DEPARTMENT OF AGRICULTURE.

REPORT OF THE DIRECTOR OF AGRICULTURE FOR 1920.

SECTION I.

AGRICULTURE IN CEYLON.

THE year 1920 has been of exceptional difficulty for the agricultural industries. The high cost of rice, imported and issued under Government control, was a serious tax upon the estates and upon all employers of labour. On estates rice was issued to labour at far below cost, and the loss incurred was borne by the estates. Recent reports of tea and rubber companies show that the loss averaged in many cases between 4 and 5 per cent. on the capital of the company, and it has been calculated that the tea and rubber industries alone met a "loss on rice" of approximately 24 million rupees. Protests at the price of rice were addressed to the Indian Government, and a deputation proceeded to India to place the Ceylon position before the Viceroy. This deputation succeeded in securing a concession of Rs. 2 per cwt. on 180,000 tons. With a view to reducing the "loss on rice," estates most carefully controlled the amount of rice issued to the labour forces, and utilized considerable quantities of locally-grown and imported kurakkan, green gram, beans, maize, &c. This demand for food other than rice at prices about three times their pre-war figure greatly stimulated the local production of foodstuffs, and the demand for chenas was greater than usual. Government realizing the serious position in regard to food supplies appointed on February 5, 1920, a Committee to make recommendations for the improvement of the situation. This Committee reported in March, 1920, and accepted many of the recommendations which had been made by the Department of Agriculture on the question of the food situation. A separate Food Production Department was formed to co-ordinate the work of Revenue Offices, Agricultural Department, Irrigation Department, &c., in regard to food production, and the draft of a Compulsory Food Production Ordinance was submitted to the country for consideration and criticism. The work of greater local food production was started in earnest, stimulated by the extravagantly high prices which ruled during practically the whole of the year. Early in December the Indian Government notified that rice would be decontrolled from Burma in January, 1921, and the Ceylon Government reduced the price of rice to an average of Rs. 6·40 per bushel with effect from December 16, and promised early decontrol. This reduction in the price of rice was a welcome relief to all agricultural industries, and particularly to the tea and rubber industries, which, owing to the world's trade depression and financial stringency, were facing a serious financial position. It will also have its effect upon the question of greater local food production, for many of the schemes will find it impossible to carry on if rice continues at a low level. The tea market collapsed completely about the middle of the year on account of trade depression and over-accumulation of stocks—particularly of teas of medium and low grades—while the price of rubber fell gradually throughout the year until the complete collapse of the market occurred at the end of October. This collapse of the two main agricultural industries of the Island soon began to make itself felt. Estates found themselves likely to be seriously involved, and had to appeal to Government for financial assistance. A sum of 10 million rupees was promised by Government as loans to estates, but this was withdrawn when the reduction in the price of rice became possible. To meet the serious situation brought about by this collapse of the market of the two staple export products of the Colony, and as many estates were producing both tea and rubber at a loss, a general restriction of output was agreed upon. In addition to this restriction of output, all connected with the agricultural industries are making a determined effort to meet the situation by the reduction, to the utmost, of expenditure. A slight recovery in the tea market was noticeable at the end of the year, especially for the finer grades, but the rubber market continued to be dull.

Tea.

2. Planting of new areas under tea was somewhat limited during the year, but it is estimated that 500 acres were planted out. The sale of tea stumps was controlled by permit from the Department of Agriculture under the shot-hole borer regulations, and permits were issued for the sale of tea plants from estate nurseries to the extent of 1,098,150, and from small holders' nurseries to the extent of 187,000. The imports of tea seed for planting purposes amounted to 12 cwt., while the export of tea seed from the Colony amounted to 173 cwt. The year 1920 will long be remembered by the tea industry. The greatest slumps in tea prices since 1900-1 occurred, and prices realized were far below the cost of production, and the teas of low grade were almost unsaleable. A restriction of output became an absolute necessity, and was decided upon during the latter half of the year. The exports of tea for the

year were 184,770,231 lb., black and green, against 208,560,943 lb., black and green, in 1919. The exports for 1920 were 4 million pounds in excess of the exports for 1918, and approximately 24 millions less than the exports of 1919. This decrease in the exports as compared with the previous year was mainly caused by the restriction of output resultant upon small demand and low prices. The qualities of tea made during the year were reported upon as being exceptionally poor, but finer plucking and more care in manufacture after the slump in prices occurred resulted in a marked improvement of quality in all grades. High grown teas of good quality and manufacture were in constant demand throughout the year at remunerative prices, while Uva teas were in demand after August. Low-country of poor quality was practically unsaleable after the middle of the year.

3. As the result of the slump in prices, cultivation in the latter part of the year was reduced on a very large number of estates, and manuring programmes completely stopped. Several small estates are being allowed to become semi-abandoned, and small holders' gardens have become neglected as the result of the majority of factories refusing to purchase green leaf.

4. Cultivation and manuring were curtailed upon some estates during the war, and with the slump in prices these necessary agricultural operations have been further curtailed. During the year under review red rust caused by *Cephaleuros* sp. and tea mites (*Tetranychus bioculatus*, *Phytoptus carinatus*, and *Tarsonymus translucens*) and scale insects (*Saissetia hemispherica* and *Coccus viridis*) were common. These pests and diseases become prevalent only upon tea bushes of low vitality. There is some evidence that they are becoming more common in the Colony, consequent upon the reduced cultivation and manuring during the war period, and the matter was brought before the Committee of Agricultural Experiments in August, and a general *communiqué* was issued to the press. If the health of Ceylon's tea industry is to be maintained, attention must be given to cultivation and manuring. If these are not carefully attended to, pests and diseases are likely to increase, especially those classes which become prevalent when the agricultural conditions are unfavourable and the general health of the plant weakened. There is evidence throughout the tropics that many insect pests can only be kept in economic control by proper agricultural methods. If satisfactory agricultural methods are adopted, these pests cause little or no damage, but if these methods are unsatisfactory, or if general conditions are unsuited to the vigorous and healthy growth of the plant, the pests increase and cause considerable losses of crops. Such pests can best be controlled permanently by an improvement of the agricultural conditions in which the crops are growing. Similarly, certain classes of diseases also become more prevalent when the agricultural conditions are unfavourable, and practically disappear when these unfavourable conditions are rectified. It is recognized that the present financial position of the industry makes it impossible for the former high standard of cultivation and manuring to be fully maintained, but as soon as more funds become available, estates would be wise to spend money upon cultivation and manures, and to adopt until the return of pre-war standards a restriction of crops.

5. The manurial experiments with tea on the Peradeniya Experiment Station have been continued. The dadap plot continues to maintain its high yield. The albizzia plot has shown some falling off, and it has been decided to replace the old trees with younger ones. The plot to which farmyard manures was applied in 1908 begins to show signs of reductions of yields, and a re-application has been decided upon. From the results to date of artificial manuring begun in 1918, it appears that a mixture containing nitrogen and potash has a greater effect than a mixture containing nitrogen and phosphoric acid, but that nitrogen and potash together have given rather less than when where nitrogen, in the form of organic nitrogen, has been applied alone.

6. Investigations into the shot-hole borer pest of tea continue to occupy the individual attention of the Assistant Entomologist. Since June work has been carried out on Sarnia estate, Badulla, by the kind co-operation of Col. W. G. B. Dickson. Field trials of paint mixture have been continued, and have been found to effect too inadequate a control of the pest and to be too costly. Control pruning was tried on a field scale, but had to be discontinued, and the use of castor as a trap tree is being experimented with. Experiments with burial of prunings with various substances have been outlined and will be put in hand, while a series of manurial experiments are being carried out to ascertain what, if any, incidence exists between various manurial constituents and the borer. The shot-hole borer pest is widespread throughout the tea-growing area of the Island, and during the year plots of castor at Anuradhapura, miles away from tea, were seriously affected by the pest. The number of known host plants is considerable, and it is probable that this list is by no means complete. It, therefore, becomes more probable that the control of the shot-hole borer pest of tea will have to be effected by cultural methods. Tea bushes of strong growth and vigour are able to withstand attack, and are capable of healing up galleries, and it is probable that by providing for the health and vigour of the plant by proper systematic agricultural methods and manurial applications control of the pest will be effected to a greater extent than by mechanical means. Investigations to confirm or disprove this view are now being carried out. There is no doubt that the pest continues to spread, and in several cases improperly cultivated tea has been found to be the most heavily infested. Tea tortrix has been prevalent in the old areas during the year. Reports have been received that the application of lime, dusted over the bushes, has given satisfactory results, and the Inspector for Plant Pests is carrying out investigations on this method of control. The results of previous investigations have indicated that the spread of this pest can be controlled by the provision of " flight breaks," and that local outbreaks can be dealt with by spraying with lead chromate. One estate is reported to have made trial sprayings with lead chromate during the year.

7. At the Imperial Entomological Conference in London the question of the efficacy of formaldehyde disinfection was discussed, and owing to the unsatisfactory results recorded from some countries, it was decided to investigate fully the efficacy of this method of disinfection of imported tea seed. These investigations were carried out by the Acting Assistant Botanist and Mycologist. It was found that formaldehyde had a low power of penetration. The adoption of this method of disinfection of tea seed was based upon reports from the United States Department of Agriculture, and was designed to prevent the introduction of leaf blister blight from India. Inquiries are being made as to the prevalence of this disease in India, and when inquiries are completed, the matter will be brought before the Estates Products Committee of the Board of Agriculture.

Rubber.

8. Accurate acreage statistics of rubber planted in the Colony were secured during the year. These returns were obtained through District Planters' Associations and through the Provincial Administration. They were as follows :—

Areas of over 15 acres (Members of Planters' Associations.)

Planting District.	1 Acreage in Rubber in Tapping on September 1, 1919.			2 Acreage in Rubber over 5 Years of Age but not in Tapping on September 1, 1919			3 Acreage in Rubber over 1 Year and under 5 Years of Age not in Tapping on September 1, 1919			4 Acreage of 1 Year old Rubber.			5 Acreage of Land cleared ready for planting of Rubber.			Total.		
	A.	R.	P.	A.	R.	P.	A.	R.	P.	A.	R.	P.	A.	R.	P.	A.	R.	P.
Agrapatana ..	80	0	0	—			—			—			—			80	0	0
Ambagamuwa ..	2,079	0	0	60	0	0	10	0	0	139	0	0	14	2	0	2,302	2	0
Badulla ..	1,787	1	0	602	0	0	97	2	0	122	0	0	50	0	0	2,658	3	0
Dimbula ..	51	0	0	20	0	0	49	0	0	—			—			120	0	0
Dolosbage ..	2,076	2	0	82	0	0	167	1	0	106	0	0	80	2	0	2,512	1	0
Galle ..	14,944	0	19	4,995	0	0	2,536	0	29	940	0	10	443	0	0	23,858	1	18
Haputale ..	3,936	1	0	316	0	0	134	0	0	124	0	0	159	0	0	4,669	1	0
Kalutara ..	45,555	0	10	1,759	1	20	2,941	1	25	1,543	2	0	398	0	0	52,197	1	15
Kandy ..	8,556	1	3	364	2	6	15,172	2	1	740	2	23	51	0	0	24,884	3	33
Kegalla ..	15,799	2	0	1,322	3	0	1,511	2	0	258	1	0	74	2	0	18,966	2	0
Kelani Valley ..	43,258	2	20	2,065	0	7	3,686	3	0	1,552	0	28	172	0	0	50,734	2	15
Kelebokka, Knuckles, and Panwila..	1,709	2	0	162	0	0	168	0	0	110	0	0	2	0	0	2,151	2	0
Kotmale ..	—			—			50	0	0	—			30	0	0	80	0	0
Kurunegala ..	8,301	3	38	208	0	0	2,030	3	21	500	0	0	296	0	0	11,336	3	19
Low-country Products Association (not members of other Associations)	1,683	3	0	473	2	0	979	2	0	192	0	0	273	0	0	3,601	3	0
Matale ..	33,699	2	19	1,068	0	19	1,536	1	35	793	0	0	1,988	3	0	39,085	3	33
Morawak Korale ..	1,598	2	0	297	0	0	395	2	0	34	0	0	75	0	0	2,400	0	0
Passara ..	6,633	1	9	330	3	26	287	1	35	235	0	0	646	2	0	8,133	0	30
Pussellawa ..	5,620	1	39	274	0	0	1,036	1	0	161	2	30	—			7,092	1	29
Rangala ..	467	0	0	66	2	0	46	2	0	34	0	0	85	0	0	699	0	0
Sabaragamuwa ..	22,770	2	34	1,292	0	1	3,182	3	6	695	2	8	32	3	0	27,973	3	9
Total ..	220,608	1	31	15,758	2	39	36,019	1	32	8,280	3	19	4,871	2	0	285,539	0	1

Acreage of Estates of 15 Acres or over in extent (not Members of Planters' or Low-country Products Association).

Revenue District.	1 Acreage in Rubber in Tapping on September 1, 1919.			2 Acreage in Rubber 5 Years of Age but not in Tapping on September 1, 1919.			3 Acreage in Rubber 1 Year and under 5 Years of Age not in Tapping on September 1, 1919.			4 Acreage of 1 Year old Rubber.			5 Acreage of Land cleared ready for planting of Rubber.			Total.		
Western Province.	A.	R.	P.	A.	R.	P.	A.	R.	P.	A.	R.	P.	A.	R.	P.	A.	R.	P.
Colombo ..	2,580	0	0	86	0	0	1,948	0	0	299	0	0	133	0	0	5,046	0	0
Kalutara ..	7,039	2	10	598	2	0	3,209	1	9	378	3	31	31	0	0	11,257	1	10
Central Province.																		
Kandy ..	1,812	0	0	276	2	0	685	2	0	87	0	0	42	0	0	2,903	0	0
Matale ..	1,419	3	0	425	2	0	405	2	0	70	2	0	14	2	0	2,335	3	0
Southern Province.																		
Galle ..	3,175	0	0	630	0	0	2,444	0	0	674	0	0	128	0	0	7,051	0	0
Matara ..	1,242	0	0	205	0	0	3,255	0	0	1,107	2	0	651	0	0	6,460	2	0
North-Western Province.																		
Kurunegala ..	4,555	2	0	282	1	0	658	2	0	437	0	0	157	0	0	6,090	1	0
Puttalam-Chilaw	—			—			14	0	0	23	1	0	—			37	1	0
Province of Uva.																		
Badulla ..	194	2	0	139	0	0	188	2	0	22	0	0	2	0	0	546	0	0
Province of Sabaragamuwa																		
Ratnapura ..	6,797	2	0	1,822	0	6	8,201	3	32	1,172	3	14	1,023	0	0	19,017	1	12
Kegalla ..	4,505	3	0	528	2	8	4,386	3	7	838	3	0	78	3	0	10,338	2	15
Total ..	33,321	2	10	4,993	1	14	25,397	0	8	5,110	3	5	2,260	1	0	71,082	3	37
Grand Total ..	253,930	0	1	20,752	0	13	61,416	2	0	13,391	2	24	7,131	3	0	356,621	3	38

The large area of rubber grown in Ceylon by small holders is apparent in the following statement :—

Revenue District	1 Acreage in Rubber in Tapping on September 1, 1919.	2 Acreage in Rubber over 5 Years of Age but not in Tapping on September 1, 1919.	3 Acreage in Rubber over 1 Year and under 5 Years of Age not in Tapping on September 1, 1919.	4 Acreage of 1 Year old Rubber.
Western Province.				
Colombo	1,387	369	3,060	1,755
Kalutara	6,185	954	7,541	3,136
Central Province.				
Kandy	1,121	520	1,569	1,517
Nuwara Eliya ..	1	2	6	13
Matale	538	249	713	711
Southern Province.				
Galle	1,453	252	2,072	805
Matara	152	100	667	471
North-Western Province.				
Kurunegala	37	37	137	603
Puttalam-Chilaw ..	—	—	22	—
Province of Uva.				
Badulla	508	182	48	31
Province of Sabaragamuwa				
Ratnapura	741	432	2,469	644
Kegalla	909	455	2,571	1,259
	13,032	3,552	20,875	10,945
Total ..				48,404

9. The exports of rubber during the year amounted to 88,552,542 lb., as against 100,822,149 lb. in 1919. The price of rubber fell gradually throughout the year until the large drop at the end of October brought prices below the cost of production. A voluntary restriction of output by 25 per cent. was agreed upon at the instigation of the Rubber Growers' Association, and several estates stopped tapping altogether.

10. Crêpe rubbers were more in demand than sheet, and heavily smoked sheet was not required. With the fall in prices the market became very particular in regard to quality, and several complaints of " rustiness " in sheet rubbers were made. In some instances this " rustiness " was superficial and could be removed by brushing, while in others it is due to a definite organism, which can best be controlled by drying the sheets rapidly in the air before they are sent to the smoke house.

11. The manurial experiments at Peradeniya Experiment Station were continued throughout the year, and the area receiving excess of potash continues to give the smallest yields. The results of these experiments seem to indicate that manuring of rubber on flat lands similar in texture and in composition is not likely to be remunerative, but these results are not as yet conclusive. The manurial experiments with young rubber have been continued, and a further extension of this experiment has been undertaken.

12. Tapping in Ceylon has now established itself as a single oblique cut upon one-third or on one-half circumference every alternate day. Some estates continue to tap every third day. Experiments have been carried out at Peradeniya since January, 1919, to test the relative yields between two- and three-day tapping. The yields to the end of 1920 have been as follows :—

Two-day Tapping.

	1919. lb. oz.	1920. lb. oz.
Series 1	3 2	3 12
Series 3	3 4	3 7
Series 5	3 4	3 7
Average per Tree ..	3·35	3·87

Three-day Tapping.

	1919. lb. oz.	1920. lb. oz.
Series 2	2 5	2 7
Series 4	2 4	2 10
Series 6	2 8	2 8
Average per Tree ..	2·57	2·83

The ratio of two-day tapping to three-day tapping in 1919 was as 100 : 77·3 and in 1920 as 100 : 73·1.

The tapping cuts in these experiments were made at the same height at the beginning of the experiments, and the relative advantage of alternate day tapping in 1920 has been in part due to the fact that the tapping in this series is upon bark which is some 3 inches lower than in the three-day series. In course of time this difference will be eliminated, and it is being considered whether any steps can be made to equalize these differences.

13. Diseases of rubber during the year were less prevalent than usual. Root disease still occurs in those estates where insufficient attention has been paid to uprooting old stumps. These diseases are now fairly well known, and are carefully treated when observed. Bark diseases have been less serious, and the use of disinfectants in the treatment of these diseases is assisting in checking their occurrence

and spread. Brown bast was much less prevalent during the year, and from reports received appears to be less common in Ceylon than in other Eastern rubber-producing countries. Leaf fall and pod disease was generally less, and this is attributed to the dry weather experienced in most rubber-producing districts in September and October.

Coconuts.

14. The area planted with coconuts continues to expand gradually, new lands being opened up, and cinnamon lands being planted. Cultivation continues to be improved, and during the year several tractors were purchased for employment upon coconut estates. Disc-harrowing is becoming more popular, and is now in common employment in all coconut districts. Whereas a few years ago disc-harrowings were given at monthly intervals, there is now a tendency to lengthen the periods between such harrowings in order to allow of a small growth of grass, leguminous herbage, &c., to be turned into the soil. The frequency of harrowings varies according to the weather conditions, and the growth of some grass or other herbage is considered desirable, especially upon very sandy soils, so that the humus content of the soil may be maintained. Ploughings are generally given annually or twice per annum in wet districts. Demonstrations of the use of tractors in coconut cultivations have been held by the importers. Trials have also been held on Peradeniya Experiment Station, and in co-operation with Mr. Ekanayake upon Walahapitiya estate in the Chilaw District. These trials indicated that ploughing could be carried out by tractors at a cost of Rs. 5·20 per acre, and disc-harrowing at an approximate cost of 91 cents.

15. Manuring of coconuts is extending, and experiments made by Gate Mudaliyar A. E. Rajapakse in the Negombo District have demonstrated that young coconuts manured from the beginning come into bearing several years sooner than when no manures are applied. The manurial experiments in co-operation with Gate Mudaliyar A. E. Rajapakse have been continued in the Negombo District and upon Millicent estate, Chilaw.

16. Coconut products commanded high prices throughout the year, the lowest prices being realized towards the middle of the year. Owing to the instability of exchange, the exports showed a decrease when compared with those of the previous year. The total exports for 1919 and 1920 are shown in the following table :—

		1919.		1920.
Coconut oil	cwt.	675,999	..	507,527
Copra	cwt.	1,759,525	..	1,357,870
Desiccated coconut	lb.	675,060	..	518,735
Coconut poonac	cwt.	87,365	..	92,452
Coconuts	nuts	3,390,710	..	9,776,479
Fibre { Bristle	cwt.	107,009	..	84,947
Fibre { Mattress	cwt.	132,382	..	167,621

Coconuts were exported in increased numbers, the greater portion being shipped to the United Kingdom. Poonac showed a slight increase, and mattress fibre an increase of 25 per cent. Exports of copra and oil declined, while the decrease in the exports of desiccated coconuts was approximately 23 per cent. The demand for desiccated coconut fell off so largely that several mills had to close down.

17. Diseases of coconuts continue to receive attention, and the Acting Assistant Mycologist has been detailed for special investigations into the various diseases of coconuts occurring in the Colony. Leaf droop has not been so prevalent as in some previous years. A leaf break disease has been investigated and is found to be fairly common in some districts, especially where soil and conditions of cultivation are unfavourable. Some instances of bud rot have been investigated. Nut fall continues to be responsible for fairly considerable losses of young nuts, especially in wet districts. Certain palms throughout the estates appear to be affected to a much greater degree than others, and frequently palms dropping the greater portion of their crops are surrounded with palms that appear to be perfectly healthy and dropping no fruits at all. Investigations are being made to ascertain if special varieties of coconuts are more commonly affected than others and if others can be found to be wholly immune. Difficulty in isolation of the species of *Phytophthora* supposed to be responsible for nut fall has made it impossible so far to carry on infection experiments, but as soon as such isolation has been accomplished, these experiments will be taken in hand. Nut fall appears to be more common in the wetter parts of the Kurunegala District than in other coconut areas, and some estates have made experimental trials with spraying with Bordeaux mixture. While the present high prices for coconut products continue, there is reason to believe that such sprayings would be remunerative, and it is probable that further trials over a larger area will be made. Accurate data are required as to the actual losses of crop from nut fall and as to the actual numbers of nuts falling from different trees. Attempts are being made to secure these.

