ENTOMOLOGY SECTION.

J. MUGGERIDGE, Entomologist.

The past year's activities are dealt with under the three headings—Routine, Investigational, and Research.

ROUTINE.

This includes—

(1) Identification of various insects sent in (approximately two hundred species in past year); and supplying all available information as to their economic significance and methods of control where known.
(2) Dealing with correspondence relating to entomological matters, apart from identification.
(3) Advice on ornithological matters.
(4) Attention to and care of entomological collection and literature.

A considerable amount of work is entailed under this heading, and during the past year over one thousand insect specimens were despatched to the Imperial Institute of Entomology, London, for identification purposes. Some of this material has already been identified and returned, but a considerable amount yet remains to be done.

(5) Investigation of minor problems in the field as they are brought under notice from time to time.

INVESTIGATIONAL.

Spray Experiments.—During the past year Mr. W. K. Dallas was seconded to the Plant Research Station as liaison officer between the various specialists and the Horticulture Division. As a result of this appointment, over forty spraying experiments relating to entomological pests were carried out during the year by the different Orchard Instructors. The experiments at the outset were initiated by Mr. Dallas, but a full account of all the work on entomological problems is kept at this office. Most of the material recorded has now been analysed by this Section, and a condensed report has been prepared.

Effect of Dry Heat on all Stages of the Flour and Grain Moth (Ephestia kühniella) *damaging Walnuts.*—This investigation is now under way, but owing to pressure of other work some time yet must elapse before it can be concluded.

Greenhouse White-fly (Trialeurodes vaporariorum).—This insect is a serious pest to the tomato-growers of the Dominion, and in order to cope with it as economically as possible it was proposed that its parasites (*Encarsia formosa*) be introduced from abroad. As practically no work had been done on the "white-fly" of New Zealand, and little was known regarding it, it was necessary at the outset to forward specimens to the Imperial Institute of Entomology for specific identification. (Specimens sent were identified by the Institute as *T. vaporariorum.*) Following on the identification of the pest, a request was made to the Institute for a supply of parasites. Three boxes of parasites were despatched from England, and this material was received here on 8th January. It was immediately placed in emergence boxes, but, unfortunately, no parasites emerged. Owing to the lateness of the season no further parasites were received, but it is hoped to continue this work in the coming season.

RESEARCH.

Diamond-back Moth (Plutella maculipennis).—The necessary preliminary studies on this insect in New Zealand preparatory to the introduction of parasites have been completed, and a full account of this matter appears in the October issue of the *Journal of Agriculture*, page 253. Regarding the biological control of this pest, word was received from the Imperial Institute of Entomology stating that they were at present unable to procure suitable parasites. Investigations, however, are to be continued as soon as weather in the Northern Hemisphere permits, and it is hoped that the Institute's investigations will be sufficiently advanced to enable us to receive consignments of parasites during the next season.

Tomato-stem Borer (Phthorimaea melanophintha).—This insect, which was first described in 1926 by Meyrick, is, as far as has been ascertained at present, a native species of New Zealand. During the last few years it has become a serious pest to the tomato-growers of the Dominion. The adult moth lays its eggs presumably in the axils of the leaves of the young tomato-plant, and the grubs when hatched bore into the stems of the plant. A study of this insect and of a closely allied species—namely, the "potato-tuber moth" (*P. operculella*) is now being undertaken. It appears, however, fairly obvious that effective control could be brought about by arsenical spraying when the plants are comparatively small; and ascertaining at what stage control can best be carried out will be specially studied during the coming season.

Insect Transmission of Dry-rot (Phoma lingam) *of Swedes.*—An account of preliminary work on this subject was published in the *Journal* for September, 1930. Preliminary experiments were conducted to determine whether a Drosophilid and a Staphylinid are responsible for transmission of dry-rot from infected to healthy swedes. These insects characteristically occur in dry-rot lesions. The sources of infection used were diseased roots taken from the field, artificially infected roots and cultures. The adult insects were taken from infected material and placed on a healthy root in a special receptacle. Only a small percentage of the roots developed the disease, but it is considered that the evidence is sufficient to incriminate both the beetle and the fly. Further work on this problem is being continued to determine (*a*) the characteristic insects present in dry-rot-affected swede crops; (*b*) whether they are responsible for producing the characteristic circles of infection round an initially infected swede-bulb; (*c*) whether from a study of the habits of selected insects in the field this incidence can be correlated with the spread of dry-rot.

Virus Diseases of Potato.—The first portion of this work is completed, and is being prepared for publication. It includes an account and description of the characteristic piercing, sucking, and chewing insects found on the potato-foliage in the commercial growing areas of New Zealand; also an account of their distribution and relative numbers. A second portion of the work dealing with the transmission of the virus "leaf-roll" by these characteristic insects is also completed, and is now in course of preparation for publication. A third and final portion of the investigation is under way, and deals with the transmission of the virus "mosaic."

Grass-grub (Odontria zealandica).—The experiments conducted and in progress on the control of grass-grub relate to the control of the grub in lawns, bowling-greens, nurseries, &c., and would not be economically useful in the treatment of large areas. The insecticides used consist of arsenate of lead, carbon bisulphide, White Island product, and Restar. Of these, arsenate of lead and Restar appear to give most promise. The former may prove useful for grub-proofing lawns if used at the rate of 2 lb. per 100 square feet of surface. For immediate results Restar is most promising, and it has been found that the application of a quarter pint of this material in three gallons of water applied to a square yard of lawn and washed in with a further three gallons of water is quite effective. Carbon bisulphide, it was found, cannot be applied to the surface as it burns the grass, but an injection of this material at the rate of 21 c.c. every foot gives 90 per cent. control. White Island product at the rate of 1,200 lb. per acre appears to give quite inadequate control. Further experiments on this subject are being conducted, and it is not expected that these can be finalized before next November.