IMPLEMENTATION OF INTEGRATED PEST MANAGEMENT IN PROCESS PEACHES IN HAWKE'S BAY

P.L. LO, P.N. WOOD and V.C. MURRELL

*The Horticulture and Food Research Institute of New Zealand Ltd.,
Hawke's Bay Research Centre, Private Bag 1401,
Havelock North, New Zealand*

ABSTRACT

A project jointly funded by industry and government commenced in 1995 to implement integrated pest management in the summerfruit industry in Hawke's Bay. Twelve process Golden Queen peach growers and one fresh market summerfruit grower were trained to conduct pest monitoring and make appropriate spray decisions. Monitoring programmes and spray thresholds have been developed for leafrollers, oriental fruit moth and green peach aphid. Unacceptable insect damage to fruit at harvest averaged 0.8% and 0.4% during the past two years on monitored orchards. This satisfactory result was achieved with a 73% reduction in post-blossom insecticide applications in 1996/97 compared with 1993/94. These averaged 1.1 sprays on monitored Golden Queen blocks compared with 1.8 applications on other Golden Queen orchards in 1996/97.

Keywords: integrated pest management, peach, Tortricidae, *Grapholita molesta*, *Myzus persicae*

INTRODUCTION

A three year technology transfer project was initiated in Hawke's Bay by J. Wattie Foods Ltd to increase the productivity of process peach and fresh summerfruit orchards by adopting integrated fruit production methods. The project is jointly funded by industry and the Government's Technology for Business Growth (TBG) scheme. One objective of the project is minimise losses from pests and diseases while reducing the use of broad spectrum pesticides through the adoption of Integrated Pest Management (IPM). The aim is to produce safe food that is grown by environmentally sound practices.

The project commenced in July 1995 with five orchardists growing Golden Queen peaches for processing. The programme expanded in 1996/97 to include the original group plus a further seven Golden Queen growers and one fresh peach and nectarine grower. These growers are being trained to conduct their own monitoring of pests and diseases. Information on this IPM programme has also been given to summerfruit growers at field days and in newsletters. Control of diseases is based on pre-infection spraying aided by infection period forecasts (Tate and Manktelow 1992; Tate *et al.* 1995). This information is provided by a commercial advisory service in conjunction with this TBG project.

Monitoring systems and spray thresholds have been developed for the three key pests of process peaches in Hawke's Bay (Lo *et al.* 1995). Green peach aphid (GPA) (*Myzus persicae*) damage new shoots and severe infestations can stunt tree growth. Fruit are attacked by the larvae of three species of leafroller, of which lightbrown apple moth (LBAM) (*Epiphyas postvittana*) is the most common. There is a tolerance of 2% leafroller damage for processing. Oriental fruit moth (OFM) (*Grapholita molesta*) is potentially the most serious pest because the larvae tunnel through the flesh of fruit and there is a nil tolerance for this pest.

This paper reports on insect damage levels to fruit from monitored orchards in the

1995/96 and 1996/97 seasons and compares insecticide use on unmonitored process peach orchards in Hawke's Bay over the past four years.

METHODS

The participating growers applied an oil or oil plus chlorpyrifos spray during the dormant period. Thereafter pest populations were monitored either by us (Orchards A-E) or by the growers themselves (Orchards F-M). Post-blossom insecticides were to be applied only when pre-determined pest thresholds were exceeded.

In 1995/96 Orchards A-E were each divided into two blocks, to determine whether pest populations differed sufficiently within an orchard to warrant different spray programmes. Orchard C comprised two large, physically separate blocks, whereas the other orchards each had a continuous area of peaches separated by a track. Pheromone trap catches of LBAM and OFM were recorded at weekly intervals from October to March. The traps had spray thresholds of an average of >28 LBAM/trap/week, or >7 OFM/trap/week for two consecutive weeks. Each week between 19 October and 11 December, four shoots/tree totalling 50/block (100 at Orchard C) were inspected for GPA. The threshold was >16% of trees infested, counting only shoots with more than one aphid. Similarly, four fruit/tree totalling 50/block (100 at Orchard C) were examined for insect damage weekly from 29 December until harvest. If insect damage exceeded 2% then the appropriate insecticide was to be applied.

