ROTHAMSTED RESEARCH

Report for 1934

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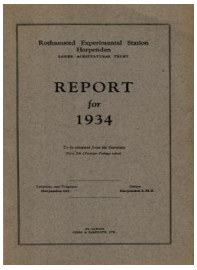

Entomology

Rothamsted Research

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are not a stage in the life history of the virus but are in the main a reaction of the cell-components to the virus, a demonstration which had been based on direct observation of the changes occurring in the infected cell, has been strikingly confirmed by the further proof that it is possible by chemical agents, *e.g.*, molybdic acid, to induce the formation of similar inclusions in the absence of virus. The conditions which control this formation of inclusion-bodies are still obscure, and we have been endeavouring by micro-manipulation and micro-dissection methods to study the changes induced inside the cell on virus introduction. This is a highly skilled and difficult technique, which is not yet fully perfected, but it ought to add considerably to our knowledge of what occurs within the cell as the consequence of the entry of the virus particles.

The fact that in nature virus is mainly transmitted from plant to plant by the agency of insects has led to much laborious work within the Department. The determination of the insects mainly responsible for dissemination of the viruses studied here is comparatively straightforward, though the fact that the vector for one of the commonest of our potato-virus diseases is still unidentified shows that the task is not always easy. But there are many problems still unsolved which deal with the mechanism of the transference from plant to plant, and the behaviour of the virus within the insect. It is generally assumed that the virus is introduced into the plant with the saliva of the infecting insect ; but it is not clear how the virus reaches the saliva, what interferes with it in those insects which do not function as vectors, nor why one insect can carry while another of similar habit does not. It is evident that the quantities of juice must be very small indeed which can be taken into the alimentary canal through the tiny stylets of, say, an aphid in the few minutes sufficient to infect the insect, and we have tried to obtain some idea of the quantities involved. Three methods were used, including feeding the insects on radio-active material, whose presence in minute quantity can be measured ; and the results are in fair concordance. The amount is so small as practically to demonstrate that multiplication must occur within the insect in those cases where the insect remains infective throughout its life after a single short period of feeding on the infected plant. We have tried throughout to introduce into our entomological work quantitative methods, and an extensive study, still in progress, has been made of the quantitative relations between number of insects, time of feeding, and resultant infection. To obtain results statistically valid, this involves a very large number of plants and much replication, but it has already led to the detection of a marked seasonal variation in the infectivity of the insects used, and will itself place on a firm foundation much that is commonly accepted on rather uncertain evidence.

ENTOMOLOGY

The work of 1934 was mainly concerned with studies of the factors determining the fluctuations and migrations of insect populations. It involves taking frequently and systematically a census of the populations of insects concerned and methods of doing this have been worked out. The results are then correlated with climatic factors, and, for the night flying insects, with moonlight and cloudiness of the

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sky : of all these factors temperature appears to be the most important. Dr. Barnes continued his work on gall midges and Mr. H. C. F. Newton carried a stage further his observations on the ovipositional and feeding reactions of the sawfly *Pteronidea melanaspis*.

The investigations on bees made during the last eleven years by Mr. D. T. M. Morland have attracted more and more attention from practical beekeepers and last year the British Bee Keepers Association guaranteed the sum of £250 annually for a period of three years, to which the Agricultural Research Council adds another £250, to permit of the investigation of Brood diseases. Dr. H. L. Tarr was appointed to the work and began on May 1st, 1934. The Lister Institute of Preventive Medicine is kindly allowing Dr. Tarr the use of their laboratories for the serological and other investigations thereby saving considerable reduplication of costly equipment and ensuring adequate control on the bacteriological side. A very successful conference with practical beekeepers was held in May, 1934, in which their experience was freely set out for the benefit of the investigators. This led to a request for further conferences and a further one was held in May, 1935, on swarming, a subject on which Mr. Morland has been working for the past few years and has now accumulated a mass of valuable information. Some 350 persons attended this Meeting and as no hall could be had to hold them, a marquee had to be erected.

INSECTICIDES

Drs. Tattersfield and Martin are studying further improvements in the method of the chemical evaluation of samples of pyrethrum, and they have begun a parallel investigation on derris. The results so far obtained have attracted wide interest and Dr. Tattersfield has been invited to the United States to confer with American experts on the subject.

Owing to shortage of staff the work on soil insecticides and fumigants has been in abeyance for a few years but this is now resumed, thanks to a grant from Imperial Chemical Industries, and Mr. W. R. S. Ladell has been appointed in charge.

STATISTICAL DEPARTMENT

Much of the time of this department is occupied with the design and analysis of replicated experiments at Rothamsted, Woburn and elsewhere and this work continues to expand as shown by the following table :

	Number of Experiments			*Plot Yields Analysed*		
Year.	Rothamsted and Woburn.	Outside Centres.	Total.	Rothamsted and Woburn.	Outside Centres.	Total.
1925	8	—	8	328	—	328
1926	13	4	17	740	73	813
1927	12	5	17	802	150	952
1928	11	12	23	1,267	392	1,659
1929	12	12	24	1,565	352	1,917
1930	14	24	36	1,341	918	2,259
1931	13	41	52	2,044	1,968	4,012
1932	17	49	64	2,153	3,792	5,945
1933	15	78	93	2,539	4,870	7,409
1934	17	98	115	2,060	7,082	9,142

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