FD: 293/61

1590-64

20

THE JARRAH LEAF MINER.

The following notes are a condensation of a report by M.M.H. Wallace* on "The Jarrah Leaf Miner in Western Australia - Miscellaneous Notes from a Preliminary Survey".

The detailed work was carried out at Nedlands during 1960 and 1961, with field reconnaissance north to Murchison River and south to Albany and Denmark.

---

1. Name.

Originally identified as a species of Tinea, the moth is now believed to belong to an undescribed genus of the family Incurvariidae. Other moths with rather similar habits are known in this family, both in Australia and overseas.

2. Life History.

The adult moth is rather inconspicuous, darkish-grey in colour, 3-4 mm long, with a wing span of about 7 mm. When at rest, the wings are folded together in a more or less tent shape, but some long scales near the tips of the wings give the moth the appearance of having a large "tail-fin".

The adults are very active on the foliage and branchlets of the trees and run along the branches extremely rapidly so that at a quick glance they can be mistaken for ants. They may also be seen flying in and around the foliage.

The eggs are laid in Autumn - April and May - by piercing the lower epidermis of the leaf and inserting a very thin-shelled and delicate egg just under the surface. The eggs are very small, ellipsoid in shape and about 0.3 mm long and 0.2 mm wide. A flask-shaped swelling containing the egg forms under the leaf, and frequently, all, or most of these swellings point in the same or nearly the same direction.

Young larvae appear about 6 weeks after emergence of the adult moth, and reach maturity some 3 months after hatching, when they cut themselves out of the leaf.

The leaf cell, containing the larva, is formed by the top and bottom layers of leaf epidermis being sealed together with silk. On reaching the ground, the head of the larva appears out of one end of the cell; it then pulls itself along and into a suitable crack in the ground, where it comes to rest half-an-inch or so under the surface. Here it remains in the larval stage until the following Autumn, when the larva pupates.

The pupal period is very short, possibly only a few days, but emergences continue for some weeks. It is suggested that variation in the times of pupation and emergence may be due to a response to temperature decrease in Autumn.

3. Intensity of Infestation.

(a) Number of Larvae per Leaf.

Newman and Clark state that the number of mines

*An officer of C.S.I.R.O., Division of Entomology, Nedlands, W.A.

in a leaf varied from 10 to 50. However, in E. rudis, over 100 small mines on a single leaf were frequently counted, the maximum recorded to date being 178. In the latter case, the leaf was unable to support so many larvae and only 64 reached maturity. It is suggested that a large leaf could possibly support 70 or more larvae.

(b) Variation Within Trees.

Although practically every leaf on a tree may be severely damaged, it is probably more usual to find some portions of the crowns more severely affected than others - for example at Nedlands the incidence of attack was almost invariably greatest on the S.E. side of the crown, away from the prevailing N.W. winds of April-May.

Although severe damage occurred to the topmost branches of some trees 40 feet or more in height, foliage near the ground suffered most.

(c) Variations Between Trees.

The intensity of attack on different trees varies enormously. However, there are strong indications that odd trees are resistant to attack at least to some degree. In view of the number of times in which resistant and susceptible trees were found growing side by side (sometimes with intermingling foliage), it seems more likely that the continuing resistance to attack of some trees is through an innate quality of their own, rather than from some special characteristic of the site.

It seemed also apparent at Nedlands that the trees which were more heavily infested in 1960 again suffered damage in 1961, and those suffering only minor damage in 1960 again contained only small numbers of leaf miner in 1961. With odd exceptions the correlation between attack in 1960 and that of 1961 was highly significant.

(d) Variations Between Years.

Further information is required on this aspect. At Nedlands and north of Perth the damage was less in 1961 than in 1960. In the Albany-Denmark area the reverse was the case, suggesting a fluctuation from year to year in each of the affected areas - possibly depending on weather conditions, etc.

4. Species of Eucalypts Attacked.

The two species which support the heaviest infestations are Jarrah and Flood Gum. There seems to be no difference in susceptibility between Flood Gum and River Gum (E. camaldulensis). Leaf miners have also been found in small numbers on York Gum and Coastal Blackbutt near the Moore River. None, as yet, have been collected from Marri, Karri or Tuart, although Newman and Clark reported them on the latter as well as on E. salubris (Gimlet) and E. transcontinentalis (Boongul).

There is no proof that the same species of leaf miner is responsible for all these infestations - see Section 9.

5. Distribution in Western Australia.

No attempt has yet been made to follow the leaf miner to the limits of its occurrence. It is known to occur as far north as the Murchison River; south to Augusta and east to the Stirling Range. Newman and Clark recorded it as far east

as Merredin and Westonia.

6. Influence of Tree Density on Intensity of Attack.

Although further intensive study is required, there appears to be quite strong evidence that open country is either more favourable for leaf miner or less favourable for its natural enemies. Infestation is generally negligible in dense forest.

7. Parasites.

Dissection of several hundred mines in which larvae had failed to reach maturity, revealed the presence of at least one and probably two species of parasitic (?) wasp - yet to be identified.

A most interesting point, based on, as yet, inadequate data, leads to the possible conclusion that open areas (and perhaps coastal areas) are unfavourable for the natural parasites, enabling the leaf miner to reach higher densities.

8. Effect of Fire.

The behaviour of the leaf miner larvae of burrowing into the ground about ½ in. or so during the summer protects them from all but very hot fires. A hot burn in a small area near Kings Park early in the 1960/61 summer had no effect on subsequent infestation. This may have been due to moths carried in from adjoining areas.

9. Other Leaf Miners.

Two other leaf miners with rather similar habits have been collected on jarrah. These could be called the "marginal leaf miner" and the "mid-rib leaf miner".

"The Marginal Leaf Miner" always occupies an area on the margin of the leaf affecting a half-moon portion of the leaf. On maturity, it cuts out a hole as does the jarrah leaf miner, but it is present the whole year round. The adult moth is smaller, and has 2 distinct white or silver patches on its wings.

"The Mid-rib Leaf Miner" invariably occupies an area surrounding the mid-rib, and frequently towards the distal end of the leaf so that the end portion of the leaf dies off. Some curling of the leaf usually results. It can be found at any time of the year and seems to prefer the new and more succulent leaves.

Both these miners could easily be confused in the field with the jarrah leaf miner.

Another miner which usually seems to occupy the terminal portion of the leaf and is very similar to the "mid-rib" type, although smaller, is found in the peppermint, Agonis flexuosa.

10. Control with Systematic Insecticides.

Some preliminary experiments with stem injection or trunk implantation of a systematic insecticide (phorate or "thimet") were carried out at Nedlands in 1961.

On June, 13th, about a fortnight after the hatching of the leaf miner eggs, eight trees with stem diameters ranging from 3" to 9" were each injected with 8 g phorate active ingred-

ient. Within 3 weeks, virtually complete control of leaf miner was obtained on trees with stem diameters up to about 5 in. The results were erratic for larger trees.

The method shows considerable promise and may be useful for shade and ornamental trees - and perhaps the control of psyllids.
