, is to the interest of the manufacturers.

6. Manufacturers have not as yet made any special machinery nor any alterations in machinery to enable them to deal with the clean dry product sent from Ceylon and the Federated Malay States. The present cumbersome methods of cleaning, and otherwise preparing, the rubber do not commend themselves as likely to endure. It would appear desirable that preparation of the rubber and its manufacture should go hand in hand, and the rubber be prepared in different ways to suit different kinds of manufacture. A beginning in this direction will form a special feature of the Show, samples of rubber coloured, mixed and vulcanised by new processes invented by Mr. Kelway Bamber, Chemist and Analyst to the Ceylon Government, will be exhibited.

7. The Exhibition will comprise anything and everything that has to do with rubber, and you are particularly invited to exhibit anything of your own manufacture, whether only in the finished state or in various stages of preparation, any forms of machinery, and anything else likely to prove of interest. Power will be provided.

8. The Exhibition will be open for a fortnight. It will be held at the most central and familiar place in Ceylon, and should attract all rubber planters from the East and dealers from India, the Federated Malay States, and other countries. It will consequently offer you an unrivalled opportunity for getting into touch with the producers, and perhaps for making contracts for supply of rubber prepared to suit your own requirements.

9. No import duty will be charged upon articles entered for exhibition, and free railway carriage will be given from Colombo on all exhibits. Entries must be addressed to: E. B. Denham, Esq., C.C.S., the Secretariat, Colombo—to reach him before July 31st, and goods should be forwarded from Europe not later than that date.

I am, Gentlemen,
Your obedient Servant,
JOHN C. WILLIS,
Director, Royal Botanic Gardens,
Peradeniya, Ceylon.

THE LONDON RUBBER MARKET.

LONDON, March 2nd.—During the past week the market generally has been quiet and the receipts in Para continue very large. During February they amounted to 3,920 tons, bringing the total from last July to 24,320 tons against 22,250 last year and 21,470 tons in 1904. The consumption and deliveries, however, continue very large, and in spite of the extra visible supply the market has kept very steady and there are no indications of any serious break in prices. Receipts are now likely to fall off and consumption to increase rather than decrease. There were 6½ tons Ceylon and 1¼ tons Straits and Malay States offered in public sale to-day. To-day's price of fine Para is 5*s.* 4*d.* per lb.

CEYLON.

MARK.	QUANTITY.	DESCRIPTION.	PRICE PER LB.
Tallagalla	3 cases	Dark biscuits	... 6*s.* 1¾*d.*
Gammadua	1 do	Very thin pale biscuits Ceara	... 6*s.* 1¾*d.*
Densworth	3 do	Dark biscuits	... 6*s.* 1¾*d.*
do	1 do	Biscuits mixed colours slight heated	... 5*s.* 10½*d.*
do	1 do	Scrap	... 5*s.* 3*d.*

MARK.	QUANTITY.	DESCRIPTION.	PRICE PER LB.
Waharaka	1 do	Biscuits mixed colours	... 6*s.* 1¾*d.*
do	1 do	Good scrap	... 5*s.* 3½*d.*
Doranakande	9 do	Darkish biscuits	... 6*s.* 1¾*d.*
do	3 do	Fine scrap	... 5*s.* 3½*d.*
do	3 do	Dark scrap	... 5*s.* 1½*d.*
Elston	2 do	Dull biscuits	... 6*s.* 1½*d.*
do	2 do	Good scrap	... 5*s.* 3¼*d.*
Rangbodde	1 do	Pale biscuits Ceara	... 6*s.* 1½*d.*
Ballacadua	2 do	Dullish biscuits	... 6*s.* 1½*d.*
do	1 do	Dark rather inferior	... 6*s.* 1*d.*
do	3 do	Scrap	... 5*s.* 3¼*d.*
Warriapolla	1 do	Pale biscuits	... 6*s.* 1¾*d.*
do	4 do	Amber do.	... 6*s.* 1¾*d.*
do	1 do	Biscuits apparently burnt	... 6*s.*
Cicely Estate	2 do	Inferior scrap	... 4*s.* 11*d.*
do	1 do	Low scrap	... 4*s.* 1*d.*
do	1 bag	Inferior sheets	... 5*s.* 3*d.*
Wiharagama	6 cases	Biscuits mixed colours rather mouldy	... 6*s.* 1½*d.*
do	1 do	Barky ball scrap	... 4*s.* 3½*d.*
Culloden	10 do	Very fine biscuits	... 6*s.* 2*d.*
do	1 do	Humps	... 5*s.* 3½*d.*
do	3 do	Good scrap	... 5*s.* 3½*d.*
Ingoya	5 do	Amber biscuits	... 6*s.* 1¾*d.*
do	2 do	Dark amber biscuits	... 6*s.* 1¾*d.*
do	2 do	Good darkish scrap	... 5*s.* 3¼*d.*
do	1 do	Good dark scrap	... 5*s.* 3¾*d.*
do	1 bag	Thin biscuits Ceara	... 6*s.*
Ellakande	2 cases	Biscuits mixed colours	... 6*s.* 1¾*d.*
do	2 do	Fair scrap	... 5*s.* 3¼*d.*
Heatherley	3 do	Fine palish biscuits	... 6*s.* 1¾*d.*
do	1 do	Amber sheets	... 6*s.* 1¾*d.*
do	3 do	Good scrap	... 5*s.* 3¼*d.*
do	1 do	Inferior sandy scrap	3*s.* 3*d.* sub.
do	2 do	Biscuits and sheets	... 6*s.* 1¾*d.*
do	1 do	Lumps	... 5*s.* 1½*d.*
do	1 do	Low scrap	3*s.* 3*d.* sub.
Nikakotua	3 do	Dull biscuits	... 6*s.* 1¼*d.*
do	1 do	Dark biscuits	... 6*s.* 1½*d.*
do	1 do	Scrap	... 5*s.*
Halgolla	2 do	Biscuits mixed colours	... 6*s.* 1¾*d.*
Galatura	1 do	Dark biscuits	... 6*s.* 1¾*d.*
Duckwari	1 do	Amber do.	... 6*s.* 1¾*d.*
Halwatura	6 do	Darkish do.	... 6*s.* 1¾*d.*
do	3 do	Dark scrap heated	... 5*s.*
Kahawatte	1 do	Ceara biscuits	... 6*s.*
K. K.	2 do	Dark do.	... 6*s.* 1¾*d.*
do	1 do	Scrap	... 5*s.* 3¼*d.*
do	1 do	Pieces	... 5*s.* 3*d.*
	STRAITS AND MALAY STATES.		
S. P. in est. mark	1 case	Sheets	... 6*s.* 1½*d.*
do	1 bag	Thin sheets stuck together	... 6*s.*
do	1 case	Thick biscuits part virgin	... 5*s.* 6*d.*
do	1 do	Thick sheets do	... 5*s.* 6*d.*
do	2 bags	Biscuits	... 5*s.*
do	1 do	Fair scrap	... 5*s.* 3½*d.*
H. & P., F. M. S.	2 cases	Darkish	5*s.* 7*d.* to 6*s.*
do	1 do	Palish	... 6*s.*
do	1 do	Dark	... 5*s.* 3¾*d.*
L. S. H.	1 do	Thick sheets part virgin	... 5*s.* 11*d.*
do	1 bag	do rough and part virgin	... 4*s.* 10*d.*
K. M. A.	3 cases	Pale sheet	... 6*s.* 1¾*d.*
M.	3 do	Large pale biscuits	... 6*s.* 2*d.*

LEWIS & PEAT.

DYE STUFFS AND TANNING SUBSTANCES.

KAMALA, A USEFUL DYE STUFF.

A recent issue of the "Agricultural Ledger" is devoted to a report on the collection and composition of the dye stuff Kamala (*Mallotus philippensis*), the writer being the acting Reporter on Economic Products. The use of the kamala in medicine is now almost obsolete, but as a dye stuff it is in favour, though the growth of its use is checked by adulteration. Inquiries have been made from forest officers in all parts of India, and the present report summarises the results and also gives the conclusions of the technical researches of Mr. Perkin, of the Yorkshire College, Leeds. The tree is a small evergreen found throughout tropical India, Burma, the Malay Peninsula and the Andamans. The reports from Burma show that *Mallotus philippensis* is found sparsely in Tharrawaddy, rarely in Prome, sparsely in Bassein, fairly common in the Mu forests, sparingly in the Yaw division, though fairly common in Gangaw, said to be unknown in Minbu, sparingly in Katha, very scarce in the Ruby Mines, not very plentiful in Pyinmana. The tree is more common in Upper than in Lower Burma. The dye, which is produced from the glands of the mature fruit, is estimated to cost at least double in Burma what it does in Northern India. Some divisions in Burma reported that kamala is a useful dye for local purposes, but it is not sufficiently abundant for commercial use, and the price precludes any possibility of an export trade. In India there is evidence everywhere that the internal trade in kamala is declining. Annatto is cheaper and produces a brighter colour. *Mallotus* produces a fast dye, but it is difficult to obtain it unadulterated. The wood is useful as fuel and the bark has been reported to be used for tanning leather in the United Provinces. Some experiments in Rangoon showed that the bark of an undetermined species of *Mallotus* produces a most satisfactory tanning extract.—*Indian Agriculturist.*

[This tree is rather common in the low-country of Ceylon, and up to 2,500 feet, being known to the Sinhalese as Hamparila, to the Tamils as Kapila. The dye is but little used.—Ed. *T. A. & Mag. C.A.S.*]

THE BLACK WATTLE.

A tree of economic value which I wish to call attention to is the *Acacia decurrens* or Black Wattle, a tree which is common in many districts throughout the Territory.

In connection with the Tantalus forest there were planted some twelve or thirteen years ago a lot of six acres of this tree. The location was a rocky one with poor and shallow soil. The grove was included in the portion of the area set apart for the Federal Experiment Station. As the trees were not in a healthy condition, Mr. Jared Smith, the Superintendent of the Experiment Station, caused them to be cut this last spring, the bark removed and sold for tanning material and the wood sold. Careful statistics were kept by him of the results obtained from this small area. By his kindness I am able to present such results to this Association, which are as follows:—

Thirty-six tons of bark were sold at $23·31 per ton, realizing a total amount of $839·44. The six acres yielded 500 first-class fence posts which were used upon the station. These posts, if purchased, would have cost 25 cents a piece, making the value received from posts $125. In addition to the fence posts there were realized 88 cords of firewood which was sold at an average of $7·83 per cord, producing a

total of $689·25. Allowing the same price for the two tons of bark given away there would be an additional value of $46·62.

A summary of the amount produced by these six acres of Black Wattle is then as follows :—

36 tons of bark sold	... ...	$ 839·44
2 tons of bark given away	... ...	,, 46·62
500 posts	... ...	,, 125·00
88 cords of wood	... ...	,, 689·25
Making a total of	... ...	$1,700·31

or equivalent to $283·38 per acre.

As stated above, the soil on which this grove was planted was rocky, thin and poor, and the trees scrubby. To my personal knowledge, in good soil on Tantalus and a number of locations on Hawaii and Maui, this tree grows to twice the size of the trees cut on Tantalus in much less time.

I am also informed by Mr. Smith that the Black Wattle bark is one of the best of the tanning barks, and the average price of good bark is much higher than that realized by him, the low price being on account of this being an experiment, its individual character being not yet established.

I am also informed by Mr. Smith that the demand for tanning bark is practically unlimited. The foregoing demonstration by Mr. Smith opens up an entirely new field for a profitable industry in Hawaii, either as a proposition by itself or more particularly as an incidental profit in connection with plantations which are now having to purchase their firewood.

The tree is a quick grower, and planted along the lines of roads and in barren spots should furnish all the firewood needed by the plantation, leaving the bark a net profit.—*The Hawaiian Forester and Agriculturist.*

[This tree is now largely grown up-country in Ceylon, and we should be glad to hear if anyone can show results to equal those given in this paper.—Ed. *T.A. & Mag. C.A.S.*]

OILS AND FATS.

A POSSIBLE COPRA INDUSTRY FOR HAWAII.

Coconut Oil in the United States.

The following letters, received in answer to inquiries made by the Superintendent of Forestry, relative to the market for copra existing in the United States, are of interest in view of the long stretches of coast line on the Hawaiian islands where coconut trees would grow and thrive:—

U. S. Department of Agriculture,
Bureau of Plant Industry.
Washington, Nov. 9, 1905.

Mr. Ralph S. Hosmer, Superintendent,
Division of Forestry, Hawaii.

Dear Sir,—In reply to your favor of Oct. 11, relative to the market for copra in the United States, I beg to state that there are but two plants in the United States equipped for grinding copra. One of these is in Philadelphia and has a completely equipped copra oil mill which has been standing idle for two or three years for want of material. The other is a linseed oil mill on the Pacific Coast that has a few oil presses for copra, and gets its supply from the Pacific region, particularly Tutuila. This latter mill supplies the demand for coconut oil for soap making on the Pacific Coast. The Philadelphia firm says it cannot compete with European buyers for the East Indian copra, and there is no other supply available in any quantity, as all the coconuts grown and shipped from the West Indies and Central America are used up in this country for desiccated coconut. Even then there is not enough available for this purpose, and several million pounds of desiccated coconut are imported from Ceylon every year.

The demand for coconut oil is growing all the time for its former commercial uses, and the demand that has sprung up in the last ten years for its use in the preparation of food products is over-taxing the supply. The total export of desiccated coconut from Ceylon amounts to between sixteen and seventeen million pounds yearly, which, of course, cuts into the oil production. In Europe there is a market for coconut oil-cake, which in the opinion of some would make it desirable to press the copra where grown, and ship the oil and oil-cake separately. In the Philippine Census for 1903, Vol. IV, pages 67-69, the plan of shipping copra alone is advocated. Though the India Refining Company of Philadelphia, referred to above, at present imports all its raw material from India and Ceylon in the form of coconut oil, the firm is of the opinion that the easiest, safest and quickest way to ship coconut oil is in the form of copra. All the production of the Philippines and other Pacific islands received here has been so shipped.

The India Refining Company stands ready to purchase copra, if it can be procured in large and constant quantities, at East India prices. The following prices per hundredweight have been quoted recently:—

At Colombo	$ 2·90	to	$ 3·10
At Trinidad	2·90	to	3·00
At Hamburg:			
East African...	3·50	to	3·80
West African	3·00	to	3·60

Very respectfully,
B. T. GALLOWAY,
Chief of Bureau.

Mr. RALPH S. HOSMER,
Supt. of Forestry,
Honolulu, Hawaii.

DEAR SIR,—Your esteemed favor of the 11th inst. is before us, and we should think that copra could be produced in your Islands in commercial quantities and made a pretty important and valuable article of commerce.

The best copra is made by drying the meat of the coconut in houses or drying machines heated by steam, although if the climate is a sufficiently dry one, sun drying produces very good results if the meat is kept clean. The grading depends on the dryness, cleanness, and sweetness of the meat. The market price varies considerably; we have seen it as low as $50·00 or $52·00, and as high as $85·00, per long ton. The present price in London is about $80·00 or $81·00 per ton.

There is no market at present in this country, unless possibly with the American Linseed Company, who have a mill in San Francisco, and we would suggest your writing to them. We trust you will be successful in stimulating some interest in this product, as it is one rapidly growing in importance, and it would hardly be possible to overload the market.

Yours very truly,
INDIA REFINING COMPANY,
W. H. MAGOFFIN,
Treasurer.

—*The Hawaiian Forester and Agriculturist.*

FIBRES.

KAPOK OR SILK COTTON.

An interesting account of the investigations of "Indian Vegetable Flosses," which have been recently carried out in the Scientific and Technical Department of the Imperial Institute, appears in the Bulletin (No. 3 of 1905) of that institution. These silk cottons, as they are also called, are regularly exported to England from India, Java and other Eastern countries under the name "kapok." The latter name properly only refers to the product of the tree called *Eriodendron anfractuosum*, which is fairly common in and around Madras; but flosses from other Indian trees, especially the *Bombax malabaricum*, are also classed under this name. The investigations carried out under the auspices of the Imperial Institute relate to five specimens, sent by the Officiating Reporter on Economic Products to the Government of India, and they consisted of pods and flosses collected from the *Eriodendendron anfractuosum*, *Cocholspermum gossypium* and *Calotropis gigantea*, the last mentioned coming out best from the chemical examination. The amount of cellulose which the flosses examined contained varied between 45 and 69 per cent, as compared with the 95 or 96·5 per cent yielded by cotton under similar conditions. Their deficiency in this respect accounts for their poor tenacity, and, according to the report under review, it is possible that even if the mechanical difficulties encountered in spinning such materials were overcome, the resulting fabrics would deteriorate so rapidly that no demand for them could be maintained. However, it is stated on good authority that although experiments are still proceeding, no process has yet been devised whereby this material can be spun on a commercial scale.

Suggestions have been put forward at various times and in various places that "kapok" might be used in the manufacture of (1) artificial silk, (2) a soft non-conducting felt, (3) gun cotton, and (4) the nap of silk hats; but there seems to be no reliable information available to show that it has been employed on a commercial scale for any of these purposes. The best use, therefore, to which kapok can be put would seem to be that for which it is most in demand, viz., as a material for stuffing cushions, pillows, chairs, bedding and similar articles. For such purposes its non-hygroscopic character and its softness and resiliency render it peculiarly suitable. It is also stated to be less absorbent and less liable to harbour insect parasites than the materials generally employed in upholstery, and, according to the authorities of the Pasteur Institute in Paris, it can be sterilised by heat at least three times without being seriously damaged, whereas feathers and other upholstery materials do not usually survive this treatment more than twice.

Among other suggestions made for the utilization of kapok is a proposal to use it as a surgical dressing for which purpose, however, its slight absorptive power for aqueous liquids is a disadvantage; and, secondly, in the manufacture of buoys and life-belts. In this connection it is noteworthy that several important steam-ships are said to have recently adopted kapok as a stuffing material for berth-mattresses, not only on account of its softness and resiliency, but also because of its buoyancy, the idea being that mattresses made of kapok could be used as temporary rafts or floats in emergencies. Floss obtained from the seeds of the West African rubber tree *Funtumia elastica*, it may be mentioned *en passant*, has also been tried in this connection, and with every prospect of success, since it has been found that this material when merely packed in calico and placed in water, will support a considerable weight for many hours. If, therefore, the cultivation of the *Funtumia* should be established in this country as an industry, the collection of the floss would probably make a useful bye-product. It is not, however, advisable to plant kapok trees in India extensively, because the floss they yield is said to be inferior to that produced in Java, and also because they are so easily grown and widely distributed that there is every prospect of the market being over-stocked in the near future, with the inevitable result of a fall in price.—*Indian Agriculturist.*

[There is a small trade in kapok in Ceylon, and the *Eriodendron* trees are grown round most native houses in the low-country.—ED. *T.A. & Mag. C.A.S.*]

EDIBLE PRODUCTS.

CO-OPERATION IN THE PINEAPPLE INDUSTRY.

The pineapple industry of the Hawaii Islands, as it stands to-day, is the result of some fifteen years of experiment and extension. The pioneers in the industry are now face to face with the work of those who, profiting by the experience of others, have largely avoided the errors of earlier cultivators, with the result that the past five years have seen a large addition to the acreage under cultivation. The agricultural end seems well in hand, and providing wise counsels prevail future years will see the development enormously increased. If the growing of pineapples is to be a profitable venture, the preparation and marketing of the fruit deserves and demands the earnest consideration of the growers.

Up to the present time the marketing of fresh fruit has been accomplished by the individual grower forwarding to some commission house at the coast the product of his ranch as it matured. The condition of the fruit market in general and the trade in pineapples in particular entered but slightly into the calculations of the man with fruit that must be disposed of on hand. Thus, at one season or another, all shippers of fresh fruit have been more or less seriously "nipped" with the result that at times the freight expenses have equalled and in some cases even exceeded the price obtained. Market conditions on the mainland are such that we have not as yet supplied even the yearly increase in consumption of the canned fruit; but with the development now in progress it is only a question of a very short time when Hawaiian canned fruit will be displacing the product of Singapore, the West Indies and Florida, and those countries which hitherto have enjoyed a monopoly of the trade. When this takes place will come the real test as to the future of the pineapple industry in this territory.

