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Report for 1929

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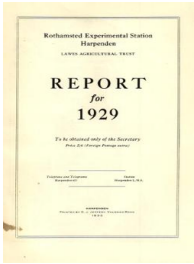

Bee Research

Rothamsted Research

Rothamsted Research (1930) *Bee Research ;* Report For 1929, pp 45 - 45 **- DOI: https://doi.org/10.23637/ERADOC-1-111**

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The breeding of stocks of insects for weed control in New Zealand was continued, and further consignments of insects attacking bramble, ragwort and gorse were sent out, including 15,260 *Tyria jacobæae,* 23,300 *Apion ulicis* and 350 root stocks containing *Coræbus rubi.* They arrived safely and in sufficient numbers to permit the New Zealand staff to take up their part of the investigation. As this work has now passed out of the research stage, it has been handed over to the Farnham Royal Laboratory of the Imperial Bureau of Entomology, which is specially equipped for the breeding and supplying of large quantities of insects.

Dr. Davidson having been appointed to the Waite Research Institute, South Australia, the investigations on aphides, with which he was associated, have been discontinued.

The insecticide investigations have been mainly concerned with pyrethrum, one of the most promising of vegetable products, as it can apparently be grown satisfactorily in this country.

Bees. The investigations on bees have followed the lines of previous years, and the accumulated data are being worked up in conjunction with the Statistical Department. The relative advantages and disadvantages of the "warm way" and "cold way" of arranging the frames, of having double walls for the hives, and of packing them in winter with insulating material, are studied. Feeding tests have so far shown no differences in effect between cane sugar and beet sugar as winter food, nor anything to justify the preference for the cane sugar. The "brood food" swarming hypothesis is being tested, and valuable information obtained, by the study of marked bees, about the ages at which they are engaged upon specific activities.

THE ACCURACY OF THE FIELD EXPERIMENTS.

The advantage of the modern Rothamsted field technique is that the results can be checked. The "standard error" per plot can be calculated; the degree of trustworthiness is therefore known. Usual standard errors per plot on our present methods of good working are:—

USUAL STANDARD ERRORS PER PLOT FOR GOOD WORKING

	Weight per acre	Per cent. of yield
Potatoes	0.4 tons ...	7
Sugar Beet... ...	0.5 ,, ...	9
Barley: Grain ...	1.3 cwt. ...	9
,, Straw ...	2 ,, ...	7
Oats: Grain ...	2 ,, ...	8
,, Straw ...	2 ,, ...	6

The standard error precisely measures the accuracy of the experiment and it includes errors of working, inequalities due to variable natural agencies, such as weather, birds, insects, diseases, and also soil variations within the individual plots, but not the large variations between plot and plot which are eliminated by the method of arranging the experiment. It is not, however, an absolute measure, since it depends to some extent on the size and arrangement of the plots. Thus, a standard error of 0.4 tons per acre of potatoes in a latin square experiment is not strictly comparable with a standard error of 0.4 tons in a randomised block experiment having more plots. Nevertheless, it is a useful guide to the experimenter as showing the standard of performance he is attaining in