MONITORING PESTS OF PEACHES IN HAWKE'S BAY TO REDUCE INSECTICIDE APPLICATIONS

P.L. LO, V.F. BOHM, J.T.S. WALKER and D.W. MANKTELOW

The Horticulture and Food Research Institute of New Zealand, Havelock North Research Orchard, Private Bag 1401, Havelock North, New Zealand

ABSTRACT

The main insect pests of peaches in Hawke's Bay, leafrollers, Oriental fruit moth, and green peach aphid, were monitored by pheromone traps and by counts on shoots and fruit, In four peach cv. Golden Queen orchards in 1994/95. Insecticides were applied only when pest thresholds were exceeded. Insect damage on fruit at harvest from all the blocks was within acceptable levels for process peaches. Excluding clean-up sprays, the monitored blocks averaged 1.2 insecticide applications during the season compared with the district average of 3.4 applications. The industry average in Hawke's Bay between 1990/91-1994/95 was 4.0 insecticide applications per season, with up to 13 applications per season on some orchards.

Keywords: leafrollers, *Cydia molesta*, *Myzus persicae*, thresholds, peaches

INTRODUCTION

The main insect pests of peaches in Hawke's Bay are three species of leafroller; light brown apple moth (LBAM) (*Epiphyas postvittana*), green-headed leafroller (GHL) (*Planotortrix octo)* and brown-headed leafroller (BHL) (*Ctenopseutis obliquana*); Oriental fruit moth (OFM) (*Cydia molesta*) and green peach aphid (GPA) (*Myzus persicae*). Leafroller larvae attack shoots and fruit, while GPA damages new growth on shoots. OFM is potentially the most serious pest because the larvae tunnel through fruit. Most OFM larvae feed on shoots only, but fruit are increasingly attacked as the season progresses (Russell 1986). Any infestation could therefore lead to whole crops being rejected for processing. OFM was first recorded in Hawke's Bay in 1982 (Baker 1982), and it has become a problem over the last 3 years (C. Simkin pers. comm.).

Crops grown for processing provide an ideal opportunity to reduce insecticide applications because a higher level of insect damage can be tolerated than on export or fresh market produce. For example, superficial chewing by leafrollers is removed during processing. In a trial on peaches, Walker *et al.* (1992) evaluated the effectiveness of applying insecticides according to leafroller numbers in pheromone traps. They found that pheromone trapping could help to reduce insecticide use, but there was a weak relationship between catches and fruit damage. This study tested a control programme for leafrollers, OFM and GPA based on both pheromone trapping and shoot and fruit damage. We also compared this spray regime with commercial programmes in Hawke's Bay process peach orchards to examine the potential for reducing insecticide use.

METHODS

Pest populations were monitored on one block at each of four peach cv. Golden Queen orchards on the Heretaunga plains, Hawke's Bay. Orchards were visited weekly from October 1994 until the peaches were harvested in late February-early March 1995. Adults of the three species of leafroller and OFM were monitored by pheromone traps around the perimeter and in the centre of each block. Visual inspections were also made for leafroller larvae and GPA. Monitoring of GPA ended

in late December when their numbers declined to zero. We examined four shoots per tree on five trees in each of the north, east, south, west and centre of the block (totalling 100 shoots from 25 trees), except at Orchard D where a smaller block meant that 20 shoots on five trees in each of the east, centre and west were examined. From December onwards, 100 fruit on 25 trees per block (60 fruit on 15 trees at Orchard D) located as for the shoot examinations, were inspected for the larvae of leafrollers and OFM.

Insecticides were applied by the grower only when a pre-determined threshold for each pest was exceeded. Spray thresholds were based on those used in overseas integrated pest management programmes and on the grade standard of 2% insect damage set by J. Wattie Foods Ltd. (J. Rimmer pers. comm.) for canning peaches in New Zealand. For GPA a threshold of >16% of trees infested was set, counting only shoots with >1 aphid. The threshold for leafrollers was initially >8% of trees infested, then from December it was >2% of fruit infested. The threshold for OFM in pheromone traps was 8/trap/week (Audemard and Gendrier 1993).

