



AREAWIDE ORGANIC PEST MANAGEMENT

The Peshastin Creek Pear Project



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INTRODUCTION

Present pest control programs for pear are largely based on chemical sprays that destroy beneficial as well as pest arthropods within the orchard agroecosystem. At best, these programs have offered temporary protection while producing many unwanted side effects. However, while biological control is the optimal sustainable approach to reduce the use of insecticides in pear, biological control alone cannot currently control any of the major arthropod pests of pear. Thus, to obtain a long-term stable pest management program in pears, research is necessary to develop a consistently effective integrated program that coordinates chemical control with biological control, and also uses semiochemical and cultural control practices.

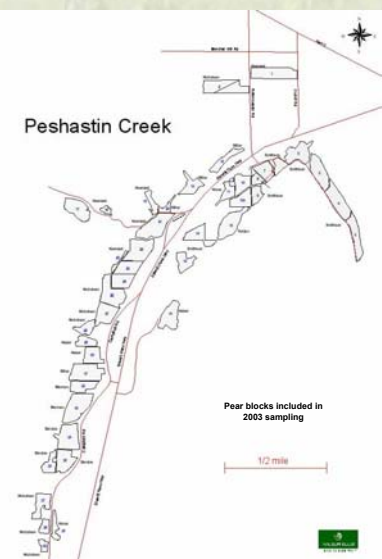
A small percentage of Washington pear growers (approx. 7%) have already chosen to become organically-certified, using pest management programs that rely solely on these more biologically-intensive pest management strategies and tactics. The number of organic fruit growers in Washington has increased dramatically since 1992, largely due to the success of mating disruption for control of codling moth, the key pest of apple and pear. Control of codling moth without organophosphate insecticides, prior to the development of codling moth mating disruption, was very difficult and costly, and served as a major barrier to development of more environmentally-benign IPM programs.

IPM programs for areawide use of mating disruption for codling moth control (CAMP), initiated in 1995, have been shown to be very effective in managing codling moth. Currently, a large USDA IFAFS-RAMP research project (Areawide II) is in underway to extend the benefits of mating disruption, primarily by developing softer IPM programs that enhance biological control in tree fruit.

However, the potential for areawide implementation of organic production has not been examined in any cropping systems. Organic pear production may particularly be appropriate for areawide implementation. The major pests of pear, codling moth and pear psylla, each have pest management tactics available that make areawide organic management possible: mating disruption for codling moth, and kaolin (Surround®) for pear psylla. Successful areawide management of codling moth has already been demonstrated; areawide management of pear psylla using kaolin has been effective since 2000.

There are some additional benefits to implementing organic production on an areawide basis, rather than orchard by orchard. Foremost is enhancing the opportunities for immigration of natural enemies. Most natural enemies of pear psylla are opportunists, and immigrate from native surrounding vegetation into pear orchards. For this to occur, the pear orchards must be adjacent to native vegetation, typically along the margins of production areas. Establishment of organic orchards in the middle of conventional production areas will have more difficulty encouraging biocontrol agents, as less selective pest management programs in the conventional orchards will likely isolate the organic orchards from the native vegetation. Areawide implementation of 'softer' organic production will provide 'corridors' for biocontrol agents to immigrate to the interior of production areas.

In February 2002, a group of twelve family farms along the Peshastin Creek drainage of the upper Wenatchee Valley of Washington formed the Peshastin Creek Growers Association. This Association comprises approximately 310 acres of contiguous pear orchards located in a narrow valley, surrounded by native woodland and bisected by State Highway 97 and Peshastin Creek.



PESHASTIN CREEK GROWERS MISSION STATEMENT

As a group of growers we strive to enhance environmental quality in a cooperative areawide program of tree fruit production. We will do this using environmentally-friendly pest management practices that will improve water and soil quality, improve worker safety, and reduce pesticide inputs.

OBJECTIVES

Overall objective:
 Establish an areawide insect pest management program based on the use of organic insect control tactics.

Specific objectives:

1. Replace broad-spectrum insecticides with safer, 'softer', and more environmentally-friendly insecticides
2. Decrease pesticide use
3. Take proactive steps to protect or enhance the Peshastin Creek water shed
4. Increase the use of sustainable pest management practices
5. Increase biological control of insects
6. Improve water quality and soil quality through reduced use of broad-spectrum insecticides
7. Improve worker safety by using only Category 4 insecticides (very low toxicity to mammals)
8. Increase communication and pest management information within the region
9. Maintain profitable fruit production
10. Produce quality fruit

PEST MANAGEMENT PROGRAMS

Comparisons were made of pest and natural enemy densities among three pest management programs: Organic, Soft, and Conventional. Within the Peshastin Creek Project, approximately 180 ac of pear were Certified Organic, 130 ac were under a soft program, and 22 ac were maintained as conventional.

The Organic program was limited to those materials approved under organic certification.

The Soft program used the same insecticides as the Organic program, however growers were allowed to use other non-organic materials if necessary. For alternatives treatments, the first choice was always an insect growth regulator, maintaining the object of preserving natural enemy populations.