Comparing the average product of the several canneries now operating in these Islands with that from other countries, the conclusion must be that the local fruit is superior to all other in flavour, colour, uniformity, and freedom from eyes and specks. Finally in the style of package and label the Hawaiian product compares favorably with the finest mainland canned goods. To this extent at least—the local canning business has been wisely handled, and it is the duty of all interested to see that the standards thus created are not only maintained, but if possible improved, a task which will increase in ratio with the increase in the number of canneries. Already we experience the effects of the moderate competition of products of local canneries, and this factor of local competition is likely to be as effective in disposing of margins of profits and inviting a departure from established standards as could be the competition with goods from older sources of supply. The inevitable consequences of such a condition, if permitted to develop would be most discouraging to those dependent on the industry, and this brings us to a consideration of the best course of avoiding such an undesirable condition of affairs. This must be sought in co-operation—and such co-operation as will permit the several conjoining elements to still retain their identity and individuality to the utmost possible limit. To accomplish this the several growers throughout the group should enter into agreements placing the control of the business in the hands of a Board of Control representing the several interests thus conjoined. The purposes and objects of the Board would be as follows:—

1st.—To establish an agent at the several distributing centres on the Pacific Coast for the disposal of fresh fruit.

2nd.—To fix, from time to time, a minimum price at which fresh fruit is to be sold.

3rd.—To regulate the disposal of fruits by a system of advance orders and such other means as would from time to time be deemed proper, or necessary to prevent the market price from dropping below the minimum while yielding same all the fruit it can consume, at or in excess of such minimum price.

4th.—To notify the several growers of the quantities of fresh fruit to be forwarded, the allotment for this purpose being based on the amount of fruit each grower has ripening, as compared with the total for the period covered by the consignment.

5th.—Each grower to make his own selections of fruit and pack same under his own brand subject only to the condition of using a uniform package and to such regulations as would apply uniformly to all growers.

6th.—All goods destined for one distributing point to go forward under one bill of lading to the Co-operative Company's agent.

7th.—Separate account sales to be rendered for each brand forwarded and settlements to be effected monthly.

The surplus fruit in all cases to go to the cannery to which the grower is tributary, under agreements as follows:—Fruit to be graded into three classes, 1st—That suitable for canning as 2½ lb. sliced; 2nd.—That suitable for 2 lb. sliced, and 3rd—Such as is unsuited for either of above, for use as "grated." In the several grades, the price should be fixed yearly or oftener if deemed desirable, at which the fruit would be accepted at the cannery; 25% of the price to be paid at the time of delivery, and the balance in instalments covering a fixed period. Only the fruit of such growers as abide by the fresh fruit agreement to be accepted at the cannery.

The canned product to be disposed of through a single distributing agency. Each cannery having its particular brand and label for its several products. Agency agreements would contemplate separate account sales for each cannery and settlements to be made at stated periods. Each group of growers having access to a cannery to be responsible, in ratio to the amount of fruit furnished for canning for any debts of the cannery and to join in like proportion in any surplus earnings.

In respect to canneries, I would advocate a single cannery for this Island—centrally located—if possible at tide water and equipped with up-to-date automatic machinery for can making and as far as practicable for fruit manipulation. The canneries now located here would be ample for the requirements of Hilo and some other fruit growing centre, disposition being thus made to the advantage of all interested in the proposition. The main purpose for such a plan of organization as herein outlined is to keep active as many competitive features as possible both in the production and canning of the fruit; the individuality of both growers and canneries is preserved while insuring them a just remuneration for their industy and outlay.

Among the benefits to be derived from such association may be mentioned the economies resulting from large purchases of like supplies of whatsoever kind. A better supervision and consequent greater production through improved methods of cultivation and canning. Employment of an expert chemist—something sorely needed by every canning establishment, but impossible to secure (owing to the expense) by the individual cannery. Such a man would be invaluable in coaching superintendents along right lines, suggesting new lines to work on, and determining the best uses to be made of what are now waste products.

Illustrating one of the possibilities of co-operation on this Island an automatic can-making plant located anywhere at tide water would, in a single season's run pay for itself in freights saved from the importation of ready-made cans in like quantities, to say nothing of the labour saving features of this class of machinery; and what is said of can-making could be closely duplicated in the several operations necessary to the canning of fruits.

Finally as to finances. A comprehensive scheme such as could be outlined and carried through along lines herein proposed would present such manifest advantages and economies over methods now in vogne—as would with proper guarantees from the growers—bring out all the financial assistance necessary to inaugnrate and perfect the sytem.

I present this outline from my view point in the hope that it may assist in bringing about a more desirable state of affairs than existing conditions promise for one of onr "minor" industries. What profits an industry if it supplies the entire market demand for its product and reap no reward except an occasional "Irish" dividend?

—*John Emmeluth in the Hawaiian Forester and Agriculturist.*

[Co-operation is producing wonderful results in agriculture in Europe and America, though England itself has as yet held largely aloof from it. To such an extent has it gone in France, that at St. Malo there is now even a Co-operative "Mistletoery" to which the farmers' children bring in all the mistletoe they can collect in the neighbourhood. and this institution in 1904 shipped to London no less than 750 tons of mistletoe, of course obtaining the benefit of the cheap freights possible on large quantities, and rendering useless any attempt on the part of the non-co-operative British farmer to compete with the pound or two to be found on his own farm.—Ed. *T.A. & Mag. C. A. S.*]

PEA NUTS OR GROUND NUTS.

We have frequently given information in the Journal concerning the value of pea or ground nuts as a farm crop; but, for the benefit of our numerous new subscribers, we once more revert to the subject. The plant is very productive, and yields a very quick return, being from six to eight months in the ground, and is one of the hardiest and most valuable of the productions of husbandry. It thrives in a light sandy soil, and is usually grown in ordinary, dry, arable lands; indeed, it will thrive tolerably well in such indifferent soils as are unfit for the growth of almost any other production. The colour of the pods always partakes of the colour of the soil they are produced in, and this is a most important point to remember, because the brightest pods always bring the most money; therefore a light-grey soil is always to be preferred. When the nuts are raised from such soil, they are perfectly clean and bright-coloured, no particle of soil adhering to them. This is not the case with black or red or chocolate coloured soils. These leave a stain on the pods, which cannot be got rid of even by washing, and these stained pods never fetch so high a price in the market, although the contained kernel may be as good as those in the light-coloured pods. Our sandy scrub soils are, therefore, especially well suited for the cultivation of the most marketable peanuts. Many of our sandy, loamy, forest lands will produce very heavy crops, if the land is previously well prepared and reduced to a fine tilth. Peanuts may follow any hoed crop with advantage, except sweet potatoes. Corn land is to be preferred. Another point is that they do best on calcareous soil. If lime is not actually naturally present in the soil it must be supplied with no sparing hand.

As to the preparation of the soil and after cultivation, the land should be prepared as for potatoes, except that shallower ploughing is needed—say from four to five inches. The object of this shallow ploughing is to secure a firm bed on which the nuts may rest. If the ploughing is too deep, the result

is that the roots run down to too great a depth, the nuts take longer to ripen, are harder to harvest, and, unless the soil is very porous or thoroughly well drained, they run the danger of destruction owing to an excess of moisture. When the soil has been reduced to a good tilth, the land should be marked off in rows four feet apart and crossrows be drawn two feet apart. The nuts before planting must be divested of their shells. Two or three seeds are then dropped at the intersections of the rows and covered with from 1 inch to 1½ inches of soil—not more. In from ten days to a fortnight the young plants will be up. Every miss should be replanted at the earliest possible moment. The ground must then be kept thoroughly clean until the vines begin to cover the intervening spaces. Next comes the time for laying by, the vines having extended nearly half way across the rows. This is done by running a mould board once in the middle, between the rows, and drawing the earth up to the rows with the hoe, care being taken not to cover the vines and to disturb their position as little as possible, as the nuts will now be forming. It will be necessary also to guard against making the bed too high. Soon after this the vines will cover the whole ground and choke every other growth.

The yellow pea-shaped flowers are produced in bunches of from five to seven. After flowering, the flower stalk gradually bends down and forces its point with the incipient seed pod into the earth, where it gradually swells and ripens with about two nuts to each pod. When the vines have quite died off, either naturally or after a frost, harvesting should begin. This work must be done in dry weather. The vines are mown off or cut off with a sickle. These may be used as fodder. The stems are drawn out by hand, the earth is shaken off the nuts, and the bunches laid down near the row. Next day they are laid out under cover on a straw platform, and in a fortnight afterwards the nuts are stripped off. This method, however, is only adopted in countries where labour is cheap. In Queensland the simplest and cheapest method of harvesting is to run the plough under the roots, turning the nuts uppermost. They are then dealt with as described. At the fortnight's end, the nuts are either separated from the haulms by hand, or, if the crop is large, by means of a machine called Crocker's separator, which separates the nuts into three grades, the heaviest, and consequently, the most unripe nuts being delivered into one compartment and the ripest and lightest into another. This machine will grade from 15,000 to 20,000 nuts in a day.

The next business is to thoroughly dry the nuts, for if not well dried they will turn dark, musty, and lose 50 per cent of their value. A bushel of nuts weighs 22 lb., and the minimum price is 2*d.* per lb., or £18 per ton for good, ripe, dry, bright-coloured nuts. The yield per acre ranges from 40 to 120 bushels per acre; two bushels in the pod will plant one acre. The uses of the peanut are numerous, but its chief value as a commercial product is the oil it contains. The yield of oil is set down at from 16 to 50 per cent. It is largely used as an adulterant of olive, sesame, and coconut oils, whilst it possesses the enormous advantage over olive oil in being the product of an annual plant instead of requiring many years for the plant which produces it to mature.

In the East Indies some 150,000 acres are devoted to peanut culture, whilst, in the United States about 3,000,000 bushels annually are produced. There is a large and ever-increasing demand for oil seeds all over the world, and also in Australia, where there would be no difficulty in disposing of the crop. In Barbados the average yield is 2,000 lb. of nuts per acre, and yields of 4,000 lb. are not uncommon.—*The Queensland Agricultural Journal.*

CACAO IN BRITISH HONDURAS.

Several cacao plantations are now established in the Colony, and some are producing good crops. Whereas a few years ago cacao was imported from London to supply local requirements, it is satisfactory to note that during 1904 British Honduras was not only able to satisfy home demands but to export the produce.—*Colonial Reports—Annual.*

A CACAO DRYING APPARATUS.

The following is a description of a patent cacao-drying apparatus erected by Mr. Hoadley at Chaguanas, Trinidad:—

The cacao-drying apparatus consists of an ordinary room, 34 feet square, with 25 feet perforated circular drying floor, upon which cacao is placed direct from the fermenting box. In the centre of the drying tray is a vertical axle from which project four arms which are revolved once in ten minutes. To each arm are attached six ploughs, the operations of which are equal to the work of twelve coolies in keeping the cacao in constant motion. Hot air is generated by exhaust steam, which is passed into 1,100 feet of piping enclosed in a box, over which cold air is drawn by a powerful fan which makes from 600 to 700 revolutions per minute. The air in its passage becomes heated to any desired point up to 150° and is forced up through the drying floor. The machine will dry from 12 to 15 bags of cacao in thirty-six hours. The cost of installing the system is said to be between £300 and £400.

After drying, the cacao is passed through a machine which clays and polishes, or merely polishes to suit the markets, and thereby saves the costly process of dancing. The cacao is fermented in cylindrical drums, which are partially turned every night and morning for ten to eleven days.—*The Agricultural News.*

COPRA IN TAHITI.

From 1895 to 1901 inclusive the export of copra from Tahiti averaged 5,000 tons per annum. In 1902 and 1903, however, the output increased to 7,100 and 8,500 tons respectively, but fell in 1904 to 5,600 tons in consequence of the presence in certain of the copra producing districts of a species of acarus (*Aspidiotus divastatrix*) which attacks the coconut tree and affects the production of nuts. This pest soon disappears under the influence of continued heavy rains, however, and the trees, with the exception of a small percentage which succumb, usually recover within a period of two years and yield as prolifically as before. Copra is in good demand at profitable rates, and it is therefore satisfactory to learn that coconut trees are being planted freely in these possessions.—*Diplomatic and Consular Reports.*

VANILLA IN TAHITI.

Whilst it must be conceded that Tahiti vanilla is inferior in quality to that of other countries, probably on account of the deterioration of the vine since its first introduction into this island from Mexico some 30 years ago, yet it is a fact that during the years 1897-1902 its export and prices were sufficiently elevated to aid this colony in the maintenance of a fairly high state of commercial and financial prosperity. In the years 1897-99 its price varied from 9*s.* 5½*d.* to 5*s.* 2*d.* per lb., decreased to 3*s.* 11½*d.* per lb. in 1900, advanced to 4*s.* 4*d.* per lb. in 1901, and fell to 2*s.* 11*d.* per lb. in 1902, since which date it has

gradually declined to 1s. 0¾*d.* per lb. in 1904. It is generally admitted that this state of affairs has arisen in consequence of foreign markets having been flooded with an imperfectly cured and sometimes fraudulently packed article forwarded hence by Chinese shopkeepers who have procured the green beans from native growers and prepared them with insufficient skill and with undue haste for shipment. However this may be, it is true that the export of Tahitian vanilla in 1902 amounted to 144¾ tons, valued at £47,417, and that in 1904 it had decreased to 134½ tons, of the value of £15,969, a difference in the space of two years of 10¼ tons in weight and of £31,448 in value. Recently some new vines from Mexico have been introduced into Tahiti, which may in time replace those at present in use.—*British Consular Report.*

The Analysis of Vanilla.—Balland ("Pharm. Central," 1905, 688) gives the following figures for three samples of vanilla from different countries:—

	1.	2.	3.
	per cent.	per cent.	per cent.
Water	19.80	20.70	13.70
Ash	2.85	3.20	4.70
Fat	10.00	14.70	11.30
Sugar	14.20	17.80	18.50
Ether Extract ...	30.41	17.66	38.64
Fibrous matter ...	16.90	20.20	8.20
Nitrogen matter ...	5.94	5.74	4.96

The ether extract consists of vanillin and waxy and fatty bodies.

BRICK TEA FOR TIBET.

Manufacture and Preparation.

The following paper by Mr. J. Hutchinson is published in the proceedings of the Assam Branch, Indian Tea Association:—

The following summary has been prepared at the suggestion of the Tea Cess Committee as a temporary guide towards the preparation of tea for Tibet, for those who may desire to make experiments in this line pending the publication of the full report which may not be ready to enable such experiments to be begun this season. It would, however, be very unwise to place any raw strong Assam Jat of tea on the market at present, as this would only confirm the prejudice against all Indian tea which prevails in Tibet. Old mature but not necessarily hard leaf from Hybrid or China Jat would be most suitable, and any coarse quality leaf from the assortment carried on during ordinary manufacture may be reserved for future use in brick-making with whatever clean dust and fluff there may be on hand.

The following four qualities of bricks may be taken as a standard of manufacture:—

(1.) China or Gin Jien, gold pointed or tapering, new season's early young leaf. Two leaves and bud, top two leaves of run-out shoots, some soft leaves that have taken twist during panning and partial rolling.

(2.) Ginsu, gold gem, second quality.—New season's leaf, mostly top leaves of run-out shoots down to red wood, partially twisted, some stalks. Pekoe Souchong and Souchong kind.

(3.) Gin Tsang, Gold Granary or Bin, third quality.—New season's coarse leaf from red wood with many stalks and some twigs. Some of previous season's leaf is occasionally mixed with this. Chopped up into 1 inch and 1½ inch lengths.

(4.) Lao Cha, old tea, fourth quality.—Coarsest new season's leaf with stalks and twigs predominating, but mostly the previous season's material kept over. Chopped into short lengths.

The first process in the manufacture of Brick Tea is panning and this is carried out as soon as convenient after the leaf is plucked. The metal pans used in Western China generally measure about 3 feet 3 inches diameter. The process is minutely described in my pamphlet on Formosa Oolongs and consists in keeping the leaf constantly and evenly moving over the hot surface of the pan which must be hot enough to cause it to emit a sharp crackling sound due to the bursting of the cells. The extent to which it is carried out varies, but the effect visibly is to make the leaf of a dark olive-green colour which it remains. It also makes the leaf soft and flaccid and tough, and when carefully done whole shoots of three and four leaves may be evenly coloured and rendered soft and pliable. The manipulation is easier if the pan is set on a slope. The fire place can be made of bamboo frame-work lined and plastered with mud about 2 feet 7 inches in height in front and 3 feet 2 inches at the back. The leaf is turned over from the front backwards and the back leaf slips downwards. The time required depends on the quantity of leaf, but a small armful should take about six minutes.

Rolling.—After panning the leaf may be lightly rolled by hand or in a machine but not sufficiently hard to break the leaf and press out the juice. After this it must be put out in the sun and partially dried, but must still retain its damp flaccid condition to some extent. As result of panning it will be found that it does not readily ferment and does not turn sour.

Colouring or Fermenting.—When sufficient leaf is collected, it should be stored in heaps about 3 or 4 feet deep and allowed to remain three or four days. The temperature will rise to about 105 to 112 degrees, and the colour will become darker without the olive-green being quite effaced.

Drying.—It should then be dried in the sun thoroughly and stored away till a convenient time. In China such leaf is generally kept for several months and often for a whole season. When required it should be roughly sorted into the classes as above described.

Steaming.—When being made into bricks, the material is steamed over a boiler or pan, which is built in all round and over the top, except for a circular hole on the top of the cone, into which a wooden tub about 1 foot 9 inches in diameter is placed. This tub has an open bamboo or iron grating at the bottom. With a pan 3 feet 3 inches in diameter and a strong fire underneath, the time required will be from 2 to 3 minutes, and temperature of the material will be from 150 degrees to 170 degrees when taken out. The leaf weighing a little over 5 lbs. should be put in a cloth of open texture and placed in the tub with one or two similar bundles on the top which in turn will be put at the bottoom. If few stalks are mixed with the leaf, it will be found that a fair brick may be turned out without any further treatment, but for the coarser qualities a mixture of boiled "glutinous" rice flour is necessary to give sufficient adhesiveness. I have not yet ascertained that "glutinous" rice is procurable in the bazaars, so the description of its use may not be necessary at present.

Moulding.—An ordinary moulding frame consists of a strong batten frame some 4 feet high on a solid wooden base. This frame is braced at top, middle and bottom on three sides, but only at top and bottom on the fourth side and the top bar is made to slip off and on that side. The frame is just of sufficient dimensions to contain four planks about 1½ inches thick and about 3 feet 10 inches long, set together on end so as to form a box or tube about 3 feet 10 inches deep and about 9⅝ inches to 9¼ inches by 4⅛ inches to 4¼ inches inside measurement. If the planks fit

loosely, they are jammed with wedges, and three of them may be fixed firmly, but the fourth has to be removed every time a case of four bricks is finished so as to take it out, and for this purpose the top bar on this side is removable. Four corner pieces are inserted, about 1⅛ inch broad on each of their two sides and grooved on the third side, and these when fitted into the corners make the tube of an oval or flat cylindrical section. The whole frame and mould is sunk some 15 inches in an excavation so as to reduce the height for easy working. Into the mould is inserted a long woven bamboo mat case of oval or flat cylindrical section approximately fitting it and open at the top. It need not be of exact size as it is elastic and will extend or contract as required. This may be woven over a wooden block with thin strips of bamboo about ½ inch to ¾ inch broad in the usual way.

When the steamed leaf is put into the case, the average weight being a little over 5 lbs., and this detail is important, it is pounded down lightly with a wooden rammer weighing some 17 lbs. of similar shape but slightly smaller than the mould and some 5 feet 3 inches in length. A small piece of bamboo matting is placed on top and another lot of leaf put in. Four bricks are made at one time, and the ends of the case are folded over and pegged down with a bamboo staple. The cases are then put aside for several days to set and dry. After which the bricks are taken out, trimmed, wrapped in paper and put back in the case again. The amount of ramming necessary must be found out by practice as it is impossible to indicate it but it must not be done too heavily. The bricks when finished will measure approximately 10½ inches long, 9 inches by 4 inches in the long and short diameter, and 19½ inches in circumference and weigh a little over 5 lb. The shape is invariable, but the sizes differ somewhat.

