

DISCUSSION.

MR. J. HORSFALL thought that these experiments if continued would lead to very far-reaching results so far as the use of artificial organic fertilisers was concerned, and hoped that they would be carried out for a year or so.

MR. A. R. WESTROP commenting on the value of Wild sunflower as a green manure stated in their experiments on artificial farmyard manure, they found that Wild sunflower gave very good results, the per cent. of nitrogen in it being 2.5.

MR. JOACHIM confirmed the statement that Wild sunflower had a high per cent. of nitrogen.

MR. C. E. A. DIAS and MR. A. A. BOWIE stated that they always got very good results with cattle dung and they were surprised that in these experiments the amount of nitrate nitrogen obtained was so low, comparatively.

MR. JOACHIM replied that on analysis the amount of nitrogen present in the dung was found to be about .8 per cent. against a minimum of 3.1 per cent. in the other green manures.

MR. T. H. HOLLAND explained the cause of the low nitrogen per cent. in the cattle dung.

MR. J. E. P. RAJAPAKSE thought that the amount of organic manures added were too high, and that small amounts should be experimented with. He also thought that grass should be included in the next series.

MESSRS. L. A. WRIGHT and A. W. WINTER thought that it would be interesting if experiments could be carried out with other commonly growing non-leguminous plants as well.

MR. J. MALCOMSON wished to know whether in the drying of these green manures nitrogen was lost.

MR. JOACHIM replied that drying had an adverse effect on the rate of nitrification of green manures.

THE DIRECTOR OF AGRICULTURE concluded the discussion with reference to the burying of green manures fresh and green or dried and promised that the investigation would be continued.

PLANT PEST INSPECTION.

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Plant Pest Inspectors, Dept. of Agriculture.

The Department of Agriculture includes a Division of Plant Pest Inspection, and the object of this paper is to explain the functions of this Division. Plant Pest Inspection may be looked upon as a sub-division of the very large subject of Plant Protection, which is one branch of the science of Agriculture. In order to clearly visualise the field in which the Plant Pest Inspectorate participates it is necessary to bear in mind the objects of Plant Protection. Agriculture is the science of looking after and improving the plants and animals valued by man until such time as they have fulfilled the functions for which they were intended. The protection of plants from their enemies is very properly a function of this science.

The major enemies of plants may be conveniently grouped under the following heads:—

1. Small animals and molluscs, including Rats, Squirrels, Snails, etc.
 2. Insects in various stages of their existence.
 3. Nematode worms.
 4. Fungi.
 5. Bacteria.
 6. Diseases, the causes of which are not yet known.
- Other enemies of plants, not included in these groups, are either of local occurrence, or rarely of economic importance.

In addition to the above, however, there are other factors to consider, for instance, the plant itself is often forgotten in the efforts to find a remedy for the believed causal organism. Again, the factors of environment which are capable of modification, chief of which is the soil, often affect the resistance and power of recuperation of the host to a marked degree. Plant Protection Services have been organised in nearly all the countries of the world in order, as far as possible, to stimulate plant production and minimise plant destruction. Such organisations constitute a form of insurance on the plant products of the country in which they exist. General Agriculture, Botany and its sub-sciences form the basis on which such work rests, but the work of Plant Protection falls mainly into two branches, namely:—

1. A Research Branch, and
2. A Field and Inspection Branch.

Between these two branches should exist the greatest possible co-operation. The work of the Research branch consist of Pure and applied Sciences and of special importance are the subjects of Entomology, Mycology, and Soil Chemistry.

The work of the Field and Inspection Branch is mainly restricted to Education and Plant Inspection. The educational part consists in propagandist and advisory work, its aims are:—

- (a) to enable the growers to recognise the more serious pests and diseases as early as possible.
- (b) to furnish them with the latest information as to the treatment and control of pests and diseases as advised by the Research Branch, and
- (c) to bring them to realise their obligations in this respect both to their neighbours and to the country as a whole.

The Inspection work consists of systematic inspections of crops, watching for and noting appearance of pests and diseases and following their development. This work provides opportunity for Research in the collecting of field observations, and such data may be of great value in guiding or respect both to their neighbours and to the country as a whole.