Insect damage levels on fruit at harvest were assessed by randomly sampling 100 or 200 fruit from each of 10 trees (total 1000 or 2000 fruit) per block, or 50 fruit from each of 24 trees at Orchard D. The four orchards were sampled between 27 February and 7 March 1995, on the same day as the main harvest. Damaged fruit were classified according to whether they would pass factory inspection and be acceptable for processing. Damage covering <1 cm^2 and <2 mm deep was judged as acceptable.

The number of insecticides applied to blocks of process peaches in Hawke's Bay were obtained from grower's spray diaries. We examined 84-136 diaries for five seasons between 1990/91-1994/95. Clean-up sprays applied between April and September were excluded from the analysis because it is the main season insecticide applications that are likely to be reduced as a result of pest monitoring programmes.

RESULTS

At Orchards A, B and C, GPA exceeded the threshold level once, during November, reaching 20-40% of trees infested. One aphidicide was applied to each of

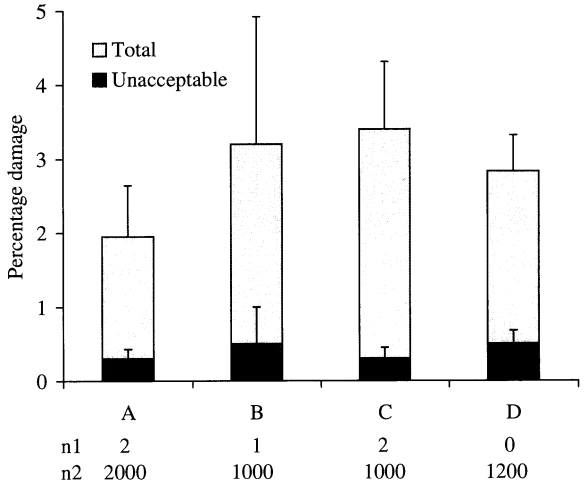

FIGURE 1: Mean percentage of leafroller damaged peaches (total and unacceptable for processing) from orchards where insecticide applications were determined by pest thresholds. Error bars are SEM. n1 = number of insecticides applied, n2 = number of fruit assessed.

these blocks. The threshold was not exceeded at Orchard D. OFM was found only at Orchards A and D, usually <0.3/trap/day, which was well below the threshold level. At harvest, only three fruit with OFM damage were found, all from Orchard A.

LBAM was the predominant leafroller species at Orchards A, C and D, where pheromone trap catches peaked between late January and late February respectively at 3.0, 1.8 and 0.4 moths/trap/day. GHL was the most common species trapped at Orchard B, peaking at 0.7/trap/day. Leafroller damage to fruit at Orchards A and C exceeded the threshold level in late February and one insecticide was applied. The fruit damage threshold at Orchards B and D was not exceeded and no insecticides were applied for leafroller control. At harvest, the proportion of leafroller damaged fruit was between 2-4% on each orchard (Fig.1). Of this fruit over 80% had only light surface chewing that would be acceptable for processing. The remaining fruit, which had an unacceptably severe amount of leafroller damage, comprised 0.5% of the total sample from each block.

Peaches grown for processing in Hawke's Bay received an average of 3.4-4.7 insecticide applications (excluding winter clean-up sprays) per season during the past 5 years (Fig. 2). The number of insecticide applications per orchard ranged between zero and 9-13 in each season. Approximately 15% of growers in each season applied none or only one main season insecticide, whereas a quarter applied more than five insecticides. Our four trial orchards were sprayed more often than the district average in 1992/93 and in 1993/94, but averaged 2.2 fewer sprays in 1994/95. The monitored blocks received 0-2 (mean 1.2) main season insecticides compared with the district average of 3.4.