18. Throughout the coconut areas there are at the present time far too great a number of dead palm stems left standing. These stems may become the breeding places of beetles and weevils and become centres of infection to neighbouring cultivations.

Cacao.

19. The acreage under cacao continues to remain stationary, little or no planting being carried on. Cultivation is being improved upon some estates, for it has been demonstrated that increased average yields can be secured from good cultivation and liberal manuring with cattle and artificial manures. Crops were slightly below normal, and exports amounted to 55,491 cwt., as against 54,742 cwt. during the previous year.

20. Prices were Rs. 86·50 per cwt. at the beginning of the year, but fell gradually towards the middle of the year, until at the close of the year quotations of under Rs. 40 were common.

21. The erection of the Peradeniya Chocolate Factory was practically completed during the year. This factory has been erected by local capital, and it is proposed to turn out high grade plain chocolate and chocolate powder from the best qualities of Ceylon cacao.

Cardamoms.

22. The exports of cardamoms fell off from 561,244 lb. in 1919 to 374,216 lb. in 1920. The market opened well at the beginning of the year, but rapidly declined, until in the latter part of the year it was difficult to secure quotations at all.

Cinnamon.

23. The prices for cinnamon products were satisfactory at the beginning of the year, but from August there was a rapid decline in the market for all classes of cinnamon products. The exports amounted to 2,505,056 lb. quills, as against 4,623,814 lb. in 1919, and 1,399,689 chips, as against 3,288,646 lb. in 1919. Some cinnamon lands continue to be planted up with coconuts.

Citronella Oil.

24. Citronella lands continue to be planted with rubber, but it is probable that the slump in the rubber industry will stop the utilization of these lands for rubber planting. The exports for the year amounted to 1,015,310 lb., against 1,050,989 lb. in 1919. Prices rose from about Re. 1 per lb. in January to Re. 1·40 in June, and then declined rapidly to about 90 cents per lb. during the last three months of the year.

Subsidiary Products.

25. The following were the exports of minor agricultural products during the year :—

Coffee	.. cwt.	123	Nutmegs	.. cwt.	311
Arecanuts	.. cwt.	124,048	Pepper	.. cwt.	1,889
Cloves	.. cwt.	97	Tobacco	.. lb.	3,603,074
Ginger	.. cwt.	56	Cotton	.. lb.	302,863

26. The tobacco crop was a short one, and prices ruled very high. Increased attention is again being given to the production of papain, and the cultivation of cotton was carried out in small areas. In the Hambantota District the yields of Cambodia cotton were satisfactory and prices remunerative. It was decided during the year to make further experimental trials with cotton in this District, and to offer to purchase all cotton grown on small holdings.

27. The year 1920 saw extensive Sisal nurseries established at Maha Iluppallama, and a beginning made with the north-east rains at the end of the year to commence the establishment of the first Sisal-growing estate in the Colony. The growth of the young plants in the nursery was very satisfactory. Sisal was previously cultivated in this part of the North-Central Province, when Maha Iluppallama was maintained as an Experiment Station of this Department. Its growth in these experimental areas compared favourably with Sisal grown in other parts of the world, and with careful attention to transport and the health of labour forces there is every prospect of Sisal cultivation as an estate product being successful in this area.

Food Products.

28. The food situation of the Colony became acute in the early months of the year, owing to the restricted and controlled export of rice from Rangoon at exorbitant prices. The dependence of the Colony for its food supplies upon outside sources was forced upon all classes, and immediate steps had to be taken to encourage greater production locally.

29. Owing to the high values for all grades of rice, the prices of foodstuffs other than rice reached exceptionally high levels, and steps were taken to enforce the control of provincial exports of the principal foodstuffs so as to prevent the poorer villagers being induced to part with their essential food. In the Eastern Province this system of control was so organized as to provide good prices for the cultivators and to form a central fund known as the Paddy Bank, from which growers of paddy can obtain loans for the purpose of extending their cultivations.

30. Every encouragement was given during the year to the cultivation of foodstuffs. Large areas of land were allowed to be utilized for chenas on the old system and other areas on re-afforestation permits. Entry to Crown lands under irrigation without detailed survey was granted, and freedom from water-rate for five years was sanctioned. The leasing of large blocks to capitalists was also encouraged, and a Department of Food Production organized to co-ordinate the work of various Departments and to facilitate the opening of new areas both by capitalists and by small cultivators.

31. In this endeavour to foster food production the Agricultural Department was called upon for technical advice, for agricultural instruction of cultivators, for the establishment of demonstration plots with manures and transplanting, for the preparation of cultivation leaflets and circulars, and for supplies of seeds. The supply of seed has received careful attention, and any shortage of seed has been met from the Central Seed Store established at Peradeniya. The Agricultural Instructors have given special attention to transplanting and to demonstrations with the use of manures. Transplanting of paddy continues to spread as the result of the efforts of the Department and of certain Revenue Officers. Practically all the paddy land in the Central Province is now transplanted for the maha season, and some areas are similarly treated for the yala season. Demonstration plots have been established in every headman's division of the Kegalla District, and transplanting paddy can now be seen in most sections of the district. Similarly, transplanting was carried out during the year around Mirigama. Every effort has been made by the Agricultural Instructors and by the Revenue Officers of the Matara District to encourage transplanting, and a very large number of small demonstration plots were arranged in all parts of the District. A demonstration in transplanting and manuring carried out by Mr. Kotalawala at Badulla gave from a sowing of 1 bushel a yield of over 100 bushels of paddy per acre. A beginning has been made by the Economic Botanist scientifically to investigate the tillering of Ceylon paddies. From the limited observations already made it would appear that Ceylon paddies have definite tillering modes, and that yields from transplanted paddies depend upon these tillering characteristics.

Government schools in the Kegalla and Matara Districts have leased small areas of paddy lands. These have been utilized by the teachers to demonstrate to their pupils the value of transplanting and of manuring, in the hope that the next generation will have been familiarized with these methods of increasing crops from their earliest days. Some of these plots attached to Government schools have been most creditably worked by the teachers and their pupils, and have attracted the interest of the village cultivators. The Department by means of funds placed at its disposal by the Food Production Department has been able to arrange 45 plots with manures. These plots are 4 acres in extent, and are designed to demonstrate the value of green manuring with phosphates and of other manurial mixtures. Some of these plots have aroused the interest of cultivators, and despite damage in many districts from the floods of October and November are giving interesting results. These plots have been under the

supervision of the Agricultural Chemist, and their yields will be tabulated as soon as harvest is completed. The distribution of manures through Co-operative Credit Societies has also received encouragement.

32. The insect pests of paddy have received careful attention during the year. The stem borer in some areas causes damage. It can be controlled to a very considerable extent by ploughing in the stubble immediately after harvest. The swarming caterpillar and paddy stem borer were less noticeable during the year than usual, but can in certain seasons cause much damage. The paddy bug (*Leptocorisa acuta*) has received attention, and an illustrated leaflet giving all details at present available was published in English and in the vernaculars and widely distributed. Sample hand nets were also sent to all districts in the hope that cultivators will take steps to control this pest, which in some seasons accounts for a serious reduction in crops. A trained officer of the Entomological Division has been detailed for duty in connection with further investigations of this pest.

33. A poster illustrative of the life history of the " paddy fly " and of control measures was prepared by the Entomological Division and submitted for publication. Its issue had not taken place before the end of the year. As soon as it becomes available, it will be widely distributed throughout the paddy-growing areas.

34. Leaflets giving instructions in regard to the cultivation of the principal foodstuffs have been prepared for all planting districts. Considerable delay has been experienced in getting these leaflets printed. Agricultural publications are not infrequently required at definite cultivation seasons, and delay in the issue of such publications greatly lessens their value.

35. A power paddy hulling machine was installed during the year at Anuradhapura Jail in accordance with suggestions made in the previous year. The mill, on the whole, has done satisfactory work, but the number of paddy varieties grown in the district and their mixture often before they come to the mill made adjustment for the best work difficult. By experiments it should be ascertained which paddies give the best results at the mill, and then the growth of these varieties encouraged. The establishment of paddy mills locally will tend towards the improvement of the industry.

36. In foodstuffs other than paddy great attention has been given to all classes of grains and to tubers, such as manioc and sweet potatoes. Increased areas were cultivated in the drier districts of the Colony in maize, and some control of the export of maize for the Walapane district was exercised by the Assistant Government Agent, Nuwara Eliya. To meet an anticipated demand for maize for seed purposes, 20 tons of South African maize were secured, but the demand was not so great as was anticipated, 2 tons were sold for seed, and the remainder to estates for food purposes. Kurakkan was largely grown, and the demands for cuttings of recently-introduced varieties of sweet potatoes and manioc were considerable.

37. The present areas of the Colony devoted to the cultivation of paddy and other foodstuffs are capable of greatly increased yields. The high prices of all classes of foodstuffs have stimulated better cultivation, as well as extension of areas. The improvement of cultivation is a matter of education. It can be brought about by instruction by fully trained instructors and by experiment and demonstration. A complete change in systems of cultivation cannot be effected in the space of a year or so, and I hope to see the early provision of the full complement of Divisional Agricultural Officers, who will be able closely to supervise the work of the Agricultural Instructors, to carry out experiments under scientific control, to arrange for demonstrations for the teaching of the peasants, and to control and supervise competitions amongst good cultivators. A beginning has already been made with this policy, and if the country is to become more self-supporting in the matter of its food supply, considerable extensions of trained staff, experiments, demonstrations, and competitions will be necessary.

SECTION II.

WORK OF THE DEPARTMENT OF AGRICULTURE.

38. The activities throughout the Colony in connection with food production increased the work of the agricultural section of the Department considerably : not only was the Department called upon for advice in connection with various schemes, private as well as official, connected with greater local food production, but the Department in co-operation with the Agricultural Society undertook to be responsible for all supplies of seed, for the preparation of cultivation leaflets, for assistance and guidance to cultivators, and for general technical advice to the Food Production Department.

39. The policy laid down for the organization of the Department has been proceeded with, and the year saw the addition of several technical officers to the staff. Progress was made in decentralizing the agricultural work, and Divisional Agricultural Officers were appointed for the Central, Southern, and Northern Divisions. Systematic investigations into the paddies of Ceylon, preparatory to the establishment of seed farms for pure strains of improved types of paddies, were begun by the Economic Botanist appointed during the year, and Plant Pest Inspection work progressed. The Legislative Council in Select Committee on the Estimates accepted proposals for the establishment of a proper research institute at Peradeniya, and sanctioned estimates for acquisition of land, the building of a central office, an entomological laboratory, and bungalows for research staff. The acquisition of land was not completed before the end of the year, but as soon as acquisition is completed building operations will commence. It is urgently necessary that properly equipped research laboratories should be provided for the Department, and that steps be taken, upon the completion of these laboratories, to make arrangements for the higher training of students in the sciences of agriculture in affiliation with the University College of Colombo. Until the Department is staffed throughout with fully trained technical officers its scope will be limited, and it is men only of the highest quality that can leave their mark upon the agriculture of a country. The main duties of the Department are research, experiment, and education. Education, be it by lectures, leaflets, or demonstration, cannot be undertaken with success, unless it is based upon definite facts, which have been ascertained by research and established by experiment. Propaganda which is not based upon actual experiment is doomed to failure, and it is satisfactory to record the decision of the Legislative Council of the Colony to provide adequately for research, and it is hoped to see established during the next few years experimental stations under the control of Divisional Officers in the various sections of the Colony.

40. Meetings of the Committee of Agricultural Experiments were held regularly during the year. The agenda for the various meetings were as follows :—

(1)

Right and left hand tapping.
Importation of Hevea seed.
Import of manures from India.
Forking rubber.
British Empire Exhibition, 1921.
Dutch beans for food production and green manuring.
Yields from the tea manuring plots for 1919.
Coconut diseases.
Inspection of tea plots, &c.

(2)

Progress reports.
Re-organization of the Department of Agriculture.
Further investigation on the coconut caterpillar.
Shot-hole borer investigations.
Results of rubber-tapping experiments.

(3)

Progress reports.
Hedge plants for chena lands to be permanently opened under rotation of crops.
Financing the manuring of paddy areas.
Importation of vedalia beetles.
Snails.
Whether any steps have already been taken to study the "paddy fly."
Whether next year's Estimates provide for the improvement of the laboratories at Peradeniya.
The desirability of introducing the cultivation of China grass in the Island as an economic product.
What report, if any, on the coconut caterpillar.
Further information *re* the cause of stems of coconut trees tapering.
Demonstration of ploughing with Fordson tractor.

(4)

A review of the proceedings of the Entomological Conference held in London.
Rubber statistics.
Rubber research.
Tractor trials.
Disc ploughing on hard soils.
Tea mites.
Snails.
Red rust on Tea.
Tapering of coconuts.
Sclerotial diseases of rice.
Growing of el-wi.
Transport of agricultural cattle.
Paddy soil survey of Ceylon.
Growing of potatoes.
Leaf break of coconuts.

(5)

Progress reports.
Tractor trials.
Tea tortrix.
Rubber experiments.
Food production leaflets.
Progress report on shot-hole borer investigation.
Shot-hole borer in relation to the tea crisis.
Kurakkan experiments.

These discussions by the Committee of Agricultural Experiments are followed closely by the agriculturists of the Colony, and are of practical value to the Department of Agriculture. Immediately upon my return from leave of absence the formation of the Board of Agriculture and the absorption into it of the Committee of Agricultural Experiments was begun, and will be completed early in 1921. A properly constituted Board of Agriculture will be of considerable assistance to the agriculture of the Colony, and the association of representatives of all classes of agriculturists with the Department of Agriculture should tend towards framing a progressive agricultural policy.

41. Annexure I. gives detailed information regarding the work of the Division of Botany and Mycology during the year. The number of disease specimens submitted for examination and report was approximately equivalent to the number received during the previous year. Brown bast "disease" of rubber has been less prevalent, and leaf fall and pod diseases of rubber show a decline. There has been an increase of red rust of tea, and as this disease is only found on bushes of lowered vitality, attention given to cultivation and manuring will help to reduce its prevalency. Coconut diseases have received special attention and continue to be under close investigation by one officer. The system of disinfection of tea seed at the fumigatorium has been investigated thoroughly, and the details when complete will be placed before the planting community. The fungous diseases of paddy have also been under investigation, and further observations made on the disease of plantains. The appointment of further officers to the mycological branch of the Department was urged upon Government by the planting community during the year, and it has been decided to increase the staff as soon as fully-trained first-class men become available.

42. Annexure II. deals with the work of the Entomological Division. Special attention has been given to the occurrence of tea mites and scale insects, to the snail pests, and to the pests affecting paddy. Articles on the principal pests of paddy have been published, and a special leaflet on the paddy bug and the means of controlling it were published in the vernaculars and widely distributed. Investigations into the cutworm (*Agrotis* sp.) were continued, and a consignment of living specimens of vedalia beetle (*Novius cardinalis*) was received from South Africa for the control of the fluted scale. A beginning was made in an investigation of the ticks affecting cattle in the Colony. The Assistant Entomologist gave the whole of his attention to work in connection with shot-hole borer of tea, and since June was in residence in the Badulla District. The investigations are being carried out in a thorough and careful manner and there are indications that the most successful measure of control is likely to be through good cultivation and proper manuring.

43. Annexure III. details the work of the Government Agricultural Chemist. Analyses of paddy soils have been made, and have indicated that the belief that Ceylon soils compare unfavourably with many other tropical soils is well founded. Ceylon soils are comparatively poor in mineral matter, and in some instances in organic matter. Analyses of sugar canes grown at Peradeniya and at Anuradhapura have been undertaken, and the sugar and starch contents of varieties of sweet potatoes grown on the Experiment Stations ascertained. Paddy manurial experiments and demonstrations have been under the control of Mr. Bamber. Some of the results of the yala experiments showed satisfactory increase in yields, while in the maha experiments many of the plots manured with green manure and phosphates have shown marked improvement. There is no doubt that if green manures and phosphates are more commonly applied to the paddy lands of the Colony increased crops would result.

44. Annexure IV. deals with the work of the Plant Pests and Diseases Inspectorate. The entomological officer attached to the Central Division has completed the insect survey of half of the tea estates and gardens within the division. Shot-hole borer has been found to be ever more prevalent than was supposed, and is particularly common in the small tea gardens owned by small holders. These owners are being educated as to the habits of the pest, the damage it does, and the measures to be taken

for its control. Some of these small holders were taking an interest in the work, and had begun to improve the conditions of their cultivations before the slump in the tea market became serious. The further survey of areas not yet covered is being pushed on as rapidly as possible. The Mycological division of the Inspectorate could not commence work along systematic lines owing to pressure of work, &c., in regard to mycological investigations of coconut diseases. A beginning was made, however, in the training of Sub-Inspectors.

45. The Economic Botanist began work during the year upon paddy varieties. The number of varieties of paddy in Ceylon is very considerable, and collections of the main varieties had been made on the Experiment Stations prior to his arrival in the Colony. Work was begun upon these at once, and upon others collected during the year. The work outlined was designed upon practical lines and based upon the desire to secure largeness of yield. It was desired to secure as early as possible pure-line strains which could be submitted to comparative varietal tests, and then propagated upon seed farms for ultimate distribution to the paddy cultivator. The details of the progress of this work to the end of the year are given in Annexure V.

46. Annexure VI. deals with the work of the School Gardens. This section of the Department's activities is being decentralized under Divisional Agricultural Officers, and a beginning was made in October with the appointment of such an officer for the Southern Division. The work in School Gardens was satisfactory during the year, and that of Home Gardens progressed. There is a dearth of implements at the schools, and an attempt to remedy this was made through contributions from District School Committees. Further funds are, however, required for implements if really efficient work is to be carried on, and application to Government for the provision of these funds is being made. The amalgamation of Home Gardens inspection with School Gardens inspection is desirable, and will be advocated during the forthcoming year. The extension of the teaching of the School Gardens with the Home Gardens of the children will do much towards interesting the rising generation in sound methods of horticulture and agriculture. Paddy fields have been attached to some schools and cultivated by the teachers and children. Transplanting has been practised in all such cultivations, and will tend to interest the children in this method of cultivation, which results in increased yields.

47. The work of Experiment Stations is given in Annexure VII.

At Peradeniya tapping and manurial experiments with rubber have been continued; manurial experiments with cacao, manurial experiments with tea, varietal tests with coffee, paddy, sugar-cane, sweet potatoes, manioc, kurakkan, maize, green gram, and various other food products carried out, and experiments with fodder grasses began. During the year special attention was given to experiments with food crops and to the organization of the economic section which is to be laid out for seed purposes. Tractor trials with a Fordson tractor were carried out during August and attracted considerable interest.

At Anuradhapura the work of planting out the fibre areas and the lime plantation has been pushed on. Mauritius hemp is growing exceptionally well, while Sisal is doing satisfactorily, except on the most gravelly soils. Limes and other citrus plants are growing well and yielding satisfactory crops. On gravelly soils their growth is retarded during the long dry period, and in some places they have been difficult to establish. In low-lying land liable to be water-logged in the wet season limes are not making much headway. The oil palms continue to make satisfactory growth, but the crops during the year were somewhat disappointing. Sugar-cane varietal tests have been undertaken, as well as trials with various food crops. Paddy experiments have been continued, but the greater portion of the paddy area has been placed at the disposal of the Economic Botanist for pure line selection work. Further areas have been opened out during the year for paddy experiments, and further extensions have been decided upon. An area of dry land was cleared and burnt for chena rotation experiments.

At Jaffna, pending final acquisition of the land, work was confined to tobacco experiments. Four acres of White Burley tobacco were grown and one acre of Turkish. The reports from Europe on the White Burley tobacco continue to be favourable, and remunerative prices continue to be received. Efforts were made during the year to interest the tobacco cultivators of Jaffna in this variety, and purchases of the green plants were made at the station.

48. Annexure VIII. contains reports of the Divisional Agricultural Officers for the Central and Southern Divisions. In the Central Division tobacco experiments were continued at Teldeniya, with the object of ascertaining whether cigar types of tobacco can be grown for the European market. The full organization of the work of this division could not be undertaken during the year owing to shortage of staff. Work in the Southern Division was begun in October, with the closer supervision of agricultural instruction, school garden work, co-operative credit work, agricultural shows, and competitions. Provision for experiment stations in this division is urgently necessary, and has been retarded only on account of financial considerations. The establishment of a central experiment station, to which will be attached a farm school, and minor experiment stations under the control of agricultural officers will, it is hoped, be undertaken during the forthcoming financial year. The Divisional Agricultural Officer for the Northern Division was appointed during the year, and was allowed to be attached for additional training to a county organization staff under the Ministry of Agriculture of the United Kingdom, and later to the district staff of the Madras Agricultural Department.

49. Annexure IX. records the work of the Botanic Gardens. The Royal Botanic Gardens have been well maintained during the year, and particular attention given to the extension of nursery work, especially of economic products. Efforts were also made to graft and bud Hevea rubber seedlings. Budding and grafting—except grafting by approach—have not been very successful, but further efforts are to be continued. Successful budding has been accomplished in Java, and there would appear to be reasons to suppose that this method of vegetative propagation will assist considerably the establishment of areas of rubber from known heavy yielders. Much is expected of the method by rubber growers, and therefore it is essential that detailed experiments should be carried out in Ceylon in order to ascertain the conditions under which budding will be successful. Hakgala Gardens have been improved during the year and new areas opened out, one for the establishment of a "wild" garden, and the other for the establishment of a rockery. The fruit plot is not making much headway, several of the imported plants having failed to become acclimatized. *Aleurites Fordii* and *Cinchona succirubra* and *Cinchona hybrida* plantations are making fair, but slow, progress, while arrangements have been made for extended trials with *Chenopodium*. The Nuwara Eliya Garden has been maintained, and special attention given

to the removal of Loranthus. Henaratgoda Gardens have been improved during the year, and were looking quite well at the time of the Henaratgoda Agricultural Show held in the Gardens in July. Special attention is now being given to nursery work for the supply of plants to the public, and the Conductor continues to give practical demonstrations to the students of the Garden School, which has been established by the Education Department.