The objects and functions of the Inspectorate may therefore, be summarised as follows:—

The objects and functions of the Inspectorate may therefore, be summarised as follows:—

1. To inspect crops for pests and diseases affecting their crops.
2. To advise growers on the control of such pests and diseases.
3. To impress upon them the losses that are being caused by such pests and diseases.
4. To encourage them to take remedial measures for the control of such pests and diseases.
5. To acquire for the use of the Department an index of the prevalence of the various pests and diseases, and the losses occasioned thereby.
6. To acquire information required for the improvement of the regulations of the Plant Protection Ordinance.
7. To take steps to enforce, where necessary, the provisions of

regulations made for the control of Plant Pests and Diseases and 8. To relieve the Research Officers of as much executive work as possible and of routine visits to estates and plantations in order that they may continue research work as uninterruptedly as possible.

Cultivated plants in every country are liable to pests and diseases from two sources:—(i) Those existing within the country (possibly on wild hosts), and (ii) Those introduced from other countries.

In order to lessen the dangers to which the staple crops are subject, various legislative enactments have been made by the Governments of the countries concerned. Such regulations aim at minimising the internal spread of pests and diseases, and preventing the entry of pests and diseases from external sources, in the former case by the enforcement of various sanitary and prophylactic measures; and in the latter by placing restrictions on the imports of various plants and plant parts.

In Ceylon the Legislative Enactments which provide for the protection of plants are embodied in the Plant Protection Ordinance No. 10 of 1924. This Ordinance repeals all previous ones and makes provision for preventing the Introduction and Spread of Weeds, Pests and Diseases injurious to or destructive of Plants.

It consists of two parts:—Part I.—deals with, and governs the importation of Plants, Pests and Diseases. Part II.—deals with the Pests and Diseases already existing in the Island.

The Plant Pest Inspectorate of the Department of Agriculture is not directly or actively concerned with Part I of the Plant Protection Ordinance. The activity of this part of the Ordinance is under the jurisdiction of Research Officers, chiefly the Entomologist and the Mycologist. The inspection and fumigation of the imports is carried out by the Officers of the Colombo Fumigatorium with the advice of the Agricultural Research staff.

Part II, which is concerned with those Pests and Diseases already existing in the Island, is that part of the Ordinance with which the Plant Pest Inspectorate of this Department is actively concerned. There are three Divisions of the Inspectorate, the Central for the Central Province, Uva and the Kegalle District of the Sabaragamuwa, the Southern for the Southern Province and the Kalutara District of the Western Province, and the North-Western for the North-Western Province and the Negombo and Colombo Districts. There are four Officers in the Central Division of the Inspectorate, a Plant Pest Inspector and three Sub-Inspectors, and an exactly similar number of Officers in the Southern Division. The North-Western Division consists of an Inspector and two Sub-Inspectors, while another Sub-Inspector is stationed in the Batticaloa District. In all, therefore, there are three Inspectors and nine Sub-Inspectors in the Plant Pest Inspectorate of the Department. The total of Inspectors and Sub-Inspectors appointed to carry out the requirements of the Plant Protection Ordinance are nineteen in number. The extra seven are the Divisional Agricultural Officers of the Central Southern, Northern, and North-Western Divisions, and the Senior Agricultural Instructors of Uva, Ratnapura and Batticaloa. Such an arrangement provides a means of co-operation between the purely Agricultural staff and the staff of the Inspectorate.

The pests and diseases which are at present declared as such under the Ordinance are the following:—

I.—The Shot-hole Borer of Tea (*Xyleborus fornicatus*, Eich.). II.—The Black Beetle of Coconuts (*Oryctes rhinoceros*, L.). III.—The Red Weevil of Coconuts (*Rhynchophorus ferrugineus* F.). IV.—The Coconut Caterpillar (*Nephantis serinopa* Meyr.). V.—Bud Rot of Coconuts, caused by either *Bacillus coli* or a species of *Phytophthora*. VI.—Bunchy Top Disease of Plantains. VII.—The Root Weevil of Plantains (*Cosmopolites sordidus* Germ.). VIII.—The Stem Weevil of Plantains (*Odoiporus longicollis* Oliv.) and IX.—The Soft Rot of Betel.

