Report for 1931

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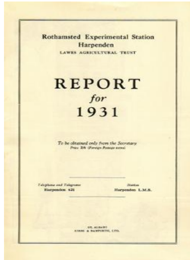

Bees

Rothamsted Research

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after a time. F. Tattersfield finds that the cause of the loss is oxidation of the poisonous principle, and this is specially marked in the light ; it is much slower in the dark. The loss is greatly reduced, however, by adding small quantities of certain antioxidants such as pyrocatechol, resorcinol, hydroquinone, pyrogallol and tannic acid ; on the other hand phenol and phloroglucinol were less effective.

Fish-poison Plants. A number of plants are used by the natives of tropical countries for catching fish by poisoning them. Many of these plants have been examined by F. Tattersfield and found to contain one of the most potent insecticides known, rotenone. Derris is the best known of these plants ; its root, which is the most effective part, usually contains some 2 or 3 per cent. of rotenone ; the quantity is variable, however, and in samples received in our laboratory it has ranged from 1 to nearly 6 per cent. Another plant, "cubé," *Lonchocarpus nicou* from Peru, contained as much as 6.4 per cent.

Certain other plants were found also to possess insecticidal properties, among them *Mundulea suberosa*, from India, and *Neorautanenia fisifolia*, from S. Rhodesia, but they seem less effective than the Derris and Haiari groups.

These insecticidal plants have undoubtedly a great future. They are far and away the best and safest insecticides and are very potent both against animal pests and against plant pests. The pyrethrin producers can be grown at home, and the rotenone producers in our tropical empire, notably in Malaya and British Guiana, and their cultivation would open up the possibility of an important new industry. F. Tattersfield has been highly successful in studying these plants, and it is deplorable that the work has had to be curtailed owing to reduction of grants just as it was beginning to yield results. It would have suffered much more but for the public spirited action of Mr. George Monro, who induced his company to make a grant of £100 for three years in order to keep the investigation going in readiness for active development whenever the opportunity arises. The Empire Marketing Board out of its slender resources made a grant of £50 to enable us to examine in detail some of the samples now being grown experimentally in British Guiana.

BEE RESEARCH

An important investigation into the causes of swarming has been begun by D. M. Morland. Young bees are hatched out in an incubator in weekly batches of 1,000 ; they are marked with distinctive marks and introduced into an observation hive ; their subsequent careers are then observed. They all go through a definite course. For the first part of their lives they act as wet nurses to the brood—the young larvae that will shortly become bees. Then, after a time, they pass on to household duties, such as the cleaning and ventilation of the hive. Still later they become food finders, going out foraging for nectar.

All goes well so long as the number of larvae is enough to keep the nurses fully occupied. But in late spring the number of eggs laid is very high, and each egg may in 21 days become a wet nurse seeking larvae to feed. As the number of eggs becomes less the number of larvae falls off, and then the nurse bees, apparently as the only way of using up their superfluous food and energy, start producing queen cells.

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This causes trouble. The queen cells disturb the old queen, and when the next queen emerges, and in some instances even before she comes out, the old queen goes off with many followers. Swarming was induced in the experimental hive by introducing a host of active nurse bees ; a few days before the migrants left home some of them were seen three-quarters of a mile away, preparing an empty hive for occupation. When finally the swarm went off it took with it bees of the different categories—nursemaids, housemaids and food-finders—in approximately the same proportion as in the parent hive.

This work is being actively developed, but it needs more helpers. It is one of the most fascinating branches of social biology.

In addition, a number of investigations are made with questions of purely technical interest, though of great practical importance. Chief among these are the methods of ventilating the hive. Bee-keepers had been divided on this subject ; some had advocated the setting of the combs parallel to the front of the hive ; others preferred to set them at right angles, supposing that this would give better ventilation and freer access to the combs ; this way called the " cold way," in contradistinction to the other or " warm way."

Observations over a number of years have shown that neither arrangement has much effect on the temperature ; the bees manage this for themselves. During summer they completely control the temperature of the brood nest by fanning with their wings and during winter they completely control the temperature of the interior of the cluster by their own body warmth.

