



## DEVELOPING IPM ON PEARS IN BRITISH COLUMBIA

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Until four years ago, a typical pest control program in most pear orchards in the Okanagan and Similkameen Valleys was based on up to 14 different sprays and cost approximately \$1,200 per hectare for materials and application. As early as 1986, however, it was apparent that pear psylla, which is considered to be the key pest, was becoming resistant to synthetic pyrethroids and other chemical sprays. By 1989, resistance in pear psylla was a major problem; most pear orchards suffered severe defoliation and fruit in many blocks was so badly damaged that it was not picked that season (honeydew produced by pear psylla drips onto leaves causing them to turn black and drop; it also stains fruit). In 1987, some growers had begun working with our pest management company to find a solution to their diminishing control over pear psylla. We felt that predators should be studied for psylla control based on observations of organic pear orchards where psylla were seldom a problem because they were suppressed by native predatory insects. The organic pears, however, usually had levels of damage equal to the conventional orchards from other pests, such as codling moth, leaf roller and fruitworm. In 1990, the pear growers helped to obtain the funding we needed to start looking for some solutions. The project began in the winter of 1990 and the research and extension work has been conducted in growers' orchards throughout the Okanagan and Similkameen Valleys for the past three years.

### Objectives

The pear IPM project had three goals:

1. Augmentation of pear psylla predators. Research explored the potential for collecting or

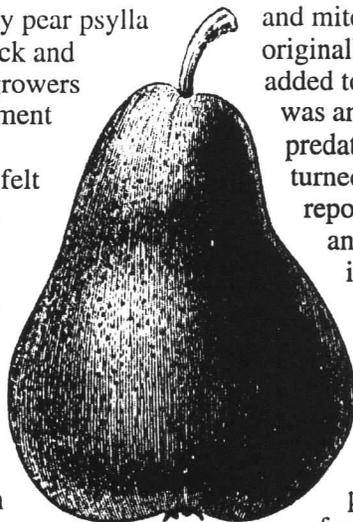
rearing and releasing lacewings, ants, earwigs and *Deraeocoris brevis* (a native predatory bug).

2. Development of a predator compatible control program for other pear pests. We needed to find effective controls for two-spotted mites, codling moth, *Campylomma*, leafroller and others, that were not destructive to the predator complex.

3. Grower education and involvement. It was important to develop a program that we were sure growers would use because a predator-based control program, using monitoring and economic thresholds, was a radical departure from what they had been doing in the past.

### Results

Of the predators investigated for augmenting natural populations, the earwigs and *Deraeocoris* were the most successful. Useful numbers could be reared or collected and they were effective pear psylla and mite predators. *Campylomma* (a mirid bug originally thought to be a pest of pears) was added to the list when it became obvious that it was an important part of the complex of predators required to control pear psylla. As it turned out, naturally occurring predators repopulated all sizes of pear orchards faster, and appeared in higher numbers, than we imagined possible. The predator complex functions well most of the time in most orchards, however, gaps do occur when predators are fewer than needed or when sprays are applied that are detrimental to them. Although we continue to look at augmenting natural populations by introducing predators, our focus has shifted to improving the habitat for the naturally occurring populations. This includes providing shelters for earwigs, planting alternate host plants for *Deraeocoris* and *Campylomma* and improving timing of sprays for other pests so they can be applied without killing predators.



In 1992, the pear pest management program used by the majority of growers in the 41 orchards we monitored, averaged 6 spray operations for the season, costing approximately \$500 per hectare (see box). Dormant oil was applied in most orchards to prevent psylla egg laying and to control red mites. About

44% of growers did not need a pre-bloom spray of endosulfan (Thiodan) for psylla. Organochlorine pesticides (such as endosulfan and dicofol) do not appear to be destructive to *Deraeocoris* and *Campylomma*, therefore can be used in our predator based program. Thiodan can also be used for curculio and green fruitworm if they are present in significant numbers. If monitoring shows that pear psylla numbers are too high at the pink stage of bloom, chinomethionat (Morestan) is used. We use sulphur (Kumulus S) for powdery mildew; it is much cheaper and less likely to damage fruit than other fungicides. Kumulus is also used by some growers instead of dicofol (Kelthane) for rust mites. Spider mites are no longer a problem under this program. Most growers use two sprays of phosmet (Imidan) for codling moths and about a third of the growers used mating disruption with pheromones. The large-scale sterile insect release program to control codling moths in the Okanagan should take care of this pest in the near future. Insecticidal soap sprays are still needed occasionally to keep the fruit clean. Leafrollers are the main problem now in many orchards and azinphos-methyl (Guthion) is the only really effective control. This chemical is very destructive to most psylla predators, however, we have identified windows in time when it would have the least impact on predators and are working on a program to assist growers in monitoring for, and timing, this spray.