It must not be assumed that only coarse leaf is required for this trade. The firmer the quality the better the price is elsewhere. Smaller bricks of special quality are also made but not to a large extent. Samples of these are very useful to give away as presents and might with advantage be used as advertisements along the border of Sikkim, Tibet and Bhutan. They may measure about an inch to one and quarter inch thick and 5 inches to 6 inches by 4 inches to 4½ inches. The chief processes are the same, but the leaf is generally fine quality Pekoe kind. Some nine or ten can be made at a time in a small wooden frame with a piece of wooden plate put between each lot. The pressure can be applied by a lever tightened up by means of a rope attached to the end of it and wound round a wooden wheel or pulley. This pulley may be attached to the legs of a long bench on which the frame is placed, and to which the lever at the other end is fastened by a piece of a rope, the pulley being turned by moveable spokes inserted in slots in it, a simple but effective arrangement.

PREPARATION OF PINEAPPLE SYRUP.

Choose very ripe fruit. Wash it well and cut into slices. In twenty-four hours these should be strongly pressed. The juice obtained is boiled, and while boiling must be kept carefully skimmed. After this it is allowed to stand for some hours to permit the impurities to settle. The clear liquid is then bottled. The bottles must first be carefully washed in warm water. Finally, the bottled syrup is sterilised. For this, the corks are secured with wire or strong rings. The bottles are placed in a copper on a layer of straw, or a double bottom pierced with holes is still better. The vessel is filled with cold water and gradually warmed until it reaches boiling point. It is kept at this for an hour. When it is desired to concentrate the syrup, it should be allowed to evaporate under reduced pressure so as not to weaken the delicate flavour.—*Agricultural Gazette of New South Wales.*

THE CONSERVATION OF FRUIT BY THE USE OF FORMALIN.

A good method of conserving fruit in as nearly as possible its natural state has been largely sought after for a long time, but whatever means have been employed, a perfect result has not been obtained. One reason is the rapidity with which fleshy fruits ferment and rot under the action—as Pasteur has demonstrated—of various organisms, fungus, and bacteria. Taking this view, and believing that if these micro-organisms could be destroyed, the period during which the fruit can be kept in perfect condition might be considerably prolonged, the English agricultural authorities have instituted a series of experiments under the direction of the Jodrell Laboratory, Kew. These have been very successful. The English Journal of the Board of Agriculture reviewed them in a recent number (No. 5, August, 1905, "Method of preventing the rapid decay of ripe fruit"). This high authority gives its fullest support to the scheme.

The method which has produced the best results is to immerse the fruit in cold water containing 3 per cent. of trade solution of formalin (40 per cent. of formaldehyde).

There are two methods employed, according as the fruit has a soft pulp or is firm-fleshed, and whether it is eaten whole or not. With the former class, to which cherries, strawberries, grapes, &c., belong, the fruit is plunged into the solution for ten minutes. Then it is taken out and steeped for five minutes longer in cold water, and is finally spread out on a metal strainer, or in any other suitable place, to allow it to drain and dry. In the second case, when the fruit has a peel or skin which is not eaten, it is subjected to the formalin solution only.

The Kew experiments were carried out on five kinds of fruit—cherries, strawberries, gooseberries, pears, and grapes. These had not been specially selected, but were bought in fruit-shops, and in some cases from street vendors.

The following figures show the number of days during which the fruit so treated remained perfectly sound, after an equal quantity of each fruit, non-treated, taken for comparison, had become rotten:—Cherries, 7 days; strawberries, 4; gooseberries, 7; pears, 10; and grapes 4;. These results apply in every case to fruits which were perfectly ripe at the time of treatment; but if they are subjected to the process before maturity, they keep just as well, while the normal development and flavour undergoes no more alteration than when the fruit is placed in a refrigerator. It would have been interesting to know the length of time which elapsed between the beginning and end of the experiment, in addition to the number of days during which the treated fruit remained in good condition longer than the other. The practical English people, having proved that this method of conservation is excellent for their indigenous fruits, are hoping to see their markets supplied with several delicious varieties of tropical fruits which, under former conditions, has been impossible.

A minute examination of ripe fruit from the West Indies intended for the Colonial Produce Exhibition at the Crystal Palace, clearly showed that the decomposition of the mangoes, for instance, during the journey was entirely owing to mould and fermentation caused by bacteria and fungi attacking the outer surface, and not owing to a tendency of the fruit to decay or ripen too quickly. A similar treatment could be profitably employed on a number of tropical fruits which are imported in a good condition (such as bananas), but which often have a dark and disagreeable appearance, caused by an exterior fungus. Pears, apples, oranges, citrons, &c., might all be treated with the same advantage. In England great importance is attached to this new means of conservation, which is at once very simple, inexpensive, and absolutely harmless. Several other preservatives have been tried, but taking all conditions into consideration—ease of application,

small cost, and perfect safety during its application—formalin comes easily first. It is easy to understand why the English, who are the greatest importers of fruit from all parts of the world, should be eager to discover a process for preserving as long as possible its quality and appearance; and it is because of their incontestable and official statements that we think it obligatory on us to bring this new process under the notice of all producers, merchants, and consumers, to whom the preservation of fruit is a daily problem.

But although the use of the preservative is chiefly directed towards the keeping of table fruit, it might be applied quite as advantageously to cider fruit. Many cider apples and pears, in spite of the great resistance of their anatomical structure, as compared with that of the garden varieties, have just as much need of protection. The greatest enemy to cider apples intended to be kept for a long time is rot. It originates in the same way as on eating-apples, and there can be no doubt that the same treatment will produce the same results on similar subjects. We repeat the mode of procedure. Plunge for ten minutes in cold water containing 3 per cent. of formalin. A tub or a cask cut in halves will serve for the purpose of a bath. Take out the fruit, and drain and dry on trays, then place in the store room as usual, putting on one side as comparison a lot of the same species and weight which have not been sterilised. The expense of this new method of conservation is quite insignificant, and the profits must be very high if the fruit will keep for some time in a perfect state, as is alleged; and if the treatment can be as successfully carried out with the more delicate garden fruits, it will become of immense importance, and affect every species under the sun.—*The Agricultural Gazette of New South Wales.*

PLANT SANITATION.

Mycological Notes.

By T. Petch.

(Illustrated.)

THREAD BLIGHT.

This blight has been known to Indian tea planters for a long time, and has done serious injury in many districts in that country. It is said to be found in the jungle on many trees, in fact, "it is a question to what extent any jungle plant can be considered absolutely free."

In Ceylon it has grown for several years on nutmeg trees together with Horsehair Blight (*Marasmius rotalis*), and one instance of its occurrence on tea has been reported.

It has also been recently observed on cacao in St. Lucia and Trinidad, where the trees are attacked by the same combination of Thread Blight and Horsehair Blight as occurs on the nutmegs at Peradeniya.

The fungus makes its appearance on branches and stems as a white thread which is somewhat woolly and adheres closely to the stem. It branches over the stem in various directions, but chiefly upwards, and spreads over all the smaller twigs. When it reaches a leaf it spreads over the lower surface in a series of veins, each with a thinner flat border. In India it is said to cover the whole under surface with a white felted layer; I have not observed this in Ceylon. Where two leaves touch one another it spreads from one to the other forming a thickened cushion at the point of contact. The leaves then turn brown and die, but instead of falling to the ground, they remain attached to one another and to the stem by the fungus threads so that a tuft of decayed leaves is suspended from the branch.

The above refers to its effect on nutmeg, and on tea in India. It has not yet been seen on the leaves of tea in Ceylon.

Watt and Mann state that wherever the threads go, there is an internal mycelium just under the bark, and the branches are ultimately killed by the choking of the vessels in the exterior of the "cambium zone" by the mycelium of the fungus. Massee supposes that the mycelium travels underground, and first attacks the root, afterwards passing up the stem either externally or internally, always finally coming to the surface. Cases of underground infection have been recorded, but experiments in this direction have given negative results. It is difficult to see how such could account for its occurrence at the ends of overhanging nutmeg branches 10 feet from the ground when the tree is in all other parts quite healthy.

Though at first considered harmless, it is now regarded as a serious blight in the Indian tea districts. In Ceylon where it is unaccountably restricted to the stems of tea bushes, its effect is negligible as far as is known, but, in view of the possibility of its spread to the leaves, it should be carefully looked for and immediately eradicated when found.

The Indian Thread Blight has been referred to *Stilbum nanum*, a minute fungus resembling a small pin, which has been found on decaying twigs after they have fallen to the ground. The identification is, however, considered

Photo by T. Petch.

THREAD BLIGHT ON NUTMEG

(½ Natural Size.)

doubtful. In practically all instances, only the white mycelium has been seen, so that it is quite possible that these white threads do not represent the same fungus in all cases. Only in a very few species can fungi be identified from mycelium alone.

It has been kept under, on nutmeg, by cutting off and burning affected branches. Where it occurs on old stems, the white threads should be rubbed with the lime-sulphur mixture, recommended for Horsehair Blight (*Tropical Agriculturist*, December, 1905). Prunings which show Thread Blight must not be buried.

During a recent visit to the low-country, I found the combination of Thread Blight and Horse-hair Blight on bushes in the jungle; the tea in the same district is attacked by the latter but not by the former. At the same time I learnt that the name Thread Blight has been commonly applied to any white threads *in the soil*. These may be part of any one of thousands of fungi; they are the vegetative part of the fungus, corresponding in function to the root, stem, and leaves of a flowering plant. It is not possible, and never will be possible, to identify a fungus from the threads alone, but it is quite certain that the majority of them are harmless. True Thread Blight grows *on the leaves and stems of living plants.*

SPRAYING MIXTURES.

At the opening of the new spraying season it may be of some advantage to call attention to a point connected with the operation which hitherto has been strangely neglected. That point is the suitability or unsuitability for mixing of various materials used in spraying. Fruit-growers and managers of spraying experiments not infrequently mix materials without any consideration of the chemical reaction which may take place between two or more of them. In combining insecticides and fungicides there is, of course, a desire to battle with the two classes of fruit pests in one operation; but if the materials chosen for this double purpose will decompose each other and enter into fresh combinations, it is important to consider what those combinations will be, whether they will be harmful or inert, and whether they will be mechanically objectionable on account of the difficulty of passing the mixture throughout the nozzles of a spraying machine.

Extremely few fruit-spraying trials have been made in this country, but they have been numerous in the United States, and it was the practice of mixing materials in that country which led me to make some inquiries as to the effects of such mixing, and as to mixtures which seemed worth trying if they could be used without decomposing the effective elements.

Some mixings cause partial decomposing of constituents, and yet leave them apparently effective. A notable example is the combination of Paris green and Bordeaux mixture. Messrs. Blundell, Spence & Co., manufacturers of Paris green, state that the addition of Bordeaux mixture to it decomposes the Paris green, producing a much less poisonous and efficient combination of the copper and the arsenic. But it is partly for the purpose of reducing the poisonous action of Paris green that the addition of Bordeaux mixture to it is commonly recommended and practised in the United States. The mixture has stood the trial of prolonged experience, and its effectiveness as an insecticide and fungicide combined has been demonstrated in the numerous experiments. The objection to it, as to Paris green alone, is that it often seriously injures the foliage of fruit trees, even when used in such moderate proportions as 8 oz. of Paris green with Bordeaux mixture containing 8 lb. of sulphate of copper to 100 gallons of water.

The use of lime with Paris green to neutralise its action upon foliage is also commonly recommended; but this probably decomposes the poison to a much greater extent than does the Bordeaux mixture.

In consequence of the injurious action of Paris green upon foliage in a tender stage, the use of arsenate of lead is becoming more and more common as a substitute As this poison is quite harmless to foliage, it is a pity that it cannot be mixed with either of the two ordinary fungicides without losing its efficiency. Dr. Dyer was consulted upon the point, and he stated that if arsenate of lead were mixed with Bordeaux mixture, the lead, by the action of the sulphate of copper, would be converted into ineffective sulphate of lead. Similarly, if potassium sulphide as a fungicide, instead of the Bordeaux mixture, were mixed with arsenate of lead, the result would be the formation of ineffective sulphide of lead and comparatively useless potassium arsenate or potassium sulpharsenate. Again, the mixing of Paris green and potassium sulphide would lead to the conversion of the copper in the former into useless copper sulphide, leaving only the arsenic to be relied on as a poison. In this case apparently the fungicide would be the agent rendered ineffective, while the insecticide would still retain considerable virulence.

For two seasons some extensive spraying experiments have been carried on by the authorities of one of the principal experiment stations in the United States, in which Bordeaux mixture and arsenate of lead have been combined for the purposes, mainly, of checking attacks of the Codlin moth caterpillar and scab in apples and pears. The constituents were 10 lb. of copper sulphate, 7 lb. to 10 lb. of lime, and 3 lb. of lead arsenate to 100 gallons of water. The trees were sprayed three times, and the results were decreases of both attacks, but not to a nearly sufficient extent to be regarded as satisfactory. No doubt the explanation is the impairment of the constituents in the way described by Dr. Dyer. As Paris green had proved harmful to foliage, the arsenate of lead was used instead, apparently without any consideration of possible decomposition. There is nothing unusual in this neglect of an important consideration. In all the numerous reports from American experiment stations relating to spraying that I have read, not one has entered into the subject of the effect of mixing spraying materials from the point of view of possible decomposition. It is not surprising, then, that in the numerous pamphlets on spraying issued in the United States, chiefly by manufacturers of spraying machines, the point in question is ignored; and the most incongruous mixtures are commonly to be found among the prescriptions.

It appears that a combination of Paris green and Bordeaux mixture in spite of the partial decomposition of the former, remains the most effective combination of an insecticide and a fungicide used at present. For the first application, just before the buds open, it would be harmless to the trees; but if applied immediately after the blossom has fallen, when it is most needed for the destruction of the Codlin moth caterpillar, my experience in last season's operations induces me to advise that only 6 oz. instead of the usual 8 oz. per 100 gallons should be used, because the foliage is then in a tender stage. The use of 8 oz., with Bordeaux mixture, at this stage, greatly injured the foliage of my apples and plums. That the Paris green was the cause of the injury was proved by precise trials on trees not previously sprayed, a branch on each of several apple trees being treated with Paris green at the rate of 8 oz. to 100 gallons, other branches on different trees with Bordeaux and Paris green, and a third set with Bordeaux alone. Each branch was labelled in reference to its treatment, and it was found that the Bordeaux mixture alone had no injurious

Photo by T. Petch.

THREAD BLIGHT ON TEA.

(¼ Natural Size.)

effect whatever upon the foliage, whereas each of the other applications caused scorching and ultimate defoliation. In this experiment, it must be explained, the spraying was done with a garden syringe, and the foliage was more nearly drenched than it would have been by a spraying machine with fine nozzles. But it is almost impossible to prevent men who do spraying work from drenching the trees. They are not satisfied with covering the foliage with a fine mist of spray, which is all that is required, and, unless constantly superintended, they keep on spraying a tree till the stuff drips off the leaves.

The third spraying, often necessary to poison the food of leaf-eating caterpillars and to check scab in apples and pears or leaf-blight in plums, is done when the foliage is better able to withstand the effect of Paris green than it is in its half-developed stage. It is much to be regretted, however, that no fungicide has been discovered which will mix harmlessly with lead arsenate. As there is none available, it may be suggested that, in spraying against the Codlin moth, just after the blossom has fallen from apple trees, arsenate of lead alone should be used. Then, if scab be apprehended, Bordeaux mixture can be applied a few days later. Where Codlin moth is not troublesome, a combination, which is at once about the most effective against the apple-sucker and the aphis and a check to scab in apples and pears and leaf-blight in plums, is fortunately not liable to cause decomposition. This is a mixture of quassia, soft soap, and potassium sulphide. As the two former ingredients, liberally used, proved strong enough to kill the saw-fly caterpillar on gooseberry bushes last season, completely clearing the infested bushes, they would be equally effective against other leaf-eating caterpillars, at least if the pests were sprayed when young. This mixture would not poison the food of the pests, as Paris green or lead arsenate does, and therefore it would act only upon broods existing at the time of spraying. But in many plantations apple-suckers and aphides on apple trees, and the latter on plums, are much more destructive than any caterpillars, and in such cases this unobjectionable mixture is strongly to be recommended. The strength which proved effective against saw-fly caterpillars was one of 12 lb. of quassia chips and 12 lb. of soft soap to 100 gallons of water. The chips were boiled for an hour in twelve gallons of water with half the soft soap, and after the liquid had been drawn off, the same chips were boiled again with the other half of the soft soap, and the two decoctions were mixed and diluted. To this mixture 6 lb. of potassium sulphide, after being separately dissolved, should be added as a fungicide. If applied just before the leaf-buds on apples and plums open, it may do much to prevent apple-suckers and aphides from harbouring on the trees where they are hatched, and possibly to check scab and leaf-blight. The operation may be repeated after the blossom has fallen for the same purposes. The two insect pests by that time will be showing on the trees, if they are to appear at all. Many young caterpillars also will be killed by this spraying.

If, in spite of the operations just described, leaf-eating caterpillars are found to be infesting the trees, spraying with arsenate of lead, 3 lb. to 100 gallons of water, may be necessary; or, if scab is persistent on apples and pears, or leaf-blight on plums treatment with Bordeaux mixture will be beneficial. Prescriptions for the preparation of lead arsenate differ slightly in proportions of constituents. Dr. Dyer states that one pound of dry arsenate of soda to 3 lb. of acetate of lead would make tribasic arsenate of lead, the actual quantity of which would be $2\frac{1}{3}$ lb. Both constituents should be of 98 per cent. purity. They should be dissolved separately and mixed well. Similarly, the quantity of arsenate of lead to 100 gallons of water varies in different recipes. A Bulletin from Cornell University says to 2 lb. to 8 lb. Another prescription says 2 lb. "or even more, as it does not hurt the foliage." An excessive quantity of the poison is wasteful; but, on the other hand, the

probable explanation of arsenate of lead having proved less effective than Paris green in some cases, according to reports of fruit-growers, is that it has been too much diluted. This poison was first recommended for use in spraying in 1892 by Mr. F. C. Moulton, an American chemist. When first tested, such weak solutions as 6 oz. to 8 oz. to 100 gallons of water failed to kill caterpillars quickly, while 1 lb. to 1½ lb. were regarded as satisfactory. No injury to apple foliage occurred in a trial of 16 lb. of arsenate of lead to 100 gallons, but 3 lb. would be ample, and as that quantity has been used in many trials recently, it may be recommended. To make this quantity, according to the formula given above, 3¾ lb. of acetate of lead and 1¼ lb. of arsenate of soda would be required.

The difficulty of spraying with lime, sulphur, and soft soap, to prevent birds from devouring the buds of gooseberries, has previously been noticed. This is one of the combinations which do not make suitable spray-liquids, as a flaky soap of lime is formed, while the sulphur also is brought out of such combination with the lime as it had made by being added in thin layers, while successive layers of lime were slaked, or by being boiled with the lime. The same objectionable conditions resulted from the addition of soft soap to calcium sulphide properly prepared by a manufacturing chemist. Therefore, potassium sulphide and soft soap, which combine well, making an excellent spraying fluid, with some other preparations, were tried last season, unsprayed bushes being left as checks. The experiment proved futile, however, as unsprayed and sprayed bushes alike were untouched by birds in the winter of 1904-5, possibly because it was an exceptionally mild one. The lime, sulphur, and soft soap spray appeared to have an invigorating effect upon the bushes, while cleansing their stems and older branches of moss and lichen. This season a new combination has been used on gooseberry bushes, consisting of 60 lb. of lime, 30 lb. of flowers of sulphur, and 12 lb. of caustic soda to 100 gallons of water. It has been tried in two seasons in several orchards of apples, pears, plums, and peaches by the authorities of the New York Experiment Station to kill scale and to check scab and otherwise to act as a caustic spray when buds are dormant. The sulphur is made into a paste, thinned gradually, poured over the quicklime, and mixed well with it while the latter is slaking, the caustic soda being added and well stirred in immediately afterwards. This is termed a self-boiling spray, and it makes an excellent mixture which, after being strained through fine brass wire gauze, passes freely through the nozzles of the spraying machine. It adheres well to the bushes.

