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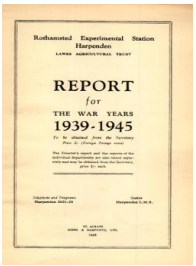
Report for 1939-45

Full Table of Content


Rothamsted Experimental Station
Harpenden
LAWES AGRICULTURAL TRUST

REPORT
for
THE WAR YEARS
1939-1945

Fungus Diseases

Rothamsted Research

Rothamsted Research (1946) *Fungus Diseases ;* Report For 1939-45, pp 23 - 23 **- DOI: https://doi.org/10.23637/ERADOC-1-87**

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isolated and identified as crystalline nucleoproteins, and studies have been made of their physical, chemical and serological properties. The serological work has led to the development of a rapid method of diagnosis for some of the commoner virus diseases. Wide variations in the size and shape of tobacco-mosaic virus have been detected and the conditions responsible for the variations have been determined. The shape of the virus particles has been found to account for their serological behaviour. The factors responsible for flagellar and somatic-type serological behaviour have been elucidated. The manner in which viruses are held in infected tissues has been studied, and it has been found that infected plants contain much more virus than was previously suspected. The work has included studies of the origin and significance of intra-cellular inclusions, new types of which have been found in infected plants and new insects have been identified as vectors. The intricate relationships between viruses and their vectors have been studied, and in the field special attention is being given to the factors which affect the spread of virus diseases particularly in potato and sugar-beet crops. Annual surveys of the insects and virus diseases of these two crops have been made and much information has been obtained on the effects of weather on the insect vectors, the relative importance of different species of insect in causing spread, the distance over which spread occurs and the important sources of infection. A book on Plant Viruses and Virus Diseases was published by F. C. Bawden in 1939 (second edition, 1943).

Biochemical work on normal and virus-infected leaves has been in progress since 1940 and has included studies of the conditions governing the release of normal protein from the leaf fibre. Use has been made of methods involving fine grinding and enzymatic disintegration. Work has also been done on plant proteases and on pectase. Extraction and fractionation of tobacco-mosaic, tomato bushy-stunt and the tobacco-necrosis viruses were carried out in the Biochemical Section.

Fungus diseases

Increased attention has been given to field work on fungus diseases. Surveys of commercial crops in many districts have shown the importance of Eyespot of wheat (*Cercosporella herpotrichoides*), and many experiments have been made to ascertain the conditions favouring this disease and to devise control measures. A survey of the causes of wastage in stored potatoes showed that *Phytophthora infestans* was the main cause but also revealed a previously unsuspected cause *Fusarium avenaceum*. Studies have been made of the environmental conditions affecting the survival of soil-borne fungi, their ability to cause infection and their survival in the absence of susceptible crops. Among the fungi studied were *Ophiobolus graminis*, *Fusarium culmorum*, *Plasmodiophora brassicae*, *Rhizoctonia solani* and *Verticillium albo-atrum*. A book on Root Disease Fungi by S. D. Garrett was published in 1944.

Studies of earthworms, slugs and various insects

Work in the Entomology Department can roughly be grouped into three divisions, a study of the causes of insect outbreaks, secondly work on particular pests—not necessarily insects—such as