In 1996/97, each orchard was monitored as a single area, except Orchard C which continued to be monitored as two blocks, and Orchard M where fresh peaches and nectarines were monitored separately. The size of blocks varied between 1.7-6.7 ha. Pheromone trapping was conducted as before, with 0.4-1.7 LBAM traps and 0.8-1.7 OFM traps /ha. Inspections of shoots and fruit were conducted less frequently than in 1995/96 to reduce the time taken by growers. A total of 200 shoots per orchard was examined on each of two or three occasions between mid-October and mid-November. The growers were also asked to inspect 500 fruit per orchard, twice during December for the fresh market crops and in early January and early February for Golden Queens.

At harvest, a sample of 1000 fruit (100 fruit from each of 10 bins) per block (1995/96) or per orchard (1996/97) was examined for insect damage. On the Golden Queen crops, damage was classified according to its acceptability for processing. The criteria for unacceptable damage was greater than 1 cm² in area or more than 2 mm deep. The programme aimed to maintain unacceptable fruit damage below 2% on process crops and all damage below 1% on fresh crops.

Data on sprays applied to Golden Queen blocks were obtained from the diaries that growers supplied to Heinz-Wattie Ltd. Insecticide use on the TBG blocks was compared with other orchards in 1996/97 and with usage four years ago, before monitoring of peach orchards began.

RESULTS

Unacceptable and total insect damage on fruit at harvest averaged 0.8% and 2.8% per block respectively in 1995/96 (Fig. 1a). Less damage occurred in 1996/97 with means of 0.4% unacceptable and 0.9% total damage per orchard (Fig. 1b). The target level of less than 2% unacceptable insect damage was met at all orchards except one block at Orchard A in 1995/96. On the five orchards (A-E) monitored in both years, pheromone trap catches of LBAM averaged 2.5/trap/day in 1995/96 and 1.0/trap/day in 1996/97. OFM was trapped at five orchards, but only a single moth was recorded at two properties. Fruit infested by OFM were found only at Orchards A and C, where damage by this pest over the two years averaged 0.7% and 0.1% respectively.

During the past two years, a maximum of two post-blossom insecticides were applied to the monitored orchards, except Orchard A in 1995/96 (Fig. 1). Different insecticide programmes were applied to each half of Orchards A and E in 1995/96. The reasons for applying each insecticide to the TBG orchards are given in Table 1. No aphicides were required on most blocks, although some growers chose to apply a post-blossom preventative aphicide (as well as the pre-bloom oil application) instead of monitoring for GPA.

Numbers of LBAM and OFM similarly did not reach threshold levels on most blocks

FIGURE 1: Percentage unacceptable and acceptable insect damage on fruit at harvest from monitored orchards in Hawke’s Bay. n = number of post-blossom insecticide applications.

before the withholding period (Table 1). In five cases where they were exceeded, each block received two sprays in response to catches remaining above the threshold for 4-5 successive weeks. In the sixth instance, trap data was misinterpreted by the grower who sprayed when in fact the threshold was not exceeded. The threshold for OFM was exceeded at Orchards A and C during December in both years. Excluding preventative aphicide sprays, 8/24 post-blossom insecticide applications were not recommended by us on the basis of pest levels.

TABLE 1: Number of monitored summerfruit blocks in Hawke’s Bay receiving

post-blossom pesticides and number of insecticide sprays applied.

Pest	Action	1995/96		1996/97	
		Blocks (n = 10)	Sprays	Blocks (n = 15)	Sprays
Green peach aphid	No aphicide applied	8	-	8	-
	Preventative spray applied	2	2	5	5
	Threshold exceeded	0	0	3	3
Leafrollers	No insecticide applied	8	-	14	-
	Trap threshold exceeded	2	4	1 ¹	1
	Fruit threshold exceeded	0	0	0	0
Oriental fruit moth	No insecticide applied	8	-	12	-
	Trap threshold exceeded	2	2	3	6
	Insecticides applied without recommendation	4	5	3	3
Total sprays			13		18

¹ Trap data misinterpreted and spray applied erroneously.

The number of dormant season sprays of oil or oil plus chlorpyrifos applied to Golden

FIGURE 2: Mean number (and standard deviation) of insecticide applications to Golden Queen peach blocks in Hawke's Bay. The TBG orchards are compared with other orchards, in 1993/94 (before pest monitoring began) and 1996/97. n = number of blocks.