50. Annexure X. gives full details of the work of the School of Agriculture at Peradeniya. During the year sixteen students completed the English course and twenty new students were admitted. The students for the English course now number 39. Thirteen teachers attended the one-year course for vernacular teachers and completed their course of instruction satisfactorily. A beginning has been made with the erection of dormitories at the hostel, residences for teachers, and class rooms and laboratories. A re-organization of part of the Irene estate has also been commenced. Particular attention has been given to paddy cultivation during the year, the whole area having been worked by the students themselves. Many of the students' plots were very creditable and produced good crops. The organization of an Old Boys' Union has been begun.

51. Annexure XI. includes details of the work of Co-operative Credit Societies. The number of societies increased by 26, and the capital by Rs. 31,522. There are large amounts of outstanding loans, and every effort is being made to impress upon societies the necessity for greater attention being given to the recovery of loans on their due dates. Two new Inspectors were selected during the year, and will be drafted to the Madras Co-operative Department for training. Societies undertook to supply manures to their members. Owing to difficulties in securing supplies and owing to high costs the quantity of supplies was less than in the previous year. This part of the societies' work is most popular, and with a fall in prices will extend considerably.

GENERAL.

52. The Director of Agriculture attended in June the Imperial Entomological Conference in London as the Colony's delegate and has issued a report upon its proceedings. At this Conference it was decided that the Imperial Bureau of Entomology should be established upon a permanent basis, and that closer attention should be given to entomological problems in the various parts of the Empire.

53. An Imperial Bureau of Mycology has been established during the year. The Colony has undertaken to make financial contributions to its establishment and to render to it every assistance.

54. A statistical council, to which the Director of Agriculture has been appointed, has been established by Government during the year, and as soon as the Census of 1921 is completed, it is hoped to begin to collect careful and accurate agricultural statistics concerning acreages under various crops, yields, costs of production, &c. Accurate agricultural statistics are urgently required, and it is hoped that a beginning will be made as soon as possible.

55. Plans have been considered during the year for the erection of new offices and laboratories for the Department, and of bungalows for the research staff. The Department is considerably handicapped for want of suitable and adequate laboratory accommodation and equipment, and officers at headquarters find it impossible to secure suitable bungalow accommodation. Government, with the approval and sanction of the Legislative Council, has undertaken to acquire an area of the Peradeniya estate for the erection of laboratories and of bungalows for the headquarters staff, and the survey of the land was completed before the close of the year.

EXPENDITURE.

56. The following is a statement of expenditure for the financial year 1919–20 :—

	Rs. c.
Salaries	163,776 97
Travelling	18,937 53
Gardens—Labour and Upkeep :—	
Peradeniya Gardens	22,183 70
Hakgala Gardens	6,059 7
Nuwara Eliya Gardens ..	1,775 93
Henaratgoda Gardens ..	3,151 21
Queen's House Garden ..	1,824 60
King's Pavilion	4,453 91
Queen's Cottage	4,655 56
Temple Trees	939 70
The Lodge	779 91
Cuddesdon Garden	710 16
Nursery Work in Colombo ..	358 77
Experiment Stations :—	
Peradeniya	35,572 8
Anuradhapura	18,581 74
Coconut Trial Ground, Chilaw ..	2,570 15
School Gardens :—	
Labour and upkeep	5,694 49
Upkeep of library, laboratories, &c. ..	2,687 69
Prevention of plant pests and diseases ..	696 85
Incidental expenses	3,389 12
Stationery	2,144 7
Printed forms	249 97
Binding	17 14
Agricultural Education :—	
Salaries	8,441 28
Travelling	865 20
Lecturing fees	1,195 50
Incidental expenses	1,186 28
Catering for students ..	478 44
Rent of quarters	690 0
Stationery	180 65
Laboratory expenses for School of Tropical Agriculture ..	15 45
Labour and upkeep of Irene House property	2,463 95
Dieting of students	4,388 97
Purchase of Irene House property ..	50,000 0
Co-operative Credit Societies :— ..	
Salaries	3,910 0
Travelling	2,988 63
Incidental expenses	104 96
Stationery	442 33
Rubber Research :—	
Investigation and research ..	7,468 56
Special Expenditure :—	
Experimental cultivation of tobacco ..	8,800 51
Seed distribution	1,999 59
Grants in aid for shows and competitions	3,050 0
Local production of castor oil ..	643 77
Total ..	400,524 39

This expenditure may be itemized under the following sub-heads :—

	Rs. c.
Administration	44,507 92
Research : Scientific investigations, including expenditure on Rubber Research, Shot-hole Borer and Tea Tortrix Investigations, and Central Experiment Station	131,783 12
Botanic Gardens, including Gardens of Governor's and Colonial Secretary's Residences	79,366 53
Agricultural Education, including School of Tropical Agriculture, School Gardens, and Grants to Shows and Competitions ..	96,296 61
Divisional Experiments, including Special Expenditure on Tobacco Cultivation, Local Production of Castor Oil, Anuradhapura Experiment Station, and minor demonstration Plots	39,124 70
Co-operative Credit Societies	7,445 92
Seed distribution	1,999 59
Total ..	400,524 39

RECEIPTS.

57. The following is a statement of receipts collected during the year :—

		Rs. c.
1.	Head Office (Publications)	882 33
2.	Royal Botanic Gardens, Peradeniya	3,782 74
3.	Botanic Gardens, Hakgala	731 68
4.	Botanic Gardens, Henaratgoda	14 41
5.	Botanic Gardens, Nuwara Eliya	39 75
6.	Experiment Station, Peradeniya	16,610 8
7.	Experiment Station, Anuradhapura	1,149 32
8.	Tobacco Trial Ground, Jaffna	1,082 69
9.	School of Tropical Agriculture	352 29
10.	Government Stock Garden, Peradeniya	93 37

To this must be added the value of seeds and plants issued gratis to Government institutions from the following :—

	Rs. c.
Peradeniya Gardens	1,015 7
Hakgala Gardens	128 65
Henaratgoda Gardens	75 40
Experiment Station, Peradeniya	147 15
Experiment Station, Anuradhapura	142 2
Government Stock Garden, Peradeniya	296 27

COMMUNIQUÉS.

58. The following *communiqué* was made to the press on matters of agricultural importance and interest during the year :—

Increase of Diseases of Agricultural Crops.

PUBLICATIONS.

59. The following publications were issued during the year :—

Annals of the Royal Botanic Gardens, Peradeniya, Vol. VII., Part II., May, 1920. *Saccolabium longifolium* and *Saccolabium Wightianum*, &c., by T. Petch.

Bulletins of the Department of Agriculture :—

No. 47.—" Change over " Tapping, by T. Petch.

Leaflets :—

No. 15.—Loranthus Eradication, by G. Bryce.
No. 16.—Paddy Fly, by J. C. Hutson.
No. 17.—Red Rust, by C. A. Gadd.

Seventeen Food Production Circulars, Planting Series.

STAFF CHANGES.

60. The following staff changes took place during the year :—

Mr. F. A. Stockdale, Director of Agriculture, who was on leave in England, returned to the Island and resumed duties on July 21.

(1) Mr. T. Petch, Botanist and Mycologist, acted as Director of Agriculture up to May 15, when he went on leave until the end of the year.

(2) Mr. M. K. Bamber, Government Chemist, acted for the Director of Agriculture from May 15 until the arrival of Mr. Stockdale.

(3) Mr. F. Summers assumed duties as Economic Botanist on January 26.

(4) Mr. J. J. Nock, Curator, Hakgala Gardens, Nuwara Eliya, was on leave from January 30 and resumed duties on November 9.

(5) Mr. T. H. Parsons, Curator, Royal Botanic Gardens, Peradeniya, acted as Curator, Hakgala Gardens, Nuwara Eliya, during Mr. Nock's absence.

(6) Mr. C. Drieberg, Superintendent of Low-country Products and School Gardens, retired from the Service on February 10.

(7) Mr. Alex. Perera, Senior Inspector of School Gardens, acted as Superintendent of School Gardens until September 30.

(8) Mr. G. Bryce, Acting Botanist and Mycologist, was on leave from February 16 and resumed duties from June 17.

(9) Mr. C. H. Gadd, Inspector for Plant Pests and Diseases (Mycological), acted for the Botanist and Mycologist during Mr. Bryce's leave, and for the Assistant Botanist and Mycologist from June 17 until the end of the year.

(10) Mr. G. G. Auchinleck assumed duties as Divisional Agricultural Officer, Southern Division, on October 1.

(11) Mr. T. H. Holland assumed duties as Manager, Experiment Station, Peradeniya, on November 12.

(12) Mr. G. Harbord, Manager, Experiment Station, Peradeniya, assumed duties as Acting Divisional Agricultural Officer, Central Division, on November 12. Mr. Harbord was on leave in India from November 24 until December 23.

61. The following appointments, changes, and retirements took place during the year in the Clerical, Gardens, and Agricultural Staffs of the Department :—

(*a*) *Appointments.*—Messrs. O. C. van Sanden and L. V. S. W. Jayawardena as clerks, with effect from January 1. Mr. G. V. Gurusinghe as clerk, with effect from April 1. Mr. M. B. Neangoda as clerk, School Gardens, with effect from July 7. Mr. D. P. Jayatilleke as clerk Royal Botanic Gardens, Peradeniya, with effect from October 1. Mr. K. J. A. Sylva, Foreman, Royal Botanic Gardens, Peradeniya, as Inspector of School Gardens, with effect from April 1. Mr. W. de Alwis, Senior Assistant Foreman, as Foreman, with effect from April 1. Messrs. D. W. K. Goonewardena, the Second Assistant Foreman, R Siriwardena, First Upper Gardener, and G. A. Jothihamy, Second Upper Gardener, all of Royal Botanic Gardens, Peradeniya, as Senior Assistant Foreman, Second Assistant Foreman, and First Upper Gardener, respectively, with effect from May 1. Mr. A. Jayasinghe as Assistant Foreman, with effect from May 10. Messrs. P. B. Kiridena, Third Upper Gardener, and T. de Silva as Second and Third Upper Gardeners, respectively, with effect from May 1. Mr. Edmund de Alwis, Museum Assistant, seconded for service as Inspector of Home Gardens, with effect from August 1, and Mr. F. W. de Silva acted as Museum Assistant. Mr. J. Jackson, Sub-Inspector under training, was appointed as Sub-Inspector for Plant Pests, with effect from September 1. Messrs. R. A. Cameron and B. A. Pereira, passed Students of the School of Tropical Agriculture, Peradeniya, as Sub-Inspectors for Plant Pests under training, with effect from October 1. Messrs. S. Thurai Raja and M. R. M. Jebaratnam also passed Students of the School of Tropical Agriculture, Peradeniya, as Sub-Inspectors for Plant Pests under training, with effect from October 6 and 9 respectively. Mr. G. D. Austin as Assistant in Entomology, with effect from October 1. Mr. A. Madanayake, Agricultural Instructor, as Inspector of School Gardens, with effect from October 15. Messrs. S. B. Yatawara and M. Amerasinha as Sinhalese Inspectors of Co-operative Credit Societies, with effect from October 25 and November 1 respectively.

(*b*) *Changes.*—Mr. C. Ragunathan, Lecturer, School of Tropical Agriculture, Peradeniya, attached to the Botanist and Mycologist's Division in place of Mr. L. S. Bertus sent to India for training, with effect from October 1. Mr. C. Wickremaratne, Inspector of School Gardens, as Agricultural Teacher to the Vernacular Classes of the School of Tropical Agriculture, Peradeniya, with effect from October 1. Mr. E. Perera, Head Gardener, Queen's Cottage, Nuwara Eliya, to act as Clerk and Foreman, Hakgala Gardens, with effect from November 1. Mr. P. J. Christoffelsz, Nurseryman, Hakgala Gardens, to act as Head Gardener, Queen's Cottage, Nuwara Eliya, with effect from November 1. Mr. P. B. Kiridena, Second Upper Gardener, Royal Botanic Gardens, Peradeniya, to act as Nurseryman, Hakgala Gardens, with effect from November 1. Mr. A. Jayasinghe, Third Assistant Foreman, Royal Botanic Gardens, Peradeniya, to act as Second Assistant Foreman, with effect from November 1. Mr. T. de Silva, Third Upper Gardener, Royal Botanic Gardens, Peradeniya, to act as Third Assistant Foreman, with effect from November 1. Mr. R. Siriwardena, Second Assistant Foreman, Royal Botanic Gardens, Peradeniya, acted for Mr. D. F. Siriwardena, Garden Muhandiram, King's Pavilion, Kandy, who was on 3 months' leave from October 1, preparatory to retirement.

(*c*) *Retirements.*—Mr. O. C. van Sanden, Clerk, was discontinued from January 20. Mr. C. V. James Perera, Rubber Tapping Conductor, Experiment Station, Peradeniya, resigned appointment on September 1. Mr. C. H. Jayasinghe, Sub-Inspector for Plant Pests under training, was discontinued from service from September 1. Mr. D. T. de Alwis, Clerk and Foreman, Hakgala Gardens, retired from the Service on October 1.

F. A. STOCKDALE,
Director of Agriculture.

April 6, 1921.

Annexures.

I.—REPORT ON THE WORK OF THE BOTANICAL AND MYCOLOGICAL DIVISION.

MYCOLOGY.

CONSIGNMENTS of diseased plants for examination and report numbered 420, of which 193 were Hevea, 119 tea, 24 coconut, the remainder including acacia, albizzia, bandakkai, beans, breadfruit, brinjal, cacao, canna, castor, *Cinnamomum cassia*, citrus, coca, coffee, custard apple, dadap, eucalyptus, ficus, gliricidia, grevillea, guava, grape, vine, hibiscus, *juniperus procera*, knol-kohl, kurakkan, mango, maize, orange, palms, papaw, pepper vine, plantain, rose, tomato, timber, and miscellaneous garden plants.

Visits have been made to estates in various parts of the Island during the year. The travelling occupied fifty-two days.

FUNGUS DISEASES.

Rubber.

Brown bast has been less prevalent during the year. The cause is still unknown, but it is generally considered to be a diseased physiological condition induced by tapping. It apparently occurs more frequently in the Federated Malay States and in the Dutch East Indies than it does in Ceylon, and in this connection it is worthy of note that alternate day tapping has been the practice in Ceylon for a number of years, whereas in the above countries daily tapping has been the common practice. An attempt was made to obtain an accurate estimate of the prevalence of the disease in Ceylon. A schedule of queries was issued. Consideration of the data obtained in the replies rendered it doubtful if the estimate would be accurate enough to be of use, and a review of the whole situation threw light on so many probable errors that it was decided to proceed no further with these figures. The morbid anatomy of brown bast has not as yet been fully described, but the condition will probably be found to be closely related, in its inception, to the alteration of latex vessel content that precedes nodule formation. The formation of nodules after an attack of brown bast, indeed, is a normal feature of the disease.

Fomes root disease (*Fomes lignosus*) is the cause of numerous losses. It is difficult to eradicate, as in uprooting diseased trees small portions of diseased root are often left in the soil. It spreads especially rapidly along drains and water-courses. The appearance of the disease and the fructification of the fungus are well known, and drastic treatment on its first appearance is essential if further losses are to be avoided.

In view of the repeated warnings as to the danger of root disease where old stumps are left among Hevea, it is surprising to find that cases still occur where old stumps are left to decay *in situ*. It should be a first principle in the plant sanitation of estates that no old stumps should be left in the ground, nor should old logs be left among the trees.

Brown root disease (*Fomes lamaoensis*) has been especially frequent. This is typically a disease connected with the presence of old jungle stumps. The fructification has not appeared so frequently this year.

Stem disease caused by *Ustulina zonata* has been reported periodically. This fungus is often found on old logs, where it produces its fructifications. Old logs thus act as centres of infection for adjacent healthy trees.

Decays of renewing bark have been less serious. Preventive painting with Brunolinum and other substances is undoubtedly checking this group of diseases. During the year several cases of suspected "mouldy rot" (*Sphæronema* sp.) of the Federated Malay States have been reported, but none of these have yielded anything save species of Fusarium and Cephalosporium. The "mouldy rot" of the Federated Malay States has, therefore, not yet been found in Ceylon. Lately it has been recorded on one estate in Java, and there is always the possibility of its appearance in Ceylon. The Java case is considered to be a case of a *Sphæronema* sp. already present in Java, developing a parasitic habit on Hevea.

Leaf fall and pod disease due to *Phytophthora Faberi* and *P. Meadii* have shown a decline, which may be attributed to the unusually dry weather in September and October. The pods were able to ripen and burst, and the trees were to a great extent free of fruit when the heavy monsoon rains set in late in October. As the two fungi attack the pods first, and later spread to the leaf petioles causing leaf fall, the absence of the pods as starting points resulted in greatly lessened leaf fall.

Two cases have been recorded of *Fomes lucidus* fructifications occurring on Hevea apparently saprophytically, *i.e.*, on dead wood. This fungus is the cause of a root disease in coconut, flamboyante (*Poinciana regia*), and mango, and is a wound parasite in some cases. While it may be only a saprophyte on Hevea, its occurrence if noted frequently on Hevea would be suspicious.

Lightning scars on the upper portions of Hevea have again been recorded. Lightning may be a more common cause of damage than is generally recognized.

A black sooty fungus growing over the leaves and associated with scale insects has been somewhat common. This fungus is a *Meliola* sp., and grows on the secretions of the scale insects. It is not parasitic on the leaf. Usually the scale insects are parasitized by entomogenous fungi, which serve to limit the extent of the scale insect attack. The damage done to the tree is insignificant, and the danger of unlimited increase of the scale insects is small, as they are effectively controlled by parasitic fungi.

A diseased condition of the leaf petiole was recorded; local swelling of tissue occurred, which ruptured later, forming a canker. The affected tissue was superficial. No fungus was obtained from these cankered spots. The effect of this disease was to cause a certain amount of leaf fall.

Tea.

Red rust (*Cephaleuros* sp.) has again been prevalent in the Ratnapura District and the Southern Province, and has been found on one estate in the Kalutara District. In this latter case the bushes were in a weak condition. The evidence from all the cases supports the view that this is a disease of weak bushes. In one particular case the attack was connected with shallow soil; the bushes sent in for examination were young, and had reached the limit of root development permitted by the shallow soil; further vigorous growth was then impossible, and in their weakly condition the bushes succumbed to attack. Unfavourable growth conditions may be of the soil or of the climate; their effect on the bush is to lessen its vitality, in which condition the bush is more liable to attack.

Poria hypolateritia has occurred up-country among old tea, and the serious nature of this root disease has again been demonstrated. It spreads freely through the soil, and is extremely difficult to eradicate. Measures for eradication must be applied drastically on its first appearance, if serious lots of bushes is to be avoided.

A new branch canker caused by *Helminthosporium gigasporum* B. & Br. was recorded. The bark generally on the upper side of the branch was killed back from the pruning cut. In conjunction with this a canker closely resembling that caused by *Leptosphæria* was found, but the fungus itself was not obtained. The damage done in one case was severe. As a measure of control, painting with various fungicidal fluids is in course of being tried.

Two ascomycetous lichens were recorded as causing stem galls of tea seed bearers. In the first the lichen fungus penetrates the cortex and ruptures the tissue along the line of the cork cambium. It does not appear to penetrate more deeply into the cortex, but its presence in the outer layers stimulates the branch to excessive growth, and a large woody swelling forms on the stem covered by a thick, much wrinkled and warted layer of abnormal cortex containing the fructifications of the fungus. The second lichen fungus also penetrates only the outer layers of the cortex, but its effect is confined to fissuring of the bark and slight woody swelling on the stem. Both lichens appear to be very susceptible to lime, and should be easily kept in check by the liming of stems of seed bearers undertaken to keep down growth of lichens. The first lichen was *Trypethelium megaspermum* Mont, and the second *Verrucaria santensis* Tuck.

Disinfection of Imported Tea Seed.

Experiments were carried out by Mr. C. H. Gadd to test the efficacy of the disinfection of imported tea seed by formaldehyde at the Colombo Fumigatorium. The importance of efficient disinfection is manifest in view of the danger of introducing from India the serious tea leaf disease known as blister blight, at present unknown in Ceylon. It was found that formaldehyde had a considerable fungicidal value, though it failed to kill all fungus spores. Its chief defect was low power of penetration in seed spread on superimposed shelves, only the most exposed seeds being disinfected to any extent.

Coconuts.

Phytophthora nut fall occurred to much the same extent as last year. The question of preventive treatment by spraying with Bordeaux mixture has been taken up. It is not improbable that a saving of nuts will be thus effected which will more than counter-balance the expense of spraying.

Phytophthora leaf droop has been less frequently reported.

Mr. C. H. Gadd has found that leaf break or dieback of coconut leaves is associated with *Diplodia* sp. The spores of this species are smaller (18–22 by 9–12 microns), and remain white for a longer period than spores of *Botryodiplodia theobromæ*.

"Tapering of the crown," a diseased condition of coconut stems in which the stem dwindles rapidly in diameter and the palm becomes barren, has been partially investigated. It is obviously related to the condition known as "pencil point" and described in Jamaica. Field observations showed that the crown is not diseased, but that many dead roots occur. Amongst the dead roots vigorously growing new roots occur. No evidence of *Fomes lucidus* was obtained. On diseased roots in the laboratory *Sphæronema* sp. and *Pestalozzia* sp. hatched out. The symptoms indicate that this is probably a root disease, but it is doubtful if it can be attributed to these fungi.

Green Manures.

Poria hypobrunnea has again been recorded on dadaps, and from the severe nature of the attack observed, it is evident that it is a serious root disease.

No cases have been reported of *Cercosporella theæ* on *Acacia decurrens*.

Tephrosia candida suffered severely from root disease caused by *Poria hypobrunnea* and stem disease caused by *Irpex subvinosus*.

Food Crops.

