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# Report for 1929

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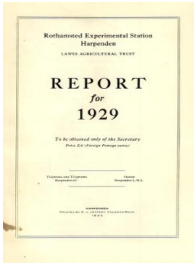


# Virus and Diseases

## Rothamsted Research

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Experiments in the chambers are at present in progress on the influence of air temperature and of humidity on secondary infection.

*Virus Diseases.* The Imperial Agricultural Conference of 1927 recommended that "funds should be provided for the more extended study of the fundamental nature of virus diseases in plants." The Empire Marketing Board thereupon provided the means for a considerable development of the virus investigations at Rothamsted which are under the general charge of Dr. Henderson Smith. Three scientific posts were created, Dr. John Caldwell being appointed to the post of Virus Physiologist, Dr. Frances Sheffield to that of Virus Cytologist, and Miss Marion Hamilton to that of Virus Entomologist. Grants were provided for equipment and maintenance during a period of five years.

Dr. Henderson Smith has studied localised forms of the disease found in *Datura stramonium* and *Lycium chinense* where certain parts of the plant only are affected, the rest being free not only from symptoms but also from the virus, so that the juices can be inoculated into highly susceptible plants without result. This is unusual : in other instances the disease affects the whole plant.

The remarkable bodies present in the cells in infected plants have also been studied. They are protein in nature, but probably not alive, as has been repeatedly asserted of similar inclusions both in animal and plant virus disease. Their progressive development from small particles carried in the protoplasmic streaming up to the stage of the completed body has been watched in individual cells of detached infected leaves.

*Entomology.* The Entomological work is largely concerned with the parasites of insect pests, they being among the most important agencies for effecting control in nature. As an example: meadow foxtail is liable to attack by gall-midges. In 1928 the attack in a particular instance was slight: there was 38% parasitism. In 1929, in the same experiment, the attack was heavy: there was only 3% parasitism. A new parasite of the frit fly has been found: a Chalcid *Callitula bicolor*. Another important observation is the greatly increased prevalence of *Loxotropa tritoma* during 1929, and decline of the Chalcid *Halticoptera fuscicornis*, two phenomena which are apparently related.

Another method of control now being tested is to alter the cultivation of the crop so as to make it less suitable to the insect. Thus, by delaying the flowering of meadow foxtail grass till after the main flight period of the midges was over—as can be done by early cutting or grazing—the attack was reduced from 80% to just over 10%. Control of the frit fly is obtained, as is well known, by earlier sowing of the oats.

Dr. Barnes has closely studied the gall-midges that infest the willow and cause much loss to the osier industry. Under experimental conditions, the "Harrison" variety of osier has been found to be immune to attack by the button top midge. The usual method of classifying the midges according to the type of gall produced has proved unsound, as one and the same species of midge can produce different types of gall. Of much greater biological interest, however, is the discovery that the fertilised females of the midge *Rhapdophaga heterobia* H : Lw. produce, as offspring, unisexual families only—a phenomenon unknown previously among insects, except in the Mycetophilidæ studied by Metz in America.