

MANAGEMENT FOR AVOCADOS IN NEW ZEALAND

P. S. Stevens, C.E. McKenna
HortResearch
Private Bag 92 169
Auckland
New Zealand

D. Steven
IPM Research Ltd.
P.O. Box 36012
Auckland
New Zealand

Abstract

Avocados in New Zealand are damaged by six leafroller species [Lepidoptera: Tortricidae], all but one of which are native to New Zealand. The most important species are *Ctenopseustis obliquana* and *C. herana*, which can account for 90% of all caterpillars collected from fruit. Most leafroller damage occurs between fruit set in December and June. Up to 30% of the fruit can be rejected from export because of caterpillar damage in unsprayed orchards.

Problems are occasionally caused by other insects, including the armoured scale species, *Hemiberlesia lataniae* and *H. rapax* [Hemiptera: Diaspididae], greenhouse thrips, *Heliothrips haemorrhoidalis* [Thysanoptera: Thripidae] and by mites.

Sprays are currently applied on a calendar basis, mostly for leafroller control, and growers apply an average of seven insecticides in a year. However, research is underway to develop an Integrated Pest Management programme.

Additional index words: leafrollers, *Ctenopseustis obliquana*, *Ctenopseustis herana*, fruit damage

1. Introduction

A recent survey found that the majority of New Zealand avocado growers (83%) considered leafrollers to be their main pest. Thrips, mites and armoured scale were less important (8%, 5% and 3% respectively) (Stevens, 1995). This survey found that growers aiming for export applied a mean of 7 insecticides a year, with a range of 0 and 10 sprays. A mixture of organophosphate, synthetic pyrethroid and carbamate insecticides are applied on a calendar basis, although sprays based on *Bacillus thuringiensis* are occasionally used.

Several species of leafroller [Lepidoptera : Tortricidae] are important pests of horticulture in New Zealand. These include the brownheaded leafrollers *Ctenopseustis obliquana* (Walker) and *Ctenopseustis herana* (Felder and Rogenofer), the lightbrown apple moth *Epiphyas postvittana* (Walker), the greenheaded leafrollers *Planotortrix excessana* (Walker) and *Planotortrix octo* Dugdale, as well as the black-lyre leafroller *Cnephasia jactatana* (Walker). All of these species are native except for lightbrown apple moth, which originated in Australia. Although these leafrollers are polyphagous, species dominance varies between different crops and regions.

The first steps in the development of an IPM programme were to identify the species composition of leafrollers damaging avocado, and to determine the phenology of damage to fruit.

2. Materials and methods

2.1 Study Sites

Four unsprayed avocado orchards (cv 'Hass') located in the Auckland region (Mangawhai, Woodhill and Kumeu) and the Bay of Plenty region (Te Puke) were used in this study.

2.2 Leafroller species composition

Caterpillars were collected from leaves and fruit at monthly intervals from January 1994 until August 1995. Caterpillars were initially identified to generic level and then reared on artificial diet (Singh, 1983) to confirm identification using moths.

2.3 Phenology of leafroller damage to fruit

Individual fruitlets were labelled with plastic tags in January 1994 and 1995. At the time of labelling the fruit were approximately 2 cm in length. A total of 150 fruitlets were labelled at each site (25 fruit on 6 trees). Each fruit was checked monthly until harvest and any caterpillars or feeding damage was recorded. Fruit with superficial feeding covering an area of less than 2 cm² were classed as lightly damaged while fruit with any penetrating damage or superficial damage covering an area of more than 2 cm² were classed as heavily damaged. Fruit with heavy damage would not meet the export grade standard.

3. Results

3.1 Leafroller species composition

The majority of caterpillars collected from both leaves and fruit were the brownheaded leafroller, either *C. obliquana* or *C. herana* (table 1). There was a significant difference between the ratios of the various leafroller species found on leaves at the four sites ($\chi^2 = 86.2$, $df = 12$, $p < 0.05$). The dominance of *Ctenopseustis* spp. was consistent between sites although a higher proportion of *C. jactatana* were collected from leaves at Kumeu. There was no significant difference between sites in the ratios of leafrollers collected from fruit ($\chi^2 = 11.7$, $df = 12$, $p > 0.05$).

Other caterpillars collected occasionally were *Planotortrix notophaea* (collected from leaves at Mangawhai and Te Puke) *Epalxiphora axenana* (collected from leaves at Woodhill) and *Stathmopoda* spp. (collected from fruit at Woodhill and Te Puke).

3.2 Phenology of leafroller damage to fruit

The levels of leafroller damage increased most rapidly in the first four to five months in both 1994 and 1995. The occurrence of new leafroller damage was slight after this time (figure 1). At harvest in 1994/95, a mean of 45% of fruit were damaged by leafrollers (minimum of 28% and maximum of 70%). The mean percentage of damaged fruit which would be rejected from export was 21 % (minimum 5% and maximum 33%).

4. Discussion

This study has shown that the most important caterpillars damaging avocados in New Zealand are the brownheaded leafrollers *C. obliquana* or *C. herana*. These two species cannot be morphologically distinguished but have different pheromones (Foster *et al.*, 1991).

The results on the timing of damage indicate that there is potential to reduce the number of sprays which are currently applied to control leafrollers, especially in the later part of the season. Many growers are applying sprays over the winter period when very little fresh damage is occurring. Future research will aim to develop a reliable and simple monitoring system for leafrollers which will allow more informed spray application decisions. Pheromone traps are simple to operate but are known to be relatively inefficient at catching both *C. herana* and *C. obliquana*. Suckling and Brown (1992) found approximately a three fold greater recapture of marked and released *E. postvittana* compared to *C. herana*. Similarly traps for *C. obliquana* are known to be relatively inefficient (Foster *et al.*, in press).

A reduction in the use of broad-spectrum insecticides could potentially result in minor pests becoming more important. For example Greenhouse thrips *Heliothrips haemorrhoidalis* [Thysanoptera : Thripidae] currently has very few natural enemies in New Zealand and could become problematic. Work is concentrating on introducing a new natural enemy from overseas. Armoured scale insects, mostly *Hentiberlesia lataniae* [Hemiptera : Diaspididae] can reach high levels in northern growing regions, and unsprayed trees can have up to 34% of fruit infested (Blank *et al.*, 1993). Basic research on the distribution of *H. lataniae* within avocado orchards is underway.

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