Piricularia oryzæ Cav. has been recorded on paddy. The commonest Ceylon paddy diseases are the Sclerotium disease and Helminthosporium leaf disease. Sclerotium disease has been recorded from various localities, and caused a considerable amount of damage in some of the old paddy fields at the Peradeniya Experiment Station. Here also paddy seedlings in seed beds were badly attacked by a Fusarium. The point of attack is the micropyle, where the fungus forms pink acervuli, and the young shoots of germinated seeds are coated with mycelium. Shoots above 4 inches in height seemed to be immune. The most susceptible paddy varieties were Macan Pina from Manila and Hatiel.

Phoma glumarum El. & Tr. was recorded on paddy.

Puccinia maydis Bereng. was recorded on maize.

A disease of plantains was reported from Uda Hewaheta and a visit was made to investigate in the field. Old banana plants were found to be riddled with banana root boring beetle, and as a result of the attack the new suckers produced were dwarfed. This is a feature of banana root borer attack in other countries. Unfortunately these infested suckers had been used to plant up new clearings, and there was a general failure. It was recommended that the old plantain clumps be dug up and destroyed by fire, and that fresh healthy suckers be obtained to supply vacancies in the new clearings, from which all affected plants had first to be removed and burnt.

Miscellaneous.

On papaya *Mycosphærella Caricæ* Sydow and *Colletotrichum Caricæ* Stevens & Hall were recorded.

Further new diseases recorded during the year were *Puccinia Nakanishikii* Diet. on *Andropogon citratus* DC.; *Kordyana Commelinæ* Petch on *Commelina nudiflora* L.; *Melampsorella ricini* (Biv.-Bern.) de Toni on castor oil plant.

Botany.

376 specimens of flowering plants, &c., have been received for identification. Seeds of *Chenopodium ambrosioides* were collected in quantity in the Nuwara Eliya District in connection with the question of a local supply of Chenopodium oil for the hookworm campaign. An examination of plants suitable for planting on bunds of salt pans at Elephant Pass for protection purposes was made, and a list of suitable plants was compiled.

WEEDS.

No new weeds have been recorded during the year. The water hyacinth, though cleared up periodically, continues to reappear in Kandy District. Specimens have been received from Kegalla District, and it was collected near Alutgama.

PUBLICATIONS.

One number of the Annals of the Royal Botanic Garden was published during the year containing the following papers :—

Saccolabium longifolium and *Saccolabium Wightianum :* A description of the specific differences, by T. Petch.

Hypocreaceæ zeylanicæ : A critical re-examination of Ceylon specimens, by T. Petch.

Recent revisions of Ceylon Botany, by T. Petch.

G. BRYCE,
Peradeniya, January 19, 1921. Acting Botanist and Mycologist.

II.—REPORT ON THE WORK OF THE ENTOMOLOGICAL DIVISION.

REPORT OF THE ENTOMOLOGIST.

CONSIGNMENTS of specimens numbered 188 during this period, and included the more important pests of tea, rubber, cacao, coconuts, rice, cotton, coffee, citrus, and food crops, in addition to insects of minor importance from miscellaneous plants.

During the period under review the Entomologist paid visits to estates in the following districts :— Kandy (four times), Nuwara Eliya (twice), Halgranoya (twice), Badulla (twice), and Ratnapura and Ulapane once each. Two visits have been paid to the Dry Zone Experiment Station, Anuradhapura, in connection with paddy fly investigation, and Hakgala Gardens and Queen's Cottage have been visited twice each for cutworm experiments. The Forest Department's reservations at Pattipola and Conical Hills, Nanu-oya, were inspected to observe the results of the Vedalia beetle.

The Entomologist attended all the meetings of the Committee of Agricultural Experiments at Peradeniya during the year, and was present at the March meeting of the Board of Agriculture in Colombo.

During the year consignments of insects and ticks have been sent to Dr. Guy A. K. Marshall, Director, Imperial Bureau of Entomology, and we are much indebted to him for his courtesy in having these identified. Our thanks are also due to Mr. E. E. Green, Camberley, Surrey, for kindly identifying some scale insects submitted to him.

FUMIGATORIUM.

During the period under review 340 cases of tea seed, 165 cases of citrus fruits, and 433 packages of plants and seeds have been treated at the fumigatorium in Colombo.

The improvements to the fumigatorium were completed about the middle of the year. Electric lights and fans have been installed in the two fumigation chambers and in the office. The verandah has been enclosed by a wooden lattice work with doors at intervals.

The Entomologist paid four visits to the fumigatorium during 1920.

Mr. G. M. Henry, who was in charge of the fumigatorium, in addition to his duties at the Colombo Museum, went on leave in February, and the fumigation work has been carried on by Mr. M. M. Salim of the Colombo Museum.

PESTS IN 1920.

Tea.

Shot-hole borer (*Xyleborus fornicatus*) continues to be a serious pest of tea. The results of the investigations of the Assistant Entomologist, who is working exclusively on this pest, are given elsewhere. The survey of the tea estates and gardens of the Central Province has been carried on by the Plant Pest Inspectorate throughout the year, and the report of their work appears elsewhere.

Tea tortrix (*Homona coffearia*) shows no signs of abating, and has been prevalent on the old areas during the year. Specimens of the caterpillars have been received from a few estates not previously recorded as infested. Experiments against this pest are being made by the Plant Pest Inspectorate.

The " fringed nettle grub " (*Natada nararia*) has been much in evidence in some districts during the dry weather, and outbreaks of this pest were usually accompanied by attacks of other species of nettle grubs in smaller numbers. In some instances the outbreaks were checked in their early stages by the collection of the caterpillars and the small brown egg-shaped cocoons, but where the pest was allowed to run on through two or three broods, it more or less completely defoliated areas of tea varying from ten to upwards of a hundred acres before its natural enemies regained control.

The " red slug " (*Heterusia cingala*) has been one of the more important caterpillar pests of the year. The conspicuous reddish caterpillars should be collected as soon as they are first noticed. They form their cocoons within folded leaves, especially those lying on the ground, and the collection and burning of all fallen leaves is an effective method of checking this pest.

Tea mites have been prevalent in some districts during the prolonged drought, and extensive areas of tea were affected on some estates. Notes on the control of these pests appeared in the " Tropical Agriculturist " for October. The species of mites chiefly concerned were the " red spider " (*Tetranychus bioculatus*), the purple mite (*Phytoptus carinatus*), and the yellow mite (*Tarsonymus translucens*).

Termites or white ants (mainly *Calotermes militaris*) are well established on many tea estates, and are responsible for more damage to the frames of tea bushes than is generally recognized. Measures to be adopted against these insects are outlined in the Sixty-seventh Annual Report of the Planters' Association.

The scale insects commonly known as " brown bug " (*Saissetia hemispherica*), and " green bug " (*Coccus viridis*) have been prevalent on some estates during the year. Remedial measures have been indicated in the above-mentioned report.

White grubs, or the larvæ of cockchafer beetles, have damaged the roots of young tea, especially where clearings have been made from patana lands, which usually swarm with these grubs. A systematic collection of the eggs and grubs from the soil and of the beetles from the green manure and shade plants serves to reduce the infestation. The commonest species found was the large cockchafer (*Lepidiota pinguis*), while the grubs of a smaller beetle (*Anomala superflua*) were also present in numbers.

The following pests have also been reported or observed to be injuring tea bushes during 1920 :—*Zeuzera coffeæ, Stauropus alternus, Clania variegata, Psyche vitrea, Gracilaria theivora, Orgyia postica, Ricanoptera opaca, Pulastya acutipennis, Chionaspis theæ, Ceylonia theacola,* the "eel-worm," *Heterodera radicicola,* and the snail *Achatina fulica.*

Rubber.

The bark-eating caterpillars of *Comocritis pieria* have been prevalent on at least two estates in different districts.

Several reports were received of injury to the stem and roots of Hevea by the grubs of a long-horned beetle. The specimens submitted were *Batocera rubus.*

Specimens of the scale insects *Saissetia hemispherica* and *S. nigra* have been sent in on the twigs and leaves of Hevea from several estates. Other scales received during the year were *Chionaspis dilatata* and *Hemichionaspis dracænæ.*

The beetles *Sipalus hypocrita* and *Xylinades indignus* were found frequenting the diseased bark of Hevea.

Cacao.

The brown bark borer (*Arbela quadrinotata*) has been prevalent on a few estates. This caterpillar also bores into the cacao pods. Helopeltis has also been in evidence on some estates. *Achatina fulica* eats the leaves of young cacao plants and sometimes kills the plants by ringing the bark. The aphid, *Toxoptera aurantiæ,* is quite commonly found on cacao estates, but is generally controlled by its natural enemies, such as Coccinellid beetles, Chrysopid and Syrphid larvæ, and minute Hymenopterous parasites.

Coconuts.

Outbreaks of the coconut caterpillar (*Nephantis serinopa*) were reported from the Eastern Province early in the year. The beetles *Rhynchophorus ferrugineus* and *Oryctes rhinoceros* continue to be prevalent. The caterpillars of *Herculia nigrivitta, Erechthias pachygramma,* Meyr., sp. nov., and *E. lampadacma.* Meyr., sp. nov., were on the dried leaves of palms already damaged by *N. serinopa.*

Rice.

The paddy fly (*Leptocorisa acuta*) has been the subject of special investigation during the year, and the work is being continued. A leaflet on this pest has been distributed by the Department, and a poster will appear shortly. The leaflet has been reprinted in the "Tropical Agriculturist" for November.

Stem borers (*Schœnobius bipunctifer* and others) are worse pests of paddy than is generally recognized.

An outbreak of the swarming caterpillar (*Spodoptera mauritia*) was reported in June. An article on this pest appeared in the September number of the "Tropical Agriculturist."

In addition to the leaf-eating caterpillars of paddy mentioned in the 1919 report, the following have been reported or observed during the year :—*Melanitis ismene, Ampittia maro, Leucania venalba, Lenodora vittata,* and *Orsotriœna mandata.* The leaf-hoppers, *Typhlocyba subrufa, Nephotettix bipunctatus,* and *Tettigoniella spectra,* have been observed injuring growing paddy.

Coffee.

Specimens of the "red borer" (*Zeuzera coffeæ*) and the "green bug" (*Coccus viridis*) were received during the year.

Leguminous Plants.

Erythrina lithosperma (Dadap).—In addition to the pests mentioned in the 1919 report, the following have been observed :—The snail (*Achatina fulica*) which eats the leaves and bark, often killing young plants ; the Membracid bugs, *Otinotus elongatus* and *O. oneratus,* which cluster on the young shoots in all stages ; and the leaf-folding caterpillars of *Agathodes ostentalis,* which eat a portion of the leaves.

Acacia spp.—The fluted scale (*Icerya purchasi*) has not been so generally prevalent during 1920, A consignment of living specimens of the Vedalia beetle (*Novius cardinalis*) was received from South Africa early in the year. These were first of all allowed to breed in the laboratory, and, with the co-operation of the Forest Department, were subsequently liberated in the scale infested areas at Pattipola, Conical Hills, and Kandapola, where they did good work. An article on the subject appeared in the "Tropical Agriculturist" for August.

Tephrosia candida ("Boga medaloa").—The caterpillars of the Lycænid, *Lampides bochus,* commonly feed on the flowers and later bore into the pods. The other insects which usually frequent this plant are those mentioned in the previous annual report.

Cajanus indicus (Dahl).—The pods are sometimes attacked in the field by the cow-pea weevil (*Bruchus chinensis*) and by the Coreid bug (*Clavigralla scutellaris*). The caterpillars of *Pseudoterpna chlora* were found eating the leaves. A list of the other pests of this crop was given in last year's report.

Albizzia spp.—Some large trees round an up-country bungalow were badly defoliated by the caterpillars of *Terias silhetana ;* specimens of the caterpillars of *Euproctis scintillans, Orgyia postica, Macaria pluviata,* and *Arbela quadrinotata* were received during the year.

Phaseolus spp.—The blotch leaf-miner *Cosmopteryx phæogastra* and the leaf-miner *Cyphosticha cærulea* were observed.

A young *Poinciana regia* was partially defoliated by the caterpillars of *Orgyia postica* at Peradeniya.

Food Crops.

Cutworms (*Agrotis* spp.) have been prevalent in up-country vegetable gardens during the year. These pests attack the seedlings of most vegetables, but protection can be afforded by banding the plants with paper or by the use of tins around the plants. Poisoned bait experiments were tried in two localities, but in each case the heavy rains materially lessened the effectiveness of the bait, and in one instance many of the plants were destroyed by "damping off." These experiments did not give sufficiently good

results to warrant a further trial until the materials (pollard, jaggery, and Paris green) become cheaper, and unless continuous supervision can be assured. The Andres-Maire moth bait trap was kept going continuously throughout the greater part of the year, but so few moths were caught that its further use was not considered practicable.

The snail (*Achatina fulica*) has been a serious pest in many vegetable gardens at medium and low elevations. This mollusc has been under investigation during the year, and an article was published in the "Tropical Agriculturist" for October giving suggestions for its control. There is no doubt that this pest is spreading rapidly, but so far it is not known to cause any serious damage to any of the main crops of the Island, with the possible exception of cacao. Further experiments with copper sulphate are to be tried on a large scale.

The following pests have been reported or observed during the year on various food crops :—*Plutella maculipennis* on cabbage and Brussels sprouts, *P. sera* on turnip ; *Crocidolomia binotalis* on cabbage and knol-khol ; *Bactrocera cucurbitæ* in pumpkin, cucumber, cho-cho (*Sechium edule*), &c. ; *Leucinodes orbonalis* in fruit, and *Epilachna vigintioctopunctata* and *Urentius echinus* (Tingitid) on leaves of brinjal (*Solanum melongena*) ; *Earias fabia*, borer in fruit, and *Helcystogramma hibisci*, folding leaves of bandakkai (*Hibiscus esculentus*) ; *Chilo* sp., stem borer, and *Dactylispa soror*, leaf miner, of maize ; *Orchesma signata* (Fulgorid) on leaves of sugar cane ; *Odoiporus longicollis* in bulbs of plantain (*Musa* sp.) ; *Aularches miliaris* on jak (*Artocarpus intergrifolia*) ; *Apoderus tranquebaricus*, folding a portion of leaves of mango ; *Telchinia violæ* on *Passiflora edulis*.

Stored Products.

The following are among the more important insects observed during the year in stored products :—*Bruchus chinensis* and *B. obtectus* in peas and beans ; *Sitotroga cerealella*, *Corcyra cephalonica*, and *Calandra oryzæ* in rice ; *Ephestia cautella* and *C. cephalonica* in cacao beans ; *Lasioderma* sp. in leaf tobacco.

Miscellaneous Pests.

The following insects have been observed injuring other plants of economic importance :—*Attacus atlas*, *Argyroploce semiculta*, and *A. aprobola* on leaves of cinnamon ; *Hypsipyla robusta* boring in shoots of toona (*Cedrela toona*) and mahogany (*Swietenia mahagoni*) ; *Œnospila flavifusata* eating leaves ; and *Acrocercops bisinuata*, leaf miner of *Eugenia malaccensis*.

A collection of ticks occurring on cattle in various parts of the Island is being made, and specimens are being sent to the Imperial Bureau of Entomology for identification. The following ticks from cattle have been identified by Messrs. Nuttal and Warburton :—*Hyalomma ægyptium*, *Amblyomma integrum*, *Rhipicephalus sanguineus*, *Rhipicephalus hæmaphysaloides*, *Hæmaphysalis bispinosa*, *Boophilus* sp.

J. C. HUTSON,
Entomologist.

Peradeniya, January 25, 1921.

REPORT OF THE ASSISTANT ENTOMOLOGIST.

SINCE June 1, 1920, the Assistant Entomologist has been in residence at Sarnia estate, Badulla, where land, labour, and accommodation have been generously provided free of cost by Colonel W. G. B. Dickson.

Speyer's Paint Mixture.—Attention has been concentrated, in the first instance, upon continued field tests of some of Mr. Speyer's final recommendations, especially in regard to his special paint mixture. The cost of this treatment is Rs. 29·65 per acre, materials representing Rs. 23·53, and application Rs. 6·12. 38 lb. of paint are necessary to paint one acre thoroughly.

Treatment caused 11·1 per cent. of bushes to die back to the collar, and there were 2·4 more die back branches per bush in the painted than in the unpainted area. The paint, however, caused a maximum reduction in occupied galleries of 41 per cent., and a maximum reduction of 47 per cent. of adults, 86·5 per cent. of pupæ, 80·9 per cent. of larvæ, and 22·1 per cent. of eggs. In view, therefore, of the extremely high cost of treatment, the injury caused to the bushes, the comparatively large number of beetles escaping from the pruned bushes in spite of treatment, and incidentally from green manure and shade trees, which cannot be treated, this method of control cannot be recommended.

Manurial Experiments.—Attention has been directed, secondly, to the possible control of this pest by cultural methods, with the object of improving the constitution and vigour of the bushes to enable them to withstand attack and repair damage by the healing of gallery entrance holes, and it is considered that investigation should proceed in this direction rather than in attempting to reduce the numbers of borers by mechanical means, especially as *X. fornicatus* does not confine its attention to tea. With this object in view preliminary manurial experiments have been commenced at Sarina estate, from which it is hoped information may be derived regarding the relation which exists between nitrogen, phosphoric acid, and potash, and borer incidence.

Gallery Entrance Healing.—Particular attention has been devoted to the question of gallery entrance healing, which appears to be stimulated by the action of certain manurial constituents. The process of healing is so complete in some cases that the branches cannot be fractured where boring has taken place. It is hoped that information on this point may be forthcoming from the manurial experiments now in progress. The advantage of encouraging the plant to repair all damage done by borer thus preventing the fracture of branches by plucking coolies and high winds is at once apparent, and inquiries on this point are being continued.

Control Pruning.—An attempt to limit the reproduction of borers by so-called "control pruning," *i.e.*, the removal of infested branches at intervals, had to be abandoned owing to the mutilation caused to the bushes, and it is feared that this suggested form of control, while sound in theory, is not practical.

Castor Oil Plant as a Trap-Tree.—An experiment with castor as a trap-tree is in progress at an estate near Kandy, and a more recent one, on a smaller scale, has been commenced in the Badulla District. An instance has been observed during the year where castor was very heavily attacked, while the surrounding tea was not, and never had been, infested by borer.

Natural Enemies of X. fornicatus.—The chief insects found preying upon *X. fornicatus* were a *Trogositid* beetle and a *Drosophilid* fly in the larval stage. Seven specimens of the former and 529 of the latter were found in 4,020 galleries examined.

Burial of Prunings.—Arrangements are complete for commencing an experiment with eighteen different substances to ascertain the effect of these substances upon the inmates of galleries when buried with prunings.

Miscellaneous.—Among other matters which have received attention are the following :—Dadap shade and borer incidence ; crop restriction and shot-hole borer ; the possibility of destroying the Ambrosia fungus in the galleries, and upon which *X. fornicatus* subsists in the adult and larval stages ; and insects injurious to various green manure and shade trees.

Itinerary.—Thirty-one visits to estates have been made during the year in the following districts :—Badulla, Balangoda, Hantane, Haputale, Hunasgeriya, Kelani Valley, Kadugannawa, Rakwana, and Ratnapura.

Reports and Addresses.—Reports have been prepared on visits to several estates which have been visited, and for publication in the " Tropical Agriculturist " and the Press. An account of shot-hole borer investigations was given before the Committee of Agricultural Experiments in March, and a lecture on the same subject before the Sabaragamuwa Planters' Association in April.

Inquiries and Correspondence.—Inquiries concerning shot-hole borer have been received from numerous sources. The total letters dealt with by the Assistant Entomologist during the year numbered 861, of which 388 were received and 473 despatched.

F. P. JEPSON,
Assistant Entomologist.

January 25, 1921.

III.—REPORT ON THE WORK OF THE CHEMICAL DIVISION.

From January 20 to May 13, 1920, I acted as Secretary to the Ceylon Agricultural Society, and again from July 22 to date.

From May 13 to July 22, 1920, I acted as Director of Agriculture on Mr. Petch's proceeding to England on sick leave.

The work during the year was largely in connection with the increased growth of food products, both on estates and in village lands generally.

Several districts were visited to inspect and advise on selected sites for opening and asweddumizing for paddy cultivation, including Minipe-ela, Nachchaduwa, Iranamadu, and Kirindi-oya Schemes.

The Provinces were also visited to ascertain the best means of increasing the yield of paddy on the area already under cultivation, some 670,000 acres.

The results of previous paddy manuring experiments in India, Ceylon, and other countries were studied, and a series of plots arranged in different districts to demonstrate the effect of green manures and phosphates, and manure mixtures with and without potash. Manuring in the wet districts of Ceylon had consisted chiefly in the application of ½ to 1 cwt. of crushed bones per acre costing about Rs. 5 per acre, but as bones had trebled in cost and were difficult to obtain, a cheaper phosphate was employed instead.

A small quantity of cyanamide was also included in one mixture, after a preliminary trial at the Experiment Station, Peradeniya, in view of the possibility of this manure being manufactured in Ceylon in the near future. It had already been tried in India and Burma, and was said to be well suited for paddy manuring on account of its production of ammonia in the soil. As it was desirable to demonstrate the effect of the manures, the ordinary method of cultivation in each district was adhered to, though the ploughings, &c., were to be thoroughly carried out and the manures applied uniformly and worked into the soil before sowing or transplanting.

One of the chief difficulties found in connection with comparative paddy experiments was the great variation in measurements both of area and grain in the different Provinces, and sometimes in the same districts. This variation would require careful adjustment to make the results comparative, and close supervision of the experiments both at time of sowing and at harvest.

A standard system of measurements both of area and grain should be taught in all schools, based on the acre and bushel, the standards chiefly in use in the Empire.

The results of the yala experiments were in some cases quite satisfactory, and the villagers were considerably interested. The maha experiments, which began in September, have not yet been concluded. In some districts the sowing period was long delayed by drought, or the plots, together with the surrounding paddy, were damaged by heavy rains and floods. In two or three cases in the dry zone late application of the manure, as seed was germinating, is said to have checked development. The harvesting of the maha plots will be done in February and March. It is desirable that all the plots should be continued for a few years, as it is only by demonstration that the beneficial effects of continued manuring can be kept before the villagers. The latter cannot afford the comparatively large amounts of manure found suitable in the India experiments, so that the process of improvement will be slow.