In one of the apple orchards in New York State this spray is reported to have damaged seriously the leaf and blossom buds; but the branches of the trees, it is stated, were "repeatedly drenched" and "much oversprayed," In four other apple orchards no appreciable injury was done to the trees. The spray proved very effective for the destruction of scale, and considerably so in checking scab, while leaf-curl in peaches was almost entirely prevented by it. Why this preparation harmed apple buds, even when excessively sprayed, is unaccountable, unless they were too much advanced, as lime and sulphur appeared to invigorate gooseberry bushes, while the mischief is not attributable to the caustic soda, as it occurred also after spraying with lime and sulphur boiled together, without any soda. But the spraying was done in April, which was probably too late in the season. Coating the buds over thickly with lime and sulphur just before the time of expansion may be easily imagined to be possibly injurious; and it is stated that the buds were "well swollen" when the operation was performed. In the four orchards where no appreciable damage was done the spraying was probably much lighter. In full confidence that this mixture will not harm entirely dormant leaf or blossom buds, it has been used this season on apples as well as gooseberries instead of the usual winter wash

of caustic potash and soda, over which it appears to have some advantage, particularly as a partial preventive to scab. So far as personal experience indicates, the caustic potash and soda, used year after year as a spraying mixture in February, have no effect whatever as a preventive of scab, apple-sucker, or aphis, valuable though they are for cleansing the trunks and branches of the trees of moss, lichen, and American blight, and possibly for destroying hibernating insects and eggs. The attacks of the apple-sucker, the aphis, and scab could hardly have been worse than they have been where this spray has been used, while infestation by caterpillars has been slight, the Coldin moth larva being "conspicious by its absence." It does not follow that the caustic spraying has been the cause of this immunity. In the New York State experiments the lime, sulphur, and caustic soda mixture was of no effect as a preventive to the Codlin moth. For that purpose it was followed by two sprayings with Bordeaux-arsenical mixtures.

It is obvious that the spraying of fruit trees and bushes is at present in a crudely empirical stage, and that a great number of experiments more varied and precise than those which have been carried out hitherto require to be conducted before the practice will be placed upon a satisfactory basis. There is much to be learned as to the best insecticides and fungicides, the most effective strength of each compatible with safety in application to different fruits, the suitability of various materials for mixing, and the most appropriate seasons for operations desirable for various purposes.—*W. E. Bear in the Journal of the Board of Agriculture.*

HORTICULTURE.

Seasonal Notes for April.

By H. F. Macmillan.

Illustrated.

Rainfall averages in inches.—Peradeniya 9·61; Colombo 11·03; Ratnapura 12·91; Galle 10·24; Trincomalie 2·00; Jaffna 2·35; Anuradhapura 7·26.

The commencement of the April rains should mark practically the starting point of the year's work in low-country gardens. Although planting and sowing operations should in general be deferred till the approach of the south-west monsoon, due towards the end of May, the requisite preparations should now be put in hand. The soil will be all the better for being tilled sometime previous to being used, so that digging, trenching, &c., must now begin. It is well to prepare for the torrential showers which are characteristic of this season, and to provide for the safe escape of excessive rain water. All drains, culverts, catchpits, &c., should be examined and freed from the accumulation of leaves and rubbish which the late winds are likely to have caused; neglect of this precaution may involve serions and sudden damage to roads and paths. As soon as the ground becomes softened by the rain, dig all beds and borders as deeply as circumstances will allow, turning the surface soil well under and breaking up large clods. For this purpose a strong digging-fork should be used, employing a mammoty only in places where there is no danger of damaging roots and bulbs.

Flower Garden.—Tillage and manuring are as essential here as elsewhere, for without both a fine floral display need not be expected. No time should be lost in taking up Cannas, Caladiums and other tubers, and digging the beds or borders to not less than fifteen inches, at the same time mixing a liberal quantity of manure with the soil. It is only by such treatment as this that Cannas especially will produce the fine effects they are capable of. Prepare beds similarly for seeds of showy annuals, bringing the surface to a fine tilth, and placing thereon a layer of finely-sifted leaf-mould. Propagate in a sheltered corner cuttings of such plants as Coleus, Salvia, White Vinca, Iresine, &c., to be in readiness for planting out later. Seeds of such annuals as Gomphrena, Cosmos, Torrenia, Helianthus, &c., may now be sown, and later, when the heavy April showers are past, the more tender annuals as Balsams, Zinnias, Marigold, Phlox Drummondi, &c. Avoid the common mistake of sowing seeds too thickly. Seedlings should have sufficient room to develop into strong healthy plants, otherwise their blossoms will be poor and of short duration. Do not unnecessarily disturb the roots of Hippeastrums, Eucharis and similar bulbous plants (so-called "lilies"), but place liberal quantities of decayed manure round these when opportunity offers. Many of the ornamental shrubs and climbers will now require to be pruned or thinned out. White-ants will become active in wet weather, and persistent effort should be directed against them. Each nest should be dug up and the queen-ant destroyed. If available pour a small quantity of carbon bisulphide down the crevices and immediately close up the latter; this is considered the most effective means of destroying the nests. Various other remedies have also been to some extent found effectual, nuch as arsenic compounds, emulsified kerosine, and even plain boiling water.

Vegetable Garden.—After the necessary preparation of the ground the various native vegetables may be planted or sown. Plant out "sets" of yams (Dioscorea) in rows four feet apart, and place supports for the vines, such as bamboo tops, along both sides of the rows. Tubers or cuttings of Sweet-potato, Jerusalem

Photo by H. F. Macmillan.

"THE TRAVELLER'S TREE"

RAVENALA MADAGASCARIENSIS

Artichoke, Alocasia, Inuala, &c., should be planted out in beds about three feet wide, with a path fifteen inches in breadth between the beds. Sow seeds of Gourds, Bandakkai, Bonchi, Dhara-dambala, Brinjals, Chocho, Maize, Katurumurunga, Nivithi, &c. Seeds of European vegetables, such as Peas, Knol-Kohl (or Kohl-rabi), Beetroot, Carrots, Scarlet-runners, Tomatoes, Lettuce, Parsley, &c., should not be sown till the beginning of the south-west monsoon. Celery should be sown under cover and the seedlings afterwards pricked out into boxes, finally transplanting them into a deep trench in which a good layer of manure and soil has been placed. Keeping notes of the various seeds sown or plants put out (the names of varieties, dates of sowing or planting, time of ripening, &c.,) is a method to be especially recommended. The experience thus gained is, of course, of much value and enables one to avoid mistakes which are otherwise liable to occur. Therefore every bed, row or plot should have a label giving some such particulars.

Fruit Garden.—March to April is the principal flowering season of most fruit trees. Mangoes, Mangosteens and Durians will now blossom in great profusion. Fork up the ground and mulch round the trees, for the quality of the fruit will be greatly affected by the treatment the trees now receive. Plantain clumps should be overhauled, cutting out barren stems and dried leaves and burying these in a trench round the plants. These are gross feeders and will take all the manure and mulch it is possible to give them, and, like other fruits, the quality of their produce is dependent on the degree of cultivation they receive. Growers of plantains would do well to grow only two or three of the best varieties, as "Suwandale" and "Koli-Kuttu." In many districts only semi-sour and inferior varieties are cultivated. The list of fruits in season at this time of year is obviously not large; it includes the Star-apple, a large handsome West Indian tree (*Chrysophyllum Cainito*); "Bullock's heart" (*Anona reticulata*) so-called from the shape of the fruit; "Avocado Pear" (*Persea gratissima*), which must rank as one of our best fruits; its proper season is July to September; and the "Velvet Apple" (*Diospyros discolor*), a kind of persimmon with pretty yellow velvety fruits.

Flowers in Season.—Most of the species mentioned in my last notes are still making a fine show. To these may be added *Schizolobium excelsum*, a handsome deciduous tree introduced from Brazil, producing before the leaves a profusion of yellow blossoms; the latter form a beautiful yellow carpet on the ground as they drop. The simultaneous flowering of many "lilies" (Amaryllids) is a conspicuous feature of this season, especially striking being the pure white-flowered *Hippeastrum solandraeflorum*, var. and the bright pink-flowered *Zephyranthes carinata* ("Rose amaryllis"), both introduced from South America.

Seasonal Gardening Notes for the Hill Districts.

By J. K. Nock.

Flower Garden.—Notes have now been written for a full year, and with the Calendar recently brought out by the Ceylon Agricultural Society, which embodies a brief review for each month, the general routine work should be fairly clear, and the time has now arrived when attempts will be made to deal in detail with the more difficult subjects, as is being done with the crops of the vegetable garden. It is necessary to emphasize the importance during April of collecting and sowing seed to raise plants for the upkeep of beds and borders until the end of the year, frequent stirring of the soil, maintaining drains and culverts open in anticipation of rain etc., etc. Most of the annuals become unsightly when seeding, and should be pulled up as soon as sufficient seed has been gathered;

the vacancies thus caused may be supplied when the weather is propitious. Sow lawn grass seed as advised last month, and take care to pull out, by the roots, weeds as they appear. Before the May issue of this Magazine is out the S. W. winds will probably have commenced, and I would advise that all tender plants and those in exposed spots be staked neatly early in May, as there will be plenty of other work to attend to in the way of clearing up etc., as soon as the Monsoon bursts, and many plants become positively ruined when once blown over. *A propos* of these notes and the Calendar I have compiled, many planters have requested me to write separate notes for their district, but with so many different climates with which I am not at present well enough acquainted, this is too big an undertaking for the time I have at my disposal, and a simple way of making the notes applicable to all districts is, as I once pointed out before, to go by the weather. In the Calendar the average rainfall and rainy days at Hakgala is given for each month, which renders the matter easy.

In Flower in the Hill Gardens.—The number of species and varieties now in flower runs into hundreds, and only a visit to the Gardens could satisfy those interested. Worthy of mention are :—

Doryanthes Palmeri, a gigantic half-lily, half-palm looking plant belonging to the Natural Order Amaryllidaceæ, which has a flower stem 12 feet high bearing over ninety crimson flowers. The aloe-like leaves are 8 to 9 feet long, and without the flower stem the plant is very ornamental and especially suitable for lawns. It appears to grow in almost any soil, preferring a rich loam, and is readily propagated by suckers.

Gaura Lindhiemeri.—This perennial onagrad was introduced from Messrs. Sutton & Sons last September, and is now in flower, bearing graceful sprays of delicate white flowers. It is hardy and should find a place in every garden.

Lavatera Rosea Splendens.—Another introduction from the same source, but an annual. It grows to a height of three feet. The flowers are two to three inches in diameter, of a brilliant rosy pink and useful for cutting, retaining their beauty for a considerable time.

Vegetable Garden.—The last of the Potatoes should have been put in last month (March) in the Nuwara Eliya district, but where the S. W. wind and rains do not penetrate they may still be successfully grown. Capsicums and Chilis (*Capsicum annum* and *C. baccatum* of the Natural Order Solanaceæ) are not as extensively grown as they might be as a vegetable relished by most people who have tried them, apart from their ornamental appearance. The general idea seems to be that they are unbearably hot, but a Capsicum such as "Sutton's Mammoth Long Red" needs only a trial to convince one otherwise. In pots they make very ornamental subjects. Their cultivation is easy, any light rich soil suiting them well. Sow the seeds in September, preferably in a cool house at the highest elevations, and prick out the seedlings when large enough to handle without damage, and finally plant out. In Nuwara Eliya itself they can scarcely be said to do well, but from 5,000 feet downward results are always satisfactory. To prepare Cayenne the moisture should be removed from the *chilis* by placing them in an open basket in an oven not allowing the heat to become too great, then pound them fine with hot dry salt. "Sutton's Tom Thomb" is a useful chili to grow, and very pungent.

Photo by H. F. Macmillan.

THE FERNERY, HAKGALA GARDENS

ELEVATION 5,500 FEET; AVERAGE ANNUAL RAINFALL, 91·59 INCHES; AVERAGE TEMPERATURE 60·2°

EDUCATION.

Education and Agricultural Progress in Denmark and Ceylon.

By Ananda K. Coomaraswamy, D.Sc.

It is well-known that the progress of agriculture and growth of prosperity in Denmark during the last twenty or thirty years have been remarkable. Without going into details, their enormous export trade to England of breakfast-table commodities such as butter, eggs, bacon etc., are alone a proof of this. The immediate cause of this progress appears to be the development of co-operative societies and the high level of intelligence of the peasant classes. The whole of Danish agriculture is controlled by a network of local co-operative societies, in close touch with Government experts; these societies reduce expenses by dealing with large quantities of produce, and at the same time teach improved methods, and effect a profitable distribution of the products. It is claimed by the Danes that their success is largely due to the development of the people's intelligence by means of education.

If we turn to Ceylon we are surprised to hear a different story. We are told, not without truth, that education is demoralising the agricultural classes; the villager's son who gets a smattering of "English" education, considers himself demeaned by returning to agriculture, and he becomes an idler and a ne'er-do-well—a man who falls miserably between two stools.

How is this? We cannot suppose that education is good for one race and not for another, or that it is desirable in temperate and disastrous in tropical climates. Is it possible that the explanation lies in the different kind of education aimed at in the two countries?

Let us enquire into the Danish system, to which the Danes themselves attach so great a value. I shall extract my account from the Report of a Deputation sent from Ireland to study co-operative agriculture in Denmark, "Report on Co-operative Agriculture and Rural Conditions in Denmark.' Dublin, 1904.

"The most important branch of the system of education in Denmark lies in the series of Popular High Schools and Agricultural Colleges. . . The Popular High Schools do not teach how to make butter, cure bacon, or to plough, although Denmark has become a wealthy nation by its yield of agricultural produce, chiefly for the English market. Improvements in reading, writing and arithmetic, together with the history of all nations, but especially the history and literature of Denmark, are taught. Should pupils so desire it, foreign languages are included in the curriculum. A strong religious feeling permeates the whole course of instruction. *National songs and fölk lore play a more prominent part in the system of education than any other subject.* A most remarkable incident was witnessed; prior to a lecture being given, the whole of the pupils—in this case numbering 108 full-grown men—sang an old Danish national song as an introduction to the work before them, and this appears to be the custom in the schools before commencing nearly every lesson or lecture. The whole theme of the song was the inspiration of the peasant with hope and enthusiasm in his capacity as a citizen. It is claimed in Denmark that this *general education*, obtained at the High Schools, and not so much the technical education, has been the development of the country. . .

"The aims of the Danish people, for which these schools are working, can be classified under these heads:—First and foremost, to foster the love of country and national feeling. . . The second aim is to educate the people that they make full use of their free constitution; and the third, to prepare the young to better fit them for the fight of existence, which is daily becoming more acute. To attain these objects the first essential appears to be to develop the personal character and to make the young man and woman true and honest Danes. To do this, they rely more on lectures, giving instructive and interesting examples of the history, and teaching the best literature of the nation than anything else. Concurrently, instruction in discipline is given, followed by instruction in the services, on which are based the economic success of agriculture.

"In many cases there is attached to the High School a course of technical agriculture, or an Agricultural College, but these latter are not nearly so numerous as the Popular High Schools. . . .The object in placing an Agricultural School in close proximity to a High School, renders it possible for a teacher to give instruction in both schools, and also it creates to some extent a desire on the part of the pupil in the Popular High School to return the following year to the Agricultural College. . . .

"The result of this patriotic and practical system of education unquestionably justifies the high compliment paid to the Danish peasant by the Norwegian poet, Bjoinson, who describes them as 'the best enlightened peasantry in the world,' and it is particularly worthy of notice, and perhaps the inevitable product of the system itself, that the different classes of the Danish people co-operate for educational purposes in a manner almost unknown, and certainly never eqnalled in any other country. . . .The highest in the land are proud to associate with the humblest artizan and farm labourer in the consciousness that the outcome of such association will be to strengthen the intellectual energies of the nation and elevate the wealth producer's conception of the duties and responsibilities of citizenship. . . .

"A committee. . . .have issued thousands of pamphlets on popular and scientific subjects, which are sold to the peasant population at an average price of one penny each, and which have been of immense importance in the spread of general information among the working and agricultural classes in the country.

"A committee has been formed at Copenhagen whose members accompany rural excursions to the public buildings and museums in the city, and give the fullest instruction on all objects of interest free of charge. Owing to the existence of this committee hundreds of rural excursions are organized every year to visit the museum, picture galleries and antiquarian collections, and with the happiest results.

"A free theatre was brought into existence in 1891, in order that the rural population might be afforded the opportunity of witnessing the best plays of Danish and Norwegian authors at intervals, and on such occasions as to harmonise with the various country excursions organized for educational purposes to visit the towns. Moreover, a series of concerts are held throughout the year, to which work-people and peasants are admitted at a nominal charge, and thus every element instrumental in the creation of a vigorous and happy national life is brought into frequent contact with even the humblest stratum of society. . . .

"The same ideas with regard to education prevail throughout the Agricultural Colleges, *national character and history being more important than anything else*, concurrently with the development of which, courses in agricultural instruction are given. The courses of instruction consist of National History and Literature (which in all cases stands out foremost), Physics, Chemistry, Natural History, Anatomy, Physiology, with practical demonstrations. . . .

"The problem presented to educationlists was: *How to impart a certain amount of intellectual culture to the people without putting them out of concert with agricultural work.* The solution was found in the Popular High Schools, and almost every educated Dane will at once assert that the great economic results achieved by the Danish people are in a great measure due to these establishments. . . ."

From all this it may be concluded that the Danish Popular High School system of education, and the thousand and one forms of organization which have sprung from it, have rendered Denmark absolutely free of the existence of what might be described as a lower order, or one without well-defined vital interest and standing apart from the spiritual life of the nation.

Now let us apply this information to Ceylon. Is it not possible that in Ceylon, it is not education itself that is at fault, but the kind of education aimed at? Might not the people's own intelligence be better developed by the imparting of their own national culture, than by attempting to Anglicise at the cost of national feeling? Denmark and Ceylon are both small countries with predominant agricultural interests; what is of so much value to Denmark may surely be of help in Ceylon; I do not of course suggest a slavish imitation of the co-operative system, or even of the High Schools, but it is the principle underlying the educational methods which might be of such value in Ceylon. I believe that nothing can foster the growth of public spirit and general intelligence—and surely this, and not the mere storage of information is the true aim of education—except a truly national education and the fostering of a national spirit. Without this broader education on national lines, progress, economic and intellectual alike, will remain at a standstill, for lack of unity and organizing power amongst a people whose intellects are now dulled, on the one hand by the lack of any education at all, or on the other, by an entirely foreign system of education which makes no appeal to their imagination or their intellect.

AGRICULTURAL EDUCATION IN VARIOUS COUNTRIES.

By H. W. Potts.

Part I.

Germany.

The small kingdom of Wurtemberg, of the German Empire, with a population of 2,000,000 living on an area of 7,531 square miles is probably the most complete example of the effect of agricultural education we possess. A contented, happy, and prosperous people is the verdict of all who visit this fertile country. Sixty-four per cent. of the land is arable, and 75 per cent. of this is in the hands of the well fed, housed, and clothed peasant proprietors, whose farms are of the average size of 14 acres. Cereal crops, tobacco, fodders, sugar-beet, chicory, grapes, fruits, and vegetables are grown in wonderful profusion. The rearing of live stock and dairying are conducted. Land is easily acquired by thrifty workmen, for which they are indebted to liberal land laws and the excellence of the country roads, also the establishment of village banks from which money is secured on easy terms. It is only fifty years since Wurtemberg had the reputation of being one of the poorest of the German Provinces. Agriculture failed to provide a means of subsistence, mainly owing to a bad system of financial aid and the ignorance of the peasants.

To two leading men is due the credit of raising the country to its present happy condition of affluence, prosperity, and contentment. A pauper is now unknown in the country. A scheme of village credit banks to advance money to small land holders, to be returned in small weekly instalments, was designed and brought into practical operation by Dr. Raiffeisen. Dr. Steinbeis visited the Great Exhibition in London in 1851, and there the idea occurred to him of formulating a scheme of technical education for the rural population of his native country. His book "Elements of Work Schools" formed the basis of a compulsory and universal teaching of agriculture.

