ROTHAMSTED RESEARCH

Report for 1927-28

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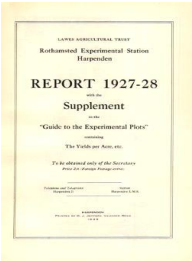

Insecticides

Rothamsted Research

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is a serious menace in New Zealand, and the possibility of controlling it has been attempted by the shipment of consignments of the beetle (*Corœbus rubi*) from the South of France to that country. Gorse is another pest plant, and very large numbers of the weevil *Apion ulicis,* have been sent to control it. Ragwort is a third pest, and many thousand pupæ and eggs of the moth *Tyria jacobæ* have been shipped to New Zealand. Before being sent out, the insects are tested at Rothamsted on all likely plants growing under British conditions; in New Zealand they are further tested before liberation, so that the possibility of danger is reduced to a minimum.

This work has now been carried beyond the research stage, and methods have been evolved for the regular transmission to New Zealand of the insects concerned. The scheme in future is to be centralised and further developed under the special facilities available at the laboratory of the Imperial Bureau of Entomology at Farnham Royal, and the co-operation of Rothamsted will consequently terminate.

Dr. Handschin has devised apparatus for studying the movements of insects in the soil in response to changes of temperature and humidity, with greater refinement than was hitherto possible. His work on the subject is being continued on his return to Basle, and will be further elaborated before any publication of the results is made.

INSECTICIDES.

The investigations carried out under the direction of Dr. F. Tattersfield in collaboration first with Mr. C. T. Gimingham and now with Dr. Hobson, have, for their general purpose, the discovery of new and improved substances for killing the insect pests of fruit and other trees. Much of the work is done in the laboratory and insectary, but as soon as a promising substance is found it is tested in the open on growing trees, so as to find out how far it would be effective in practice.

Insecticides fall into two great groups: those used in winter against the eggs, which are generally laid by the parent on the tree to be attacked, and those used in summer against the young animal as soon as possible after it hatches out. The eggs, being more resistant than the young animal, need a stronger poison: fortunately, the tree is then resting and is devoid of leaves so that it can tolerate substances that would injure it later on: hence winter washes must and can, without harm, be fairly potent.

The older winter washes were made up of caustic soda, or lime and sulphur; more recently tar distillates have come into use and these are now standardised sufficiently well for practical purposes. Being by-products they are likely to change if the method of treating coal should alter. Other winter washes are sought at Rothamsted, the work being done on systematic and fundamental lines, finding out what chemical groups are most

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toxic to insect eggs and then combining these so as to build up a suitable insecticide. Of the substances tested, a dinitrocresol has proved highly effective, and is easy to make on a large scale: it is so potent that ½ to 1 ounce makes sufficient wash for a large standard tree, and few, if any, of the eggs, escape. This high effectiveness is a great advantage where transport is a consideration. The only complaint made by the practical men who tested it is, that when it gets on the hands and clothing, it stains them yellow.

The summer washes, being used against young living insects, need not be so penetrating in action, but they must be harmless to the young leaves. Two kinds are in use: stomach poisons and contact insecticides. The stomach poisons are used against insects or caterpillars that eat the leaves: lead arsenate is popular among growers, but is open to various objections; attempts are therefore being made at Rothamsted to find something different but equally good. Some of the silico-fluorides are proving valuable; they also are easily made on the large scale, and are free from the stigma attaching to arsenic. The contact insecticides kill by touching; how, exactly, is not known; they are used against sucking insects such as green flies and capsid bugs. Nicotine is most commonly used: it is made only by few firms, and always from one substance, tobacco; alternative substances are, therefore, highly desirable. The necessity for high toxicity to the insect and harmlessness to the leaf rules out many possibilities, the desirability for harmlessness to human beings further narrows down the choice, and has restricted it up to the present to certain paraffins and to vegetable poisons, the latter being the more convenient. Much work has been done on these at Rothamsted. The method is to try the parts of the poisonous plant on the insect to find where the poison is, then to isolate it and study it in detail, finding its chemical nature, methods of detection and estimation. Four plants are especially promising: Derris from Malay, which contains its poison in its roots; Tephrosia from tropical Africa; a climber, Haiari (both white and black varieties), from the forests of British Guiana; and Pyrethrum, the only one which grows in temperate regions. All these could be cultivated in their respective climates, and the chemical work is so far advanced that the chemist can advise the grower and breeder whether he is maintaining, increasing, or lowering the toxic properties of the plant by his treatment. Remembering the remarkable improvement following the chemical control of the sugar beet crop, there seems great scope for improving these insecticidal plants. The most poisonous of the principles when extracted from the plant prove to be extraordinarily deadly to certain insects: a spray containing only about one ounce of the pure poison from pyrethrum flowers dissolved in a ton of water is fatal. Fortunately, it is not harmful to human beings. The Derris compound called Tubatoxin is only slightly less potent, and it is also highly effective against many parasites.

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At present, the poisonous substances are most easily obtainable by growing the plant, and they need not even be extracted except where transport is important. The cultivation of these plants bids fair to become a useful industry, pyrethrum at home, and the others in the tropics; this part of the problem is being studied in close co-operation with the Ministry of Agriculture Plant Pathology laboratory at Harpenden.

BEE RESEARCH.

The prevalence of acarine disease has hitherto considerably hampered work, but the Ministry of Agriculture has now agreed to remove the restriction on the programme of work which had previously cut out the study of bee diseases. Cane sugar has been compared with beet sugar as winter food, but no difference could be detected. Further tests were made of the respective merits of the "warm" and "cold" way of arranging the frames in the hives, and the data are now being examined in the Statistical Department. The programme of bee research is drawn up by a Committee of Bee Experts who, from time to time, meet to discuss problems of importance to bee keepers.

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