ROTHAMSTED RESEARCH

# Report for 1937

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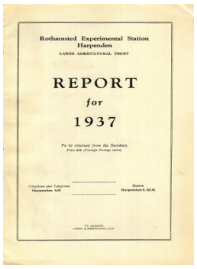


## Statistical Department

### Rothamsted Research

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centage infection (which increases with increased feeding time on the healthy plant) decreases rapidly with increasing times on the infected plant from two minutes to one hour.

In 1932-1933 Mrs. Watson investigated an outbreak of disease in commercial grown *Hyoscyamus*, from which she isolated three viruses, two of them new. In a crop of this kind, which is limited and valuable enough to warrant the expense, it seemed that control by spraying might be practicable ; and it was found that the aphis infestation and consequent infection were reduced thereby. The greatest effect was obtained with weekly sprayings. The influence on yield was less evident, but as a result of weekly spraying in the first year a 30 per cent. increase was obtained in the third crop taken in May of the second year.

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As the work of the other Departments has been recently described in full it is not necessary to do more than mention some of the chief lines of work being done in each.

## SOIL CULTIVATION AND MANAGEMENT

These investigations are in charge of the Soil Physics Department : an extended account was given in the Report for 1936. Evidence has been accumulated that the purpose of cultivation is to keep down weeds, and operations additional to what is required for this may prove ineffective or even detrimental. The importance of preparing a good seed bed is recognized though some of the rather striking differences in appearance of crop resulting from different methods of preparation do not lead to corresponding differences in final yield.

*Soil moisture.*—The water relationships of soils have been much studied as being among the most important factors in soil fertility. Water easily moves downwards in the soil under the force of gravity but in other directions its movement is both slow and small in amount. Evaporation seems to occur *in situ ;* plant roots grow to the water, the water does not move to the roots. The investigation of this subject would be greatly facilitated if a trustworthy method were known for the direct measurement of water in the soil and some progress has been made in this direction.

*The colours of soils.*—Soil surveyors regard the colour of the soil as one of the properties helpful in classification. An improved method of recording colour devised by Dr. Schofield was found to be so valuable that an important firm of instrument makers has acquired the patent and taken over his assistant for the purpose of further developing it.

*Soil structure.*—Methods are being devised for studying in detail the structure of the soil.

## STATISTICAL DEPARTMENT

During the last few years the scope and work of the Statistical Department have changed considerably. The staff had at first to develop methods ; now these methods are used for the solution of problems presented by other departments. At the present time there are three main lines of work :

(1) The improvement of designs for field experiments whereby these may become more useful than at present.

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These new methods have proved very popular and are now adopted all over the British Empire and in many other countries of the world. The principle of randomisation introduced by Dr. Fisher, and his subsequent developments of factorial design and of "confounding," have been carried further by Mr. Yates. He has also worked out quasi-factorial and other designs which are being widely adopted in plant breeding and other work which necessitates the testing of a large number of varieties.

(2) Sampling problems such as crop estimation, forecasting, etc. Methods are being worked out experimentally for wheat and a beginning has been made with methods for potatoes and sugar beet.

(3) Methods of analysis have been designed to deal with data collected in various surveys; among these are the results of the Rothamsted Barley Conferences; the enquiry of the Potato Marketing Board on the blackening of potatoes when boiled; and others.

The work of this Department is widely known and attracts much attention from overseas countries. A constant stream of research workers come here for study: last year's group included students from Australia, China, India, Kenya and Iceland. Mr. Yates had a very successful lecture tour in the United States where his work has been attracting considerable attention because of its importance in agricultural planning and development.

## MICROBIOLOGY DEPARTMENT

The investigations on biological purification of effluents from sugar beet and milk factories carried out during the past 11 years under the aegis of the Department of Scientific and Industrial Research will be completed during the present year (1938). The work has been done jointly by the Fermentation and General Microbiology Departments and it has proved of great value to the general work of both Departments.

The bacterial flora of some of the Rothamsted plots is shown to be affected not only by the manuring but also apparently by the crops. The protozoan fauna in the soils collected by the British East Greenland Expedition 1935-36 has also been studied.

## ENTOMOLOGY

The work on insect population and insect activity has continued; light trap observations went on till February 1937, and were then stopped so as to allow the large numbers of results to be worked out. The number of insects caught during the night was fairly closely related to the minimum temperature; a rise of 4 or 5 degrees F. over the minimum temperature approximately doubled the catch independent of the time of the year or the species of insect. The maximum temperature, however, was much less important.

Work on certain special insects has been continued, notably midges, cabbage aphids and white flies. Much attention has been devoted to insect migration and it has been shown that some of the insects at any rate tended to migrate simultaneously in Europe and in North America. This work on migration will now be put on to a much sounder basis as a grant has been given from the Leverhulme Trustees for the appointment of additional staff.

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