A COMMERCIAL MITE MONITORING SERVICE FOR NELSON APPLE ORCHARDISTS

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SUMMARY

A commercial mite monitoring service was set up for Nelson pipfruit orchardists in the 1993-94 season in response to renewed interest in integrated mite control (IMC) and concern about miticide resistance. Over 50% of local pipfruit growers attended meetings to promote the programme and 54 growers (20%) used the service in its first season of operation. Leaf samples were collected and counted from a total of 163 orchard blocks in November and January. A spray decision model was used as the basis for spray recommendations on individual blocks and regional spray timing information was provided using predictions from a temperature driven phenology model. Some spray reductions were achieved with the monitoring service, but low predator numbers early in the season meant that miticides were necessary to prevent mites reaching unacceptable levels.

Keywords: mite monitoring, integrated mite control, mite models, pipfruit

INTRODUCTION

For pipfruit growers, the decision if and when to apply a miticide against European red mite (ERM), *Panonychus ulmi* (Koch), is usually determined by visual examination of leaves to estimate the mite population in the orchard. The decision to apply a miticide is often made as soon as mites are found and no real attempt is made to quantify the number of pest or predator mites present. Often a miticide is applied as an insurance measure to prevent a possible mite outbreak later in the season.

Growers had the benefit of a commercial mite monitoring service operated by the Cawthron Institute during the 1970's but this has not been available for many years. Recently, some Nelson growers have experienced control failure of ERM, after continued use of ovicidal miticides for several seasons. The use of disruptive protectant fungicides for early season control of blackspot, *Venturia inaequalis* has also suppressed predator mite (*Typhlodromus pyri*) populations (Wearing and Wilton 1984; Walker *et al.* 1989). These two factors have led to concerns over miticide resistance and a renewed interest in IMC. A commercial mite monitoring service for pipfruit growers was introduced in the 1993/94 season by HortResearch after trials on commercial blocks in the previous 3 years. These trials showed the potential for effective mite control and miticide reductions using computer derived population models which determined if and when a miticide should be applied (Hayes *et al.* 1993; Shaw unpublished data). This paper discusses the introduction of the mite monitoring service and outlines the potential benefits of such a service to pipfruit growers.

METHODS

Mite counting

Three grower meetings were arranged at suitable packhouse venues to publicise the service and over 50% of local pipfruit growers attended. All growers involved in the monitoring service were mailed a monitoring kit comprising information sheets,

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three bags for leaf samples and a pre-paid mailer for return of samples. More bags were available on request.

Growers were instructed to pick random 50 leaf samples from up to one hectare blocks. Bags were labelled with the growers name and block numbers were supplied for identification of the samples.

Growers were advised to pick their samples on a certain day to ensure an even supply of samples for the counters over the monitoring period. Three staff were employed and trained for the mite counting service. All samples received were stored in a fridge and were usually counted within 2 days. A mite brushing machine was used to brush the mites and eggs off the leaves onto a revolving glass plate covered with a light coating of glycerine and detergent to hold the mites. After brushing, the plate was placed onto a grid and the sample was counted using a binocular microscope. Most samples could be brushed and counted within half an hour.

Spray decision

All participating growers were advised to provide leaf samples in mid - November so that a decision could be made on whether or not to spray a miticide in December and/or January.

Some growers were advised to provide further samples in January, based on the results of the November counts. For the mid-November sample, only ERM eggs and predators *T. pyri* were counted. Results were then checked against a graph of the spray decision model (Hayes *et al.* 1993) (Fig.1) and growers were advised in writing which blocks required a miticide and when it should be applied. The recommended spray dates for the district were provided using the ERM phenology model (Hayes *et al.* 1988) and these dates were given to growers approximately a week before the recommended spray period, so that they were prepared to spray if necessary. The information was also publicised on the farming page of the local newspaper and all spray representatives and consultants were also notified.

Counts for the January spray period were based on the DSIR monitoring system (Cook 1980) which compares the ratio of ERM to predators. All active stages and eggs of both ERM and predators were counted. Growers were provided with spray recommendations and timing information as for the December period.

