MANUKA BLIGHT

Causative Organism

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A CONSIDERABLE amount of publicity has been given to the effects of an eriococcid mealy bug on manuka over the last 8 years. A survey made in 1948 showed that the insect was present throughout the plains and foothill area of Canterbury and that a considerable number of stands of manuka were dead or dying. Plants of kanuka in mixed stands were carrying large numbers of mealy bugs apparently without detrimental effects.

Since that time there has been a large-scale distribution of mealy bug infested plant material by both farmers and commercial interests. The mealy bug has been established over the greater portion of New Zealand and manuka is dying in many areas. There has been a large amount of controversy as to the wisdom of using a biological control agent against such an important member of the indigenous flora.

Infested plants of both manuka and kanuka are heavily coated with black fungal growth, particularly on the lower portions of the plant. The white, cottony pupal sacs of the male are scattered over the surface of this mould on the leaves and bark. The adult females and the earlier stages of the mealy bug, apart from the active crawler, are sheltered beneath the loose bark.

THE INSECT

The female insect is light brown, pear-shaped, and about 1/25in. long. The female is sheltered within a greyish white, closely felted sac. The legs are still functional, but disproportionately small for the size of the insect. The mealy bug is attached to the plant by its long sucking tube or rostrum. Another and larger mealy bug, *Coelostomidia wairoensis*, is commonly found on kanuka and to a less extent on manuka throughout the North Island and the northern portion of the South Island. This insect is much larger, about 1/8in. long and bright red-orange. There is no reason why even a casual observer should confuse these two insects.

The resting or pupal stage of the male is found within small, white, loosely felted sacs scattered on the surface of the sooty mould and leaves of the plant. The male is the only winged stage of the mealy bug. It resembles a very small and slender fly, less than 1/32in. long and inconspicuous apart from its ample and iridescent wings and a pair of long, waxen filaments projecting from the rear of the abdomen.

The dispersion of the mealy bug occurs during the crawler stage. In this form the insect is a small replica of the female except that the legs are in proportion to the size of the body. The sucking tube is held close against the body, and as its name implies the crawler can move freely over the plant. It is approximately 1/40in. long and light brown to pale pink.

The feature which most characterises the presence of the mealy bug on manuka is the black, sooty mould on the lower portions of the plant. This fungus is growing on the honey dew excreted by the insect. The honey dew falls or is washed down by rain on to the leaves and stem below the feeding site of the mealy bug. Here it supports a luxuriant growth of mould. This mould is entirely dependent on the honey dew and does not penetrate the living plant tissue.

LIFE HISTORY OF THE INSECT

In Canterbury there is apparently one generation of the insect each year. Eggs are laid within the female sac. On hatching, the crawlers rest for a short period and then become particularly active, swarming over the plant in search of feeding sites. Within dense stands of manuka, spread from plant to plant occurs through contact of the branches, by wind movement of bushes, and by movement of the crawlers along the ground. In recently infested areas in Hawke's Bay, spread of the mealy bug has been extensive with the prevailing wind and slight against it, indicating that the crawlers become wind borne and may be carried for considerable distances. The transference of crawlers by other insects, notably bees, and by birds is a possibility, but as yet this has not been seen with this mealy bug. Crawlers have been found on infested plants in Canterbury during March to September, maximum numbers free on the plant occurring during the 6 weeks from mid-April. Immature females, which are naked apart from some loose cottony material, are found in increasing numbers from June onwards. By September few active crawlers may be found. Immature females are sheltered beneath the loose bark and are feeding in the sap stream of the plant. During the same period male cocoons appear in increasing numbers. Most of these cocoons are constructed on the surface of the black fungal growth, mainly on the leaves and lower stems. From October and November onwards large numbers of males are present and during this period mating takes place. By February the number of live adult females is decreasing, most female sacs containing the shrivelled remains of the female and a large number of eggs.

EFFECT OF MEALY BUG ON HOST PLANT

The rapidity with which the mealy bug affects the host plant depends on a number of factors, the most important being the age and vigour of the manuka and the density of the initial infestation. In the field, starting from light infestations, plants of manuka between 10 and 15ft. in height die in up to 5 years. Regrowth manuka usually reaches a height of 18in. before dying, and though in such cases the initial infestation is usually heavy, the elapsed time to death is from 2 to 3 years.

