Areawide Organic Pest Management

The Peshastin Creek Project, Year II

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Introduction

Organic pear production may be highly appropriate for areawide pest management. The major pear pests, codling moth and pear psylla, have management tactics available that make areawide organic management possible: mating disruption for CM, kaolin (Surround) for PP.

Implementing organic production on an areawide basis, rather than orchard by orchard, enhances opportunities for migration of natural enemies. Most natural enemies of PP are generalists and migrate from native vegetation surrounding orchards. Organic 'islands' in conventional production areas have difficulty encouraging natural enemies—less selective conventional management tends to isolate them from native vegetation. Areawide implementation of softer production will reduce the barriers to natural enemy migration.

While biological control is the optimal approach to reducing insecticides in pear, biological control alone cannot currently control the major arthropod pests. To obtain a long-term stable pest management program, research needs to develop a consistently effective integrated program that coordinates chemical control with biological control.

Objectives

This was the second year in a three-year development project of an areawide organic pest management program for pears.

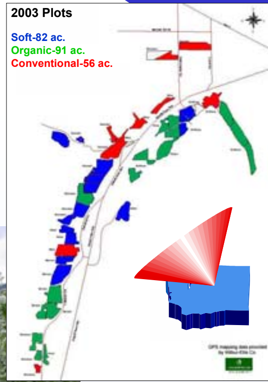
In February 2002, twelve family farms, along the Peshastin Creek drainage of the upper Wenatchee Valley, WA, formed the Peshastin Creek Growers Association, with the *mission of increasing use of environmentally-friendly pest management techniques to enhance water and soil quality, improve worker safety, and reduce pesticide inputs.*

In 2003, we continued our pursuit of the two main objectives:

1. Development of organic or soft pest management in an areawide context.
2. Comparison of pest and natural enemy densities, crop damage and cost effectiveness between pest management strategies categorized as:

Organic (certified Organic management practices),
Soft (organic when possible, allows use of IGR's and other selective pesticides), and
Conventional (uses organophosphates and other non-selective insecticides).

Project area: 300+ contiguous acres of pears in the Peshastin Creek Valley. 230 acres were sampled in 2003 at 41 sites, (orchard blocks) This doubled the sampling effort of 2002.



Sampling Techniques

All sampling was done weekly.

Beating trays were used to sample predators and adult PP (25 taps/block).

Results and Analysis

ANOVAs were conducted on data normalized by Box-Cox (*x*+1) transformation. Means separations were done with Fisher's Protected Least Squares Differences Tests.

Pear Psylla Adults

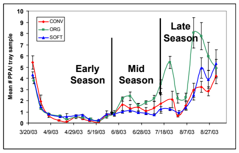


Fig 1. 2003 Adult Pear psylla (PP) densities.

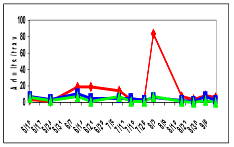


Fig 1a. 2002 Adult PP densities.

Adults: Averaged over the entire season, PP populations were higher in ORG than CONV. There were no differences early season or mid-season; in late season ORG blocks had higher densities than SOFT and CONV (Fig 1). All programs had lower densities in 2003 than in 2002 (Fig 1a.)

Predators

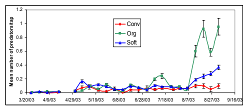


Fig 2. 2003 predator densities.

Predator densities remained low through most of the season in all programs. However, late season increases were seen in ORG and SOFT.

Spurs (early season) and leaves (mid - late season) were examined for PP (eggs and nymphs), Two-spotted spider mites, European red mites, Pear rust mites and Grape mealybugs.

Pear Psylla Nymphs and Eggs

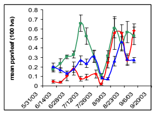


Fig 3. 2003 PP nymphs.

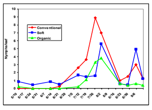


Fig 3a. 2002 PP nymphs.

Nymphs: Differences in PP nymph densities between programs were small in 2003 (Fig 3).

Both nymph and egg densities were lower in 2003 than in 2002 (Fig 3a).

Mites and Other Pests

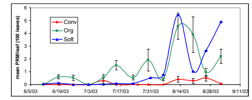


Fig 4. Pear Rust Mite densities.

PRM was problematic in some ORG and SOFT blocks, with no statistical differences between management types.

Two-spotted spider mite, European Red mite and Grape mealybug pressure was low in 2003.

Codling Moth and CM Damage

Codling moth damage was evaluated once each generation (1000 fruit /plot).

Delta traps with Pherocon lures, 1 trap/ block, were used to monitor Codling moth pressure.