The first of the winter schools was compulsorily brought into operation in 1879, at which every pupil attended a course of general and agricultural education of at least two evenings a week for six months. There are now 700 schools, with an attendance of 16,000 pupils. There are over 100 voluntary evening schools, attended by 2,000 pupils over 18 years old. The village schoolmaster is trained at suitable centres in this course of teaching, and is assisted by itinerant specialists or experts in the technical details of agriculture. From these elementary schools pupils who desire to follow agricultural education further pass on to the Farm Schools or Colleges. There are five of these schools with model farms attached; a course extends over three years. The pupils are sons of small land-owners, farmers, and agricultural labourers. They receive board and instruction free of charge, giving their labour on the land for this privilege. From these farm schools the student has the opportunity of entering what is generally recognised as the best agricultural college in Germany, and probably the most perfect institution of its kind in the world, the Agricultural University of Hohenheim, which has been established since 1818. It was promoted to the rank of a University in 1817. To it is attached a College of Forestry, a model farm, technological institute, sugar factory, distillery, brewery, vinegar factory, laboratory for testing garden and farm seeds, and a department for proving agricultural machinery, a butter and cheese factory and model dairy, poultry yards, live stock departments, fish-breeding ponds, and a bacteriological institute. A splendid museum is attached, in which is found a unique collection of agricultural products and implements, soils, and minerals.

The library contains 14,000 volumes, and an herbarium of some 30,000 plants. The physical, chemical, botanical, and biological laboratories are models for teaching purposes and equipment. All agricultural implements and machines are submitted to rigid examinations and tests in the presence of the farmers. New methods of culture, manuring, new varieties of plants and seeds, are tested by a competent and separate staff. This splendid system of complete agricultural education, combined with the establishment of the co-operative banks first started by Raiffeisen in Stuttgart in 1880, have doubtless provided the requisite stimulus and knowledge to effect such excellent results. There are over 700 of these co-operative banks in Wurtemberg—the usurer has disappeared. The vote for agricultural education for the province exceeds £80,000 per annum. A compulsory course of training in agriculture, gardening, and horticulture of two hours weekly is found in all the primary schools of the German Rhine Province during the final two years of the school curriculum. The teacher is given a free hand in determining the character and scope of the training in which the agricultural needs of the district are to be considered. The success of the tuition, it is fully recognised, largely depends on the theoretical and practical knowledge possessed by the teacher, his enthusiasm, and ability to teach.

France.

In France the Organic Law of 1850 placed "Elementary instruction in agriculture" as an optional subject for teaching in the curriculum. An agitation commenced in 1860 to make the teaching of agriculture in the primary schools obli-

gatory; this terminated in 1879 by provision being made for departmental and communal instruction in agriculture by means of departmental centres, and further made primary instruction in the elements of agriculture an obligatory subject.

In the instructions issued to teachers under this law they are advised that 'they should commence by employing visible and tangible objects, which they should make the children see and feel, thus putting them face to face with concrete realities; then by degrees they can exercise them in obtaining from these objects abstract ideas, by comparison and generalisation, and by the use of the reasoning faculties without the aid of actual specimens." The law of March, 1882, made compulsory teaching "the elements of physical and natural science with their application to agriculture." In 1888 a further revision of the methods of teaching agriculture in the primary schools was declared essential. Finally, the French Minister of Instruction issued the following guide to Public school teachers on the 25th of April, 1898, to direct them in this routine work of teaching elementary agriculture :—

"Instruction in the elementary principles of agriculture, such as can be properly included in the programme of primary schools, ought to be addressed less to the memory than to the intelligence of the children. It should be based on observation of the everyday facts of rural life, and on a system of simple experiments appropriate to the resources of the school, and calculated to bring out clearly the fundamental scientific principles underlying the most important agricultural operations. Above all, the pupils of a rural school should be taught the reasons for these operations, and the explanation of the phenomena which accompany them, but not the details of methods of execution, still less a resumé of maxims, definitions, or agricultural precepts. To know the essential conditions of the growth of cultivated plants, to understand the reasons for the work of ordinary cultivation, and for the rules of health for man and domestic animals—such are matters which should first be taught to every one who is to live by tilling the soil; and this can be done only by the experimental method. The master whose teaching of agriculture consists only in making the pupils study and repeat an agricultural manual is on the wrong path, however well designed the manual may be. It is necessary to rely on very simple experiments, and especially on observation.

"As a matter of fact, it is only by putting before the children's eyes the phenomena to be observed that they can be taught to observe, and that the principles which underlie the science of modern agriculture can be instilled into their minds. It should be remembered that this can be done for the rural agriculturists only at school, where it will never be necessary to teach him the details which his father knows better than the teacher, and which he will be certain to learn from his own practical experience. The work of the elementary school should be confined to preparing the child for an intelligent apprenticeship to the trade by which he is to live, to giving him a taste for his future occupation; with this in view, the teacher should never forget that the best way to make a workman like his work is to make him understand it.

"To sum up: The aim of elementary instruction in agriculture is to initiate the bulk of our country children into that degree of elementary knowledge which is necessary to enable them to read a modern book on agriculture with profit, or to derive advantage from attending an agricultural conference; to inspire them with a love of country life, so that they may prefer it to that of towns and factories; and to convince them of the fact that agriculture, besides being the most independent of all means of livelihood, is also more remunerative than many other occupations, to those who practice it with industry, intelligence, and enlightenment."

This entailed the provision for establishing school gardens and farms. At the present time nearly 4,000 primary schools in France have these farms. The training of teachers for rural districts includes agriculture. The superior primary schools' curriculum embraces lessons on general facts of agricultural production, treatment of the soil, principles of irrigation and drainage, the management of agricultural labour and machines, the study of insects, as well as special instruction in horticulture, arboriculture, and viticulture, the treatment and health of domestic animals, their breeding and fattening, dairy work, farm book-keeping, rural economy, bee-keeping, silk-worm culture, and poultry raising. Only those plants, animals, and methods are treated in detail which form a distinctive feature of the agricultural industry of the district. Weekly visits are made to farms, dairies, piggeries, and such like in the district, by the pupils accompanied by the teacher. Medals and money are awarded annually by the Government, municipalities, and agricultural societies, to both masters and pupils who distinguish themselves at competitive examinations on the subjects relating to agriculture and its allied industries.

ITALY.

The Director-General of Primary and Normal Instruction issued, under date 29th November, 1897, a report, in which is shown that in 471 elementary schools practical teaching in the rudiments of agriculture was given, but shortly afterwards a strong demand was made to attach a piece of land to each school, so that the essential rules of the art of cultivating the soil could be learned by observation and experiment. The appeal was couched in the following terms:—

"Let us return to the fields! This is the invitation which from all time men of superior understanding and of generous hearts have repeated to the Italians. Be it granted to us to join them; let us enamour the rising generation with the land! From the little garden, where the country teacher shall practically teach the rudiments of agriculture, upwards through the technical schools and the professional institutes, may the knowledge of agriculture continually be reinforced and elevated; everywhere may they reawaken the Virgilian affection for rustic labour."

In less than six months, 2,257 blocks of land, varying in extent from a small garden to that of a farm, were presented for the purpose. Courses of instruction were arranged for teachers at the Royal School of Practical Agriculture of Ascoli Picera, and certificates were issued to those who attended. Other similar institutions were utilised, where teachers acquired a sufficient knowledge and training of the principles and practice of elementary agriculture. Lectures were given at 184 places, with a total attendance of 8,000 teachers. In 1899 12,000 teachers had obtained the certificate of attendance. Great care has been exercised to see that teachers know how to adapt their treatment of the subject to the age, intelligence of the pupils, and the local needs of the district; and also that the teacher possesses the aptitude, experience, and education necessary for his work. The Department declined to adopt a general text-book for pupils, on the grounds that it depended solely on the efforts of the teacher, for whom it was more essential to be provided with a text-book. During the year 1898-9, 8,000 rural schools were given instruction on the subject.

AUSTRIA—HUNGARY.

To each elementary rural school a fruit garden is given. Special attention is devoted to the theoretical and practical teaching of agriculture. In the National Schools, instruction in agriculture is combined with natural history. The tuition embraces the description of domestic animals, vegetables, and minerals; the cultivation of vegetables and fruits, the breeding and rearing of cattle, agricultural methods, and, where local conditions are suitable, silk-worm rearing.

Hungary.

Hungary boasted of an agricultural college in the eighteenth century and may claim priority amongst the countries of the world in providing systematic agricultural edueation for her people. Lectures on agriculture were first given at the University at Nagy Syombat in 1680. The first farm school was established at Syarvas. A Chair of Agriculture was established at the University of Sciences at Buda in 1777. Agricultural schools and colleges were established and endowed by several noblemen. There are now four agricultural colleges with eourses ranging from two to five years. Winter farm schools are maintained by the Government, at which 300,000 students attend.

Agricultural education now comprises:—

Higher teaching in the Agricultural Academy, with a yearly attendance of 157 pupils.

Intermediate education, provided by four agricultural colleges, at which there is a yearly attendance of 502 students.

Practical teaching and training in farm schools.

Itinerant teaching, conducted by seven departmental professors, who travel from place to place teaching, and four experts for the cultivation of hops, hemp, dairying, and promotion of rural associations.

Twelve professors are engaged in training teachers for the rural schools.

The staff of the Department of Agriculture numbers 185 professors, teachers, experts, &c.

Switzerland.

In Switzerland there are sixteen agricultural schools with about 400 students, who pay in fees £16 per annum each. The expenditure devoted to agricultural education has risen from £49,000 in 1888, to nearly £200,000. This is given towards the support of agricultural schools, aid to farmers, improvement of stock, prizes, &c.

Denmark.

The extraordinary agricultural development of Denmark is attributed to the intelligence and capacity for organisation of the Danish farmers, and mainly to the education received by the peasantry in their rural high schools, and to the distribution of land amongst freeholders. There are 224,000 farms in Denmark, ranging from 7 to 110 acres each, of which more than 94 per cent. are farmed by their owners. Sir John Gorst, in referring to the progress of technical education in Great Britian, recently made the following remarks as to Denmark:—

"The important influence technical education had on the national, social and economical development of the people was indicated in the case of Denmark, which had, from being the poorest of European countries, become one of the richest, and that by producing butter, bacon, and eggs chiefly for the English market."

Sweden.

The practical teaching of agriculture with aboriculture has been in vogue for a very long period. Since 1865 the teachers of the National Schools have been trained in these subjects. The regulations of 1882 state:—"To every Nationa School shall be annexed, so far as possible, a tract of ground to serve as an experimental kitchen garden, and it is the duty of the School Council of every parish to see that such kitehen garden is arranged in a manner suitable to the object of instructing the children in agricultural subjects."

Belgium.

In Belgium the introduction of teaching agriculture in the rural primary schools dates from 1884. Artiele 49 of the regulations states:—"The master must keep the garden belonging to the school in such a way that it may serve for

praetical instruction in the rudiments of agriculture, horticulture and aboricul-ture. He must endeavour to make it into a model kitchen garden, containing the best varieties of vegetable and fruit trees."

Praetical lessons both in class and in the gardens—on flowers, herbs, fruit trees, useful farm birds, and the eommon agricultural implements—are given at regular periods. The expenditure of the Department of Agrieulture exceeds £100,000 per annum.

England.

England has not been prominent in forwarding agrieultural education with anything like the organisation and energy displayed by other countries in the past; of late, however, a marked change has swept throughout the rural counties. In 1887 the English Government set aside £5,000 to be distri buted among the agricultural and dairying sehools.

The Board of Agriculture distributes grants to Universities, Collegiate and other institutions engaged in teaching agriculture and allied subjeets. It inspects educational and experimental work. It conducts experiments. It pub-lishes a monthly Journal and leaflets to farmers. The County Councils are awakening to the importance of this work, and now some twenty-six institutions are engaged in teaehing agrieulture, and something like £100,000 is expended annually in England on agricultural edueation and research work. No effort has been made yet to organise systems such as exist in Wurtemberg, France, Denmark, Belgium, Austria, Italy, United States, and Canada.

A Chair of Agriculture was founded in 1790 at the University of Edinburgh, but Seotland has always been to the fore both in education and agrieulture. The Chair of Rural Economy, established at Oxford by Sibthorp in the eighteenth century, has not been noted for its agricultural aetivity. The Royal Agrieultural College of Cirenecster was established by private enterprise in 1845, and others followed.

The most noted of all efforts to establish agriculture on a seientific basis was the world-renowned experiment station at Rothamsted, established by Sir John Lawes. In 1899 a Chair of Agriculture was established at Cambridge, and a well-organised Department of Agriculture. The subject is also taught at the Universities of North Wales and Durham.

Ireland.

The Commissioners of National Education in Ireland make a special feature of their efforts to teaeh agriculture in all rural National sehools. Numbers of these schools have school farms, gardens, and live stoek. Rural teaehers go into training in practieal agriculture in residence at the Albert Institution, Glasnevin, near Dublin, for six weeks, where they qualifiy for certificates to earn special fees for practieal agricultural instruction to pupils. Teachers are not only given this training free, but are allowed travelling expenses to and from the Institute from any part of Ireland. No teacher is permitted to give tuition in agri-culture unless he has been trained and possesses a certifieate of eompeteney.

Two agricultural eolleges are maintained, one at Glasnevin, Dublin, and one at Cork, where a sound system of agricultural training is provided. Itinerant dairy instruction is organised throughout the dairying eentres.—*Agricultural Gazette of New South Wales.*

(To be eoncluded.)

LIVE STOCK.

Apiculture.

ADVICE TO BEGINNERS IN BEE-KEEPING.

The keeping of bees, both for pleasure and profit, is, happily, much more frequent now than thirty years ago, when the advent of cheap sugar had nearly driven from the country markets the coarse honey gathered by the old straw skep system. This increase of bee-keeping has been brought about by the perfecting of the modern frame-hive, which enables the home of the bee to be laid open to view, and provides means whereby the store can be taken, fit for immediate use, without injury to the bees or their owner.

For any one desirous of becoming a bee-keeper the first step is to get a book on apiculture and study it. There are many now from which to choose, but the following may be recommended: "Modern Bee-Keeping" (price 6*d.*), published by Longmans, Green & Co., Paternoster Row, for the British Bee-Keepers' Association; and the "British Bee-Keeper's Guide Book" (price 1*s.* 6*d.*), by Thos. W. Cowan, F.L.S., 10, Buckingham Street, Strand, London. As a personal explanation of the terms used and of the outfit required is a great help, an interview should, if possible, be obtained with an experienced bee-keeper. In "Modern Bee-Keeping" will be found a list of Secretaries of County Bee-Keepers' Associations, any of whom will be able to furnish names of expert bee-keepers willing to render assistance if needed. The appliances required are: Black net veil; smoke, for subduing bees; wax comb foundation (brood and super); bottle-feeder; section boxes; frame-hive fitted with brood-foundation in ten or twelve standard frames, two division boards, section-rack or lift of shallow frames, a queen excluder and quilts. If the hive is to be worked for extracted honey, a centrifugal honey-extractor will also be needed. Additional useful articles are: Scraper-knife for cleaning floor-boards, frames, etc.; comb-uncapping knife for use when extracting; a straw skep for taking swarms; spare coverings of felt or carpet; a super clearer for clearing bees from section racks or supers.

There are many patterns of hives, all made to take the one British standard frame. A simple one should be chosen possessing accuracy of workmanship and soundness of material, so as to stand exposure to the weather for years. The outside of the hive should be thoroughly painted, to keep it rain and damp proof. It must be placed on its stand in a spot sheltered, if possible, from the cold north and east winds, and with a free flight for the bees in front. Space should be left behind it for easy access, then all manipulations can be carried on from the back; this avoids irritating the home-coming bees.

The swarm should be ordered either from a recognised dealer or from a neighbouring bee-keeper. The only safe way for a beginner to start is with a "head" or first swarm. By this means he will avoid all the pitfalls of disease or lack of condition, which only a practised eye can detect, but which beset the purchaser of second-hand stocks. Given a good season, a swarm should be able to establish itself, and provide some surplus for its owner in its first year.

When the box or skep containing the swarm arrives, it must be placed in the shade near the hive the bees are to occupy. The screws of the lid of the box should be taken out; or in the case of a skep the cording and wraps should be removed, and in the latter case the skep should be placed on a board with a fair-sized stone under its edge, to allow of ventilation. The bees will soon quiet down, and cluster, after the shaking up of their journey, and thus will be in a condition

for handling easily. In the early evening the hive must be prepared to receive them. The shallow-frame lift or section-super should be taken away leaving only a thin quilt over the frames, which have already been fitted with brood-foundation. Then the front of the hive must be raised from the floor-board about an inch, by means of two wedges. Next, a board, the width of the hive, is placed in front of, and level with, the alighting-board, sloping down to the ground. This temporary board and the alighting-board are covered with a cloth hanging over the sides to the ground, to prevent bees from crawling underneath. Then the skep or box is taken between the palms of the hands, and carried mouth downwards, until it is just above the sloping board. With a smart jerk, the bees are thrown out in front of the hive, and they will at once begin to take possession of their new home. As they run in, watch should be kept for the queen. It is a satisfaction to see her safely enter her abode. When all are in, the wedges should be taken away and the front of the hive lowered to its proper place. Crushing of any of the bees must be avoided. Any that are in danger may be cleared away with a feather. If the swarm has been a long time on its journey, or if the weather is bad on its arrival, the bees will be greatly benefited by being supplied with half a pint of warm thin syrup, through an opening in the quilt and by means of the bottle-feeder. On the second day after hiving, the quilts should be turned back from the ends of the frames to ascertain if the "foundation" remains properly fixed, and to see if the work is going forward well. If this is the case the quilt may be taken off and the queen-excluder put on in its place. Over this a lift of shallow frames should then be placed and covered warmly with a quilt and carpets. The stock may now be left alone till the end of the honey season. More skill is required for obtaining comb honey in sections in good condition, but the section rack may be used instead of the shallow frames, if desired.

It is important that the beginner should clearly understand the principles that underlie successful bee-keeping. A colony of bees consists of a queen, a large number of worker-bees, and (during summer) a certain proportion of drones. The strength of a healthy stock depends on the vigour and laying power of the queen, who is at her best in her second season, *i.e.*, a queen hatched in June, 1904, is at her best in May, 1905, and should be replaced by a young one in 1906, either by natural swarming or by re-queening. Queens may be purchased, or raised by the methods taught in text-books. The economy of a hive consists, first, on the keeping up of the warmth of the brood nest (by means of the heat evolved from the bodies of the clustering bees) to such a point as will stimulate the queen to lay eggs, and will enable young bees to be reared; secondly, on the feeding of the queen and nursing of the brood, and cleansing the cells for the queen's use; thirdly, on the obtaining of pollen, water, and nectar for the brood; lastly, on the building of the storage combs and collecting nectar for the future supplies of honey. The first three of these conditions must be fulfilled before the last can be begun; therefore, it is only by means of a large and vigorous surplus population that a stock can gather enough stores for its future use, and provide also for the bee-keeper. It is obvious that the aim of the bee-keeper is to keep his stocks strong, for a weak stock is always unprofitable.

The next consideration is, that the crowded condition of the hive should be secured at the right time, *i.e.*, at the honey-flow. Honey is the concentrated nectar of flowers. Spring and early summer are the times when the land is gay with a wealth of blossom, and the honey-crop is gathered. Late summer and autumn are times of seed and fruit, and only a gleaning of nectar from bramble and wild flowers then remains. There is a period every year, varying in each district according to soil and altitude, when the supply of nectar is most abundant.

This time should be ascertained by the bee-keeper, who will then stimulate his stocks beforehand, so that they may have their largest population ready to gather the produce of the various flowers.

Diseases are best guarded against by having dry, weather-tight hives and vigorous queens, and by giving suitable food when feeding is requisite. The following are the chief maladies to be apprehended:—Dysentery, a disease of adult bees, is caused by undue winter confinement, unsuitable food, and damp hives; Chilled-brood and Paralysis are caused by sudden frost in late spring, or by untimely manipulation; Bee-pest or Foul-brood is a terribly infectious disease, endemic in many places in England. A description of this disease is given in Leaflet No. 32 issued by the Board of Agriculture. A copy may be obtained, free of charge, from the offices of the Board, 4, Whitehall Place, S.W., or from any County Bee-Association Secretary.

