

Fumigation Experiments.

In my report of December, 1908, I proposed to fumigate a small line of oranges by every steamer throughout a season to prove whether fumigation at this port of shipment would be injurious to the fruit or otherwise. This experiment has been carried out, and I am pleased to report that fumigation has no injurious effect whatever on fruit treated.

T. W. Kirk, Esq., Government Biologist, New Zealand, examined treated lines on arrival in Wellington, and reported as follows: "There can be no doubt whatever that fumigation at your end does not in any way deteriorate the fruit. This I have always maintained; and the experimental lines you have forwarded more than proves the correctness of this contention."

George Harnett, Esq., Port Fruit Inspector, Auckland, reports as follows: "Fumigation at your port of shipment has proved a complete success, the oranges arriving in splendid order." Oranges were taken from both fumigated and unfumigated lines before shipment on every occasion here at Rarotonga, and no injurious effect was noticed on the treated fruit nor to its keeping qualities.

This experiment should prove conclusively that there is no danger of injuring the carrying or selling qualities of the fruit by fumigation under proper conditions and supervision.

Fruit-fly.

Investigations into the habits and extent of infection of fruit-fly have occupied a considerable portion of my time. In my former report I stated that "although this fly has been present a number of years, it has apparently never increased in numbers, and I strongly suspected the presence of a parasite." The former part of this statement was based on reports from planters who have been here some years. The investigations have now extended over a period of one year, and, although a minute examination has been carried out, I have failed to find a parasite. I was also informed that I should only find the fruit-fly towards the end of the orange season.

Knowing that it would be impossible in this climate for the pupæ of the fruit-fly to remain dormant for any considerable period, I set to work to find out (1) if correct—which I doubted—why the fruit-fly have never apparently increased in numbers; (2) what fruit furnished food for the fruit-fly larvæ between the finish and commencement of the orange seasons—in other words, the connecting-link—with the following results: During the months of December and January, on one or two occasions, when rambling up the mountains, I came across some orange-trees carrying fruit. Some of these oranges had been infected with the fruit-fly. Some weeks afterwards infected guavas were found, and then on several occasions more infected guavas were discovered. The next fruit found infected was some early oranges just showing signs of colour. What I surmise takes place is this: that when the orange crop in the valleys and low-lying plantations is gathered, the fly makes for the trees in the hills; and when this fruit is finished they are driven to the few stray orange-trees scattered far up the hills, and from these trees spread to the guavas; these afford fruit in plenty for the fruit-fly larvæ until the oranges again show signs of colour, when it is once more noticeable on the plantations. This would, no doubt, have led planters to believe it was only to be found well on in the orange season. As for not increasing in numbers, scarcity of their favourite fruits for some months in the year may account for some diminution of their numbers; but this question requires further investigation. I firmly believe this fly attacks mangoes and alligator pears, but so far have not detected infected fruit, so have no proof. It is, however, evident that the stray orange-trees and guavas afford a connecting-link between the orange seasons. Can this link be destroyed? I very much doubt it, as, owing to the dense bush and scrub, it would be a difficult matter to find and destroy all the trees, especially guavas. However, when the work of clearing and cleaning the plantations is well in hand we can give this matter our attention, and get this work under way.

I am pleased to report that, although I have now hatched out a large number of fruit-flies from infected fruits, no new species have been noticed, all being identical with those hatched last season.

Other Pests.

The aphid family in particular is noticeable all over the island, and were it not for the presence of the lacewing flies (*Chrysopa ramburi*, Set), this family would cause wholesale destruction to the citrus trees. The lacewing flies are assisted in their useful work by the syrphus fly and ashy-grey ladybird (*Cycloneda abdominalis*, Say); but these latter are not very numerous in Rarotonga: still, it is gratifying to know that they are established, and, no doubt, in time their good work will be more noticeable.

The ravages of the Lecanium and Mytilaspis scales are to a very great extent checked by the delicate white fungus and a suitable parasitic fly. These parasites are valuable assets to the fruit industry: without their help it would be almost impossible to control the pest (aphids and scales) under the present conditions; indeed, until systematic planting is carried out, a proper and effective system of control of pests and diseases can never be commenced with any hope of success: therefore the success of the fruit industry depends to a very great extent on the work of these beneficial insects and parasites.

In conclusion, I wish to again thank the traders, planters, and Natives for their assistance, which has always been willingly given.

To the Assistant Inspectors I am also indebted for the manner in which they have assisted me in carrying out my duties.

A. E. REID,
Fruit Inspector, Cook Islands.

20th September, 1909.