The Conventional program followed standard recommendations for pear production in the area. Conventional plots were also allowed to use organophosphate insecticides for codling moth control.

Sampling for pest and natural enemy densities was conducted throughout the project biweekly. Samples were collected at 23 locations: 6 Organic, 13 Soft, and 4 conventional. Locations were biased toward Soft, as orchards under this program could shift to either Organic or Conventional during the season.

RESULTS

Figures 1-3. Pear psylla densities

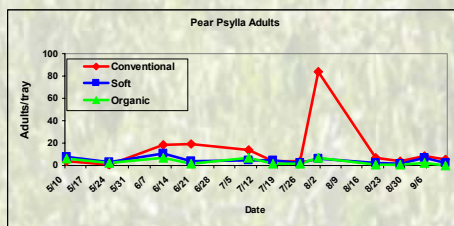
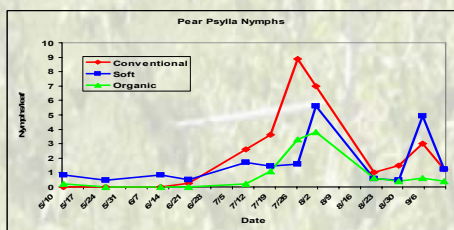
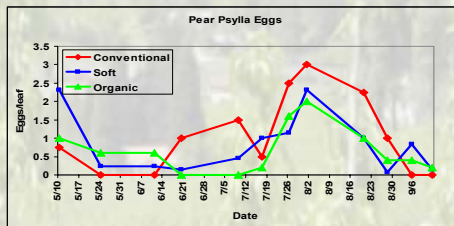
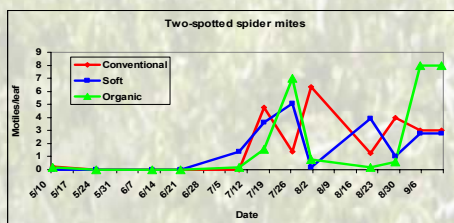


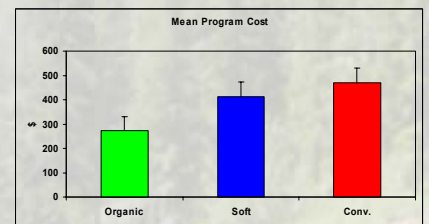
Figure 4. Spider mite densities



Conventional	Spray Programs	
	Soft (mating disrupt.)	Organic (mating disruption)
Delayed/Dormant		
1) Thiodan	1) Thiodan	1) Surround
2) Surround	2) Surround	2) Oil
3) Lorsban	3) Oil	3) Sulfur
4) Oil	4) Sulfur	
Clusterbud		
1) Sulfur	1) Surround	1) Surround
2) Oil	2) Azadirachtin	2) Oil
3) Surround	3) Oil	3) Azadirachtin
4) Esteem		
Petalfall		
1) Actara	1) Azadirachtin	1) Oil
2) Oil	2) Oil	2) Bt
Summer		
1) Guthion	1) Oil	1) Oil
2) Vendex	2) Acramite	2) Azadirachtin
3) Agri-Mek	3) Azadirachtin	

Red = Non-selective Pesticides Blue = Selective Pesticides Green = Certified Organic Pesticides

Figure 5. Mean insecticide program costs



RESULTS and DISCUSSION

There were no significant differences in pear psylla control through the season between the Organic, Soft, and Conventional orchards (Figures 1-3). Pear psylla nymphs, the damaging stage, peaked in early August and some honeydew was found on fruit, however this occurred in all three programs.

Spider mites also caused limited damage in all treatments (Figures 4). Acaricides were used in all Conventional orchards, as well as in 33% of the Soft orchards.

No differences were found in codling moth damage among programs. Codling moth pressure within the project has historically been low.

No differences were found in natural enemy population densities. Levels of natural enemies were very low throughout the season in all programs.

A preliminary analysis of costs also did not show statistically significant differences between programs (Figure 5). However, further analysis is necessary to examine the economics of each program.

Overall, pest management was obtained in the Organic and Soft programs relative to the Conventional program. While this is the first year of a 3+ year study, this demonstrates that there is potential to move larger acreages to organic management and soft, more environmentally-friendly insect pest management. While demonstrating economic benefits of softening pest management may prove challenging, areawide organic programs may provide an avenue for delivering tree-to-table IPM.

Update for 2003 Season

The 2003 season will see the continuation of pest monitoring in the orchards of the Peshastin Creek Growers Association, with sampling expanded from 22 to 41 sites, all of which are based on grower-identified blocks.

A new phase of research is also beginning this year. Transect sampling will be used to measure predator density through the gradient from native vegetation into orchard vegetation. Also, direct measurements of biological control activity will be made in orchards and surrounding vegetation, using exclusion cages with sentinel pear psylla eggs and nymphs along transects. We will look at these components of biological control in both Organic and Conventional systems.

Thanks to the Peshastin Creek Growers Association

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