A word of warning and encouragement on one other point must be given. No one can keep bees without being stung; the sting of a bee is painful but harmless (except in rare instances), and in time, after many stings, the effect is so slight as to be quite disregarded. It is advisable to wear a veil to protect the face and head, but the hands should be left bare. Their best protection is the gentle, careful manipulation of the bees while attending to them. The foregoing is written for those who propose to keep a few stocks of bees; anyone intending to keep a large number of stocks is advised to get a season's instruction in a well-managed apiary before laying out capital in the business.—*T. I. Weston, in the Journal of the Board of Agriculture.*

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The Weligama Korale Agri-Horticultural Exhibition

By J. K. Nock.

I have the honour to forward the following report on the Weligama Korale Agri-Horticultural Exhibition held in the Resthouse grounds at Weligama on 15th and 16th March, 1906.

It was unique in being the first Exhibition held under the new regulations of the Ceylon Agricultural Society, the first time the moveable iron sheds provided by the Parent Society were utilised (they proved to be very useful and quite serviceable), and the first Exhibition held exclusively in a Mudaliyar's district.

Taking the Show as a whole it was a success, and showed that the Society has to a certain extent commenced to gain its object in the district, and the good quality of some of the exhibits convinces one that only energy and interest are necessary to develop certain branches of agriculture, and make the villager realize that there is money in it besides supplying his homely wants. An interesting and important point gathered from the list of prize-winners with the aid of the Mudaliyar was that the percentage of the prizes taken by bona-fide villagers was greater than is usual, the bulk generally being carried off by the influential persons; to be on the safe side I would put it at 40%. A similar percentage should be taken at all future Shows, as it is a means of finding out whether the objects of the Society are being realised or not.

Section I. Class A.—Fruits.

In this class the display was moderate, nothing being actually poor and nothing wonderfully good, but considering the recent drought and the fact that the real season for fruit is not until about May, it can be taken for granted that the district is capable of producing fruit of certain kinds as good in quality as in any other in the Island—Mangoes, Guavas, Soursops, Custard Apples, Bullock's Heart, Rambutans, Lovi-lovis, Durians, Nam-nams, and Bread-fruit, were either conspicuous by their absence or by solitary immature representatives; however, I was given to understand that in the season these kinds are as good as in any other district. From the general appearance of the exhibits the district is somewhat lacking in stock of real good quality, and before much can be done in the way of supplying fruits to other parts of the Island or even to the towns in the district with European residents, only good varieties must be cultivated, gradually doing away with the poor kinds. In this connection I would especially mention Pineapples, Oranges, and Limes.

Pineapples.—The exhibits of these were not at all up to standard, probably on account of the season proper not being until later. However, there were representatives of three excellent varieties which proves that they can be grown in the

district, and if only these were cultivated and encouraged there might be possibilities of the canning of pines becoming an industry as in Singapore; because, I was informed, that at certain times of the year pines are procurable which could not be improved upon anywhere in the world. The small sour kinds should nevertheless be discarded altogether.

Oranges and Limes.—The Mudaliyar informed me that the bulk of these grown are poor in quality, only an odd tree producing fruit of a superior quality being occasionally met with. One exhibit of each of these was good, indicating that the district is suitable to their growth. Mangosteens and Avocado Pears are under trial only.

Section II. Class A.—Vegetable Products.

A large lot of oils were exhibited, most noteworthy being the sample of groundnut, it being only the second time to date that this oil has been shown in the Island; there is a general complaint that the drawback of the groundnut cultivation is that there is no suitable market, but when it can be turned into oil of such quality this should perhaps be no longer a matter for consideration. I was told that the oil is an excellent lubricant, and already being used for lighting purposes as a substitute for kerosine and is more lasting, but rather like coconut oil the light being less powerful. I could not find out definitely its cost, but it must be considerably dearer than kerosine, and no doubt would be more profitable if sold for the same purpose as Olive oil.

Ground nut cake is dealt with further on.

The Citronella oil was good and pure, and of the same quality as the samples and unadulterated would easily fetch from ten to fifteen per cent better prices than at present ruling in London. A paper on Citronella oil is to be read at the next meeting of the Board to be held on 2nd proximo by Mr. Weerasuriya of the Weligama Korale, when it will doubtless be shown that this district and the Southern Province in general is admirably suited to its cultivation, which if extended should result in good profits if the deplorable adulteration is ceased. 105 kinds of medicinal oils were sent by one exhibitor, and in these there is large trade; also with coconut oil and native fibre which were all good.

Class B. Coir Industry.—The yarn, fibre, and rope compared well with what I have seen elsewhere, and the natives have an assured future if only industrious enough. The imports of coir rightly are practically nil while the exports are large.

Section III. Class A.—Food Products.

The tea samples, pepper, nutmeg and maize, cloves, ginger, arecanuts, and copra were of a good class. Arrowroot was especially good and this product is receiving the attention it deserves. Much might be done to save the imports of pepper, coconuts, copra, palmyra fibre, maize, etc.

Grains called forth a somewhat bewildering exhibit (said to include over 175 kinds, but the same variety was in all probability split up into several lots as is usual at all shows), but all were of good quality.

Section III. Class B.—New Products.

This class was an important one. The groundnuts were as fine as could be grown anywhere, and one plant was shown bearing 600 nuts which must constitute a record—at this rate taking 80 nuts per plant to yield one ton per acre, one acre would yield approximately 7½ tons. The groundnut cake was of fine quality, and should find a large and ready sale as a fodder and manure. Mr. Herbert Wright informs me that it contains 7½% of nitrogen, *i.e.*, rather more than in Castor cake, and in the Weligama

district, where such luxuriance in growth and first-class yields are obtained, a large industry should spring up.

The Sea Island Cotton was of good staple.

Class C.—Vegetables.

It was surprising to see such vegetables as Knol-Khol, French Beans, Cabbages, and Lettuce, and, though the quality was naturally somewhat poor, it was creditable to have grown them in the district. Knol-Khol and Lettuce were the best, but the hot climate quickly forces the latter into flower.

The Special Prize for the best display of vegetables from any School Garden in the Weligama Korale was won by the Teacher of Dampella School with an exhibit of over thirty varieties, all well grown. Most noticeable were the chillies, and where these can be so successfully grown there is no reason why the import of such a vast amount from India should not become a thing of the past. The difficulty seems to be in the curing of them, but from the pamphlet (No. VI. entitled "a Note on Chilly Cultivation") written for the Ceylon Agricultural Society by Mr. C. Drieberg, Superintendent of School Gardens, this could be easily overcome if a little care were only exercised.

The exhibits in the classes of the remaining sections showed that there are smart workmen in the district, and an industry has been formed in the cleverly executed wood-work, brass-work, pottery, lace, &c. The mats and baskets were very good, and I was told the needle work, lace, &c. was first-rate.

Nothing need be said of the Fishing Industry which forms a means of livelihood for a large proportion of the population.

Briefly the most important necessities for the welfare and future of the district are :—

(1). Energy and interest, especially by the *villager* himself.

(2). Introducing Stock of better quality, or propagating only from good Stock.

There was no class for pot plants, which should be included at the next show, as some exhibits staged "not for competition" were very good.

CATTLE SECTION.

By G. W. Sturgess, G.V.S.

1. For a Show confined to one Korale I think the exhibits as a whole compared very favourably with larger Shows, especially the Native Cart Bulls of which there were several good specimens.

2. The Buffaloes were poor, only two being shown.

3. The Native Cows were poor and small specimens.

4. Only one pair of Indian Cart Bulls was shown.

5. The arrangements in connection with this section should be better next time, for instance, the cattle-keepers should not be sent out of the show as they are required to hold the cattle and lead them out for inspection.

6. The animals entered should each be numbered, and the number entered against the class in the Judge's catalogue, otherwise it is impossible for him to make out in what class or classes each exhibit is intended to be shown.

7. Sheep and Goats.—*Sheep.*—only one exhibit from Sultanagoda Farm. *Goats.*—A fair number were shown, but they were very small in size and low in condition.

8. Poultry and Domestic Animals.—The poultry were very poor and nearly all badly affected with "Scaly Leg" and out of condition. Again, attention has to be drawn to the want of proper pens for poultry (which can be hired for a small charge from the Poultry Club, Colombo). All exhibits were cramped in small baskets or cages, and to keep them two days in such a state is certainly cruelty.

If Show Committees cannot provide proper pens for the birds when they arrive at the Show, it is better to omit the class altogether.

9. The exhibits included small Wild Birds, Cats, Hares, Pigs, Owls, and a Crocodile.

The exhibition of these unfortunate and miserable animals in small cages should not be allowed, and I hope Show Commitees will stop it in future and turn away any that are brought for show.

10. Horses.—Seven small Country Bred Ponies were exhibited, most of them not groomed and very indifferently shown.

AN AGRICULTURAL SHOW IN LAGOS, WEST AFRICA.

An Agricultural Show will be held in Lagos, West Africa, in November, 1906, under the auspices of the Lagos Government.

A leading feature of the Show will be the Sections for Implements and Machinery suitable for either the cultivation of tropical produce, or for its preparation for the European Markets, and for local consumption.

Medals and Diplomas will be awarded, and Manufacturers are now invited to consider the desirability of forwarding exhibits to compete in the above Classes.

For the information of firms abroad, it may be stated that Lagos is the most important centre on the West African Coast. It is bounded on the South-West by the British Protectorate of Southern Nigeria, with which it is allied, and the population of the Lagos Colony and its sister protectorate may be stated approximately as seven millions. The combined trade (Imports and Exports together) totalled to five millions sterling in 1904, and the following are the principal products which figure in the Export List:—Palm Oil, Palm Kernels, Rubber, Cotton, Maize, Cocoa, Coffee, Shea Butter, Mahogany.

In addition to the above, Cassava, Yams, Corn, Ground-nuts, Sugar-cane, Tobacco, Peppers, etc., are cultivated for home consumption, as also of course Fruit, Plantains, Bananas, Oranges, Limes, Pine-apples, Mangoes, etc.

Exhibits of any simple Implements or Machinery suitable for the cultivation or preparation of the above products are cordially invited. For the guidance of prospective exhibitors it should be noted that in this part of West Africa there are at present no draught animals working on the plantations and farms consequently exhibits of Hand Implements and Machines would be the most suitable.

It is believed that the Steamship Companies from Liverpool and Hamburg to West Africa, viz.—Messrs. Elder Dempster & Co. and the Woermann Line, will quote only nominal rates of freight on Exhibits, but definite information on this and other points may be obtained in April to June, 1906, by applying in writing to the Colonial Secretary, Lagos, or to the Commercial Intelligence Officer for Lagos and Southern Nigeria, care of The Crown Agents for the Colonies, Whitehall Gardens, London, S.W.

By Order,
E. A. SPEED,
Acting Colonial Secretary and Vice-President of the Council of the Lagos Agricultural Union.

Lagos, January 2nd, 1906.

AGRICULTURAL CREDIT BANKS.

In agriculture to an even greater degree than in commerce the function of credit seems peculiarly applicable. In trade the purchase and sale of goods is usually effected within comparatively short limits, whereas the growth of crops and the breeding of stock alike require the advance of money and labour for long periods before any return can be expected. Pending the sale of his produce, and the realisation of his profits, the farmer may reasonably require assistance for the purchase of fresh stock, manures, feeding stuffs, and implements, or to enable him to take full advantage of his opportunities—to buy in a cheap market or to hold his produce for a rise. The land-owner, also, may need money for improvements, for drainage, for making farm roads, or farm-buildings, etc.—expenditure from which he can only receive a very gradual return in the form of a rent. How to make the capital thus required accessible to agriculturists at a low rate of interest is a problem which has attracted great attention on the Continent during the last half-century, and in many countries it seems to have been satisfactorily solved.

In Great Britain the needs of owners of land desirous of carrying out agricultural improvements with the aid of borrowed money are met to some extent by the provisions of the Improvement of Land Act, 1899, and earlier Acts of the same character, which authorise the creation of rent charges over a series of years. Here, however, the security offered, viz., the land, enables the advances to be obtained with much greater facility than where the security partakes of the nature of personal credit. In the latter direction little progress has, as yet, been made in Great Britain, the number of loan banks on a mutual or co-operative basis being insignificant, but in Ireland there has been a considerable development in the past five years. This is largely due to the difference in the conditions prevailing in the two countries. Banks of this character are, no doubt, more suitable to the needs of the small holder than to those of the average tenant farmer, as may be gathered from the fact that it is among the peasant proprietors of the Continent that they have reached their greatest development. The practicability, however, of this form of self-help is undeniable, and in districts where small cultivators are sufficiently numerous there seems no reason why one or other of the methods which have proved successful elsewhere could not be adapted to meet local conditions in this country.

The Labour Gazette for April last contains a note on this subject, in which it is stated that with few exceptions the societies at present in existence (in Ireland, chiefly,) are organised upon what is known as the "Raiffeisen" principle, the main features of which are that no shares are issued, the capital being raised by entrance

fees, subscriptions and deposits, and loans bearing a fixed rate of interest; that the liability of the members is unlimited, every member being jointly and severally responsible for any losses that may be incurred by the society; that the loans advanced by the societies are for reproductive purposes only, the borrower being required to satisfy the managing committee that the object for which the loan is required is one that affords a reasonable security for his being able to repay the loan at the date fixed; and that the operations of a society are confined to a small area in order that the personal character and needs of applicants for loans may be known to the members and committee.

All the societies existing in the United Kingdom, with the exception of fifteen (thirteen of which are town societies) are registered under the Friendly Societies Acts as "Specially Authorised Societies." The fifteen societies are registered as Industrial and Provident Societies, with share capital and limited liability. In a number of cases in Ireland, where sufficient local capital has not been available at the commencement of the society, loans ranging in amount from £50 to £100 have been advanced at a low rate of interest by the Congested Districts Board, or by the Department of Agriculture.

In the following table the progress of these societies during each of the six years for which statistics are available is shown. It will be seen that in 1903, as compared with 1898, the number of societies had multiplied five times and the membership four times; the capital had more than doubled; the amounts of loans advanced and repaid had each multiplied about 2¼ times; while the working expenses had doubled and the profits trebled.

Year.	Number of Societies making returns.	Total number of members.	Total Capital (Share, Loan and Reserve).	Amount of Loans.		Working Expenses, including Interest on Capital.	Profit after allowing for Interest on Capital.
				Advanced during year (including Renewals).	Repaid during year (including Interest).		
			£	£	£	£	£
1898	31	2,659	42,245	14,955	11,734	1,396	212
1899	48	3,472	47,511	17,773	12,712	1,658	309
1900	64	5,015	53,922	17,975	14,461	1,901	493
1901	81	6,014	64,746	20,058	19,777	2,012	568
1902	114	7,921	77,607	31,107	23,279	2,671	813
1903	154	10,509	85,128	33,753	27,194	2,938	652

Except in the case of the fifteen societies referred to above, no dividends are paid by the societies, the profits, after working expenses and interest on loans and deposits have been paid being carried to the reserve funds and used as working capital. It is claimed for these societies that, by advancing loans for the purchase of a cow, or a few pigs, and for similar purposes, they have enabled many labourers to realise considerable additions to their income, and that as yet no bad debts have been incurred. Considerable progress is shown in 1903, as compared with 1902, the number of societies in 1903 being 154 as compared with 114, and the membership 10,509 compared with 7,921. The total capital was £85,128, or an increase of 9·7 per cent; the amount of loans advanced £33,753, an increase of 8·5 per cent; and the profit after allowing for all expenses £652, a decrease of about 20 per cent.

The following table shows the membership, capital, business and profits of Co-operative Credit Associations during the years 1902 and 1903 distinguishing England and Wales, Scotland and Ireland, and town from agricultural districts:—

	No. of Societies making Returns.	No. of Members.	Capital.		Amount granted in Loans during the Year.	Amount of Loans repaid during the year including interest.	Working Expenses including interest on Capital.	Profit after allowing for interest on Capital.
			Share and Loan.	Reserve.				
England & Wales:—			£	£	£	£	£	£
Town Districts ...	11	1,931	9,182	229	6,648	4,676	417	123
AgriculturalDistricts	7	199	962	148	679	723	41	21
Total England and Wales 1903 ...	18	2,130	10,144	377	7,327	5,399	458	144
Ditto, 1902 ...	17	1,549	10,567	282	4,450	4,286	581	262
Scotland:— TownDistricts,1903...	2	777	47,156	6,176	5,340	6,047	1,854	209
Ditto, 1902 ...	2	768	46,852	5,963	10,822	8,283	1,656	288
Ireland:— AgriculturalDistricts 1903. ...	134	7,602	20,249	1,026	21,086	15,748	626	299
Ditto, 1902 ...	95	5,604	13,350	593	15,835	10,710	434	263

An account was given in this Journal in June, 1902, of the steps taken by the Co-operative Banks Association, since incorporated in the Agricultural Organisation Society, for the establishment of village banks in the rural districts in England. A village bank, which joins the Agricultural Organisation Society, receives on formation a complete set of books free, together with simple instructions for keeping the account and specimen model rules. The Central Association also gives expert advice from time to time as required.

In Germany, among the various systems of real credit, *i.e.*, loans on real estate, the best known takes the form of a voluntary association of landowners; these associations, known as Landschaften, have been in existence for over a century, and make advances to their members by the issue of negotiable debentures, bearing interest at 3 or 4 per cent. guaranteed by the society. They usually operate in small areas, and are controlled by legislation and by the public authorities. Their great advantage, in addition to a low rate of interest, perhaps rests on the fact that they ensure the borrower who has sunk the loan in improvements against any sudden demand for the repayment of the capital. Although the operations of these societies have been attended with great success, it is on the side of personal credit that the greatest development has taken place in Germany. The principles on which the agrarian banks know as the Raiffeisen Credit Associations, which date from about the middle of the last century, are based, have been mentioned above, and it is claimed that they have effectually delivered the German agriculturists out of the hands of the usurers. Their number has increased very greatly, especially during the past ten years, and similar institutions exist in Austria, Switzerland, Belgium,

France, and Italy. In Belgium the number of these societies has increased from thirty-three in 1895 to 313 in 1902 with over 15,000 members.

Co-operative Banks have also taken a prominent place in Italy. The Rural Loan Societies, which were inconsiderable in number in 1892, have since increased rapidly, and at the end of 1903 amounted to 1,216. Raiffeisen Banks also exist to the number of 730, but no marked progress in their number appears to have recently taken place. In Spain also there has in recent years been a great development of co-operative credit. In France the demands for real credit are met by the Credit Foncier, an institution under Government control, which enables house and land-owners to raise money on mortgage at a low rate of interest, with facility for repayment by an annuity including redemption of the capital. This institution, which dates from the year 1852, has been very successful, and its methods have been largely copied in other countries. On the side of personal credit, there has been considerable activity, though not to anything like the same extent as in Germany. Since 1899 the Government have placed sums of money to be used as capital at the disposal of the banks, and there were in all in 1903 some 1,038 institutions of one form and another for the promotion of agricultural credit.—*The Journal of the Board of Agriculture.*

FUTURE PROSPECTS OF IRRIGATION IN CEYLON.

From the Report on Irrigation By Sir John Keane.

With regard to the general question of paddy cultivation in the future it has been said that there is an increasing tendency among the villagers to cultivate less paddy and more coconuts. Existing figures certainly show that the increase in coconut lands has been far greater than that of paddy lands, but this is no doubt largely due to the application of European capital to the former industry. The reason why the decline of paddy cultivation is predicted is on account of the small profits it returns. Many calculations have been made in this respect, but they differ so widely that it is impossible to draw from them any satisfactory conclusion.

The conditions in various localities differ, however, so widely, and there are so many occasional factors that may or may not arise, that it is quite impossible to arrive at any reliable conclusion in this matter. The popularity of paddy cultivation is really independent of any mere question of profit or loss. The distinct and conservative spirit of the East cannot be resolved to the commercial standards of the West. Where the political economist draws deductions from market prices and the cost of a living wage, the Eastern often knows no markets and regards it as derogatory to work for hire. He reveres paddy cultivation on account of its antiquity; it possesses for him an almost sacred significance; it is attended by time-honoured ceremonies; and the ownership of rice lands bears in his eyes a *cachet* of respectability. In addition, moreover, to the minds of many who know little or nothing of the ways of trade, who rarely handle actual money, who are perplexed by a change in prices, the possession of paddy lands, and thus of a self-contained food supply, carries with it a sense of security which is comforting. For these reasons, therefore, apart altogether from mere considerations of gain, the continuance and further development of this cultivation in future may be expected.