Figure 1: Graph of the spray decision model used to determine miticide recommendations.

RESULTS AND DISCUSSION

A total of 206 samples were counted over the November and January sampling periods and miticide recommendations based on the spray decision graph were provided for 54 growers (20% of registered growers) (Table 1). Predator numbers were generally low in most blocks in November (Table 2). No predators were recorded in samples from over 50% of the blocks monitored. European red mite egg numbers were generally low to moderate in November and 58% of the blocks monitored had less than five ERM eggs per leaf. This resulted in the recommendation for only five blocks to receive no miticides and three to receive a single miticide in December. However, a further 11 blocks did not require any miticides after recounts in January. The majority of blocks were advised to apply a single miticide in January (68) or a spray in December with a re-count in January (58). The recommendations for the remaining blocks were that 26 would not require a December miticide but should be re-sampled in January and for three blocks, with high initial mite numbers, to receive both a December and January miticide.

TABLE 1: Summary of recommended and actual miticide applications and recounts for all blocks monitored.

Recommendations	November samples No. blocks advised	December No. blocks sprayed	January No. blocks recounted	January No. blocks sprayed
No miticide necessary	5	0		0
Spray December	3	3		
Spray January	68	16 ¹		52
Spray December and January	3	3		3
Spray December recount January	58	58 ²	24	15
No December spray recount January	26	7 ³	19	8

¹Blocks sprayed with fenpyroximate in December and not sprayed in January as advised.

²Includes 34 blocks sprayed with fenpyroximate in December and not recounted in January as advised.

³Blocks sprayed with fenpyroximate in December and not recounted in January as advised.

TABLE 2: The number and (percentage) of samples with *T. pyri* recorded in November.

	0	No. <i>T. pyri</i> / 50 leaves		
		1 - 7	8 - 14	≥15
No. of samples	83 (51)	67 (41)	11 (7)	2 (1)

Because the spray decision model has some difficulty predicting ERM and predator development from initially very low populations in November and because of the sampling error when determining low mite densities from a 50 leaf sample (Hayes *et al.* 1993), it was recommended that 84 blocks (51%) be re-sampled in January to check if a miticide was required later in the season. Forty three samples were supplied and, although this required additional sampling and monitoring time, it resulted in miticide savings, with 20 of the 43 blocks re-sampled not requiring a miticide.

The average number of miticides used by growers in recent years is around two sprays per season (Shaw unpublished data). Most of the blocks monitored (79%) received only one miticide application while only 11% received two applications and 10% of the blocks did not require any miticides. This result was strongly influenced by the introduction of a new miticide fenpyroximate (Dynamite) which was introduced during the monitoring period. Of the 84 blocks recommended for re-sampling in January, only 43 were checked because the remaining growers chose to apply fenpyroximate to these blocks in December instead (Table 1). It is possible that some of these blocks may not have required spraying and the benefits of the monitoring programme and use of IMC may have been reduced for these growers. On the other hand, it is also possible that the use of fenpyroximate in December may have reduced the need for a second spray in January for some growers with high mite populations or those who may have experienced poor control with existing miticides.

Growers generally achieved good control with the recommendations provided. The overall results confirm the value of the mite monitoring service in helping to reduce miticide use and provide growers with cost savings, as well as optimising the effectiveness of miticides through correct timing. The judicious use of miticides is an important part of a resistance management strategy. Each miticide application saved by a grower provides a cost saving of approximately \$100 to \$150 per hectare on chemical costs alone. Considering the cost of \$35 per sample to growers, the monitoring service is cost effective. As part of the monitoring service next season, it is planned to provide *Typhlodromus pyri* to growers to enhance predator populations on their orchards. Growers will also be encouraged to follow a spray programme compatible with IMC (Wearing and Ashley 1982).

In its first season of operation, the mite monitoring service has been well supported by local growers and some miticide reductions and consequent cost savings have been achieved. The monitoring and decision system is efficient and less time-consuming than the previous DSIR method and it should enable a return to IMC and its associated benefits.

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