In an experimental plot of manuka heavily infested with the mealy bug death of the plants occurred within 3 years of the initial infestation. Each alternate plant in this plot was sprayed with insecticide to eliminate the insect. The plants thus freed continued to grow in a normal fashion, indicating that no plant virus is involved.

As yet death of manuka in the presence of the insect but in the absence of the sooty mould has not been demonstrated. Experiments are now under way to determine whether insect feeding is in itself sufficient to kill the plant. Mulcock in a paper now in the press shows that in 52 per cent. of leaves from infested manuka plants less than 50 per cent. of the available light can reach the leaf surface. He considers that such a reduction could affect the photosynthesis of the plant. It may well be that the plant weakened by direct insect feeding dies as a result of reduction in photosynthetic activity.

It has been possible to demonstrate death of the manuka in the presence of high populations of the mealy bug, but with little attendant sooty mould. I am of the opinion that death of the plant is due to direct insect feeding, but as yet this is not completely proven. This much is certain, the insect is primarily responsible for the death of manuka, as the fungus is dependent on the mealy bug and not on the plant for its nutrition.

The relative immunity of kanuka is difficult to explain. Very few plants of this species are killed, though some plants appear to be very

sickly when carrying high populations of the insect. In no case has this particular *Eriococcus* mealy bug been recovered from any other plant than kanuka and manuka, though a considerable number of other plants have been examined. The possibility still exists that this *Eriococcus* may have a wider host range than that known at present.

In the foothill areas of Canterbury manuka has been gradually replaced by gorse, bracken, and in some cases blackberry. Little if any attention appears to have been given to the regressing of the dying stands of manuka. It is extremely doubtful if the present cover of native and exotic weeds is an improvement, from a farming point of view, over the dense stands of manuka.

THE ORIGIN OF THE INSECT

This particular mealy bug is not known to entomological institutions overseas, but to presume that it is a native species poses the problem of its comparatively recent attack on manuka. Though such occurrences are not unknown, they are rare and are usually associated with some change in the ecological environment. For some time a number of people held the view that climatic conditions had temporarily lowered the parasite-predator complex and allowed the mealy bug to build up in large numbers. Surveys of infested areas show that the insect is little affected by varying climatic conditions, parasites, or predators.

The possibility that this insect has been accidentally introduced cannot be discarded, as the coccid fauna of most countries is still imperfectly known. There has been a considerable interchange in ornamental species of manuka with a number of countries and the insect may have come in on plant material. The genus *Leptospermum* has representatives in Australia, New Zealand, New Caledonia, and the Malay Archipelago. A similar mealy bug described from this genus in Australia has recently been recorded on manuka in New Zealand. The two species are distinct and the *Eriococcus* associated with the death of manuka has been described as a new species in a paper now in the press.

CONTROL OF THE MEALY BUG

This insect may readily be controlled with a number of sprays. A mixture of 50 per cent. p.p.i. DDT (wetable) or 10 per cent. gamma isomer wettable BHC, nicotine sulphate, and a wetting agent in the proportions of 8:1:8 in 800 parts of water gives effective control, and treated plants recover satisfactorily. The efficacy of the spray depends on the thoroughness of coverage. Cost of such treatment would scarcely justify its use except in a national campaign to eliminate the insect, but the spray can be used to free specimen trees from infestation. Biological control of the mealy bug may offer some possibilities, but in view of the widespread distribution of the mealy bug such control would be of a long-term nature.

SUMMARY

Manuka occupies a considerable proportion of the land area of New Zealand. It plays an integral part in the regeneration to indigenous forest. The widespread distribution of this mealy bug focuses attention on a problem of national importance. If the insect continues to exert its effects on manuka, it is difficult to envisage the survival of any of the larger stands of this plant. Control of the mealy bug by chemical means is possible, but the cost would be enormous. Immediate attention must be given to the problem created by the death of manuka. In Canterbury little if any attempt has been made to colonise killed stands with useful plant species.