With the large areas yet unsold and with so many incomplete works the policy of the present Government is to refrain from undertaking new works and to develop existing ones. There is, however, one matter in this connection

which deserves a few words of remark. Many of the existing works may *per se* be regarded as complete, *i.e.*, the tanks are fully restored and all the channels are cut, but they still lack that sufficiency of supply essential to their full utility. They were in many cases originally portions of some large connected scheme; now, as restored, they depend upon a limited and, in years of drought, an altogether insufficient catchment area. . .The restoration of these main sources of supply is, therefore, only a final step towards the completion of many existing schemes, and constitutes an improvement which will, in most cases, benefit an existing population and be less speculative than the restoration of large costly works in remote, sparsely populated, and unhealthy districts.

PROPOSALS FOR THE FUTURE: CAREFUL PROJECTION OF NEW SCHEMES.

As to proposals for the future, it will suffice if we summarise the conclusions. In the first place, matters of irrigation policy and finances should be considered, not by any *ad hoc* Board, but by the recognised advisers of Government in relation to the claims of other Departments and to the financial position of the Colony as a whole. The Irrigation Department should collect all necessary information to enable the feasibility of any project to be fully considered; the project should be approved by the Governor with the assistance of his constitutional advisers; the Legislative Council should be asked to vote the necessary funds; and the Irrigation Department should then carry out the work. It is understood that certain changes to effect this object are already under consideration. The imperfections of the past have been in no small measure due to the fact that the control and development of works has been left largely in the hands of the Government Agents, who are already over-burdened with a multiplicity of duties, who are not qualified to deal with the many technical points involved, and who cannot therefore be held responsible for defective results. In matters of policy and local usage the authority and influence of the Government Agent could not, of course, be dispensed with; but on technical questions—and most of them are technical—the Director of Irrigation and his officers should be alone responsible. With regard to future schemes, the fullest irrigation surveys in their extended sense should be made before any work is undertaken. The time necessary to admit of this being done is now possible, as no new works appear to be urgently required. Every care should be taken to discount the often unduly, though not unnaturally, "sanguine assurances" of local headmen and officials. Development, while not neglecting the necessities of more remote localities, should as far as possible take place outwards from a populous centre; wherever possible a complete system of channels should be traced in advance, and the share due from the cultivators towards their construction decided; the exact obligations of Government and cultivators in respect of maintenance should be defined; and, above all, every thoroughness should be exercised in the framing of estimates.

IMPROVEMENT OF EXISTING WORKS.

With regard to existing works, many of them can never, it is feared, become a financial success without a revision of rates—in some cases a delicate matter requiring the aid of legislation. When, however, a closer attention is paid to all the details of development, when all necessary channels have been cut and reasonable facilities for approach provided, when the control of water has been carefully regulated under skilled supervision and waste prevented, when a survey has been made of all irrigable lands, and a further survey—if not cadastral, at least block—has been made of all cultivated areas, when on the basis of these surveys proper specifications have been prepared—and when prepared are automatically revised—when on the basis of these specifications the dates due are

regularly collected, when these recoveries are brought to account in an accurate and systematic manner, and when over these accounts an efficient scrutiny of audit is provided, then it may with confidence be hoped that the development of Irrigation works will be much accelerated and their financial position much improved. None, moreover, of these changes would involve controversial issues; they merely make for the better regulation of existing machinery.

FARMERS' CO-OPERATIVE SOCIETIES.

The growth of voluntary co-operative associations of farmers for the promotion of their common interests has been a noteworthy feature in the history of agriculture during the past quarter of a century. This movement has hitherto found its greatest expansion on the Continent, where also it has been longest established. But within the past ten years there has been a remarkable development in this direction in the rural districts of Ireland, and the principle of combination has also been applied with success to the dairy industry in the British Colonies and the United States. On the other hand, among agriculturists in Great Britain co-operation has not yet made much progress, though, owing to the efforts of the Agricultural Organisation Society, the advantages to be obtained by it are slowly becoming more generally recognised by British farmers.

Some of the earliest co-operative associations established on the Continent took the form of credit banks or agricultural loan societies which now exist in large numbers in regions occupied by small holders and peasant farmers, particularly in Germany, Italy, and Belgium. Briefly stated, their object is to enable their members to borrow small sums at low rate of interest for the purchase of farming requisites. In Ireland small agricultural credit banks have been established in many districts under the auspices of the Irish Agricultural Organisation Society. A few village banks of this kind have also been started in England during the past ten years. Particulars of the organisation of these institutions may be obtained from the Secretary of the Co-operative Banks Association, 29, Old Queen Street, Westminister, S.W.

Next to the banks, the most common, and perhaps the most effective, form of combination amongst farmers is to be found in the joint purchase societies, or agricultural trading associations. Their usual function is to purchase wholesale, manures, feeding stuffs, seeds, implements, and other articles used on the farm. By purchasing in large quantities direct from the manufacturer, these societies are able to obtain supplies for their members at wholesale prices. In this way they not only help the small farmer to procure his manures and feeding stuffs at a more moderate price than he could do by purchasing for himself alone, but they also save him a large part of the incidental charges usually incurred by the individual buyer in the carriage and testing of the goods. For instance, only one analysis is required of a fertiliser or feeding stuff consigned in truck-loads to the society to test the quality of the several portions of the consignment bought on behalf of individual members, while each member benefits by the lower rates of carriage obtained by collecting sufficient orders to make up loads of four tons and upwards.

Co-operation in production has been applied with greatest success to the dairy industry. The remarkable development of the butter trade of Denmark is attributed largely to the establishment of co-operative dairies and creameries, which have enabled the farmers of that country to supply the British market with immense quantities of butter of uniform quality. Uniformity in flavour, in

appearance, and in consistency, is the characteristic most required in butter intended for general consumption in the great towns of this and other countries: and it is obvious that this is more likely to be secured by manufacturing the article in dairies which can manipulate the milk supplied by a large number of farmers, than if each of these farmers himself makes butter from the milk produced on his own farm. A full account of the organisation and methods of the Danish dairy societies, and of similar associations in Sweden and Germany, is given in a special report published by the Board of Agriculture, and articles showing the progress of co-operative dairying abroad, in the colonies, and in Ireland, have appeared from time to time in the pages of the Board's Journal. Except in the case of butter and cheese-making, little advance has been made in the application of co-operative principles to productive processes in agriculture. Danish farmers have, however, associated for the curing of bacon for export, and there are also instances abroad of agriculturists having combined with satisfactory results for the prosecution of such businesses as milling, baking, distilling, the preservation of fruit and vegetables, sugar refining, the manufacture of starch, and the raising of seeds.

Co-operation in the sale of general agricultural produce presents difficulties which have not yet been successfully overcome. When it is remembered that corn, vegetables, and meat are usually sold wholesale in separate markets under entirely different conditions, it is not surprising that comparatively few farmers' associations have attempted to undertake the sale of all these articles on a large scale These difficulties are less conspicuous in cases where the societies have confined their business to a single class of produce, such as butter and eggs, and the wholesale disposal of these products on co-operative lines has been organised with success. Where this business has assumed large dimensions, as in the case of the sale of butter manufactured in the Danish and Irish dairies, the work of distribution is undertaken by special agencies formed solely for that purpose, to which the dairies consign their produce. This form of co-operative distribution is one which offers great possibilities in connection with the question of the economic carriage by rail of agricultural produce. Many of the complaints made by farmers of excessive and preferential railway charges arise from the fact that the consignments concerned are not sufficient in bulk to enable the companies to handle them with profit at the lower charges at which they convey larger consignments. In such cases the remedy would frequently be found in the formation of a co-operative distributing agency, which would undertake the collection and packing of small consignments to make up truck-loads for dispatch at regular intervals.

Retail trading has been taken up by some co-operative societies in dairying districts on the Continent, through the medium of the parcels post, and this means of reaching the consumer direct has also been employed for the distribution of fancy cheeses, honey, eggs, and fruit.

Among the other co-operative institutions established by farmers on the Continent, perhaps the most important are the associations for the improvement and insurance of live stock, which are more numerous in France and Belgium than elsewhere. As a rule cattle are the animals with which these associations are concerned; only in a few instances are horses, sheep, and swine included. In the case of the Belgian cattle insurance societies, which may be taken as a type of these institutions, the usual compensation allowed to members for the loss of an animal is two-thirds of its value, and this is paid out of the funds of the society to which all the members make periodical contributions. Another method adopted by some societies is to pay the compensation out of the common fund only when the animal is declared unfit for food; but if the

meat is suitable for human consumption it must be purchased by members of the society, each contributing to the price a sum proportionate to the number of animals he has insured in the society. In some societies there is, however, no common fund, and then the practice is to compensate the owner of a condemned animal by levying a subscription on all the members to make up its value if the meat has been seized; or if the meat may be used for food then the society purchases the carcase and distributes the meat amongst the members at an agreed price. In this country so-called "Cow Clubs" are sometimes met with among cottars and farm servants for the purpose of compensating the members in the event of the death of their cows, but unfortunately the custom of keeping cows by cottars is not so common now as formerly, and many cow clubs have been dissolved.

All the forms of association to which reference has been made have been adopted to a much greater extent by farmers abroad than by the agriculturists of the United Kingdom, and are one important cause of the success of the foreign competition in fresh agricultural produce, such as butter and eggs, which is now felt to so large an extent by the home producer. The co-operative movement has, however, made much progress amongst Irish farmers since the work of organisation was taken up by the Irish Agricultural Organisation Society in 1894. At the end of 1902, there were in Ireland 712 farmers' co-operative societies, with 71,023 members. These included 122 agricultural societies, 334 dairy societies and auxiliary creameries, 145 agricultural banks, 31 poultry societies, 49 home industries societies, 18 bee-keepers' societies, and 13 societies with miscellaneous objects, such as the promotion of the flax industry and fruit growing, and including also three federations of societies.

The chief function of the agricultural societies in Ireland is the joint purchase of agricultural requisites, especially manures. Some of these societies have also undertaken sales of live stock; others have been useful in procuring implements and spraying machines, which are hired out to the members at a small charge; and three have hired grazing lands and let them out at reduced rents to their members.

The Irish dairy societies or creameries, whose main business is the manufacture of butter, are organised on the lines of similar associations in Denmark, and their process of butter-making follows closely the Danish system. Few of the Irish dairy societies were started with sufficient share capital to cover their outlay in buildings and machinery. In many instances, credit was obtained from the contractors, or the extra capital required was raised by means of a loan from a local bank. The shares in the dairies are owned, for the most part, by the members. In some cases, persons who do not keep cows hold shares but they have become shareholders to help the associations as social institutions rather than for the purpose of investment. Shares are usually taken up by farmers in proportion to the number of cows they keep, at the rate of £1 for each animal. This arrangement, however, is not uniform in all the societies. It is the practice to pay for the shares by instalments, generally of five shillings at a time. After the creamery has been started, these instalments are frequently paid in milk: sometimes the member delivers a certain quantity free of charge until the call on the share is paid up. The liability of the farmers is, in all cases, limited to the amount of their shares.

The accounts for 1900 of 195 of these dairy societies, with a membership of 33,064 showed a paid-up capital of £77,282, and a loan capital of £46,204. The value of their buildings and plant, after allowing for depreciation, was estimated at £130,818. The quantity of milk handled by them in the year was 37,162,000 gallons, from which 15,394,500 lb. of butter were produced. The average price paid

to members for milk delivered to the societies was 3·97*d.* per Imperial gallon; and the net profit on the operation of all the societies, after deducting working expenses, was £14,576.

The co-operative poultry societies in Ireland have confined themselves as a rule to the collection and sale of eggs on behalf of their members, but some of them have recently embarked in the table-poultry trade. They purchase eggs as well as poultry from their members by weight, and the introduction of this practice is said to have had the effect of making poultry-keepers more interested than before in maintaining a good breed of fowls.

In every case the price paid for the eggs sold through the societies has been above that obtained before they were started. It is claimed that the societies have accomplished an incalculable amount of useful work for the poultry industry of Ireland by raising the standard of quality, by introducing new and improved methods of keeping fowls, and by procuring for their members birds of serviceable pure breeds.

In Great Britain the co-operative movement has hitherto advanced very slowly amongst agriculturists. There are, however, several old-fashioned associations for the joint purchase of manures in England, and a number of similar bodies exist in Scotland. Among the English institutions of this class, one of the oldest is the Lincolnshire Farmers' Association, established in June, 1868, for the purpose of purchasing genuine phosphatic manures of guaranteed quality, and supplying the same to its members at cost price. This society is organised on a strictly co-operative basis; no profit is made on its transactions, and the working expenses are defrayed by an entrance fee of twopence per acre on the land occupied by each member, and by a fee of one shilling per ton on the goods ordered. All manures are analysed free of cost to the members, and delivered carriage free within a certain area. In 1901 this association distributed 6,400 tons of superphosphate to its members, and its accounts for that year showed a turnover of over £19,000. It is maintained that by the influence of the Lincolnshire Farmers' Association the price of manures has been considerably reduced, and that consequently thousands of pounds have been saved by the members, and by others connected with the cultivation of land within the sphere of the Association's operations.

A few other Farmers' Supply Associations exist in various parts of Great Britain, but most of them differ from the Lincolnshire Association in the sense that they are run as large stores or companies with considerable share capital upon which dividends are paid.

In addition to these large associations, there are to be found, here and there, in some of the western counties of England, local manure clubs working on a small scale on the lines of the Lincolnshire Association; and a number of analytical societies of the same type exist in Scotland. But the benefits to be gained from the formation of societies of this class have not yet been recognised by the great body of occupiers of small holdings and allotments south of the Tweed, amongst whom there is great scope for all forms of co-operation.

The task of organising agricultural co-operative associations in Great Britain has been recently taken up by the Agricultural Organisation Society, which has been found for the same purpose as the kindred society in Ireland. The objects of this society, as stated in their report, are to secure the co-operation "of all connected with the land whether as owners, occupiers, or labourers, and to promote the formation of agricultural co-operative societies for the purchase of requisites for the sale of produce, for agricultural credit banking and insurance and for all other forms of co-operation for the benefit of agriculture." The society carries on its work by sending organisers to address meetings and to give advice as to

the proper course to be pursued in the formation of local societies; by providing model rules for such local societies; and by publishing leaflets from time to time dealing with the various forms of agricultural co-operation. The local societies affiliated to this central organising agency already number 52, including 29 co-operative agricultural trading societies or joint purchase associations, six dairy associations, one for the production of cheese, three allotment societies, one basket making association, six combining the purchase of agricultural requirements and the sale of produce, four joint purchase societies also undertaking the improvement of stock by the purchase or hire of pedigree bulls or boars, one entire cart horse society, and one land association. Many of these bodies have only recently commenced operations; but as an example of the advantages of co-operation to the small farmer, reference may be made to the published accounts of the work already accomplished by two or three of them.

The Muskham Agricultural Society may be quoted as an example of an agricultural trading association. This was started in May, 1899, with 17 members and a share capital of £16. In 1900 the membership had increased to 38, and the turnover amounted to £365. One of the first steps taken by the society was to purchase a reaper and binder with money borrowed from a bank on the joint personal credit of the committee. The scale of charges for the hire of the machine was last year fixed by the committee at the rate of 4*s.* 6*d.* per acre, the society providing twine, and a man to take charge of the machine and horses. The result of three seasons' work has been that the society has liquidated the debt to the bank and the machine now belongs to the members, who can avail themselves of its use at a nominal charge just sufficient to cover wear and tear.

Some of the agricultural trading societies are also able to assist in the improvement of the livestock kept by small farmers by purchasing or hiring first class bulls, boars, and stallions. The Tregaron Agricultural Society, a small co-operative body of 50 members holding shares of 5*s.* each, of which 1*s.* 6*d.* is paid up, has, in addition to its business in manures, cakes and seeds, secured for its members, free of charge, the services of a boar, which is hired out to non-members at a fee of 2*s.* 6*d.*

Among the affiliated dairy societies, mention may be made of the Brandsby Dairy, in Yorkshire, which is chiefly engaged in the sale of butter, cream, and cream cheese on behalf of its members, but also undertakes to supply them with manures, feeding stuffs, and other farming requisites. A small warehouse has been rented by this society from the railway company, in which the manures, cake, and other articles purchased in bulk are stored, and from which they are distributed to members as a return-load for their carts which have brought produce to the station. By purchasing in truck-loads and relieving the dealer of the risk of bad debts and the trouble of collecting small sums of money from a number of individual buyers, the society has been able to obtain reduced quotations by which every member has benefited, however small his purchase.

The local societies affiliated to the Agricultural Organisation Society are registered under the Industrial and Provident Societies' Act and can therefore sue and be sued as corporate bodies.

The foregoing examples are sufficient to afford some idea of the directions in which farmers, and particularly occupiers of small holdings, can effectively combine to their mutual advantage. Hitherto the Agricultural Organisation Society has been working single-handed to encourage and assist such combination. But its efforts can now be seconded by County Councils in rural districts where co-operation is likely to be useful, the Board of Education being prepared to sanction the teaching of the principles and practice of agricultural co-operation

in the case of all County Councils which may make application to them in terms of Section 8 of the Technical Instruction Act, 1889, provided the Board are satisfied that such a form of instruction is required by the circumstances of the district.—*Board of Agriculture*, Leaflet No. 97.

THE INDIAN DEPARTMENT OF AGRICULTURE.

The annual report of the Imperial Department of Agriculture for India, which has just reached our hands, possesses several characteristics that give it special interest and distinguish it from the large number of Blue Books annually issued by the Government Press. It tells the story, in fact, of a new and progressive department, and of one which promises to be pre-eminently useful to the people of the country at large. The Government have at last wakened up to the fact that the agriculture of India is capable of improvement, and that to lay out money in the endeavour to bring this improvement about is a good investment. It has taken many years of agitation to bring them to this point. Even when convinced in former days of the utility of trying to improve a special crop like cotton, that conviction usually disappeared with the particular official who attempted to carry out the policy. Now, however, a permanent department has been created, dating from 1901, charged with the sole duty of trying to improve, by investigation and by demonstration, general Indian agriculture. If progress is judged by the money spent in carrying out the work, this department has already shown itself very progressive; in 1901-2 thirty thousand rupees sufficed to sustain it; in the last year three lakhs do not cover the cost. The work, still in its infancy, undertaken by this department consists in inquiries into the many problems facing cultivators of the land in India, such as the most economical manures, the utilization of sewage on the land, the improvement of sugarcane, the introduction or production of better types of cotton than are now grown, the battling with crop disease, the destruction of dangerous insects, and similar lines of investigation. Already it can point to good results. Egyptian cotton—of higher quality than any indigenous variety—is now an established crop in Sind; sugarcanes, better than any in cultivation, and free from disease, are being distributed throughout Madras; while the distribution of high class seed among the cultivators of the North-West has become a regular practice. Some of these results have been obtained by local provincial departments working in connection with the Imperial Department, some by the Imperial Department itself. Of special interest to Bengal is the appointment, announced in the report under review, of an expert to study the improvement of the jute crop. His activities have not yet begun, but this cultivation affords a splendid opening for work of the sort most beneficial to the country. The central station and headquarters of the Imperial Department are situated at Pusa in Behar, on an estate belonging to Government and formerly held as a large stud-farm. Here there is already at work a large staff of chemists, botanists, entomologists, and similar experts, and the farm attached, of over 1,300 acres, affords opportunity for experiment of the highest character, such as, we believe, has never been possible in India before. When complete this station will also form the headquarters of higher agricultural education in India, and the beautiful large college now being erected will, if it answers its purpose, be the means of training men who will be able to spread the latest and best agricultural methods into every corner of the country. We welcome the inauguration of the Imperial Department of Agriculture, and we heartily congratulate it on its first report. It gives an account of work well started and of the highest promise for the future. If it can only keep as free as it is at present from the trammels of departmentalism and red tape, we have hopes that it will ultimately, directly or indirectly, confer the greatest benefit upon India. — *Indian Agriculturist.*

CEYLON AGRI-HORTICULTURAL SHOWS.

INSTRUCTIONS FOR FORWARDING AND ARRANGING EXHIBITS.

1. First of all obtain a catalogue or schedule of the forthcoming Show. Go carefully through the various classes, when doubtless a number of the prizes offered will suggest themselves to you as within your scope.