The areas for which the various pests and diseases have been scheduled are notified in the "Gazette" and Gazette notices are circulated to all Officers of the Plant Pest Inspectorate. There are regulations and specified treatments for Shot-hole Borer, Black and Red Beetles of Coconuts, Coconut Caterpillar, and Bud Rot of Coconuts, and the Inspectors who are declared as such under the Ordinance endeavour to see that the regulations are carried out. The *modus operandi* of the Regulations may be briefly outlined as follows:—

The Owner or occupier is liable to report declared pests, diseases and weeds; but in any area the Director of Agriculture and any Inspector or Sub-Inspector may enter plantations, estates or gardens, for the purpose of inspection or investigation. All infested areas are to be declared as such and when free again shall be so declared. No plant or part of plant attacked by or liable to be attacked by a specified pest or disease shall be removed without a permit signed by the Director of Agriculture.

An Inspector or Sub-Inspector upon visiting a plantation, estate or garden, may order affected plants to be treated in the manner prescribed, and if upon a second visit, after an order has been issued, it is found that no action has been taken, the matter is reported to the Director of Agriculture, who may by notices in English, Sinhalese and Tamil, order the owner or occupier to treat the plants or weeds as prescribed. If such notice is not complied with, the Inspector or Sub-Inspector may enter upon the land and carry out the treatment at the expense of the owner or occupier, and enter a prosecution against him. (Under section 7 of the Ordinance).

Such, therefore, are the not inconsiderable functions of the Inspectorate so far as the Plant Protection Ordinance is concerned. Over and above the requirements of the Ordinance there are other duties which the Officers of the Plant Pest Inspectorate have to carry out. (The Officers of the Plant Pest Inspectorate must not be confused with Inspectors declared as such under the Ordinance). These duties may be conveniently summarised under two heads:—I. Education. II. Routine.

1. Most of the work under the head Education consists in arousing the interests of the grower, and getting him to realise by lectures, demonstrations and exhibits the following facts:—

1. The existence of an Inspectorate and its functions. 2. The use of the Inspectorate to him; the information it can give him and what it expects in return. 3. The existence of pests and diseases; the losses caused by them, and the advantages of adopting control measures. 4. That the time to control pests and diseases is in their early stages, while they are localised, and before they become general. 5. That pests and diseases should be reported to the Inspectorate and inspection and advice about them asked for. 6. The symptoms of, and treatment for, the more commonly occurring pests and diseases. 7. That reports and statements as to the efficacy of control measures tried and recommended are of the utmost value. 8. That laws and

and regulations exist as to certain pests and diseases, and the reasons for them and how they work. 9. That there are two methods of controlling pests and diseases—Special methods available to special pests and diseases, and General methods, which vary according to the host plant. 10. That these general methods that include good seed, good cultivation, and control the number of tea plants which have been moved under permit during the run generally involve a minimum of expense.

II. The Routine work consists of:—

1. Inspections which include both systematic inspections of the various crops, and Special inspections as called for or rendered necessary. 2. The compilation of an index of the various pests and diseases and their range and activity. 3. The making of field observations on the various pests and diseases, and on the efficacy of control measures adopted. 4. The reporting and collecting of specimens for the Research Officers of all new hosts, pests and diseases observed. 5. As previously stated the supervision, and when necessary, enforcement of various laws and regulations in force for the control of pests and diseases. 6. The collection of information for the improvement and revision of these laws necessitated from time to time by the varying incidence of pests and diseases of staple crops. 7. The checking of every application for permits for the removal of plants, in accordance with the regulations of the Ordinance before permits are granted by the Director of Agriculture. In this connection, it may be of interest to you to learn that the number of tea plants which have been moved under permit during the last four years is just over 13 million.

This number is made up as follows:—

1922.....	2,614,600	Plants.
1923.....	3,717,300	„
1924.....	2,643,566	„
1925.....	4,064,600	„

Special attention is given to the uneducated grower, in order to advise and encourage him to grow healthy plants and to keep these plants healthy. This calls for the complete confidence and co-operation of the cultivator, which is of slow growth and can only be attained by a personal knowledge of the man himself. For this is needed the exercise of patience, perseverance, tactfulness, sympathy and interest.

The foregoing is a review of the functions in Ceylon of the Division of Plant Pest Inspection. Its usefulness is, up to a point, only limited by its capital and its personell. With the limited staff and means available every endeavour is made by the Inspectorate to carry out as much as possible of the work with which they are faced.

It is hoped that the foregoing explains the functions of this Division and the importance of these functions to a primarily Agricultural country.

