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Rothamsted Report for 1947

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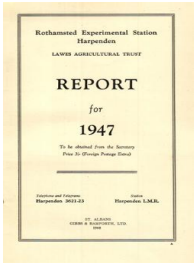

Introduction

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INTRODUCTION

By The Director

Staff

During the year there have been a good many changes in the staff. Dr. B. A. Keen, who had been Head of the Physics Department since he joined the Station in 1910 and Assistant Director since 1923, left in August 1947 to become Director of the East Africa Agriculture and Forestry Research Organisation. The Head of the Insecticides Department, Dr. F. Tattersfield, retired after being at Rothamsted for over 29 years, but he remains on a part-time basis to advise on the chemical side of the work. At the time of his retirement he received the O.B.E. Dr. Charles Potter, who had just spent a year in America as a Visiting Professor, succeeded him as head of the department in June 1947. Mr. N. W. Pirie took up his duties as head of the newly formed Biochemistry Department on returning from a year at the Worcester Foundation for Experimental Biology. Dr. and Mrs. D. J. Watson were granted a year's leave of absence and are spending the greater part of it at the Waite Institute, Adelaide. They are also visiting other stations in Australia, New Zealand and the United States. At the request of the Colonial Office, Dr. F. M. L. Sheffield was seconded for a year to the Clove Research Station, Zanzibar, to study a very serious disease affecting clove trees. Several other members of the staff left, some to go to University lectureships and others to posts overseas. Amongst the new appointments was that of Mr. J. B. Bennett, A.C.A., who was appointed Secretary in succession to the late Mr. W. Barnicot, M.B.E.

The administration of the plant nematology work at the Institute of Parasitology, Winches Farm, St. Albans, was transferred to Rothamsted from 1st October, 1947, and as soon as accommodation is ready for them the staff, under Dr. T. Goodey, F.R.S., will come to Rothamsted.

Voluntary workers

During the year there were 21 long-term voluntary workers at the Station. Many applications had to be refused for lack of bench space and at present there is a waiting list.

Visitors

The number of visitors has continued to rise since the war and, in 1947 well over 4,000 people came to Rothamsted. Most of them were in organised parties, but about 600 came privately: of these one half were from the British Isles, one third from foreign countries, and the remainder from the Dominions and Colonies. There was a substantial increase in the number of educational parties.

The distribution of the 139 parties was as follows:

Foreign Agriculturists	19
Scientific Societies	3
Farmers and Agricultural Students	35
Senior Science Classes from Schools	75
Various Clubs and Associations	7

During the month of July Rothamsted received the members of the 11th International Congress of Pure and Applied Chemistry, the Genetical Society, and the Institute of Physics.

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The distinguished visitors included Mr. Henry Wallace, formerly vice-president of the United States, who came on 15th April, accompanied by the Rt. Hon. Tom Williams, Minister of Agriculture.

A few specialists are now beginning to arrive from ex-enemy countries. During the year we had visitors from Germany, Austria, Italy, Hungary and Finland.

Accommodation

During the year a certain amount of building work was carried out. The lecture room at Red Gables was enlarged and a new kitchen provided to enable mid-day meals to be served to the staff. The top floor of the Plant Pathology building has been altered and re-equipped to house the Pedology Department and Soil Survey, and a new building for the Nematology Department is nearing completion. Work has been started on a new road from the laboratories to the farm and six new farm cottages are in course of erection.

The work of the station

A considerable amount of work is in progress on the soils and crops of the Classical fields. A new series of analyses reveal no net loss of organic matter from the soils of the wheat plots on Broadbalk field since fallowing was introduced twenty years ago.

The studies on the viability of weed seeds from Broadbalk is nearing completion. Much trouble has been encountered in the past few years from wild oats, not only on Broadbalk and Hoos but on certain of the experiments at Woburn. Other work on Broadbalk includes investigations on the actinomycete flora on earthworms and on wheat midges.

A large programme has been carried out on soil fertility questions. Preliminary tests with an experimental fertiliser seed drill gave promising results with sugar beet, mangolds, swedes, and peas. One of the merits of controlled placement is that in a dry season it ensures that most of the fertiliser is in a moist state.

Field experiments on potatoes over the two contrasted seasons of 1946 and 1947 showed that broadcasting fertilisers before ridging was much less efficient than applying them after ridging and controlled placement gave no advantage over broadcasting on the prepared ridges. Field trials with sugar beet over three seasons showed that salt was equally effective when broadcast or ploughed in during the winter as when broadcast in spring.

Experiments on the manuring of forest nurseries are proving to be very interesting and already results of use in practice have been obtained, especially from the use of superphosphate and, on watered plots, from nitrogen top-dressings. Seedlings and transplants from many experiments were planted out in forests to test the effect of early treatments on forest establishment and growth.

Work on phosphates has been continued and a study has been made of the occurrence in organic soils of complexes between heavy metals and certain fractions of the organic matter. Sodium pyrophosphate proved a very convenient extractant in this work and is being used in systematic attempts to fractionate soil organic matter and to classify the various ways in which heavy metals occur in soils.

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Other soil work in progress concerns the effect of micro-organisms on soil structure and it has been shown that fungal mycelium has the best effect. In association with the Road Research Laboratory a study has been made of the microbial decomposition of resins that have been prepared for use in soil stabilisation.