The effect of green manuring in several districts has been very marked, and it will probably be found the best and cheapest method within reach of the villagers of permanently improving paddy soils, especially if an annual application of phosphate is also made. The chief green manures employed are the leaves and small branches of Ingasaman, Dadap, Wild Sunflower, Keppitiya, Pila (*Tephrosia purpurea*), Hana (*Crotalaria juncea*), and other leafy plants growing near the paddy fields.

In connection with this question of the manuring of paddy, several soils have been analysed both from Ceylon and other paddy-growing countries. The most marked feature of these analyses is the comparative poverty of Ceylon paddy soils in mineral matter (lime, potash, and phosphoric acid) compared with others.

Analyses of the food value of ordinary paddy and hill paddy and of the ash on mineral matter made in Colombo are of interest. Ordinary paddy has rather more starch, but is poorer in oil and proteids than hill paddy. The relative nutritive ratios being as 1 : 9·4 and 1 : 8, respectively. The ash in both cases amounting to 5·5 and 4·7 per cent. respectively is very similar, the chief ingredient after silica being the phosphoric acid. Most of the silica is present in the husk of the paddy ; the lime content is low, also the potash. Rice contains only 1·4 per cent. of ash with 30 per cent. or more of phosphoric acid.

The amount of nitrogen and mineral matter removed from the soil by an average crop of 30 bushels of paddy, straw being returned or left on the land, is—

	lb.		lb.
Nitrogen	15·37	Lime	0·71
Phosphoric acid	6·18	Magnesia	2·37
Potash	3·00		

The ingredients supplied by 1 cwt. of bones is 3·36 lb. of nitrogen and 24·6 lb. of phosphoric acid.

	Food Analysis. Paddy (Ordinary Dark). Per Cent.	Hill Paddy. Per Cent.		Ash Analysis. Per Cent.	Per Cent.
Moisture ..	6·9	9·0	Lime ..	1·20	1·60
Oil ..	1·7	2·4	Magnesia ..	3·46	3·30
Ash ..	5·5	4·7	Potash ..	4·35	4·90
Woody fibre ..	11·0	9·5	Phosphoric acid ..	8·96	9·00
Proteids ..	7·6	9·0	Silica ..	77·44	74·50
Carbohydrates ..	67·3	65·4	Sulphuric acid ..	0·34	0·70
			Chlorine ..	Trace	Trace
	100·00	100·00	Soda ..	2·30	4·60
			Iron and Alumina	1·95	1·40
Containing nitrogen	1·22	1·44			
Nutritive ratio ..	1 : 9·4	1 : 8		100·00	100·00

Estimations of fibre were made in Sisal (*Agave rigida*), Mauritius hemp (*Fourcræa gigantea*), and *Agave americana* in view of their utilization as hedge plants round chenas to allow of permanent cultivation. The weight and yield of fibre in average well-grown leaves were as follows :—

	Average Weight. lb.	Yield of Fibre. Per Cent.
Sisal (*Agave rigida* var. *Sisalana*)	2 ..	3·12
Mauritius Hemp (*Fourcræa gigantea*)	3¾ ..	1·66
American Aloe	5 ..	2·06

Both Sisal and Mauritius hemp grow well from sea level to 3,500 feet or more, and it was suggested to plant Sisal or Mauritius hemp in double rows, the plants being 4 feet apart diagonally, outside the ordinary timber fence usually made around newly-cleared chena lands. In three to four years, with some attention, a fence would be established impervious to cattle, from which the cultivators could then obtain a saleable fibre from the lower leaves for some years. The fibre of Mauritius hemp is now largely used for the manufacture of mats and hats, and possibly can be utilized as a substitute for the fabric of motor tyres.

A list of thorny plants from Ceylon jungles suitable for hedges has been compiled and seed collected when possible for distribution to school gardens, &c., for trial. One of the best for the low-country is Sapan (*Cæsalpinia Sapan*), a small thorny tree flowering in August and September, the wood of which yields a valuable red dye. Kapok (*Eriodendron anfractuosum*) is also recommended for the drier districts. It yields a valuable cotton employed in life belts, &c. The best qualities from Java fetch 7*d.* to 9*d.* per lb. The seed also contains 28 per cent. of an oil similar to cotton seed oil, and the cake is a useful cattle food.

Full inquiry has been made into the question of the manufacture of cyanamide in Ceylon in view of the possible production of power by the electrification of the Laxapana-Aberdeen falls in the Central Province.

During 1919 the manures imported into Ceylon contained approximately 4,094 tons of nitrogen, the figures being based on the guaranteed analyses. This would be equivalent to 22,750 tons of cyanamide, while the actual amount of cyanamide (nitrolim) imported in 1919 was 5,549 tons valued at Rs. 305 per ton.

If half the acreage of tea, rubber, and cacao, and one quarter the acreage of coconuts used 1 cwt. per acre of nitrolim per annum, and half the paddy area used half cwt. of nitrolim per acre per annum, the consumption would be about 50,000 tons per annum.

The analytical work included analyses of eight varieties of sweet potatoes to determine the food value and the value as a source of power alcohol.

The total dry matter ranged from 30·5 to 34 per cent. on the fresh tubers. The percentage of starch varied from 19·12 per cent. to 24·48 per cent. in Red Jersey and Joes' respectively ; and the sugar content from 2·50 per cent. in Pierson to 4·11 per cent. in pumpkin yam varieties. The combined sugar and starch ranged from 22·84 per cent. in Red Jersey to 28·35 per cent. in Joes' sweet potato, and averaged 25·94 per cent. in the eight varieties. These figures compare favourably with the potato, which is largely grown in Germany for the production of alcohol. The starch content ranges from 16 to 22 per cent., and the sugar and dextrin about 1·5 per cent. The total nitrogen and mineral matter in the sweet potatoes averages 0·21 per cent. and 0·77 per cent., respectively.

There are few records as to yields per acre in Ceylon on which the choice of variety to grow would depend ; but the best should yield an average of 12,000 lb. per acre.

Other analyses included the ash of citronella grass and elephant grass and jaggery, the latter with a view to finding a simple means of purification by the producer. It was found that the purification was difficult, but that an improved jaggery could be produced by greater care in the process of manufacture.

Analyses of paddy soils included samples from Minneriya, Weligama, Karachchi, Trincomalee, Nachchaduwa, and Allai, also several samples from the paddy manuring demonstration plots. Samples of paddy soils were also obtained from some of the chief rice-growing areas in Burma, Japan, and South India, including Tinnevelly, Coimbatore, Pudukarai, Trichonopoly, and Tanjore. A full report on these soils will be issued when analyses are completed. It is noticed that in most Ceylon paddy areas the yields from certain fields vary greatly. Samples of soil from the highest and lowest yielding fields of such areas are being compared to ascertain the cause.

M. KELWAY BAMBER,
Government Chemist.

Peradeniya, February 21, 1921.

IV.—PLANT PESTS AND DISEASES INSPECTORATE

ENTOMOLOGICAL.

The original plan of the work for the year was that this section should inspect every tea estate and garden in the Central Division, namely, Central Province and Uva, and complete the insect survey of these Provinces. The Inspectorate was to start at a given centre (Nawalapitiya), and extend through the Provinces district by district. The functions of the Inspectorate were to be made known to all agriculturists, and special educational publicity given in the case of small cultivators. It was proposed that the entomological section would supply the Inspectorate with illustrated pamphlets of the chief insect for explanation and distribution among the small holders.

During the year a great many requests for permits to sell tea plants came to the Department, and the Inspector received orders that all estates and gardens requesting permits were to be examined before permits were issued. As the Inspectorate consisted of only two active units, the carrying out of these orders made the immediate execution of the original plan an impossibility. The two active units were forced to scatter all over the tea-growing area to whatever estates and gardens called for permits for sales of tea plants.

Through the execution of new orders and the lack of assistants, the Inspectorate was unable to function along the lines of the original plan. Half of the original plan has been completed, every nursery applying for permits has been inspected, the Inspectorate is in close touch with the small cultivator, and its influence has radiated to villages little known as agricultural centres. The Inspectorate has always endeavoured to give special attention to gardens, because the small cultivator is especially ignorant of the pests of crops, the damage they do, and the serious menace they are to cultivation, and the legislation governing these pests ; again, hundreds of tea gardens are so widely scattered, they are little seen or visited in the ordinary course of events, and their owners have not the opportunities of keeping pace with the progress of agricultural affairs that the estates and villages near high roads have.

5. During the year Messrs. Jackson and Mendis have satisfied the Director of Agriculture and their examiners of their knowledge of the plant pests and diseases of the Island and the laws appertaining to them, and have passed the vernacular examinations ; they are now enrolled as officers of the permanent staff.

6. The following figures show the amount of work covered by the Inspectorate during the year :—

Reports on estates and gardens	2,729
Number of estates inspected	182
Number of estates scheduled for shot-hole borer	755
Number of permits for sale of tea plants to estates	111
Number of plants sold by permit from estates	1,098,150
Number of gardens inspected	2,547
Number of gardens scheduled for Shot-hole borer	2,362
Number of permits for sale of tea plants to gardens	21
Number of plants sold by permit from garden nurseries ..	187,000
Total number of reports	2,729
Total number of permits issued	132
Total number of plants sold	1,285,150

7. The following insects have been recorded on tea by the Inspectorate during the year :—

COLEOPTERA.

Xyleborus fornicatus, Eich.
Singhala tenella.

DIPTERA.

Oscinis theæ, Bigot.
Tipulidæ spp.
Dolichopodidæ spp.

HEMIPTERA.

Helopeltis antonii, Sign.
Ceylonia theacola, Buck.
Icerya purchasi, Mask.
Pseudococcus spp.
Lecaniun viride, Gr.
Do. nigrum, Niet.
Do. hemisphericum, Targ.
Chionaspis theæ, Mask.
Orthesia insignis, Doug.

LEPIDOPTERA.

Zeuzera offeæ, Niet.
Suana concolor, Wlk.
Taragama dorsalis, and on dadaps.
Parasa lepida, Cram.
Thosea cana, Wlk.
Scopelodes venosa.
Orgyia postica, Wlk.
Dasychira horsfeldi, Saund.
Stauropus alternus, Wlk.
Phyche (Manatha) albipes, Moore.
Clana crameri, West.
Gracilaria theivora.
Homona coffearia, Niet., also on dadaps, acacias grevilleas, and albizzia.
Heterusia cingala, Moore.

PSEUDONEUROPTERA.

Calotermes militaris.

THYSANOPTERA.

Thrips spp.

ARACHNOIDÆ.

Tetranychus bioculatus, W–Mas.

Achatina fulica : Never found actually devouring tea, but on the common vegetation and leguminous trees.

HYMENOPTEROUS PARASITES.

ICHNEUMONIDÆ.

Paniscus nigriventris, Brulle.
Paniscus levis, Cam.
Ophion bicarinatus, Cam.
Ophion luteus, L.
Pleuroneurophion erythrocerus, Cam.
Stauropodoctonus orientalis, Morl.
Henicospilus hariolus, Morl.
Nototrachys flavo-orbitalis, Cam.
Nototrachys variistriatus, Morl.
Campoplex zonatus, Morl.
Campoplex altius, Morl.
Tarytia flavo-orbitalis, Cam.
Pristomerus marginicollis, Cam.
Cremastus noxius, Morl.
Melcha erythropus, Cam.
Melcha sp. n. (capitanigra, Jar.)
Pimpla ampla, Morl.
Phytodiatus capuæ, Morl.

Prevalence of Shot-hole Borer on Estates.

Name of District.	Total Number of Estates in District.	Total Number of Estates infested.	Per-centage.	Name of District.	Total Number of Estates in District.	Total Number of Estates infested.	Per-centage.
Alagala	29	22	75	Madulsima	43	15	34
Ambagamuwa	38	25	66	Maskeliya	73	8	10
Badulla	88	60	68	Matale East	81	35	43
Balangoda	42	15	37	Matale North	47	8	17
Dikoya	89	3	3	Matale South	30	18	60
Dikoya Lower	33	15	45	Matale West	49	30	69
Dimbula	144	8	5	Maturata	23	9	39
Dolosbage	58	46	79	Medamahanuwara	22	6	26
Dumbara	35	1	3	Monaragala	9	—	—
Galagedara	47	4	8	Morawak Korale	32	1	3
Galle	115	6	5	New Galway	13	—	—
Hantane	56	22	61	Nilambe	29	26	89
Haputale	72	45	62	Nitre Cave	12	1	8
Haputale West	18	—	—	Nuwara Eliya	36	—	—
Hewaheta Upper	21	6	27	Passara	21	21	100
Hewaheta Lower	29	14	48	Pundaloya	14	7	50
Hunasgeriya	19	11	57	Pussellawa	69	69	100
Kadugannawa	46	19	41	Rakwana	56	4	7
Kalutara	210	6	3	Ramboda	21	3	14
Kegalla	84	14	16	Ratnapura	85	18	21
Kelani Valley	227	60	26	Uda Pussellawa	36	6	16
Kelebokka	17	16	94	Walapane Lower	7	1	14
Knuckles	21	21	100	Wattegama & Panwila	34	14	41
Kotmale	30	23	77	Yakdessa	16	7	43

Presence of Shot-hole Borer in Tea Gardens.

Name of District.	Total Number of Gardens in District.	Total Number of Gardens infested.	Per-centage.	Name of District.	Total Number of Gardens in District.	Total Number of Gardens infested.	Per-centage.
Alagalla	143	140	98	Hantane†	45	40	89
Ambagamuwa	217	214	98	Haputale	15	—	—
Badulla*	127	19	15	Hewaheta Lower	79	59	75
Dikoya	1	—	—	Kadugannawa	579	579	100
Dikoya Lower*	1	—	—	Kotmale	54	51	94
Dolosbage*	1	1	100	Matale *	1	—	—
Dumbara*	3	1	33	Pussellawa	245	237	96
Galagedara*	39	39	100	Uda Pussellawa*	1	1	100
Galle*	2	—	—	Walapane*	1	—	—

* District only half completed.
† Districts of which only one-third remains to be inspected.

Where districts are not mentioned (see estates list on previous page), no insect survey of the gardens in those districts has as yet been made.

List of Nurseries attached to Tea Gardens.

Name.	Village.	District.	Remarks.
Gatedelewatta	Lagamuwa	Kadugannawa	Scheduled
Wattegodda	Kobbekaduwa	do.	Free
Gondenawa	Warakawa	Ambagamuwa	Free
Upasakagedarawatta	Gadaladeniya	Kadugannawa	Free
Ferndale	Pinnawela	Balangoda	Scheduled

NIGEL K. JARDINE,
Inspector for Plant Pests and Diseases (Central).

Plant Pests and Diseases Inspectorate,
January 21, 1921.

MYCOLOGICAL.

The organization of the Plant Pests Inspectorate (Mycological) has been delayed owing to the shortage of staff and pressure of work in the Mycological Department. On February 14 the Plant Pests Inspector (Mycological) took over the duties of the Acting Botanist and Mycologist during his absence on leave. On Mr. Bryce's return on June 18 the Plant Pests Inspector (Mycological) assumed the duties of Acting Assistant Mycologist until November 14, when he was appointed Assistant Mycologist on probation.

In October two Sub-Inspectors reported for duty, and they are now undergoing a course of training in the identification and treatment of fungus diseases under the Assistant Mycologist.

C. H. GADD,
Assistant Mycologist.

January 15, 1921.

V.—REPORT OF THE ECONOMIC BOTANIST.

I.—Introduction.

The method of attack upon the problem of the selection and breeding of Ceylon paddies has been based upon the presumption that the sole desirable aim for the time being is largeness of yield. Yield is not a simple character like colour of grain, immunity to fungus attacks, early ripening or chaff colour, and the problem of securing a maximum is one of straight selection of heavy yielding paddies coupled with a study of the best possible cultural conditions.

II.—Methods.

The selection portion of the problem has been visualized as—

(1) The initial choice of the best yielding and most popular paddies of as many districts of the Island as possible.
(2) The isolation from these of the highest yielding pure lines.
(3) The multiplication of the seed of the latter on a field scale to provide a source of seed supply.

In other words, the idea is to place at the service of the cultivator the highest yielding types of such varieties as Mawi, Heenati, Illankalayan, Dewereddiri, Hatiel, and so on. At the same time, by keeping the cultures as large as possible, opportunity has been given for the manifestation of new strains arising spontaneously by mutation.

A difficulty met with at the outset is that the limits of paddy varieties in Ceylon are in the majority of cases not rigidly defined, while the same variety often exists in different localities under different names. Consequently, the conception of a variety such as Mawi has had to be extended to include many varieties not ordinarily known as Mawi. Further, under the name Mawi several varieties exist, which are quite distinct. It is therefore necessary, in the first place, to isolate and define the type of the Mawi variety.

Side by side exist varieties such as Kamookampoosamba, Dikwi, and Dewereddiri, which appear to be botanically distinct and monotypic.

The first step, therefore, was evidently to define the limits of each variety before working upon it, and to this end seed samples of varieties of all ripening periods were collected from every Province.

The progress of work upon these collections is indicated in the following summary.

III.—Maha Season, 1920.

(*A*) *Six Months' Paddies.*

(*a*) *Anuradhapura* (*Series I.*).—105 varieties collected from all parts of the Island were transplanted at the Dry Zone Experimental Station, before the arrival of the Economic Botanist. Of these, 99 were harvested February to April, 1920, and selection work was carried out upon them for the following maha. (See Series V. and VI.).

(*b*) *Peradeniya* (*Series I. a*).—68 varieties, nominal duplicates of some of the above, collected in the same manner were transplanted at the Experiment Station, Peradeniya, before the arrival of the Economic Botanist. All turned out so poorly that it was possible merely to save seed samples from 37 of them. No selection work was done upon them.

(*B*) *Four and Five Months' Paddies.*

(*a*) *Anuradhapura* (*Series II.*).—272 varieties, collected as above, were transplanted before the arrival of the Economic Botanist at the Dry Zone Experimental Station. Of these, 82 failed, and about as many were rejected on the score of impurity. The remaining varieties were harvested, and selection work was carried out on them for the next yala. (See Series IV.)

(*b*) *Peradeniya* (*Series II. a*).—266 varieties, nominal duplicates of the above, were transplanted before the arrival of the Economic Botanist at the Experiment Station, Peradeniya. These failed to such an extent that it was only possible to harvest 19 of them in March-April, 1920, in order to retain seed samples. No selection work was carried out upon these.

IV.—Yala Season, 1920.

(*C*) *Three Months' Paddies.*

(*a*) *Anuradhapura* (*Series III.*)—90 varieties, collected as above, were transplanted by the Economic Botanist at the Dry Zone Experimental Station. All were successful, and selection work upon all is in progress for future trials.

(*b*) *Peradeniya* (*Series III. a*).—44 varieties, exact duplicates of the above, were transplanted at the Experiment Station, Peradeniya. Of these, 24 were good and 20 moderate. Selection work is being carried out on these.

(*c*) *Anuradhapura* (*Series IV.*).—68 pure line cultures of Suwandel, Madoluwa, Suduhatiel, and Kalupanniti were sown, and have been harvested as far as required. The best of these will be multiplied as far as opportunity allows in the following yala.

(*d*) *Peradeniya* (*Series IV. a*).—41 varieties, collected as in series I., were broadcasted in order to retain seed samples. All were successfully harvested.

V.—Maha Season, 1920–21.

(*A*) *Mawi Selections.*

(*a*) *Anuradhapura* (*Series V.*).—421 pure lines of all available varieties of Mawi were transplanted at the Dry Zone Experimental Station in November, 1920. All were doing very well, and the harvesting of the earliest will commence in February, 1921.

(*b*) *Peradeniya* (*Series V. a*).—179 pure lines of the same varieties were transplanted at the Experiment Station, Peradeniya, in October. All these are doing very well, and will be harvested in March-April, 1921.

(*B*) *Samba Selections.*

(*a*) *Anuradhapura* (*Series VI.*).—155 pure lines of all available varieties of the samba type were transplanted at the Dry Zone Experimental Station in November. All are proving successful.

(*b*) *Peradeniya* (*Series VI. a*).—44 pure lines of the same varieties were transplanted in October at the Experiment Station, Peradeniya. These are only doing moderately well.

VI.—GENERAL REMARKS.

As indicated above, the improvement work is being confined to straight selection work on the best native paddies, together with the study of the best cultural conditions. No attention is being given to foreign paddies, or to improvement by cross-breeding. At present the advantages to be gained by attempting to produce new strains by cross-breeding appear doubtful.

The only pest from which the paddy crop suffers to any great material extent is the paddy bug. Immunity to a pest of this kind, however, is not a breeding character, and it is very unlikely that any variety is totally immune. Fungi do so little damage to Ceylon paddy that the question of immune varieties has no urgency, unless this state of things shows signs of altering.

It is possible that it may prove useful in the future to combine the characters of early ripening, strong straw, or absence of awns in one variety with other desirable characters in the case of another possessing these desirable characters but lacking the first mentioned, and this possibility is being borne in mind.

F. SUMMERS,
Economic Botanist.

January 26, 1921.

VI.—REPORT ON THE WORK OF SCHOOL GARDENS.

THE school gardens in the Kalutara, Galle, Matara, and Hambantota Districts were handed over in October to the newly appointed Divisional Agricultural Officer of the Southern Division.

School Gardens.—There were 419 registered Government school gardens at the end of the year, as against 389 at the end of 1919, showing an increase of 30. The number of registered school gardens attached to grant-in-aid schools stood at 110, as compared with 95 at the end of 1919. There are 60 Government schools awaiting registration. Owing to our inability to equip these schools with the necessary implements for lack of funds registration has had to be postponed.

A sum of Rs. 1,800 was received from District School Committees for supplying implements to new schools. This sum was devoted entirely for the purchase of implements for the newly registered schools. The prices of implements continued to be high throughout the year, and considerable difficulty was experienced in replacing worn out and unserviceable tools with the small vote of Rs. 1,500 provided for this purpose.