Warm air is expelled by the bees during the active season, especially in the process of ripening honey, but in winter the chief loss of heat from a hive occurs through the walls, by conduction. This is so important that special studies have been made to see how to minimise it. An outer cover was made giving a space of 6 or 8 inches all round the brood chamber, this space was filled with planed shavings. This additional protection improved the brood rearing conditions in spring and autumn, greatly reduced the consumption of stores in winter and afforded drier conditions in winter by eliminating condensation.

The omission of the shavings, as in the " W. B. C." hive, reduced the efficiency of the cover ; the temperature in winter was no better than in the single walled hive.

The moisture evaporating from the bees gives rise to important problems in hive construction. It penetrates the wall of the hive, but if the outside of the wall is painted it is held back by the paint forming a water blister. This penetration could not be stopped by coating the inside of the wall either with boiled oil or with the varnish gathered and applied by the bees themselves. If, however, the outside is not painted but only creosoted the moisture escapes. In winter this led to the bees clustering well forward against the warm south side of the hive instead of retiring on their stores in the normal way ; further, on sunny days in winter the bees flew while those in the white painted hives remained quiet. In summer, however, the creosoted hives were unbearably hot to the hand. The bees were quite equal to the emergency, and they kept down the temperature to the proper degree by fanning.

Unpainted zinc was an effective roofing material. Painted white,

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it remained very wet inside with condensed moisture during winter months, while painted black it became very hot in summer though it was always dry inside.

FUNGUS DISEASES OF CROPS ON EXPERIMENTAL PLOTS AT ROTHAMSTED AND WOBURN, 1931

M. D. Glynne

WHEAT

Mildew (*Erysiphe graminis DC.*) was first observed in June, and was most plentiful in July. It was generally slight, but in Little Hoos Top Dressing experiment at Rothamsted and in the New Rotation experiment on Stackyard field at Woburn the disease was moderate to plentiful.

Whiteheads (Take-all) (*Ophiobolus graminis* Sacc.) was first observed in May. The severity of the attack varied considerably from field to field and from plot to plot. It was more common on wheat grown continuously or in alternate years on the same land than when longer intervals occurred between each wheat crop. On Broadbalk the disease appeared to be rather more plentiful on the badly nourished plots 3—5 than on the others. It was considerably more plentiful at Woburn than at Rothamsted.

The permanent wheat plots on Stackyard Field, Woburn, showed such great differences in the incidence of disease on differently manured plots that a detailed survey was made which will be published later. On plots with a high degree of soil acidity the disease was absent or very much less than on those with a higher pH.

Loose Smut (*Ustilago Tritici.* (Pers.) Jens.) This occurred on several plots of Broadbalk. At Woburn it was found on the Continuous Wheat in Stackyard Field and on the Green Manuring Experiment in Lansome Field. It was also present on the variety Square Heads Master, but not on Yeoman II in the Precision Wheat Experiment on Lansome. Its incidence was slight.

Yellow Rust (*Puccinia glumarum*, (Schm.), Erikss. and Henn.) Was observed as slight in early June but increased as the season advanced. The attack varied from field to field, and from plot to plot, and on the whole was more abundant where the crop was heavy. In Woburn, on the Precision Wheat, it was more abundant on Square Heads Master than on Yeoman II, especially early in the season. It was very plentiful on Winter Wheat Var., Wilhelmina sown in July on Fosters Field, especially in September, when the leaves looked yellow with rust. In October, however, though the older leaves were still badly affected, the younger ones were green and appeared to be growing away from the disease.

Brown Rust (*Puccinia triticina* Erikss). Very plentiful in September on Winter Wheat, var., Wilhelmina sown in July, in Fosters Field. In October the plants appeared to be growing away from the disease, as the young leaves were very much less badly affected than the old ones.

Leaf Spot (*Septoria Tritici* Desm). Was found on all the wheat fields ; its incidence was on the whole slight.

Foot Rot (*Fusarium sp.*). Was found on the underground parts of the wheat plants as a white mycelium. Its incidence was very

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