Other microbiological investigations are concerned with mycorrhiza, myxobacteria, and protozoa. An interesting investigation on effective and ineffective strains of nodule bacteria of clover has been continued. The work includes studies on the physiology of nodule formation, genetics of clover in relation to nodule formation, the establishment of nodule bacteria in field soil and the stability of bacterial strains. In a study of nitrifying bacteria it has been found that certain trace elements affect the oxidation of ammonia to nitrite.

The work on deep and shallow ploughing has been continued. For the third year in succession potato yields have been unaffected but significant responses have been obtained with wheat. The meteorological work has been continued and extended in relation to studies of insect flight and spore dispersal. Estimates have been made of the transpiration from extended areas of grassland. Other work in the Physics Department includes studies of the migration of ions, negative adsorption and vapour pressures of aqueous solutions. A new technique of measuring the separated diffusion of anions and cations has been developed.

On the pedological side work has been handicapped because the laboratories are under reconstruction, but some work has been done on rock weathering and on the oxidation of iron in soils. Professor Mannkopff and Mr. Albrecht from Göttingen have been spending some time at Rothamsted and giving help in the setting up of the spectrographic section.

The Botany Department continued its work on minor elements and a special study was made of molybdenum. Other work included the effect of root temperature and light on growth, and studies on the viability of buried weed seeds. Botanical separations are being made of samples from all the Park Grass hay plots, and the material accumulated since 1919 is being gradually worked up with the intention of bringing the survey up to date since the issue of "Manuring of Grassland for Hay", which dealt with all the earlier work. In Crop Physiology the main lines of work are on the physiology of leaf growth and on the effect of cultivations and fertiliser applications on the activity of roots, and the consequent effects on crop yields.

On the plant pathological side the virus studies were continued very actively, particularly on the nature of viruses and on the conditions of the host plants that affect resistance. The field work, as before, was done mainly on the potato and sugar beet crops. Biochemical studies have been made of various plant viruses and work done on the factors influencing the extraction of protein from leaves. On the mycological side, investigations on violet root rot disease, clubroot, and eyespot, were continued. It was found that the survival in soil of the fungus causing violet root rot was prolonged by increased carbohydrate and lessened by nitrogen. Soil conditions favouring infections with *Plasmodiophora brassicae* were

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those in which resting spores germinate most readily in fallow soil. Next to rotation, spring rainfall had the greatest influence on the incidence of *Cercosporella herpotrichoides*, but any conditions increasing humidity within the crop increased eyespot and lodging; there was less eyespot in 1947 than in any of the previous 10 years.

In the Entomological Department the work on insect migration was continued and studies made of the relation of changes in numbers of certain common Lepidoptera to weather conditions. Much progress was made on the earthworm investigations, and it is unfortunate that Dr. Evans, who was in charge of this work, has left Rothamsted to take up an appointment elsewhere. The work on wheat midges has been continued and also the work on slugs. Other investigations include the drift of aphides in wind currents at various altitudes and the build up of a population of black aphis of beans.

The advisory work previously undertaken by the Bee Department is now handed over to the National Agricultural Advisory Service, but is located at Rothamsted, and more research is now possible. Work at present in hand includes a study of the behaviour of pollinating honeybees, the effect of anaesthetics upon foraging behaviour, and the floral sources from which bees obtain their pollen. A new line of investigation started during this year is on artificial insemination with a view to producing strains of bees for special purposes. Work has been commenced on the determination of the possible harmful effects of various herbicides on honeybees. Preliminary experiments have indicated that serious poisoning may occur if dinitro-ortho-cresol is used to destroy charlock whilst it is actually in flower.

The Insecticides Department has continued work on the stomach poison effect of a number of insecticides, and collaborative work on methods of estimation of the pyrethrins has also been continued. Several investigations on various aspects of the use of D.D.T. have been continued and extended. In addition to the chemical studies a good deal of physico-chemical and biochemical work was carried out. On the biological side the programme included a study of the relationship between body weight and resistance. This was found to vary with the poison used. Another piece of work was on the insect cuticle and in the larvae studied this was found to vary greatly in thickness and structure in different parts of the body. It appears that certain areas are likely to be much more permeable than others. A field experiment on the control of wireworms has been started in Little Hoos field in conjunction with the Entomology Department.

The Statistical Department has been rather handicapped through many changes occurring in staff, but final arrangements have been made for extending the department into a general research statistical service for agriculture. The National Agricultural Advisory Service and various research institutes are already making use of its services. Research in statistical methodology and in the design of experiments was continued and included studies of grass cutting techniques and the assessment of yields of grazed pastures.

The field and pot experiments at Woburn have been continued

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and details of the work will be found in the Field Experiments reports and the report by Dr. Mann.

Although the Station is organised in departments the work is not carried out in water-tight compartments. Many of the investigations are carried out jointly between different departments. For instance, a joint piece of work on nitrification is being carried out by the departments of Soil Microbiology and Biochemistry; the departments of Chemistry and Biochemistry have been co-operating on manganese investigations, and there has been the very closest association between Biochemistry and Plant Pathology for many years. Physics and Crop Physiology have co-operated in studies of the effect of cultivation on root development. Physics and Entomology are co-operating on meteorological work, and a 100 ft. tower has been erected which has suction traps for insects and recording apparatus for temperature, humidity and run-of-the-wind. The Bee Department is engaged in investigations on D.D.T. jointly with the Insecticides Department, and these have proved of great interest. These are merely a few instances of the co-operative work which is now in progress.