Awards.—School gardens were regularly inspected throughout the year. Awards to the value of Rs. 1,500, were distributed amongst deserving schools. The following statement shows the distribution of the amount :—

	Rs.		Rs.
Ratnapura	135	Kandy	295
Kegalla	125	Nuwara Eliya	40
Puttalam	10	Matale	30
Colombo	195	Badulla	90
Galle	90	Kurunegala	290
Matara	230	Anuradhapura	125
Kalutara	25	Mullaittivu	20
Hambantota	100		

103 certificates of merit were awarded to those schools which did not reach such a standard as to deserve a cash award.

Home Gardens.—Every possible encouragement is being given by this Department to school children to cultivate small plots of land attached to their dwelling-houses, where they can put into practice the improved methods of agriculture taught to them in the school. Two new temporary inspectors were appointed by the Education Department to be solely in charge of the inspection of these gardens. These inspectors were attached to this Department, and good work was done during the year. The children, seeing the interest taken by Government in the scheme, appear to take considerable pains over their work. It is encouraging to see the home gardens scheme becoming popular amongst both teachers and pupils. A sum of Rs. 600 was distributed in awards during the year.

Bee-keeping.—The newly-formed Bee-keepers' Association is doing everything possible to popularize scientific bee-keeping in Ceylon. It has, with the assistance of the District School Committees, supplied 69 standard hives to Government schools. A brochure in Sinhalese entitled "Bee-keeping," written by Mr. A. P. Goonetillaka, an enthusiastic bee-keeper, has also been supplied to a good many schools free of charge. Well-established colonies in standard hives are now to be seen in many schools, and it is gratifying to see villagers in many parts of the Island taking to this useful industry. Every possible assistance was given by this Department to the Association during the year. Two prizes of Rs. 25 and Rs. 5, respectively, have been offered for bee-keeping by Messrs. F. A. Stockdale and George Crozier.

Stock Garden.—Floods greatly interfered with the work of the Stock Garden. The low-lying land adjoining the railway line went under water several times, and considerable damage was done to nurseries. In spite of this, a good deal of both seeds and plants was distributed. 15,343 packets of economic seeds, 379 packets of ornamental seeds, 17,127 economic plants, and 414 ornamental plants were despatched during the year. Both the English and the vernacular students of the School of Tropical Agriculture paid several visits to the Stock Garden, and practical demonstrations on the cultivation of dioscoreas, tannias, &c., were given by the Foreman-in-charge.

ALEX. PERERA,
Senior Inspector of School Gardens.

Peradeniya, January 26, 1921.

VII.—REPORT ON THE WORK OF THE EXPERIMENT STATIONS.

PERADENIYA.

Tea.

Plucking was resumed in February. The total weight of green leaf plucked for the year was 58,905 lb. Plot 149, the dadap plot, gave the highest yield, 6,928 lb. green leaf. The dadaps between the acre plots were uprooted. A large quantity of couch grass was forked out. In plot 149 dadap stumps were planted to eventually replace the old trees. The " hillside " clearing of dark leaf Manipuri was supplied, plain forked, and re-drained. The manuring programme was carried out in April. Approximately 1 acre of young tea was cut out and the land used for paddy.

Cacao.

The crop for the year was 20,762 lb. cured cacao. The highest price realized was Rs. 80 per cwt., a serious fall in the market followed. The manuring of the plots under experiment was carried out in May. In plots 1 to 10 the dadap shade was heavily lopped. Treatment was given to all trees affected by canker. Loranthus was removed throughout. Systematic shooting of squirrels was continued.

Rubber.

Tapping of trees under the following experiments has been continued throughout the year :—

(1) Two- and three-day tapping trials in plots 151 to 154.

(2) Five double rows under manurial experiments.

The following experiments terminated :—

Tapping $\frac{1}{3}$ two cuts 1 foot apart twice weekly ;

Versus tapping $\frac{1}{3}$ two cuts 2 feet apart twice weekly.

Seven avenues of rubber have been extended up to the jungle boundary with plants from No. 2 tree, Henaratgoda. The newly-planted area comprises about 4 acres. Plots 21 to 27 were supplied twice, disc-harrowed, and ploughed. The Funtumia and Ceara rubber were cleared of undergrowth.

Coconuts.

37,614 nuts were gathered. The highest price realized was Rs. 80 per 1,000 nuts. The 10-acre plot of young coconuts was re-drained according to plan to facilitate cultivation. The flatter portions were disc-harrowed.

Coffee.

There was a large demand for Robusta seed. 684 lb. Robusta and 136 lb. Hybrid coffee were sold for seed. All plots were forked in March and April. The old Robusta coffee was thinned out by 50 per cent.

Paddy.

Fifty-three new plots were made in the land adjoining the tea plots. These new fields were sown for the maha season with the following varieties of paddy :—Village Hatiel, Elvi, Dr. Lock's Hatiel, Indrasail, Gizasamba, Jeerakasamba, Muttusamba, and Macan Pina Manilla. In the old paddy area 1 acre was sown broadcast with Heenati for the yala season. The remainder of the ground was given up to the Economic Botanist for paddy breeding experiments.

Sugar Cane.

Canes from the following varieties were cut :—

Variety.	Yield per Acre. Tons.	Variety.	Yield per Acre. Tons.
1,237 ..	.. 37·8	D. K. 74 ..	.. 21·8
55 P. ..	.. 35·4	3,390 ..	.. 27·6
Sealy's seedling	.. 45·8	Striped Tanna	.. —
131 P. ..	.. 20·8	Striped White Tanna	.. 14·1

The plots were cleaned and forked after cutting. Soil samples and samples of canes were sent for analysis. Two acres were also planted with sets of all the above varieties, with the addition of Sin Nombre, Barbados 208, and Mauritius Red Top.

Food Products.

Six acres of Eureka and Nuwara Eliya maize were grown. In addition 5 acres of young rubber were interplanted with five varieties of maize, from which a good crop was obtained. Nine varieties of Mauritius sweet potatoes were planted. Six varieties were lifted; the best yields were given by Sealy's and Red Jersey.

$3\frac{3}{5}$ acres were sown with kurakkan ; a crop of $48\frac{1}{2}$ bushels were harvested.

Two acres were planted with six varieties of Mauritius Cassava. Five varieties of Ceylon yams were planted. Varieties of West Indian and Mauritius yams are being propagated in the fruit plots.

In November $2\frac{2}{5}$ acres of green gram and $1\frac{1}{5}$ acres of Dwarf Lima beans were sown.

GENERAL.

The rainfall for the year was 103·24 inches. 20·78 inches fell in November, which was an exceptionally wet month.

Four 1-acre plots of different fodder grasses have been planted. A great deal of work was done in straightening and broadening of roads. Trials with Fordson tractors were carried out on the station in August. A covered manure pit has been constructed.

On November 11 Mr. G. Harbord handed over management to Mr. T. H. Holland.

The resident labour force received anchylostomiasis treatment in March.

The health of the labour force has been satisfactory.

The working of the station was somewhat impeded at the end of the year by sickness among the staff.

T. H. HOLLAND,
January 25, 1921. Manager, Experiment Station, Peradeniya.

ANURADHAPURA.

1. *Paddy : Time of Sowing Experiments.*—These experiments, started in September, 1919, were continued until August, 1920. In September a fresh start was made to test the best average season to plant, and when paddy fly and other pests may be expected to be troublesome. The following varieties have been selected for trial :—Murungan, Illankalayan, Mawi, and Muttusamba.

Varietal Tests and Botanical Examinations.—105 varieties of six months' paddies, 272 varieties of four and five months' paddies, and 90 varieties of three months' paddies, which were collected from all parts of the Island, were transplanted under the supervision of the Economic Botanist. Most of the varieties were successful, and selection work upon all is in progress for future trials. The best of these will be multiplied as far as opportunity allows in the following seasons.

New Land.—A further block of 2½ acres has been brought under cultivation during the year. A start has been made to extend this area on the site occupied by the old cooly lines for planting in the next yala season.

2. *Manurial Experiments.*—Three blocks of 4 acres each belonging to private land owners in the district have been manured with various mixtures under the supervision of the Manager of the Station. It is too early to draw conclusions.

3. *Pests.*—The paddy fly was prevalent in exceptional numbers when the crops were coming into ear. An entomological officer of the Department has been sent from Peradeniya to study the life-history of this troublesome pest and the effect of control measures Monkeys are becoming troublesome.

4. *Fibres : Fourcroea gigantea* (Mauritius Hemp).—The plants have continued to make good growth during the year, the length of the lower leaves being now 5–6 feet. A plant for extracting the fibre will soon be required.

Agave rigida var. *Sisalana* (Sisal Hemp).—This variety, which did not look well during the severe drought, has recovered with the rains, and is making satisfactory growth.

The interplanted castor have all been uprooted. Several attempts at planting Ranawara to take its place proved unsuccessful.

5. *Coconuts.*—The plantation of 4 acres on unirrigable land has continued to make exceedingly satisfactory growth. All the trees are in a thriving and healthy condition. The land has been ploughed once in two months and the trees weeded round.

6. *Citrus.*—The whole of the area set apart for limes has been planted with plants from our nurseries, with the exception of the low land, which is in a water-logged condition, brought about by the excessively heavy and prolonged rains during November and December. The young plants are all doing well. The plot of lime raised from seed received from British Guiana has begun to bear fruit 2½ years from planting. Some of the trees in the older plots of orange, lemon, citron, and grape fruit are bearing fruit for the first time.

7. *Coffee.*—The Robusta coffee trees are laden with ripe berries. The plants have so far been immune from the chief enemies of the coffee plant. There has been a demand for fresh selected seed from planters in the low-country. The dadap, gliricidia, and *Leucæna glauca* shade over the coffee has been regularly pruned. It has been found necessary to leave the side branches during the strong winds prevailing from September to December.

8. *Oil Palms.*—The oil palms planted in 1915 continue to make good growth. Several visitors to the Island have been struck with the satisfactory appearance of the trees. It is of interest to learn that the results furnished by palm nuts sent previously from this station to the Imperial Institute in London are very satisfactory.

9. *Sugar Canes.*—Nine varieties were tried this year. Sealy's seedling and Red Top Mauritius did best. Their superior growth, tillering capacity, and the quality to withstand both drought and water-logging assure one of the suitability of these varieties for planting in the dry zone districts. It is unfortunate that the land on which these varieties were grown had not good facilities for drainage.

10. *Miscellaneous Crops.*—Dhall (*Cajanus indicus*) sown as a mixed crop for seed on one acre yielded 9 bushels of clean seed. The whole of the lime area has been sown with dhall as a catch crop. Several orders for seed have been executed.

Millet (Jaffna) was grown on one-fifth of an acre and yielded a small crop.

Sorghum sown in the early season suffered from wet weather. Manioc was grown on one-tenth of an acre with an acre yield of 1,720 lb. Two plots of one-tenth of an acre each were planted with manioc cuttings to test the relative merits of horizontal *versus* vertical planting. In appearance so far the horizontal method is by far the better method. The plants are certainly healthier and more robust.

Dioscorea Yams (*Rajawali* and *Kirikondol*): One-tenth of an acre was put under this crop in 1919, and the acre yield of 6,900 lb. was a very good one. One-fifth of an acre has been planted with this crop this year.

Tannia Yams.—Ten varieties obtained from the Stock Garden at Peradeniya have been planted out and are all doing well.

Chillies.—This was tried on one-fourth of an acre. An acre yield of 720 lb. of dry chillies was obtained.

Turmeric.—One-twentieth of an acre of turmeric has been lifted yielding 170 lb. of rhizomes.

Plantains.—Plots of Suwandel, Kolikuttu, Ambul Hondarawalu, Alu Kehel, and Mohandum have been established.

Green Gram.—One-fifth of an acre has been sown.

Setaria Italica, Varagu, and Thanna failed owing to the rains.

Vegetables.—Brinjals, Ladies' Fingers, Spinach, Lettuce, Jerusalem Artichokes, and different varieties of beans were grown in small plots for propagation. Tomatoes fruited very well, most of the fruit weighing over a pound each.

11. *Fruit Section.*—Melons, custard apples, mulberries, pomegranates, guavas, and pineapples grew well, and the fruit were readily sold on the spot. The vacancies in the mango plot were supplied with grafts from India. The plots are situated on irrigable land, and during periods of drought were irrigated once in three weeks.

12. *New Works.*—Two new sets of cooly lines, which were badly needed, have been erected, and a third set is in course of construction. A new bungalow for the Foreman is nearing completion. The erection of the store, which was commenced last year, and was held up at the end of the year owing to the difficulty of obtaining bricks, &c., has been completed.

A portion of the low land opposite the new cooly lines has been filled and terraced. A temporary store has been built for the Economic Botanist. Six acres of jungle land has been cleared for chena experiments. New posts were erected right round the boundary to replace the decayed ones. The trace of the main road has been pegged out and cleared of stumps. A road was made through the Sisal fibre plot leading from the archæological reserve to Punkuliya village.

13. *Chena Experiments.*—An area of 6 acres has been enclosed by a five-strand barbed wire fence. The non-rocky area has been divided into three. The following crops have been planted:—Part 1, Tuber: Manioc and Sweet potato; Part 2, Legume: Green gram and Black gram; Part 3, Cereal: Maize and Kurakkan. The rocky portion has been sown with Elwi. The experiment is to test whether with rotation chenaing of lands can be made continuous.

14. *Visitors.*—The station was visited by His Royal Highness the Crown Prince of Roumania and his suite. A number of officers of the Government Departments at Anuradhapura and others interested in agriculture were given lectures and practical demonstrations on different tropical products grown on the station.

15. Labour has, on the whole, been satisfactory. The health of the coolies towards the end of the year has been very unsatisfactory. A severe epidemic of malarial fever and dysentery broke out. A house-to-house inspection was carried out, and coolies needing special attention were despatched to hospital, and others treated on the station.

H. A. DEUTROM,
Manager, Dry Zone Experimental Station.

February 3, 1921.

JAFFNA.

Four acres of White Burley and one acre of Turkish tobacco were cultivated. The White Burley is now definitely decided to be the best imported variety suitable for the locality. There is a great demand for this tobacco in London. The last crop fetched 1*s.* 9*d.* per pound. During the first quarter of the year leaflets were distributed among cultivators, and propaganda work was carried out to induce them to grow this crop. The Department offered to purchase the green plant at rates varying from 8 to 20 cents. As a result six cultivators from among Kondavil, Thavadi, Inuvil, Uduvil, and Urumpirai planted nurseries. These nurseries failed owing to unfavourable weather, and perhaps careless management. However, seedlings from the station were supplied to two of them. Lack of competitive purchase and higher prices obtained just then for local tobacco were the principal reasons which prevented more cultivators from taking to this crop. The nursery did well in spite of unfavourable weather, and more than sufficient was available for the requirement. The nurseries were sown between October 7 and 30. The bulk of the crop was planted during Christmas week, when the weather was favourable. With one exception, all the plots had a uniform crop, and the stand was good considering the nature of the soil. The yield of Turkish tobacco was 400 lb. The White Burley gave an average yield of 317 lb. to the acre, *i.e.*, 1,267 lb. for the 4 acres. The yield from the best plot was 130 lb. for one ¼-acre plot, which works out at 520 lb. to the acre.

One cultivator sold 1,000 plants at 16 cents per plant, and another 100 plants at 18 cents. The 1,000 plants after curing gave 125 lb. and the 100 plants gave 18 lb. (4,000 plants are planted to the acre).

In addition to the management of the station, three visits were paid to the castor plantation of Iranaimadu. This was planted by the Forest Department.

The writer was consulted by intending purchasers of paddy land at Iranaimadu under the tank. Four visits were paid in this connection. One lecture on general agricultural topics was given to cultivators at Atchelu.

The Tobacco Trial Grounds and an additional area, making nearly 25 acres, were purchased from cultivators and fencing work was started. A farm school will be built, and agricultural education will be given to students, headmen, and farmers. It is also the intention of the Department to run a small dairy.

W. P. A. COOKE,
Officer in Charge.

January 25, 1921.

VIII.—REPORTS OF THE DIVISIONAL OFFICERS.

CENTRAL DIVISION.

IN addition to my duties as Manager of the Experiment Station, Peradeniya, and in the absence of any working staff, my work in this connection was necessarily confined to making short tours when time permitted, mainly in the Matale District, also Pata Dumbara, Uda Dumbara, Pata Hewaheta, and Uda Hewaheta.

2. The knowledge gained of crops and agricultural conditions generally will be of assistance when the organization of the Central Division is taken in hand.

3. The tobacco experiments being carried out at Teldeniya Tobacco Trial Ground were continued on the same land. Six acres only were utilized, and a crop of 2,066 lb. of cured leaf was produced. The area was divided into half-acre blocks, and trials were made with twelve varieties with the object of securing a stock of seed of varieties true to type as far as possible, and also with the object of comparing varieties as regards wrapper, binder, and filler leaf production and crop weights.

4. Meetings of the Food Production Committees at Kandy and Matale were attended regularly.

G. HARBORD,
January 29, 1921. Acting Divisional Agricultural Officer, Central.

SOUTHERN DIVISION.

STAFF AND OFFICE.

THE Divisional Officer arrived in Ceylon on October 1, 1920, and remained until the 18th at headquarters at Peradeniya, since which date he has been stationed at Galle.

DIVISIONAL OFFICER'S CIRCUITS.

The following circuits were made by the Divisional Officer during the quarter :—

October.	
Matara District	Two days
Kalutara District	Three days
Galle District	Four days
November.	
Galle District	Five days
Hambantota District	Four days
December.	
Galle District	Eleven days
Matara District	One day
Kalutara District	One day

As a result of these, and of various interviews, inspections, and meetings, an idea has been gained of the agriculture of the districts concerned and of the outlines of policy advisable.

AGRICULTURAL INSTRUCTION.

This should be among the most important branches of work, as the Instructors are the link between the Department and the peasantry. It appears to have been lacking in purpose and organization in the past, chiefly owing to the absence of a clearly defined policy, and the extent to which activities—elsewhere the duties of Departments of Agriculture—have here passed into the hands of other individuals.

The work of an Instructor is peculiarly difficult. He is always liable to be called upon to perform a variety of disconnected tasks, unless the boundaries of his duty are clearly defined and upheld. In addition, it is not easy to measure the results of instructional work. In order to effect some improvement in this line of work a conference of the staff was called in Galle on January 10, 11, and 12, 1921.

The chief points which need attention may be summed up as follows :—

(1) A re-distribution of certain of the existing Instructors is needed.
(2) Area to which each Instructor is assigned should be clearly defined.
(3) Additional Instructors are required.
(4) Salaries and travelling allowances are in all cases inadequate.
(5) A defined policy of agricultural instruction should be formulated.

The question of salaries and travelling allowances will be dealt with by the Salaries Commission if and when the Instructors are transferred from the Agricultural Society to the Department.

An additional Instructor will be posted to the Hambantota District in 1921. To complete the staff Instructors are needed at Elpitiya and Hinidum in Galle District and Tissa in Hambantota.

The Instructors have been working under great difficulties in the past. Their low salaries and absence of any legitimate road to promotion, the inadequacy of the travelling allowances, which permit of travelling for only half of each month, and the ill-defined work which is required of them, all combine to lower the standard of their work.

SCHOOL GARDENS AND HOME GARDENS.

In October these two struck me as being among the best organized and most promising lines of work. There are 126 registered school gardens in the division, and over 300 schools without gardens or with unregistered gardens ; 58 gardens are now awaiting registration until they can be supplied with implements.

All of the registered schools and many of the others conduct competitions for home gardens worked by the pupils. The number of home gardens varies from 50 to 150 per school. The home gardens system is an index to the degree of interest taken by the pupils in their school gardens, and from this point of view is the more important of the two.

The class of work performed in school gardens is satisfactory. Some of the gardens have attained a degree of excellence that is remarkable, and practically all of them are good. The ultimate effect of training thousands of children annually in nature study hardly needs to be indicated.

Points which need attention in connection with school gardens may be summarized as follows :—

(1) The distribution of implements is unsatisfactory.
(2) The variety of crops grown in the gardens is too restricted. The school gardens afford an excellent opportunity for spreading good varieties throughout the Colony.
(3) Annual courses of training of teachers are needed in the division.
(4) The system should be gradually extended until all schools are provided with gardens.

Co-operative Credit Societies.

Until necessary legislation has been passed, the Divisional Officer has no control over this movement, and in consequence little has been done during the quarter towards examining the work of each society in detail. An Inspector will be appointed for this work in the Southern Division in 1921, and this, together with the projected recognition of the Divisional Officer as Assistant Registrar, will provide the machinery for future improvement.

There are 16 societies in Kalutara District, 11 in Galle, 12 in Matara, and 2 in Hambantota. The capitalization is in all cases low, and the standard of enterprise and efficiency is below that of societies in other countries.

As a result of discussion of this movement during a session of the staff conference, in which the Secretary of the Board of Control took part, the following conclusions have been arrived at :—

(1) Annual conferences or training courses for the secretaries of societies are necessary.
(2) The tenure of several presidentships by one individual tends to retard progress, but is not always avoidable.
(3) Services of Chief Headmen are valuable in starting societies, in many cases they later do good work as presidents.
(4) Propaganda is necessary in order to bring home the advantages of these societies to the peasants.

The potential importance of this movement to the division is enormous, and every effort should be employed to popularize it.

Agricultural Shows and Competitions.

Allocations have been made by the Department of Agriculture for the following in the Southern Division during 1921 :—

Kalutara District : Three Village Shows.
Galle District : Vegetable Gardens Competition.
Matara District : Three Village Shows ; Paddy Transplanting Competition.
Hambantota District : One Village Show.

These allocations were made to the Food Production Committees of the districts. I recommend, for reasons which will appear later, that in future allocations be made to the Divisional Officer.

Agricultural Shows must always be largely dependent upon the initiation and help of private individuals. Where Department money is voted in aid, however, steps should be taken to ensure that the Divisional Staff is represented on each Show Committee.

The admission of headmen as competitors in these shows, which has given rise to dissatisfaction in the past, was discussed at the staff conference, and has since been brought forward by me at the Matara Food Production Committee. The proposals under discussion are (1) that headmen should compete against each other in separate classes from the villagers ; and (2) that headmen should be debarred from competing, but substantial prizes be offered to those headmen whose villagers make the best exhibits.