THE DIRECTOR OF AGRICULTURE thought that the paper read would clearly illustrate the work of Plant Pest and Disease Inspectors. These field inspections were of the greatest importance and resulting in bringing knowledge regarding pests and diseases before cultivators. At the present time a campaign of education in regard to scheduled pests and diseases was being undertaken and he thought that good results would be obtained therefrom.

CONCLUSION OF CONFERENCE.

In conclusion, the DIRECTOR OF AGRICULTURE thanked Sir H. Marcus Fernando for presiding over this session and hoped that the Conference would tend to encourage greater Agricultural progress throughout the whole of the island.

ANIMAL DISEASE RETURNS FOR THE MONTHS ENDED 31st MARCH, 1926. AND 30th APRIL, 1926.

Provinces, &c.	Disease	No. of Cases up to date since Jan. 1st, 1926	Fresh Cases	Reco- veries	D & H	Bal- ance Ill	No. Shot
Western	Rinderpest	5	...	5	...	...	...
	Foot-and-mouth disease	...	...	...	...	...	...
	Anthrax	6	...	...	3	...	3
Colombo Municipality	Rinderpest	...	2	...	1	1	...
	Foot-and-mouth disease	...	1	...	3	...	...
	Anthrax	3	3	...	3	...	...
Cattle Quarantine Station	Rinderpest	3	...	2	...	...	...
	Foot-and-mouth disease	154	32	...	154	...	...
Central	Rinderpest	82	14	69	...	13	...
	Foot-and-mouth disease	3	2	...	3	...	...
	Anthrax	3	...	...	1	...	2
Southern	Rinderpest	881	337	20	674	157	30
	Foot-and-mouth disease	...	...	...	...	...	...
Northern	Rinderpest	Free	...	...	...	...	...
	Foot-and-mouth disease	...	...	...	...	...	...
Eastern	Rinderpest	758	...	748	10	...	...
	Foot-and-mouth disease	...	...	...	...	...	...
North-Western	Rinderpest	64	32	62	...	2	...
	Foot-and-mouth disease	...	...	...	...	...	...
North-Central	Rinderpest	...	...	...	...	...	...
	Foot-and-mouth disease	...	...	...	...	...	...
Uva	Rinderpest	68	8	60	...	8	...
	Foot-and-mouth disease	1	...	...	1	...	...
	Anthrax	...	...	...	...	...	...
Sabaragamuwa	Rinderpest	199	74	7	153	...	39
	Foot-and-mouth disease	...	...	...	...	...	...
	Anthrax	...	...	...	...	...	...
	Hæmorrhagic Septicæmia	...	...	...	...	...	...

* a horse

G. W. STURGESSE,
Government Veterinary Surgeon

Colombo, 6th May, 1926.

METEOROLOGICAL

MARCH, 1926.

Station	Temperature		Mean Humidity	Mean amount of cloud or clear	10% overcast	Mean Wind Direction during Month	Daily Mean Velocity	Rainfall		
	Mean Daily Shade	Difference from Average						Amount	No. of Rainy Days	Difference from Average
Colombo Observatory	82.4	+1.0	79	3.9	3.9	W	93	5.74	13	+1.07
Puttalam	83.4	+2.2	70	2.5	2.5	Var.	147	1.92	5	+1.15
Mannar	84.2	+1.3	75	3.6	3.6	E	169	2.80	4	+1.35
Jaffna	85.8	+1.0	74	3.3	3.3	ESE	152	0.38	3	0.76
Trincomalee	84.1	+1.5	74	2.9	2.9	ESE	181	0.12	4	1.58
Batticaloa	82.2	+1.4	76	4.5	4.5	ENE	173	1.08	5	1.95
Hambantota	81.3	+0.9	80	3.1	3.1	ENE	206	2.30	6	0.07
Galle	82.2	+1.1	80	4.5	4.5	ESE	143	7.13	12	2.62
Ratnapura	83.6	+1.4	73	4.6	4.6	—	—	10.88	18	+1.91
Anu'pura	83.1	+1.1	72	4.1	4.1	—	—	4.92	7	2.16
Kurunegala	84.1	+1.3	70	4.3	4.3	—	—	4.43	10	0.68
Kandy	80.1	+1.8	70	5.4	5.4	—	—	3.91	6	0.09
Badulla	74.6	+1.2	78	3.6	3.6	—	—	2.83	7	1.73
Diyatalawa	68.4	+0.7	72	5.0	5.0	—	—	2.71	8	1.59
Hakgala	64.1	+3.9	72	3.9	3.9	—	—	2.25	8	3.23
N. Eliya	59.6	+0.5	71	4.4	4.4	—	—	1.71	8	1.73

The rainfall of March was slightly below average over the major portion of the island. The biggest deficits occurred in the area immediately south of the main hills and were of the order of five to six inches. A few stations in the Northern Province recorded no rain at all.