Adoption of the "soft program" of reduced pesticide use in the pear industry was promoted by conducting the research in the pear orchards, giving weekly workshops throughout the valley, engaging in one-to-one consultations with growers, publishing newsletters and working with horticulturalists and field people.

In 1990, pear psylla control in 80% of the

acreage was rated as greatly improved to excellent. There were further improvements in pear psylla and spider mite control in 1991 as more of our time and energy shifted to investigate other pests. The 1992 crop was the cleanest in 25 years. Over 90% of the growers have now adopted the "soft program". We were able to convince the marketing agency for 70% of the growers to try marketing part of the 1992 Anjou pear crop as an IPM product.

### Success Factors

Several factors contributed to the success of the project. One factor was that we worked with the whole system instead of one pest at a time. We feel that examining many relevant factors and finding simultaneous solutions gave us a workable program within a relatively short period of time. Grower involvement was also fundamental to success. Growers made their orchards available and helped with, and also conducted, experiments. They gave us ideas, support and feedback on the practicality of what was being done and they learned how to make the new program work in their own orchards. Another factor in the success was the extensive and long-term monitoring conducted in many different orchards. Seven pear orchards were monitored weekly from early spring until the pears were harvested for three years. From 40 to 50 other pear orchards in both valleys were also monitored bi-weekly during key times of the year for the same period. This provided the wider context to enable us to evaluate what we were seeing in our experiments.

For example, our pear rust mite experiments indicated that, at current levels, neither pre-bloom nor post-harvest control programs had a practical impact. This was validated by the experience of many growers in both valleys carrying out a variety of pear rust mite experiments and control programs.

1992 PEAR IPM PROGRAM		
Pest	Pesticide	Cost/ha/season
<b>Dormant Stage:</b>		
Pear Psylla, Mites	Dormant Oil	\$ 60
<b>Delayed Dormant Stage:</b>		
Pear Psylla	Endosulfan (Thiodan)	\$ 81
<b>Pink Stage:</b>		
Pear Psylla, Powdery Mildew and Mites	Chinomethionat (Morestan)	\$160
<b>Summer Sprays:</b>		
Codling Moth- 2 applications	Phosmet (Imidan)	\$138
Mites	Dicofol (Kelthane)	\$ 84
<b>Total of 6 Sprays:</b>		\$523
<b>Alternatives:</b>		
Codling Moth	Pheromone Mating Disruption	\$270
Leafroller	Azinphos-methyl (Guthion)	\$ 76
Fruitworm	<i>Bacillus thuringiensis</i> (Dipel)	\$120
Fruitworm, Curculio	Endosulfan (Thiodan)	\$ 81
Pear Psylla	Insecticidal Soap	\$ 40
Powdery Mildew, Mites	Sulphur (Kumulus S)	\$ 40
Scale (Delayed Dormant Stage)	Horticultural Oils	\$ 60

This project relied on harvest results, such as information from bin checks, packing house records and evaluations by growers as much as on experimental data to assess progress and determine direction. The research program was flexible and evolved with the changing needs of the program. For example, two-spotted mites essentially disappeared by the second year and experiments on controlling them were discontinued. Leafroller and rust mites problems, however, increased greatly, so more time and energy was shifted to them. It is important that a pest management system remain flexible, with on-going monitoring, to respond to problems such as increasing pesticide resistance and the appearance of new pests, such as curculio, a weevil that became a problem in some orchards.

The new pear pest management program is not one set recipe which can be applied in every block, nor will it remain unchanged from year to year. However, with better monitoring and adaption it should serve the pear growers longer and better than a program based on chemical pesticides.

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