

It is thought that all likely methods for improving the type of winter oil spray have now been investigated, and nothing can be suggested that will offer any real advantage over the good commercial oils used to-day for winter applications against *P. pilosus*. It may be possible to improve the kill secured in winter applications by increasing the concentration of oil to water in the spray—e.g., from 5 per cent. to 10 per cent. strength. This, of course, will be governed by what concentration the trees will stand in the late winter, and will be tested in the coming season. The difficulty of killing *P. pilosus* winter eggs with petroleum oils is apparently a characteristic of this species.

Since it seems that there is little possibility of any substantial improvement at present in winter application of oil sprays it is proposed to discontinue this phase of the work except for some experiments on the effects of concentration as explained above. Without some fundamental work on the method of killing red mite winter eggs there is little prospect of an advance being made in the improvement of petroleum oils for winter treatment of *P. pilosus* eggs. It is preferable to investigate the possible methods of summer treatments before any such fundamental work should be considered. From work performed to date it is known that summer oil will give an excellent kill of mites, and investigations made last summer showed that summer eggs of the mite were also readily killed by this treatment; this, of course, requires corroboration. The present recommendations for summer applications state that two summer oil sprays should be applied, with an interval of ten days between them—usually in January. Work last season showed that on heavily-infested trees that received no winter oil *P. pilosus* was browning the trees in November. Where, however, winter oil at 5 per cent. concentration was applied browning was retarded until towards the end of December, but even then summer treatment became necessary. Trees that received no winter oil but which were sprayed in November with two summer oils at an interval of ten days were beginning to bronze at the time of treatment, but an excellent kill of mite was secured, and by Christmas the trees were green again and in better condition than those in the plots sprayed with winter oil only.

Although summer oil is very effective against the mite the difficulty is to work it into the sulphur programme necessary for the control of fungous diseases. The possibilities of summer treatment will be further explored in the coming season.

Before long it is hoped to be able to present a detailed report on all winter oil experiments for publication, mainly with the object of providing a statement of the case.

Use of Insecticides against White Butterfly: This work was carried on further in the summer of 1936–37 and is now completed. The object in prolonging the investigation over three seasons was to test out the keeping qualities of derris and pyrethrum insecticides. Pyrethrum sprays and derris dusts were again effective, and the materials used were known definitely to be at least three years old. It was considered that the period over which derris and pyrethrum insecticides remain effective is very important if these materials are to have any place in the insecticide programme. The experiments at the experimental area were greatly curtailed this season on account of the almost total absence of white butterfly from the cabbage plots put down for the work. It was possible, however, to collect several thousand caterpillars and thus infest certain of the plots artificially, all 1936–37 work being carried on blocks so infested.

Arsenates are the cheapest insecticides that can be used at the present time to combat effectively the white butterfly. There is a prejudice against their use, however, on account of their poisonous nature, and a chemical investigation was carried out on the question of this spraying residue on market cabbages and cauliflowers. The results of this work have shown that with reasonable care and the provision of a suitable interval between spraying and harvesting there is very little danger of poisoning from the consumption of cabbages treated with lead arsenate.

It is proposed to prepare and publish a detailed account of the whole of this work.

Control of Mealy-bug on Hot-house Grapes: A certain amount of work on the control of grape mealy-bug (*Pseudococcus maritimus*) was carried out in glasshouses at Palmerston North, but owing to lack of sufficient time to devote to this work the results were not very satisfactory. It was demonstrated, however, that by stripping the bark from the vines and then painting them with a paste of tar, clay, and water excellent control of the pest was secured. Fumigation by spreading calcium cyanide on the floors of the houses gave very unsatisfactory results. The houses were by no means gastight, however, and the fumigation was carried out by the owner. It does appear, however, that this material is not very efficient for fumigation against mealy-bug in the average glasshouse.

Citrus Insect Pests: Investigations of the insect pests of citrus and their control are at present being undertaken with the co-operation of the Department of Agriculture. Most of the work has been written up, but the final statement is awaiting the results of experimental work at Auckland on the white-wax scale (*Ceroplastes sinensis*).

Other Investigations: Work on the bronze beetle and codling moth was carried out in conjunction with the Plant Diseases Division and will be reported on by that Section.

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1. *Diamond-back Moth Control*.—(a) An attempt is being made to breed, in large numbers, parasites of the diamond-back moth. A glasshouse 100 ft. by 30 ft. was planted with about six hundred cabbage-plants. As soon as the plants were fairly well grown diamond-back moth pupæ were collected in the field, allowed to emerge, and after they had mated were liberated in the glasshouse.

A consignment of 354 *Angitia cerophaga* parasites was received from Palmerston North and liberated in the glasshouse on 22nd January, 1937. The parasites appear to be established and to be breeding freely. The immediate aim of the work is to find out the behaviour of the moths and their parasites under glasshouse conditions during the winter months. There are no data available to show if *Angitia cerophaga*, which has been introduced from Britain, can survive the winter in New Zealand in an unheated house.