The chief area in which the average rainfall was reached was in the low-country west of the hills from Kegalle to Ratnapura. Keragala with 20.43 inches had the highest total reported for the month, and was 7.35 inches above its own average. Other areas above average were a strip close to the west coast, the neighbourhood of Anuradhapura, and a thin strip round the eastern limit of the hills extending from Nalanda, via Nitre Cave (Hendon), Madugoda, Passara and the extreme South-east shoulder (Poonagalla) to Koslanda.

The pressure was extremely uniform throughout the island and consequently the rain fell chiefly in the form of local thunder showers. A few cases of damage by lightning were reported. Only three stations (Eheliyagoda, Hendon and Kobonella) reported falls of over 5" in 24 hours.

Both humidity and amount of cloud were on the whole below average, and as will be seen from the table, temperature was consistently well above average.

A. J. BAMFORD,
Supdt. Observatory.

APRIL, 1926.

Station	Temperature		Mean Humidity	Mean amount of cloud or clear	10% overcast	Mean Wind Direction during Month	Daily Mean Velocity	Rainfall		
	Mean Daily Shade	Difference from Average						Amount	No. of Rainy Days	Difference from Average
Colombo Observatory	83.4	+0.8	80	6.2	6.2	WSW	98	2.53	12	-4.77
Puttalam	84.5	+1.7	74	3.3	3.3	SW	124	0.68	5	-4.76
Mannar	86.3	+0.9	75	4.6	4.6	SSW	140	3.04	4	+0.24
Jaffna	86.5	+0.7	76	3.8	3.8	S	202	0.91	1	1.00
Trincomalee	86.8	+1.6	72	3.8	3.8	SSE	133	0.27	2	-1.68
Batticaloa	84.8	+1.6	74	4.4	4.4	ENE	132	0.42	1	-1.44
Hambantota	83.4	+1.5	82	4.6	4.6	SSW	122	3.32	6	+0.05
Galle	83.1	+1.3	84	6.2	6.2	W	134	4.30	3	-5.57
Ratnapura	84.4	+2.0	76	5.7	5.7	—	—	8.04	17	-4.29
Anu'pura	85.6	+2.0	72	4.6	4.6	—	—	4.38	6	1.33
Kurunegala	84.7	+1.3	76	5.6	5.6	—	—	9.59	10	+0.17
Kandy	81.2	-2.2	74	6.6	6.6	—	—	4.40	14	-2.30
Badulla	77.0	+1.6	77	4.8	4.8	—	—	2.68	10	-4.71
Diyatalawa	70.5	+1.1	76	5.6	5.6	—	—	4.70	9	-0.89
Hakgala	65.4	+3.1	79	5.4	5.4	—	—	7.60	15	+0.68
N. Eliya	61.2	+0.7	76	6.0	6.0	—	—	2.14	10	-3.51

The rainfall of April was deficient over three quarters of the island. What rain fell was chiefly of the thunderstorm type and consequently its distribution was patchy. The areas in which the average was passed can be summarised roughly as forming a ring round the outer limit of the main hills, including Udahena, Lunugala Estate, Meeriabedde (whose total of 17.96 is the highest reported as yet), Koslanda, Keenagahaella (Balugoda), Anfield, Pradeniya, Dooroomadella and Alutnuwara.

The biggest deficits were mostly near the West and South coasts, though observers at some of the central stations, e.g. Waragalande, have called attention to the cumulative effect of deficiencies in rainfall since the beginning of the year. The only stations to report no rain were in the Jaffna peninsula where the smallness of the averages prevents any great deficits.

Temperature was consistently above average, a fact which shows in the table above, but which has been emphasised still further on account of this month's offsets following on similar ones in March. Anuradhapura with 109.39 on the 22nd recorded the highest temperature, while all the stations north of it recorded over 98°f.

Humidity and amount of cloud were both on the whole below average and wind velocity about normal.

A. J. BAMFORD
Supdt. Observatory.