¹Post-blossom insecticides

²Dormant season applications of oil or oil and chlorpyrifos

Queen orchards has shown little change during the past four years (Fig. 2). However, on the TBG orchards applications of post-blossom pesticides in the same period decreased by 73% from an average of 4.0 in 1993/94 to 1.1 in 1996/97. This reduction was due mainly to fewer applications of miticides, and of organophosphate insecticides to control leafrollers. More organophosphate sprays were used where OFM was a pest. In 1996/97, excluding the routine use of chlorpyrifos with oil in the dormant period, the three orchards where the OFM threshold was exceeded each applied two organophosphate sprays, compared with an average of 0.3 sprays on the other 12 monitored orchards.

Post-blossom insecticide use on other Golden Queen blocks (i.e. those not monitored in 1996/97) also averaged 2.9 fewer applications than four years ago, although these orchards received one more spray in 1996/97 than did monitored orchards (Fig. 2). The timing of post-blossom insecticide applications during the season has not changed over the past four years. In both 1993/94 and 1996/97, two thirds of the organophosphate insecticides were applied between October and December.

DISCUSSION

Process peaches were oversprayed with insecticides in the past, when some growers made up to 13 post-blossom applications in a season (Loet *al.* 1995). The introduction of IPM during the past two years has enabled the participating growers to greatly reduce their insecticide inputs without compromising fruit quality. Four years ago most insecticides were applied to control leafrollers, whereas now on the monitored orchards most sprays are targeted for GPA and OFM control. By avoiding the use of synthetic pyrethroid insecticides against aphids, process peach growers have virtually eliminated the need for miticides.

The reduction in insecticide use on Golden Queens in Hawke's Bay shows that the message about overspraying has been heeded by growers. Previous research (Loet *al.* 1995) enabled Heinz-Wattie Ltd to set a maximum number of insecticide applications for process peaches and this was largely responsible for the change. A further reduction in insecticide use is feasible, especially applications of organophosphates between October and December. Pre-Christmas insecticide applications to control leafrollers are generally unnecessary in Hawke's Bay.

Development of IPM in future could see the removal of organophosphate insecticides from summerfruit programmes. A dormant season application of oil alone, without chlorpyrifos, effectively controls GPA in Central Otago (McLaren and Fraser 1996), while insect growth regulators such as tebufenozide could replace organophosphate sprays for post-blossom leafroller and OFM control. Alternatively, pheromone mating disruption offers a non-insecticidal method of controlling both of these pests.

An important benefit of IPM is that growers have a greater awareness of which areas of their orchard are likely to have higher populations of pests and of the potential danger from OFM. In some cases, when the leafroller threshold was exceeded only part of the block needed to be sprayed. This confirmed the benefit of monitoring different areas of the orchard separately. Although OFM has been in Hawke's Bay since 1982 (Baker 1982), this study suggests that it is not widely distributed in the district. Infestation by OFM has caused crops to be rejected for processing (C. Simkin pers. comm.), so growers should use pheromone traps to detect its presence. More insecticides are likely to be needed where OFM occurs and often at different times to sprays for leafrollers. OFM did infest fruit at three blocks; therefore growers will be advised in future to spray once the threshold is reached, instead of waiting for trap catches to exceed the threshold for two consecutive weeks.

There are several areas where the programme could be improved. For example, several growers made insecticide applications that were not recommended. This was largely due to old habits and this should become less of a problem as growers develop more experience with and confidence in IPM. Although contrary to the principles of IPM, the early application of a preventative aphicide, e.g. taufluvinate or pymetrozine, that will give season-long control is clearly an attractive option for some growers. One reason is that these two aphicides are registered for use only until shuck fall in late October. This is sometimes earlier than monitoring can determine if spraying is necessary. Another

general issue was that some growers did not regularly check pheromone traps or do two inspections of fruit as required in the monitoring schedule. This did not cause problems in the past season, but insufficient monitoring could result in unacceptable levels of damage in other years.

IPM has been successfully implemented by the initial group of 13 growers, and it is hoped that the technology will be eventually adopted by the whole summerfruit sector. The challenge for the future will be to ensure that monitoring standards are maintained and that growers do not remain complacent about OFM. This currently minor pest could become more important as insecticide use declines.

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