The Gardens and Transplanting Competitions held in past years have been unsatisfactory. They have been used merely as a means whereby small amounts of money may be awarded to more or less worthy peasants. They are capable of being made instruments for immense good. Proposals will be put forward separately in connection with the following points :—

(1) Defining the locality in which each competition is held.
(2) Providing for adequate (six months) notice of each competition.
(3) Limitation of entrance to *bona fide* owners of not more than a specified area of land.
(4) Providing early and full information to competitors regarding the agricultural points on which their holdings will be judged.
(5) Appointment of efficient judges.
(6) Ensuring the representation of the Divisional Staff on all Committees of organization and judging.
(7) Providing for one crop competitions in addition to vegetable garden competitions.

Efficient utilization of competitions of this kind for purposes of instruction, and also efficient judging of the competitor's holdings, are largely technical.

Agricultural Experiments and Demonstrations.

No provision exists whereby reliable experiments with crops and methods can be made by the staff of the division. The postponement for another year of the establishment of an experiment station and farm school in Galle District is regrettable. I have elsewhere asked that if funds be not procurable for both of these institutions simultaneously, the experiment station be provided first, and I take this opportunity of again urging this procedure. My reasons for this request I may summarize as follows :—

(1) The unfairness and inadvisability of keeping the staff of a scientific department without even elementary provision for agricultural experiment.
(2) The need for reliable experiment with existing crops and new crops.
(3) The proposed farm school is merely an extension of an already existing institution, and, so far as this division is concerned, can more conveniently be postponed.
(4) Educational work can be performed on an experiment station ; reliable experiment cannot be expected of a farm school.

Separate memoranda have been submitted dealing with the two gardens at Bandaragama and Weligama. The Village Committees concerned are desirous of being relieved of them. Neither of them is an ideal site for an experiment station experiments with minor crops to be carried out on them. The present system of joint control is irksome, and has in the past prevented systematic work being performed. I recommend that provision be made in next year's Estimates for taking the two gardens over as experiment stations for the division.

Funds are available in 1921 for establishing a cotton experiment plot of 50 acres in Hambantota District.

Demonstration plots are conducted by the Instructors, but at present this work is entirely confined to paddy. The position is as follows :—

Large Scale Manurial Paddy Plots.—Galle 3; Matara 6; Kalutara 2; Hambantota 3. There is a possibility that fairly reliable records may be obtained from some of these, and the reaping and measuring will be supervised by Instructors.

Small Scale Manurial Paddy Plots.—Matara 32; Kalutara 10. These plots are useful, and are leading to increased manuring of paddy. Reliable records cannot be looked for from any of them.

Paddy Transplanting Plots.—Galle 1; Kalutara 15; Weligama 17. The same remarks apply here as to the small manurial plots.

Demonstrations of this kind might well be conducted with other crops as well as paddy, and the question will be later discussed with the Instructors.

G. G. AUCHINLECK,
Galle, January 20, 1921. Divisional Agricultural Officer, Southern Division.

IX.—REPORT ON THE WORK OF BOTANIC GARDENS.

ROYAL BOTANIC GARDENS, PERADENIYA.

IMPROVEMENTS AND ROUTINE.

AN improvement has been effected at the junction of the Lake road with the South Garden drive, the junction being now forked, instead of at right angles as formerly, with a V-shaped grass plot in the centre.

The Gardens, on the whole, have been well maintained. The river banks were cleared of all rank growth, and the bamboos trimmed and isolated into more defined clumps, showing the latter to better advantage and affording a better view of the river. The resumption of the Garden reaper, owing to the arrival of essential spare parts from England, has resulted in the large lawns being kept in good condition.

Several parts of the River drive and Trimen drive were repaired, and a number of choked culverts were opened up and rebuilt. A large culvert with a connected drain and concrete tank was built at the cattle shed in order to regulate the amount of liquid in the manure pit and conduct the excess for use in the economic nursery.

An increase of 50 per cent. on pre-war wages was granted to the labour force, in addition to a rice allowance, varying from about 10 to 12 cents a day, with effect from January 1.

CULTIVATION, PROPAGATION, &C.

The work of propagation, especially of economic plants, received special attention. The economic nursery has been considerably improved and classified, and the stocks increased. There has been a keen demand for plants of this class, which has been satisfactorily met. The contents of all the nurseries were widely advertised by means of leaflets and local press, which resulted in a much-increased demand.

Experiments were made in propagating Hevea by vegetative means with a view of raising pure stocks of the best and most desirable varieties. Though the results so far have not been conclusive, owing chiefly to unfavourable weather, the following percentages of success may be interesting :—Cuttings, 48 per cent.; grafting by approach, 44 per cent.; marcotting or gooteeing, 30 per cent. These experiments are being continued.

The avenue of *Agathis robusta*, planted in 1919, is making rapid growth, some of the plants being now about 7 to 8 feet high.

The row of *Ficus elastica* trees raised from cuttings and planted in 1914 continue to make good progress, having added an average of 5 feet to their height since last year.

LAWNS.

In order to enhance the beauty of the great lawn and induce a more park-like effect, one plant each of the following trees was planted, viz., *Poinciana regia*, *Mesua ferrea*, *Enterolobium cyclocarpum*, *Ficus Benjaminii*, and *Pithecolobium Saman*. Both this lawn and the Great Circle have been brought again into good condition by the removal of a number of termites' nests and by the use of the bullock-draught reaper.

ACCLIMATIZATION.

Seeds of *Chenopodium anthelminticum* were received from the Director of Agriculture, Java, and sown at Henaratgoda, Peradeniya, and Hakgala Gardens. All, however, failed to germinate.

An interesting collection of 25 orchids was raised from the Agri-Horticultural Society, Rangoon.

Seeds of the white-flowered variety of *Petroea volubilis* were obtained by the courtesy of the Director of Agriculture, Trinidad, but this has not yet germinated.

The hybrid Rhododendron plants, introduced from England in 1914 and planted in Queen's Cottage Garden, Nuwara Eliya, have now all died. Those planted in close proximity to trees of the indigenous Rhododendron have not fared any better than the others.

Notes of Botanical Interest.

Sterculia lanceolata, introduced from Hong Kong in 1898, fruited here in February for the first time, its bright red follicles amongst the green foliage producing a very ornamental effect.

Pachira insignis produces periodically its remarkable and handsome flowers, but has so far not fruited.

Ochrosia acuminata, a small evergreen tree introduced in 1882, has shown in the arboretum the benefit of the removal of excessive overhanging shade by fruiting profusely. It is a very ornamental tree when bearing a full crop of its bright crimson smooth fruit.

Pests, Diseases, &c.

Special efforts were made in all the Gardens to reduce as far as possible the Loranthus parasite, of which there are several species, and the Gardens are now freer of this pest than they probably have ever been.

The snail pest, referred to in previous reports, would appear to be on the decrease, but is still troublesome enough in the vicinity of Peradeniya to make it difficult to grow tender vegetables and flowering plants in the rainy season.

The common squirrel is a troublesome pest, attacking not only fruits of almost every description, but also seed beds, graft bandages, &c.

Pink disease during the very wet month of November developed considerably, attacking the cocaine plant (*Erythroxylon coca*), which all had to be cut well back and treated with Bordeaux mixture. It also appeared prominently on Amherstia, Citrus, &c. Of the *Cassia nodosa* trees mentioned in last year's report, only one now remains, which is moderately free of disease.

The cutworm continues to be the worst pest of up-country gardens, and no means have yet been discovered of controlling it except hand picking, and protecting the plants when young with collar bands.

Visitors.

The following distinguished visitors visited the Gardens during the year, viz., His Royal Highness the Crown Prince of Roumania in April; Their Excellencies Admiral and Lady Tothill in May; M. Clemenceau, *ex*-Premier of France, in October; and Sir Ronald Munroe Ferguson (now Viscount Novar), late Governor-General of Australia, in October.

Miscellaneous.

The Superintendent paid visits of inspection to the work of laying out the grounds of the King Edward Sanatorium for Consumptives at Kandana, also visited and reported on the improvement of the vicinity of the Supreme and District Courts, Colombo, and of the Residency, Gampola. The Superintendent also assisted at the organization of, and judging the exhibits at, the Gampola, Henaratgoda, and Nuwara Eliya Shows. During March and April all the labour and most of the Garden staff were treated for anchylostomiasis.

Correspondence.

The volume of correspondence with the public, local and foreign, as well as on departmental routine, has now become very heavy, and occupies the greater part of the Superintendent's time.

Meteorological.

The following is the rainfall for the year showing the average per month for the last thirty-seven years. The highest fall in any 24 hours was 4·43 inches on May 2:—

	Rainfall for 1920.		Average from 1884 to 1920, inclusive.	
	Inches.	Days.	Inches.	Days.
January	3·58	6	3·59	6
February	·40	2	1·59	3
March	6·49	10	4·72	7
April	8·94	17	8·51	12
May	7·07	5	6·04	11
June	22·33	25	11·20	17
July	7·58	25	8·33	18
August	1·34	5	5·88	13
September	7·14	7	6·84	15
October	11·20	17	13·62	18
November	24·77	29	10·59	16
December	2·22	3	8·63	12
	103·06	151	89·54	148

The timber collection has been added to by specimens of *Dracæna reflexa*, the only woody stem known amongst the monocotyledons; Brya ebenus; Jamaica ebony; *Gliricidia maculata*, consisting almost entirely of dark brown heartwood; *Couroupita guiænsis*; Cannon ball fruit; *Flacourtia Ramontehii*; Uguressa; and *Acacia melanoxylon*.

The collection of economic insects has been partially renovated and mostly re-mounted by the Entomologist.

Economic Museum, Peradeniya.

Progress in the improvement of the collection has been maintained, and the renewal of labels has received special attention. The following additions amongst others have been made to the collection:—

Musenna Bark (*Albizzia anthelminticum*) from H. M. Consul, Adis Ababa. A decoction of the bark has long been used by the Arabs as a vermifuge.

Collections of cinnamon samples and of articles made from the coconut palm, presented by Mr. G. Rajapakse, son of Gate Mudaliyar A. E. Rajapakse, Negombo.

Sun-hat as used by the paddy cultivators of Ratnapura, presented by Mr. C. W. Dias.

HAKGALA GARDENS.

The following is from the report of the Acting Curator, Mr. T. H. Parsons :—

"COLLECTIONS.

"The 1919 plantings of *Aleurites Fordii*, *Cinchona succirubra*, and *C. hybrida* are thriving well. Additional plantings this year of *A. Fordii* have been made on the exposed site in front of Hakgala laboratory to the number of 38. The Acacia plot near nursery has been kept in good order, and all the plants are now labelled with the large type of wooden label.

"The experimental plot near potting shed, infested with Oxalis, was planted up with sweet potatoes early in March and harvested in September, the yield amounting to 759 lb. from the eight varieties planted.

"BEDS, BORDERS, AND SHRUBBERIES.

"All beds, borders, and shrubberies have received regular attention in weeding, pruning, and forking up, and the annual digging and manuring was undertaken during October. All dead trees have been removed from the shrubberies, and also from the fernery.

"ROADS, PATHS, AND DRAINS.

"The main upper and lower drives were re-metalled in patches, and the whole re-gravelled during February and March. The grass verges of drives and paths have also been kept trimmed, and in some cases re-made. Stone steps have been made up the nursery terraces in place of the old earth cuttings. The fernery paths have also been entirely re-metalled and gravelled.

"The path to the Camphor, Pine, and Acacia plots has been periodically cleaned, and the drains both here and throughout the Gardens have received regular attention.

"ARBORETUM.

"All sections of the arboretum have been kept in order, and for the most part labelled with the large type of wooden label. A few gaps in the row of Acacia plantings near main gate were planted up in February, but all did not succeed owing to the weather immediately following these plantings being unfavourable.

"LAWNS.

"The section of lawn made in 1918 on old herbaceous site was given a top-dressing in October last, the result being very beneficial. The mulch was obtained from siftings of the residue of all burnt rubbish mixed with sifted leafmould and manure.

"The sinking of the piece of lawn over the old rubbish pit site in the section above Nock Memorial has been raised to the normal level of the surrounding lawn.

"FRUIT PLOTS.

"The new fruit plots have been taken in hand and vacancies filled. Only five of the 1918–19 plantings have survived. The beds have been filled temporarily with the best fruits obtainable locally, pending the arrival of the new fruit plants ordered from Australia for next season. A broadcast sowing of *Tephrosia candida* was made in July last for the purpose of using this as a smother crop for Oxalis, but little success resulted owing to unsuitable weather following the sowing. A second sowing was made in October in drills 6 inches apart. These have germinated freely, and a successful result is anticipated from this sowing.

"LORANTHUS.

"Strenuous efforts have been made to reduce this pest at Hakgala, and a large labour force was engaged on the work from the end of August to the middle of October, resulting in practically a clean eradication from the garden trees. Further efforts are required as soon as weather permits on the trees immediately outside the wire fence boundaries on the east, north, and west, and above the garden bungalows on the south side.

"The opportunity was taken during these operations to remove all dead and overhanging branches from the surrounding trees.

"The trees mostly attacked were *Acacia melanoxylon*, *Eucalyptus robusta*, *Cryptomeria japonica* and *Rhododendron arboreum*, and to a lesser degree *Acacia decurrens*, all Pines, and the English Oaks.

"OLD NURSERY PLOT.

"The abandoned terraced area between Foreman's and Nurseryman's bungalows, and approximately 1 acre in extent, was re-opened with the object of forming a food plot. All the terraces were thoroughly cleared and the banks shaped, and the small stream running through the plot re-formed and built up. This clearing was completed in August, and it was later decided to utilize this plot for experimental purposes in raising stocks of Chenopodium instead of for food production as at first intended. The Chenopodiums have been raised and pricked off into boxes, and the planting up of the above area is now in progress.

"REPAIRS.

"The whole of the wire fencing around Gardens has been periodically repaired and kept in good order and the gateways re-railed. The nursery sheds, which were in very bad order, have been demolished and new sheds erected. All bridges over garden paths have been repaired and kept up. New arches were erected in middle path near the old rockery, and over the path leading from this rockery to Camellia bed in upper drive.

"New Improvements.

" The widening of the main drive from cart road to junction of drives near lower pond and the reduction of the sharp curve here was commenced in April and completed in June.

" The stone retaining wall supporting the drive along the whole length on the left hand side has been rebuilt, allowing a uniform width of drive of 13 feet, and the gate pillar moved back in alignment with the retaining wall.

" The high bank at the sharp curve has been cut away to the extent of 10 feet, thus reducing the sharp bend to a considerable extent. This allowed room to widen the narrow border opposite the cutting, on left-hand side, and to form a 3-feet bed, which has been planted up with mixed Azaleas.

" The whole of the main drive, therefore, from turn off from cart road to the junction of drives at lower pond, was dug up and thoroughly re-made, some 68 to 70 cartloads of new metal being added. The narrow strip of border running along left-hand side of drive has been carried back to the new retaining wall and planted up with Anthericum.

" The clearing through and opening up of the section below propagating sheds and linking up with the Oak collection has been made with a view to preserving this section as a purely natural garden. A large amount of rampart undergrowth was removed, thus affording more light and air to the Aristoæ and Crinums already established there.

" Other bulbs have also been added and a small winding path opened up, leading to the large *Cupressus macrocarpa* at top of mound, and under which a seat has been erected. The Agaves obstructing the view at this point through the Oak collection have been removed and planted to form a screen to the cooly lines to the north-east, and also to define the boundary of this natural garden.

" The strip between propagating shed and cart sheds has been improved. All mounds have been levelled off and holes filled in, and the area now presents a gradual sloping appearance. Twelve ornamental shrubs and small trees have been planted out here. The old path dividing this section from the propagating sheds has been re-paved and the drains re-made.

" The path dividing this section from the rubbish pit has been widened from the original 4 feet to 7 feet to allow the garden cart entrance to the latter. This necessitated a rebuilding and widening of the existing culvert over stream.

" The rubbish pit area has been planted around with Cupressus to form a screen hedge, a space being allowed for entrance and exit of the cart.

" The area from below the rubbish pit to the cooly lines screen on the north-east, Nock Memorial clearing on the north-west, and natural graden on the south-east, and in prominent view of the latter, has been opened up to form a rockery. This area has been terraced where necessary, steps made, and area dissected by winding paths into four sections. The position allows of all the morning and early afternoon sun and should meet rockery requirements admirably.

" All suitable plants obtainable at Hakgala and Nuwara Eliya have been planted out, and the commoner types can be eliminated as new kinds are received. Such arrangements are being made for obtaining new plants from England and elsewhere.

" The paths lead from the 4-feet path dividing the sections enumerated in paragraphs 2 and 3 of new improvements at Hakgala and link up with the small paths leading to the lower drive and Nock Memorial respectively. The water system is ample, and obtainable from the part diversion of the adjoining stream and from the overflow of the tank near the potting shed (the latter a permanent supply), the water being retained in four tanks arranged at fairly regular intervals and allowing of one tank to each section.

" The straggling border on left-hand side of lower drive on entering has been re-made, the back of this border having been well made up and turfed over. A small path has been opened up (opposite existing path from rose graden) leading from lower drive to the lower path from Nock Memorial. The section of the old border from this new path to the Camphor tree, previously planted with *Salvia involnerata*, has now been turfed over to correspond with the grass and lawn opposite.

"General.

" Seventy-five trout received from the Fishing Club, Nuwara Eliya, have been put out in the upper pond.

" A large increase in the propagation and potting up for nursery purposes has been carried out to meet the increased demands, particularly in respect to all kinds of plants suitable for wind screens.

" Many of the more prominent unlabelled trees have now been labelled, and many more re-labelled. Flowering specimens of other unnamed trees have also been forwarded to Peradeniya for identification.

" New stocks raised during the year include *Abies pectinata*, also *Cunninghamia sinensis*, *Larix leptopus*, *Pseudo Tsuga Douglasi*, *Picea morinda*, *Pinus excelsa*, *Pinus sylvestris*, and *Paulownia imperialis*.

" Advice has been tendered and supervision given by the Acting Curator on improvements and plantings in Nuwara Eliya, including roadside planting around park and along Badulla road as far as Lake Gregory, for which purpose a gang of twelve coolies was loaned by the Chairman, Board of Improvement, from June 1 to July 10, during which period 43 trees were cut out, 38 trimmed up, and 60 young Cypress plants put out. Planting of wind screens were also undertaken in the Residency compound and in the new quarters of the Kachcheri clerks at Nuwara Eliya.

" Loranthus eradication within Board limits has received attention, for which purpose six coolies were loaned from September 1 to date, during which period 947 trees have been cleared of Loranthus. A further gang of coolies was loaned for the purpose of cutting out all trees too badly infested for cleaning properly.

" A report was also submitted to the Chairman, Board of Improvement, on timber trees suitable to the locality, and a complete planting programme drawn up for the future guidance of the Board.

" PLANTS AND SEEDS RECEIVED.

" Plants and seeds have been received from the following :—Waiata Botanical Gardens, Birkenhead, New Zealand ; the Agricultural Department, Federated Malay States ; Mr. W. Nock, West Hakley, England ; and from the following in the Island :—Sir Anton Bertram ; Mr. N. P. Braine, Peradeniya ; Mr. J. Erskine, Haputale ; Mr. M. K. Bamber, Peradeniya ; Mr. B. Bowie, Talawakele ; Mr. J. H. Thomas, Talawakele ; and from the Acting Secretary, Ceylon Agricultural Society, Peradeniya.

" WEATHER.

"The number of inches of rain recorded during the year was 86·75, falling on 226 days compared to 100·24 on 255 days for 1919. The wettest month was November, with a rainfall of 14·23 inches ; and the driest August, with 2·88 inches. The highest temperature in the sun's rays was 157·3 on March 1, compared to 154·1 on October 12 of the previous year. The lowest temperature on the grass was 36·2 on February 23, compared to 37·5 on March 9 of the previous year."

NUWARA ELIYA GARDENS.

The Acting Curator, Hakgala, reports :—

" All routine work has been kept well in hand throughout the year, thus permitting labour for a number of minor improvements in the park. The chief of these is the forming of a pond at north end of the park, portion of a previously swampy area planted up with Eucalyptus. The pond has been made oval in shape with sloping banks. The two drains have been turned into the pond and a sluice made. This should effectively drain the surrounding ground.

" Other improvements include—

"(*a*) The breaking up of the border of shrubs at park entrance into beds. Three beds were traced out and the intervening spaces turfed over.

"(*b*) A number of Azalea plants have been planted around the fountain, all of which are growing well.

"(*c*) The soil excavated by the Board of Improvement coolies when cutting the new flood outlet has been utilized to fill in and level the swampy portion in the vicinity of the new outlet. This portion is now being turfed over, and should give a greatly improved appearance to this part of the garden.

"(*d*) The path intersected by the cutting of the new flood outlet has been joined up behind the crescent-shaped border, the points of which have been modified to allow of this.

" A request to purchase 10 dozen roses and to form a rose garden on the high ground near pond was sanctioned by Board of Improvement, and the number and kinds desired have been selected and ordered from Australia. Six Wisteria and three Prunus have also been ordered for filling up gaps in the park.

" The branches of Acacias overhanging end of plant shed in nursery were cut back hard in May.

" Loranthus eradication has received full attention, resulting in the eradication of this pest from all trees in the park by end of October."

HENARATGODA GARDENS.

The condition of the Gardens has been generally improved. The central borders have been thoroughly dug up, manured, and re-planted, and are now beginning to show up well.

The straight Livistona avenue, planted in July, 1918, along the entrance drive, is making good progress, and the wide stretch of lawn on either side is now well-formed and maintained in good order.

An Agri-Industrial Show on a rather ambitious scale was held in the Gardens in July and opened by His Excellency the Acting Governor, Sir Graeme Thomson.

A summer house made entirely from the coconut palm for this Show was generously presented by the owner, Mr. G. Rajapakse of Negombo, to the Gardens.

The rubber seed crop was normal. Some 281,500 seeds were collected, and realized by sale to the public Rs. 1,407·50.