2. Crops of vegetables, flowers, &c., should be sown or planted in sufficient time to allow them to grow and mature to suit the Show, the period thus required in each case being dependent on the nature of the crop and local conditions of climate or soil.

3. If in due course you are satisfied that the result of your efforts will make at least a creditable exhibit, write to the Secretary of the Show, intimating the articles which you wish to exhibit.

4. In selecting exhibits adhere to the rules laid down in the catalogue, especially in regard to number or quantity required: disregard of these may disqualify an exhibitor.

5. Show rules usually disqualify exhibits which have not been grown by the exhibitor or his employer for at least two months before the exhibition. This does not necessarily apply to flowers for table decorations.

6. Remember that quality counts for more than quantity: that vegetables, fruits, and other edible products should be in a reasonably fit state for consumption when exhibited, it being impossible to properly judge under-ripe or over-mature articles.

7. Fruits such as oranges, mangosteens, sapodilla, tomatoes, &c., should be packed in shavings, sawdust, or some soft material to prevent bruising; smaller fruits, such as uguressa, kon, strawberries, &c., may be packed in layers with their own leaves; whilst large kinds, such as plantains, pineapples, durians, jak, &c., may be packed with dry straw or shavings in crates or well ventilated boxes.

8. Plants, too, should be sent in crates, the stems, leaves or flowers being securely tied and held in position. Support the stems of flowering annuals in pots. Avoid obtrusive pots, stakes, or ties.

9. Wash root-crops carefully before sending to Show, and cut off all unnecessary roots.

10. Remember that the impression your exhibit makes on the Judges is largely dependent on the manner it is arranged. Do not send articles in large and unsightly receptacles, such as cadjan baskets, with their contents usually hidden at the bottom.

11. Fruits, vegetables, herbs, &c., should be shown in shallow basket-trays or plates of uniform sizes.

12. Fruits are rendered more effective by having a few of their own leaves arranged neatly round them.

13. Cut flowers should have their stalks placed in water immediately after cutting; these will keep longer if when being trimmed their stalks are cut under the water instead of in the air. For exhibition uniform bottles or tins securely held in position should as far as possible be used for cut flowers.

14. Each exhibit should have a label fixed to it, giving the name under which it is commonly known, and, if possible, the scientific name, this will secure points in the judging and add interest to the Show.

H. F. MACMILLAN,
Curator, Royal Botanic Gardens.

Current Literature.

GUIDE TO THE ROYAL BOTANIC GARDENS, PERADENIYA.—BY H. F. MACMILLAN.—This guide has just lately been published, and may now be obtained at the Garden gates for Rs. 2. Though the price may seem high, the guide is well worth the money for the sake of the numerous photos, reproduced for the first time, that it contains.

The Guide consists of 40 pages of elongated 4 to prints about half of which are covered with illustrations. As worthy of special remark, we may call attention to the views of Monument Road (p. 11) the flower garden (p. 15) the flood scene (p. 18) Flying Foxes (p. 21) the screw pine (p. 23) the Fernery (p. 31) Monument view (p. 33) and the Satinwood Bridge (p. 38). A good presentation of the Royal Botanic Gardens Staff is given on page 6 but the author has omitted to give their names, and the date should be 1904, not 1906, several changes having occured since then.

The text consists of a detailed account of a route round the gardens, with descriptions of the more interesting plants. This is very well done, but is just a little too detailed for the casual visitor: for the visitor with time at his disposal it is excellent.

Every one who is interested in the Royal Botanic Gardens at Peradeniya—and who in Ceylon is not?—should possess himself of this excellent guide without delay.

THE DISEASES OF THE HORSE'S FOOT—BY H. CAULTON REEKS.—A copy of this valuable and up-to-date work has reached us during the month. While being of moderate size it embraces the Regional Anatomy—Physiology—Methods of examination—Operations—Conformation and Diseases of the tissues of the foot of the horse, all of which are dealt with clearly and fully with excellent illustrations. It is a book written for professional men and students in whose library it should find a prominent place.

Nevertheless much information may be gained by anyone desirous of understanding the conformation and complex structure of the horse's foot.

It is published by Messrs. Baillière, Tindall and Cox, Henrietta Street, London. Price 10*s*. 6*d*.

LAND REVENUE ADMINISTRATION IN THE CENTRAL PROVINCES OF INDIA.—This is a compilation on the land settlement question in the Central Provinces of India. It is compiled by the Tenants' and Landlords' Association of Jabalpur and published at the office of that Association. Price R1.

Correspondence.

SARSAPARILLA.

SIR,—The author of the paper on "Sarsaparilla" in the February number of the Society's Magazine apparently accepts the fact quoted by him from a correspondent's letter—that Sarsaparilla (the officinal drug) grows wild in Ceylon.

As far as I can gather the correspondent quoted is referring to Indian Sarsaparilla (Sinhalese Iramusu) *Hemidesmus indicus*, while Mr. Etherington writes of Jamaica Sarsaparilla—*Smilax officinalis*.

Some time ago there was a demand from Europe for the Iramusu which is a weed in Ceylon, but I am not aware that it is exported at present, though that is quite likely, as I know of a party who has been collecting native drug plants and sending them away to Europe.

Indian and Jamaica Sarsaparilla are botanically very far removed from one another, the former being an asclepiad and the latter a "lily." The method of cultivating the two plants would also be very different.

I am, etc.,

C. DRIEBERG.

Office of the Superintendent of School Gardens,
Colombo, 1st March.

STUMPING RUBBER PLANTS.

SIR,—Can any of your correspondents, or yourself, inform me if when stumping rubber plants prior to planting—one year plants—it would be good to stump in the *green wood*, so as to ensure being above the first eye in the brown wood; and thus avoid the dying back to the root which happens if the plant is stumped below the eye?

In your March number, owing to the way the stops are placed, the information as to acreage of some of the Travancore places, on page 103, is incorrect. I annex the alterations.

El Dorado Estate, total acreage about 700 acres, planted and being planted about 500 acres.

Kardaman Kolam, total acreage about 1,200 acres, planted or being planted about 500 acres.

Kuppu Kayam Estate, total acreage about 800 acres, planted or being planted about 150 acres.

Graham's Land (or Manikal) total acreage 300 acres, planted or being planted about 250 acres.

Yours faithfully.

H. D. DEANE.

Peermaad, S. India,
April 10th.

CARAVONICA COTTON.

SIR,—In reference to Dr. H. M. Fernando's reply to me in the *Tropical Agriculturist* I do not think there is anything required of me to say. From it I gather that he makes three complaints: 1st. That Caravonica does not suit the Ceylon climatological conditons of two wet and two dry seasons; 2nd. that it is a perennial tree-cotton; 3rd. that the value of its lint has not yet been *tariffed* or entered in the Liverpool Weekly Reports. On these three points with your permission I shall try to give some explanations.

1st.—I believe the months of August, September and October are fairly dry in Ceylon. If so, the Caravonica should be made to crop in this time by plucking off all the blossoms appearing from November to June or in some districts, like Kurunegala, the cropping could be made to take place during the dry months of January, February and March, by plucking of all the blossoms from April to December. This should be left to the judgement of the planter. Of conrse, Ceylon being just on the Equator, her climate is *double-jointed*, that is two wet seasons and two dry seasons of half-duration each: that is quarterly alternatively and then, unfortunately, the grower will have to content himself with three months picking instead of the whole cropping period of six months as in extra-equatorial districts. But a heavy picking for even only three months of Caravonica will greatly exceed the yield of Sea Island, Egyptian or any other cotton; and by its high price it will represent a nett income more than double or treble of that from other varieties.

2nd.—Caravonica, as a perennial big tree, must be a great advantage for its simple and inexpensive culture, its great yield and its power as a tree to stand trying seasons, monsoons or droughts, whereas annual herbaceous cotton often perish in the germinating of the seed or in the growth either in floods or in droughts. This is the fate often in the United States. As to the pests; remedy could be made by spraying tobacco water, or better still by cutting off all the branches and leaving only the mutilated trunks just after the crop. The trees will grow again in time for the next crop; or even set fire to the small parched grass under the trees, burning it completely so that all pests will perish at same time that all green foliage of the cotton trees will be scorched. I did this here in the very patch of Caravonica I.- Silk, of which you gave the view in your November *Tropical Agriculturist*. The result was the heavy crop you see on the trees after seven months from the time of the fire in January, as during the wet season, February-May, the scorched branches put forth innumerable secondary branches loaded with blossoms! This is a simple, speedy, inexpensive mode of culture and pruning.

3rd. As to the value of its lint not being catalogued in the Liverpool Weekly Report, it is not my fault. I am not a millionaire. I cannot grow millions of bales of it—especially at the Australian wages of 9*s*. a day and no man to work even for that!

My cotton so far has been sent here and there all over the world for specimens more than commercial deals. Messrs. Elliton & Co., Cotton Brokers, valued it at 10*d*. per lb. in November, 1901, when Upland was 6·12, Pernambuco 6·72. Egyptian 8¾, Broach 5½, B'nggar 4⅞, Bengal 4 3-16th, as stated in the "Liverpool Daily Post" of 26th November, 1901, page 10. But in the same cotton columns of that issue of the "Liverpool Post" the following special paragraph appeared:—Queensland cotton. We have received from Dr. Thomatis of Cairns a sample of cotton raised by him. This cotton is allied to Peruvian, good in colour, long silky and strong in staple and 'would sell here readily at something over 9*d*. per lb. This cotton is 'too good in quality and too expensive for the requirements of nine-tenths of the spinners of Lancashire." My cotton of the season just cultivated will reach Liverpool in April, and I intend to have it sold by public auction so that all buyers from Lancashire and the Continent will have a chance to judge of the value of this new cotton, which is being largely grown in India where land and labour are not wanting. Thanking you in anticipation.—Yours,

DAVID THOMATIS.

Cairns, Queensland, Dec. 29.

The Ceylon Board of Agriculture.

The Seventeenth Meeting of the Board of Agriculture was held in the Council Chamber at 12 noon on March 5th.

His Excellency the Governor presided.

There were also present Sir Alex. Ashmore, K.C.M.G., Lieut.-Governor, the Hon'ble Messrs. Nicolle, Crawford, Wace, C.M.G., and J. Ferguson, C.M.G., Messrs. J. Harward, E. E. Green, H. T. S. Ward, R. Morison, G. W. Sturgess, C. Drieberg, C. J. C. Mee, F. Beven, D. Joseph, Dr. Willis, Dr. H. M. Fernando, the Maha Mudaliyar, and the Secretary.

Visitors:—Mr. A. F. Borden, of the United States Department of Agriculture, and Mr. A. B. Jayasuriya.

1. The minutes of the previous meeting were read and confirmed.

2. A list of new members was read.

3. Progress Report XVI was circulated.

4. The Hon'ble Mr. H. Wace moved—"That the Board of Agriculture recommends that the Government Dairy be moved from Colombo, and that experiments be made at once in sterilization of milk; that Government be asked to appoint a Committee to be composed of the Government Analyst, the Director of the Bacteriological Institute, the Government Veterinary Surgeon, and the Secretary, Ceylon Agricultural Society to take steps to carry out these experiments."

His Excellency and Dr. Fernando spoke on the motion, which was carried unanimously.

5. The Hon. Mr. John Ferguson read a paper entitled "The Ilukk Grass" of the Sinhalese, and "Lalang-Lalang" of Malay; being a paper by a Malay States planter on the method adopted to get rid of grass in Sumatra with comments by Ceylon coconut planters.

Dr. Willis, Mr. Beven, Dr. Fernando and the Chairman spoke.

6. Mr. F. Beven read a paper on "Experiments at Talawe."

The Chairman, Dr. Willis, and Hon. Mr. Ferguson spoke.

7. The Hon'ble Mr. H. C. Nicolle moved that—"Life Members of the Society be elected on payment of a subscription of Rs. 50/, such members to have no claim to any refund in the event of the Society ceasing." Mr. Ward seconded and the motion was carried.

8. Dr. Willis moved "That three Agricultural Instructors—two Sinhalese and one Tamil—be engaged on a salary of Rs. 40/ per month with a travelling allowance of Rs. 4/- per diem." Mr. Daniel Joseph seconded. It was decided after some remarks by Mr. Ward to omit the travelling allowance and leave this to be settled subsequently by the Finance Committee. The motion so amended was carried.

9. The Hon'ble Mr. Nicolle proposed "That the services of an Interpreter-clerk be engaged on a salary of Rs. 30 per mensem." The Hon'ble Mr. H. L. Crawford seconded the motion was carried.

10. The Hon'ble Mr. John Ferguson, C.M.G., proposed:—"That the Society vote a sum of Rs. 2000 per annum as remuneration to Dr. Willis, Director of the Royal Botanic Gardens, for his services to the Society."

The Hon. Mr. Nicolle seconded, and the motion was carried.

The meeting terminated at 2 p.m.

Agricultural Society Progress Report. XVII.

The number of members of the Society is now 1,047, an increase of 23 since the last meeting.

The proposal to elect Life Members on payment of a subscription of Rs. 50 was approved by the Board. The first Life Member of the Society was Framjee Bhikajee & Co.

Local Societies.—A new Society was started at Balangoda, at a largely attended meeting under the presidency of the Ratemahatmaya, with a membership of 45.

There are now 42 Branches of the Society. Since the last meeting of the Board I have visited the Branch Societies at Trincomalee and Matale.

The Trincomalee meeting was well attended; and a feature of the meeting was a capital display of vegetables and fruit grown in the district, which were exhibited in the Kachcheri. Papers were read by Mr. M. M. Subramaniam, Proctor, on "Pasture Lands," and by Mr. P. C. Nicholas, Mudaliyar, on the "Needs of the Agricultural Branch at Trincomalee."

Several prizes were offered for vegetable and fruit gardens, including one by Mr. Hopkins, Government Agent, Eastern Province, for the best kept—viz., best-fenced, best-manured, &c.—paddy field in the district.

At the meeting of the Matale Branch, a paper on the work done in the past by and the prospects in the future of the Matale Branch was read by Mr. Daniel Joseph.

It was decided to offer a prize of Rs. 20 for the best vegetable garden in Matale South.

The Negombo Branch has secured a plot of 2 acres in the town for an Experimental Garden, and is arranging for the employment of an experienced gardener, the cost of whose services will be met by the Branch.

Efforts are being made by the Matara Branch to secure sufficient local support to open an experimental garden near the town. The subscription has been raised from R. 1 to Rs. 2 per annum. The number of members of this Branch is now 71; there were only 14 members at the end of February.

A successful meeting was held by the Panadure Branch of the Society on 3rd March. Prizes were offered for the two best school gardens, the two best gardens opened by village headmen, the best cultivated field of paddy yielding the largest crop, the best vegetable garden in the district, the best ash pumpkin grown in any garden in the district.

At a meeting of the Nuwara Eliya Branch on the 28th Mr. H. D. Martin gave a demonstration in grafting of plants.

Agricultural Shows.—Since the last meeting of the Board Shows have been held at Weligama on the 15th and 16th, and at Gampola on the 30th and 31st.

Reports by the Government Veterinary Surgeon, the Superintendent of School Gardens, and Mr. J. K. Nock, Curator, Hakgala Gardens, who acted as Judges at the Weligama Show, are tabled to-day.

Dates have now been fixed for the following Shows:—

Nuwara Eliya	April 17 and 18
Badulla	May 7 and 8
Colombo	June 22 and 23
Kegalla	July 6 and 7
Kurunegala	August, 23, 24, and 25
Avisawella	September 7 and 8

The Wellaboda Pattu (Galle) Branch has decided to hold a Show this year confined to the Pattu; the dates will be fixed at a meeting to be held this month.

It has been decided to postpone holding a Show at Matale this year on account of the severe drought prevailing in the district.

The portable iron sheds were used for the first time at the Weligama Show. An auction of the goods exhibited and marked "For Sale" was held at the Gampola Show. Prizes of Rs. 50 were offered by the Society; at Weligama for the best display of vegetables grown in one compound in the Weligama Korale, and at Gampola for the best bull in the Show. An exhibit of dry grains imported from South India was made at the Gampola Show.

Paddy.—The 50 bushels of Kiushu paddy imported from Japan have been distributed in the Wellaboda Pattu (Galle), Badulla, Katana, Colombo, Bibile, Kurunegala, Henaratgoda, Hambantota, Nuwara Eliya, Anuradhapura, and Panadure Districts.

Sixty bushels of "sixty-days" seed paddy were received during the month and were sent to the Kurunegala and Katunayaka Branches.

There may be some difficulty in securing a further supply of this paddy for the Collector of Tanjore, from whose district the paddy has been imported writes to the Commissioner of Revenue Settlement and Director of the Department of Land Records and Agriculture "to express regret that circumstances do not permit of my complying with the requisition of the Ceylon Agricultural Society for the supply of "sixty-days" paddy. It is only available for purchase at the time of harvest, that is to say in or about September, and as the quantity now in possession of the ryots is barely sufficient to meet their own requirements, they are not willing to sell it."

The Deputy Director of Agriculture has been requested to report at an early date whether "sixty-days" paddy is cultivated in any other district. One hundred bushels of Banku paddy for sowing in the Southern or Northern Provinces will be imported in August, and have been promised by the Deputy Director of Agriculture, Madras.

Cotton.—An application for the patent hand power MacCarthy cotton gin and the hand saw gin sent the Society by the British Cotton-growing Association has been made by Mr. A. H. Don Bastian de Silva of Matale, who reports that he has planted about three acres with Sea Island cotton and 10 acres with Caravonica, and also cotton with rubber.

Date palms.—Four varieties—in all 28 suckers—of date palm suckers have been received from the Principal of the School of Agriculture, Gheizeh, Egypt.

Mr. V. Casipillai of Jaffna, who applied for the suckers, has been asked to state his requirements. Applications from the Northern and Eastern Provinces and Hambantota can be entertained.

Yams.—The Secretary of the Jamaica Agricultural Society reports that he has despatched to this Society a box containing white yams (*Dioscorea alata*) and yampies, called also Indian yams and Cush-cush yams (*Dioscorea Triphylla*).

Dhall.—Mr. A. E. Rajapakse, Muhandiram, Chairman of the Katunayaka Branch, has forwarded 100 packets of dhall seed for distribution.

Vegetables.—Seeds have been sent to the Three Korales Branch and several members of the Society. Varieties of American maize have been sent to the Nuwara Eliya Branch.

Sericulture.—The Superintendent of School Gardens states that a large number of growers of silk worms have reported to him that they have quantities of cocoons to dispose of. He has been given a further advance of Rs. 50 to make purchases at Re. 1·50 a lb. It is hoped that a market for cocoons locally will soon be found. Samples have been sent to Europe. Mr. A. Perera, on his second tour in the Province of Uva purchased 36 lb. 8½ oz. of cocoons. It is worthy of remark that the natives of India find it profitable to grow cocoons at a much lower rate than has been paid by this Society. The market price in Calcutta comes to 75 to 87 cents per lb.

Castration.—Demonstrations have been held at Negombo and Veyangoda in the Western Province; at Maturata and Nildandahena in the Central Province; at eleven centres in the Southern Province; at thirteen centres in the North-Western Province; and at Mattanagoda in the Province of Sabaragamuwa, being the first in that part of Ceylon. Applications have been received for further demonstrations in the North-Western Province and in the Trincomalee District.

Steps are being taken to arrange for experiments in sterilization of milk and the removal of the Government Dairy from Colombo.

Publications.—Copies of the Ceylon Agricultural Society's Calendar are circulated to-day. Hints are given for cultivation in different parts of the Island. It is hoped to publish calendars in Sinhalese and Tamil.

The following leaflets are with the Government Printer:—"Tobacco Cultivation" by C. Rasanayagam, Mudaliyar, and "Manicca" by Mr. J. P. Lewis, C.C.S.

A leaflet on "Salt for Manure" by Mr. Kelway Bamber is circulated to-day, and has been sent out to English-speaking members. Copies in the vernaculars are with the Printer.

The "Sihala Samaya" and the "Dinakaraprakasa" kindly supplied 50 copies of one and two editions respectively of their papers containing the proceedings of the last Board Meeting in Sinhalese. Copies have been circulated to the Branch Societies.

E. B. DENHAM,

Secretary, Ceylon Agricultural Society.

April 2nd, 1906.

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