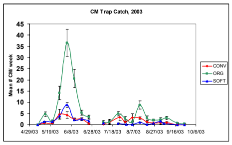


Fig 5. 2003 codling moth trap catch.

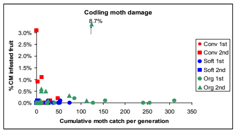


Fig 6. Codling moth fruit damage and pressure for 1st and 2nd flights.

During 1st generation, CM trap catch was extremely variable from block to block; ORG blocks had higher pressure than others programs (most of the ORG catch from two hot-spots). In the 2nd generation, ORG moth captures were higher than SOFT, although there was significantly different from CONV.

There were no statistical differences in CM damage between programs. However, there were two notable occurrences of damage, one in a CONV block treated with sprayable pheromone, another in an ORG block where supplemental sprays of spinosad were not used.

Pest Control Programs

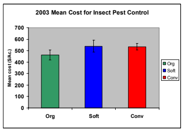


Fig 7. 2003 mean program costs.

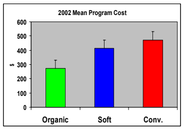


Fig 7a. 2002 mean program costs.

There were no differences in mean program costs in 2003 (Fig 7). Costs were slightly higher than in 2002 (Fig 7a), likely due to high CM pressure.

		CONV	SOFT	ORG
CM	% of blocks using MD			
	Sprayable	40%		
	No-Mate	10%	100%	100%
	Average No. applications/ac.			
	Avaunt	0.36	0.52	
	Cyd-x			1.46
	Entrust		0.04	1.74
	Guthion	0.47		
	Imidan	0.39		
	Intrepid	0.42	1.83	
	Lorsban	0.52		
	Oil	6.87	7.31	8.09
PP	Actara	0.30	0.13	
	Agri-mek	1.50	0.19	
	Assail	0.96	0.38	
	Azadirachtin	0.35	3.54	1.67
	Carzol	0.28	0.69	
	Esteem	0.50	1.62	
	Sulfur	0.13	0.31	2.48
	Surround	2.78	1.71	1.90
	Thiodan	0.61	0.51	
	Acramite	0.72	0.12	
	Dipel			0.78

Table 1. 2003 pest control programs.

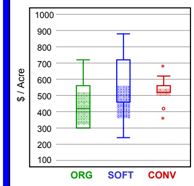


Fig 8. 2003 Cost distribution.

SOFT programs were most variable in cost, CONV least variable (Fig 8).

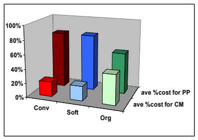


Fig 9. Allocation of spray cost to PP, CM.

ORG allocated more $/ac. to control of CM than did other programs, and fewer $/ac. to PP control (Fig 9).

Discussion

Pear psylla densities—adults, eggs, and nymphs—were lower in all three programs in 2003 relative to 2002. There were higher adult PP densities in the ORG program relative to SOFT and CONV, although the difference occurred near harvest—thus possibly not economically significant. PP nymphs, the damaging stage of PP, were kept below the economic threshold in all programs.

Predator densities increased in late-season in the ORG and SOFT programs, which followed increases in PP densities. This suggest orchards managed for PP will never see large numbers of predators; PP damage thresholds may be too low to sustain higher predator populations.

Pear rust mites were problematic in the SOFT and ORG programs; there are no effective organic tactics for post-bloom control of PRM. Inadequate early-season (prebloom) PRM control led to severe economic damage in three related ORG blocks. The lack of available postbloom interventions for PRM remains a limitation to selective programs.

Codling moth pressure was high in several SOFT and ORG blocks. In SOFT blocks, Intrepid and Avaunt in combination with mating disruption was successful in controlling the pest. For ORG blocks, Entrust and codling moth virus (Cyd-X) with mating disruption proved very effective in controlling very high pressure.

Costs for pest control were comparable between programs. SOFT programs tend to be most variable in cost, possibly due to flexibility. The disparity in cost allocation to the main pests suggests that the cost and effectiveness of materials is a significant factor in CM control, but that ORG programs are achieving PP control despite these factors—biocontrol may be sufficient to augment the less-effective chemicals available for selective programs.

Conclusion

Over a two year period, Organic and near-organic Soft pest management strategies have been successful in managing pests, and initial results suggest chemical costs for Soft and Organic to be competitive with Conventional . Further analyses are in progress to determine the effects on fruit yield, quality and grower satisfaction. Results from these analyses as well as a third year of study will provide better determination of the feasibility and benefits of implementing organic and soft programs on an areawide scale.

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