The Coco-de-mer (*Lodoicea sechellarum*) continues to carry its burden of enormous fruits, which now total 24, in different stages of development. The oldest two of these are now nine years, and apparently still growing in size. One more flower was fertilized this year by pollen sent from the old male tree at Peradeniya.

The roads and paths received a good deal of attention, having been re-gravelled by the Public Works Department. Some sharp curves were rounded off and others straightened out.

The nurseries have been enlarged in area and stock, and an increased number of inquiries for plants and seeds were received and supplied.

The conductor has continued to give practical instruction and demonstrations to the students of the Garden Schools for Teachers, and a well laid out and stocked model garden has been established around the school.

RAINFALL.

The total rainfall for the year was 105·08 inches, as against 117·90 inches in 1919. July, August, and September were the driest months, contrary to former years.

STOCK GARDEN NURSERY AND MUSEUM GARDEN, COLOMBO.

The Stock Garden Nursery, which was re-occupied by this Department in October, 1919, has been progressing well, but is now being abolished for use as a building site for the Denham Hostel for Students. It is proposed to establish a new nursery and stock garden on a site off Jawatta road in the Cinnamon Gardens.

The Colombo Museum grounds have been maintained in good order, the extensive lawn in front being particularly pleasing. All the seats have been scraped and painted white by the Public Works Department.

The Foremen of Government Gardens, Colombo, in addition to supervising the Gardens at Queen's House, Temple Trees, Colombo Museum, and Stock Garden, paid numerous visits of inspection to the work of laying out the Kandana Sanatorium for Consumptives, also to the vegetable plots at the Welikada Jail, and several visits to the Government bungalow gardens in Buller's road, &c.

THE GOVERNOR AND COLONIAL SECRETARY'S GARDENS.

The King's Pavilion Garden, Kandy.

This has been maintained in its usual attractive condition. Certain useless and superfluous trees were removed; the lawns have been weeded, and the grass verges renovated where necessary. The new flower garden has been maintained in an attractive condition, and the arches for climbers have been mostly renewed.

The Lodge Garden, Kandy.

This has been kept in good order. The borders were re-planted and manured, and the lawns weeded and regularly mowed.

The Queen's House Garden, Colombo.

This has been maintained in good order, and many of the borders have been re-planted. A number of the palms in pots, which have become badly affected by the sea breeze, have had to be replaced by healthy specimens from Peradeniya. The garden seats have all been re-painted white.

The Temple Trees Garden, Colombo.

This has been much improved, the flower beds and borders have been increased in number, and several undesirable and superfluous trees removed. A number of coconut plants, Flamboyante, Pisonia, and others have been planted against the west boundary of the grounds in order to effect a screen and secure more privacy. The plantains planted in December last year began to ripen fruit in eleven months from planting, but the pineapples planted at the same time have not yet shown any sign of fruiting.

The plant house has been entirely reconstructed, the Public Works Department having allowed some of the old timber obtained in the course of extensive alterations to the bungalow to be used for the purpose.

Queen's Cottage Garden, Nuwara Eliya.

The Acting Curator, Hakgala, reports :—

"Flower Garden.

"A great deal of attention was given to Loranthus eradication, resulting in practically a clean eradication by the end of November.

"The row of Daturas in front of the house have been removed, and the bank towards rear of house formerly planted with ornamentals has been turfed over.

"A number of tree ferns have been potted up into large tubs for indoor purposes, and several plots for additional cut flower plants have been formed, chiefly Azaleas and Chrysanthemums.

"Vegetable Garden.

"Owing to the more regular arrival of seeds towards the second half of the year a suitable succession of vegetables has been maintained.

"Club root and cut worm are, however, still very troublesome, and the necessity of opening up new ground is increasingly urgent. The wet weather experienced in the south-west monsoon interfered somewhat with the succession of the peas and beans. A more sheltered position is desirable for any extension of the vegetable gardens."

Cuddesdon Garden.

A new extension to the vegetable garden was made, and the old vegetable garden boundaries straightened and planted around with Cupressus, thus forming a Cupressus hedge boundary on three sides.

The rustic work circle for roses in front of bungalow having become dilapidated has been entirely re-erected and additional beds for roses made within the circle. The roses for these beds are being obtained and brought out from England in March next.

H. F. MACMILLAN,
Superintendent of Botanic Gardens.

December 22, 1920.

X.—REPORT ON THE WORK OF THE SCHOOL OF TROPICAL AGRICULTURE.

Gradually during the year the activities of the school have been increasingly located in its own grounds, the Irene House property. In the last two months of the year the foundations of the new buildings were laid—extensions to the main existing building for hostels, one bungalow for staff, and the class rooms block. The estate has been worked to a great extent by the students themselves, and the development of all areas has been marked. As anticipated in the last report, the plotwork of students has improved considerably.

One full English course was completed in March, and a new class admitted in May. One vernacular teachers' class was admitted in January (13 men, Sinhalese), and this with two English classes was in session throughout the year. In October Mr. C. Ragunathan was transferred from school work, and in his place came Mr. C. Wickremeratne, Inspector of School Gardens, who took charge of the Sinhalese work, relieving Mr. J. C. Drieberg for work on the English side. This new arrangement has worked very satisfactorily.

The Principal returned to the Island from leave on July 22.

The Registrar was absent from Peradeniya on military duty at Diyatalawa for five weeks in June–July, and during this time Mr. J. C. Drieberg acted for him, in addition to his duties. The Registrar was also mobilized for military duty at Kandy for the months of January and August, but attended to his own duties in addition.

Mr. J. C. Drieberg continued during the year to control the work of Irene Estate. The two main gates have been moved and the drives reconstructed at right angles to the main block of buildings. On this alignment all other buildings and the students' plots have been laid out. The lower drive has been carried past the first of the bungalows for staff and continued as the estate road to the end of the area under tea. Work with tea and rubber was suspended during the year owing to the slump in the trade, after the students had been given sufficient practice in the operations concerned. The paddy field was subjected to manurial trials, Mr. A. Baur, of the Ceylon Manure Works, kindly supplying gratis the manure required, and the results so far appear to be very satisfactory. Students engaged in all the operations of tilling, sowing, manuring, and transplanting. Much work has also been done on the road frontage: boundaries and drains sloped and straightened, fences rebuilt, and hedges re-planted. A labour force averaging 15·75 has been employed daily throughout the year for clean weeding the whole estate, and planting up slopes and odd corners with fodder grasses and food crops and for estate routine.

Mr. Drieberg was operated on for appendicitis in August and went on sick leave for six weeks in August–September. During part of this time it was arranged for the Sinhalese class, for which he was responsible, to take its vacation in lieu of the one in October. For the period of his absence the Registrar attended to his field and class room duties, in addition to his own.

Messrs. N. Wickremaratne and L. S. Bertus (of the Department of Agriculture) and D. C. de Silva (of New Peradeniya estate) again assisted during the year in the work in Co-operation, Plant Diseases, and Estate Accounts, respectively.

Progress has been maintained uniformly throughout the year. The weekly and monthly staff meetings were held regularly.

1918–20 ENGLISH COURSE.

Sixteen students, admitted in May, 1918, completed the full English course in March, 1920, on the results of which the following awards were made :—

First Class Certificate.

Samuel Alexander Iddamalgodde Elapata : Salgado Gold Medal for Field Work ; Pandittasekera Prize for Agricultural Botany ; De Mel Prize for Agricultural Economics.

Mendis Warnaratna Jayasuriya : Rajapakse Gold Medal for best all-round Student of Course ; Bibile Prize for Botany ; Fernando Prize for Agricultural Chemistry.

Marcus Richard Muttuvelu Jebaratnam : Ratwatte Prize for Agricultural Zoology ; Namasivayam Prize for Agricultural Chemistry.

John Edward Seneviratna : De Soysa Prize for Agriculture ; Wijesekera Prize for Agricultural Economics.

Second Class Certificate.

* Samuel William Coplestone Dias Bandaranayake ; Gunhewage Duncan Gratiaen de Silva : Dias Bandaranayake Prize for Agriculture.

H. Vincent Fonseka ; H. Don Baron Gunesekara : De Silva Prize for Agricultural Zoology.

Edmund de Silva Goonesekara Karunaratne ; Cathirgamer Ambalavanar Vaitilingam.

Pass Certificate.

Francis Aloysius de Silva ; D. L. Don Palitha Dharmawardena ; Walter Dionysius Fernando ;
* K. V. Marcandan Thiagarajah.

Partial Certificate.

* Dionysius de Silva.

1919–21 ENGLISH CLASS.

Of this class of twenty students, one was withdrawn in December for irregularity. The progress of the remaining nineteen has been satisfactory.

1920–22 ENGLISH CLASS.

In May twenty students were admitted for the full course. During the year two of them were withdrawn, one owing to ill-health. Plans have been discussed for raising the standard of admissions. With the establishment of permanent and well-equipped buildings for the school now begun, this will become easier.

1920 VERNACULAR COURSE FOR SCHOOL TEACHERS.

In January, 1920, the Education Department sent up 13 men selected from various Government village schools for one year's instruction on the lines of previous courses for teachers. All thirteen completed the course satisfactorily and earned the School Certificate for Vernacular Teachers. The

* Excluding estate accounts.

average age of the men was 27 years, and they comprised 3 head teachers, 7 assistant teachers, and 3 monitors. They were selected from 9 several districts of the Colony. The results of the course showed the head teachers to have gained the silver medal and the first, sixth, and eighth places (average age 29 years) ; the monitors both bronze medals and the second, third, and thirteenth places (average age 21 years); and the assistant teachers the rest.

The Education Department offered three medals for competition, and the awards were made as follows :—

Names in Order of Merit.

W. A. John Sinno : Silver Medal and Certificate.
W. Charles Boteju : Bronze Medal and Certificate.
D. J. Subasingha ; Bronze Medal and Certificate.

Subasingha Don Yothan D. A. Sugatadasa P. R. Banda S. Edirisingha D. P. Wijesingha G. P. W. Jayasundara W. Perera A. Jayawardana H. D. Budinis A. de Alwis	Certificate.

A report, with detailed results of the course, was duly furnished to the Director of Education.

COURSE FOR HEADMEN.

No class was formed for this course in 1920 owing to shortage of staff.

A special short course of two months was arranged in collaboration with the Government Agent, Eastern Province, for one headman of collegiate standard from the Batticaloa District.

PASSED STUDENTS.

On prize day was inaugurated an Old Boys' Union of the school, and a committee appointed to draft the constitution and rules. This Union has among its objects the maintenance of interest and the fostering of fellowship between past and present students, and the mutual rendering of professional assistance.

Twenty-eight passed students are now employed in the Department of Agriculture : 16 as Agricultural Instructors, 6 as Sub-Inspectors of Plant Pests and Diseases (in training), 1 as an Assistant in Entomology, 1 as an Inspector of Co-operative Credit Societies, and 1 as an Assistant Farm School Officer ; three others are still under training at the Poona Agricultural College. Sixteen passed students have gone back to the development of their own lands, and thirty have taken up work on estates as superintendents or assistants.

One student who completed his course in March proceeded to Cambridge for further study.

The death occurred of one passed student. Five others have given up agriculture for other callings, among them one for the Police Force and one for journalism.

Two passed students are doing good work out of Ceylon, one in South India and the other in the Dutch East Indies.

HOSTELS AND SPORTS.

Throughout the year three hostels have been occupied. Irene Hostel accommodated seventeen students of the final English class, and in addition provided quarters for the Registrar. The "New Hostel" at Peradeniya Junction accommodated all twenty students of the first-year English class and one house master. The vernacular teachers' class occupied the house, also at Peradeniya Junction, which from its continuous association with successive classes of this course has come to be known as the "teachers' hostel." The "prefect system" has been generally adopted.

Adequate supervision of these scattered units was maintained, and cleanliness and discipline kept up to standard.

Malarial fever lowered the attendance of students periodically. During the greater part of the year there was stomach trouble in hostels owing to the variation of the quality of rice available as the result of the food crisis. Three cases of enteric fever resulted from the visit of the school to the Henaratgoda Agricultural Show in July. One student did not recover sufficiently to return to the school. In this connection samples of Peradeniya drinking waters were sent for bacteriological examination and were reported to be sound, the best sample being that taken from the Irene House well.

From the new session in May the dieting in the English hostels has been given on contract, and tenders publicly called for. In the vernacular hostels the residents made their own arrangements as before.

The school sports comprise cricket, tennis, football, and volley ball. The Tennis Club was the most popular and efficient.

MISCELLANEOUS.

In February the staff and students numbering 53 left for a one week's agricultural tour in the Colombo and Negombo Districts for the study mainly of the coconut and cinnamon and allied industries ; also manure works, cold storage, meteorological instruments and observations, agricultural machinery, and dairy farming. A full programme was completed successfully ; and a detailed record compiled. The courtesy of those in charge of the many and varied institutions visited contributed largely to the success of the tour. The value of this annual tour is now fully recognized.

In July the staff assisted at the Henaratgoda Show, which the whole school visited.

On September 25 the third annual prize giving of the school was held, the Hon. Mr. W. L. Kindersley, Government Agent, Central Province, presiding. Two gold medals and ten prizes of books were presented, with the certificates, to the successful candidates of the 1918-20 course. The donors of the medals and prizes were all prominent Ceylonese agriculturists, two of them past students of the school.

The visitors to the school during the year included His Excellency the Acting Governor, Sir Graeme Thomson, and two Directors of Food Production, Mr. E. B. Denham and his successor Mr. F. J. Smith.

Copy was collected for the fifth number of "The Peradeniyan," but no issue was published during the year.

Visits were arranged for students to the Kandy Municipal market and the Mailapitiya market gardens, the dairy at the Ampitiya Seminary and the local slaughter-house, the Tobacco Trial Ground at Teldeniya, and the various tea and rubber factories in and around Peradeniya.

Under the auspices of the Students' Debating Society, a lantern lecture was delivered by the Registrar. Beyond this, its activities were very limited. The Students' Council maintained its activity and usefulness.

ST. L. H. DE ZYLVA,
Registrar, School of Tropical Agriculture.

February 19, 1921.

XI.—REPORT ON THE WORKING OF CO-OPERATIVE CREDIT SOCIETIES.

THE beginning of the year under report was rather unfavourable towards the progress of the societies. The price of rice and other necessaries of life continued to be high. The scarcity of bone manure set back the working of many village societies. The slump in the rubber market caused a scarcity of ready cash in the villages, with the result that the repayment of loans by the poorer members on due dates was delayed. On the other hand, the societies gave first consideration to the grant of loans for food production, and assisted in a larger measure for the increased food supply in the villages. The societies increased their activity and usefulness, and have made progress in many directions.

2. The Registrar returned from furlough and resumed duties in July, relieving Mr. M. Kelway Bamber, who acted as Registrar from May on the departure of Mr. T. Petch on leave. Two additional Inspectors, viz., Messrs. M. Amarasingha and S. B. Yatawara, were appointed in October.

3. The number of societies rose to 153 from 127 of last year, showing an increase of 26 societies. These are Kalupahana Palata, Atulugama Moors', Millewa Palata, Godakawela, Dompe Peruwa Palugama, Heenatigala, Gandolaha Pattuwa, Hambantota Government Servants', Vavuniya South Sinhalese Division, Taranagollewa-Pihimbiyagollewa, Relapanawa-Andarawewa, Kaluwamodera Agricultural, Galkadawala, Udunuwara Kurushikarma, Kurukal Madama, Valaichena, Tammannawa, Kiran, Kalmunai-Panduruppu, Tampiluvil, Ampilanturai, Tamuttegama, Nindoor Muslim, Naipaddimunai Tamils' and Moors', Wew Tulana, and Pahala Ambatale.

4. *Members.*—The number of members of all the working societies is 17,104. This works out at an average of 114 members per working society.

5. *Capital.*—The paid-up share capital also shows an increase. It has risen to Rs. 118,243·50 from Rs. 86,721 in last year.

6. *Deposits.*—The amount to the credit of deposit account of members is Rs. 10,801. This includes the bonuses declared and credited to members at the end of the last co-operative year.

7. *Loans.*—A sum of Rs. 81,870 was outstanding at the end of last year. Rs. 121,903 was lent and Rs. 85,854 were recovered during the year under report. A sum of Rs. 117,919 was outstanding at the close of the year.

8. *Reserve Fund.*—The amount due to reserve fund at the end of the last co-operative year (March 31, 1920) was Rs. 14,662·73, of which a sum of Rs. 4,108·24 was in deposit in banks.

PROGRESS OF THE MOVEMENT IN THE PROVINCES.

9. *Western Province.*—The societies increased in number and in the volume of business transacted. There are 47 societies in the Province, of which 30 are in the Kalutara District. New societies were formed in the Rayigam korale, the Siyane korale east, and the Kalutara totamune. The majority of societies have made satisfactory progress. The members of the Minuwangoda Society have proposed to start a Central Bank, and the proposal is under consideration.

10. *Central Province.*—One new society was registered during the year. The total number of societies is 17, of which 12 are in the Kandy District, 3 in the Matale District, and 2 in the Nuwara Eliya District. Some of the old societies are still stagnating.

11. *Southern Province.*—The number of societies increased to 30. The two new societies are one each from Galle and Hambantota Districts. There are 14 societies in the Galle District and 4 in the Hambantota District. The Hambantota Government Servants' Society is a supply society, and is the first of its kind registered under the Ordinance.

12. *Northern Province.*—One new society was registered within the year under report, bringing the total number of societies to 17, of which 15 are in the Jaffna District and 1 each in the Mannar and Mullaittivu-Vavuniya Districts. By the establishment of the Vavuniya South Co-operative Credit Society, the co-operative movement has penetrated into all the revenue districts in the Island.

13. *North-Western Province.*—The number of societies remains the same, viz., 4. The Marawila Society held under its auspices a successful Demonstration Show of agricultural implements, when a large variety of implements were exhibited, showing their usefulness. The Puttalam Society is in a moribund state.

14. *Eastern Province.*—Eight new societies were registered during the year in the Batticaloa District. These new societies were established primarily as a result of the interest taken by the Government Agent of the Province. Almost all these societies have started work. The total number of societies in the Province is 14. Of these, 10 are in the Batticaloa District and 4 in the Trincomalee District The three village societies in this district and the Bintenna North Society in the Batticaloa District have not started work.

15. *North-Central Province.*—Seven new societies were established and duly registered in this Province. These, with the old Anuradhapura Society, make a total of 8 societies in the Province. The Government Agent is keenly interested in the formation of these new societies, and has afforded facilities to the officers of the Kachcheri to attend to the working of societies.

16. *Province of Uva.*—There are 7 societies in the Province. The Uva Society, with its head-quarters at the Kachcheri, was revived, and a new Secretary and a Vice-President were appointed. The Wellawaya Society does not show any progress.

17. *Province of Sabaragamuwa.*—Two new societies, one each from Ratnapura and Kegalla Districts, were registered during the year. These make a total of 9 societies for the Province. Of these, 3 are in the Ratnapura and 6 in the Kegalla Districts. The newly-formed society at Godakawela in Atakalan korale has made a very good beginning.

Inspection and Audit.

18. The annual inspection of societies was carried out by the Secretary, Board of Control, and the Tamil Inspector.

Financial Assistance by Govenrment.

19. A sum of Rs. 6,000 has been given on loan to 5 societies during the year. The total number of societies which received financial assistance from Government is 18. The total sum lent is Rs. 19,935, and the repayments are Rs. 3,230. The balance outstanding is Rs. 16,705. Applications from three more societies were before the Local Loans and Development Commissioners at the end of the year.

Agricultural Shows and Food Production.

20. The Ganga Ihala Korale Society, the Minuwangoda Society, and the Matugama Society took a prominent part in the Shows held at Gampola, Henaratgoda, and Matugama, respectively. The Handapangoda Society has successfully raised paddy and other food crops in the land leased from the Crown. The Alutgama Society is closely associated with the increase of food crops within its area of operation. The Uruwela Peruwa Society is working in co-operation with Local Food Production Committee in the matter of food production. The Udunuwara Society gives loans exclusively for agricultural purposes. All the rural societies have devoted a good deal of their activities in the increase of local food crops.

Supply of Manure, Implements, Seed, &c.

21. The supply of manures for paddy is one of the main businesses of the societies in the Western Province and in the districts of Galle and Matara in the Southern Province. There was a great demand for bone manures at the beginning of the year. Owing to the high price and the scarcity of manure, a number of societies failed to meet the demands of their members. This was not only a matter of disappointment, but also a loss to members, for their fields had to be sown without manure being applied. Arrangements were, however, made in consultation with the Food Production Department, and a suitable paddy mixture was supplied to a number of societies. Some societies preferred to purchase bone manure at higher rates. The following are the particulars of manures supplied within the year under review :—

	Quantity. Tons cwt. qr. lb.	Cost. Rs. c.
1920	241 17 3 18	35,061 57
1919	328 16 0 0	37,074 53

At the end of the year the price of bone manure was quoted at Rs. 130 to Rs. 140 per ton. Investigations are being made with regard to the possibilities of a local supply of bone manures.

22. Sugar cane tops for experimental purpose were supplied to the Nagoda Society. This and the Ganegama Society were supplied with sweet potato and manioc cuttings. All these cuttings were supplied from the Peradeniya Experiment Station.

23. The supply of agricultural implements and barbed wire is gradually increasing, and several societies purchased these on easy terms. Messrs. H. Don Carolis & Sons have agreed to supply agricultural implements at six months' credit to approved societies.

Co-operative Education.

24. A leaflet on " Co-operative Credit Societies and Deposits " was issued in English and the vernacular languages during the year. The Sinhalese and the Tamil magazines of the Ceylon Agricultural Society were issued regularly to societies free of cost.

25. Separate courses of lectures on co-operation were given to each of the English-speaking and the vernacular students of the School of Tropical Agriculture during the year.

26. *Amendment of Co-operative Credit Societies Ordinance.*—Proposals for amendment of the Ordinance as approved at the last Conference have been submitted to Government, and are receiving the attention of the Law Officers of the Crown.

N. WICKREMARATNE,
Secretary, Board of Control, Co-operative Credit Societies.

Peradeniya, January 31, 1921.