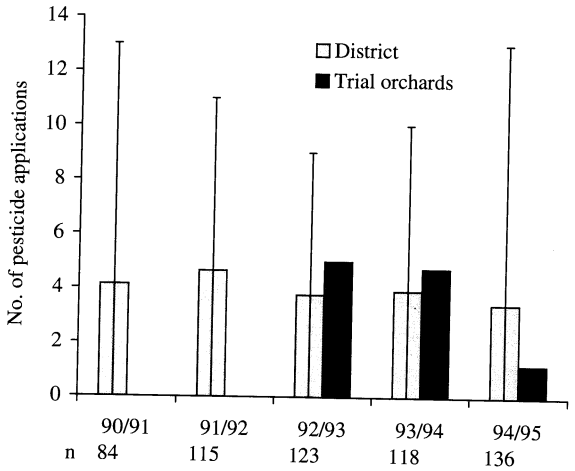

FIGURE 2: Mean number and range of insecticides applied per season from October to March, on processing peaches in Hawke's Bay, across the district and on the four trial orchards used in this study. n = number of orchards surveyed in the district.

DISCUSSION

Applications of insecticides in response to the thresholds for GPA and leafrollers prevented significant damage from these pests. GPA disappear from peach trees in early summer, so it may be possible to adjust their spray threshold during the season. For example, once most shoot growth is no longer vulnerable to aphids, a higher threshold may be justified. The level of unacceptable leafroller damage on fruit was well below the grade standard for process peaches, therefore it may be possible to set

a higher threshold. The trial was conducted, however, during a season when leafroller populations in Hawke's Bay were relatively low (Walker unpubl. data). Numbers of OFM were not high enough to test their threshold.

The variability in amount of insecticide use throughout the district suggests that either there was a wide range of pest pressure amongst properties, or that many orchardists applied more sprays than were necessary to achieve an acceptable level of pest control. The latter scenario is more likely, since no peach crops have been rejected because of leafroller damage by J. Wattie Foods Ltd. during the past five seasons (C. Simkin pers. comm.), even with minimal insecticide use by many growers. Also adequate control was achieved on our trial orchards with an average of 2.2 fewer insecticide applications than were used by other growers. If this reduction could be applied across the district it represents a significant saving for the industry, and particularly for some individual orchardists.

The number of insecticides needed in each season to maintain damage below the grade standard is likely to vary with pest populations. The situation could also alter with a change in status of OFM at individual orchards. At the start of this season the orchardists at our trial sites intended to follow a similar insecticide programme as they had used in the previous season. In practice, however, they adjusted their own programmes according to our instructions for the monitored blocks, hence the reduction in insecticide applications between 1993/94 and 1994/95.

In conclusion, these data suggest that the number of insecticide sprays applied to process peaches can be reduced from current levels, without significantly increasing fruit losses for canning. The thresholds for shoot damage by GPA and fruit damage by leafrollers need to be tested over more seasons to ensure that they are appropriate for process peaches in Hawke's Bay.

ACKNOWLEDGEMENTS

We thank B. Brittin, H. Burns, R. Graham, and I. Thame for their co-operation with the trial. A. Kale and J. Morton assisted with the initial planning and J. Wattie Foods Ltd. provided financial assistance. Comments by K. Clapperton, J. Charles and M. Suckling improved the manuscript.

REFERENCES

Audemard, H. and Gendrier, J.P., 1993. Lutte raisonnée contre la tordeuse orientale du pêcher *Cydia molesta* Busck en verger de pêchers sur la base du piègeage sexuel avec des capsules mini-dosées. *Bulletin OILB/SROP 16*: 42-45.

Baker, R.T., 1982. Oriental fruit moth in New Zealand. *Proc. 35th N.Z. Weed and Pest Control Conf.*: 17-21.

Russell, D.A., 1986. The ecology of the oriental fruit moth in New Zealand. Unpubl. Ph.D. thesis, Auckland University, 235 pp.

Walker, J.T.S., White, V. and Scott, W.M., 1992. Evaluation of a low residue programme for pest control on process peaches. Report to Rex Graham and Associates Ltd. on behalf of J. Wattie Foods Ltd. 13 pp.