Areawide Organic Pest Management

The Peshastin Creek Project, Three Years

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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, including mating disruption for codling moth (CM), *Cydia pomonella,* and kaolin (Surround) for pear psylla (PP), *Cacopsylla pyricola.*

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, immigrating from surrounding native vegetation. Organic 'islands' in conventional production areas have difficulty encouraging natural enemies—conventional management tends to isolate them from native vegetation. Areawide implementation of softer production reduces the pesticide barriers to natural enemy migration.

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

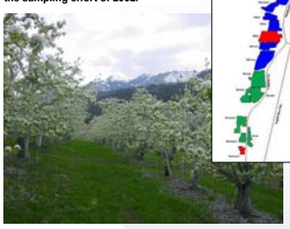
Objectives

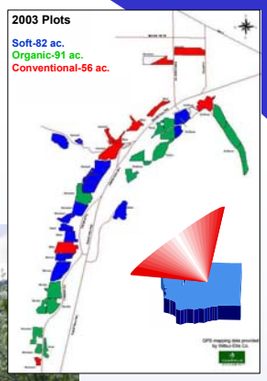
This is a multi-year project to develop an Areawide Organic Pest Management program for pears. In 2002, twelve family farms along the Peshastin Creek drainage, WA, formed the Peshastin Creek Growers Association, with the mission of *increasing use of environmentally-friendly pest management techniques to enhance water and soil quality, improve worker safety, and reduce pesticide inputs*. Preliminary work was done on the project in 2002.

In 2003 and 2004, we continued the pursuit of our two main objectives:

1. Replace conventional pest management practices with organic or soft areawide pest management.
2. Document the effects of three pest management programs on: pest densities and crop damage, natural enemy densities, and costs of pest control. The three programs are categorized as:
   - Organic (certified Organic management practices),
   - Soft (organic when possible, allows use of IGR's and other selective pesticides),
   - 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

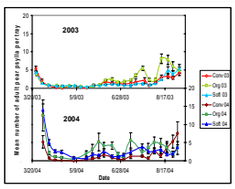
All sampling was conducted weekly.

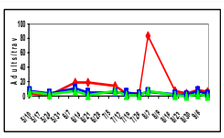
Beating trays were used to sample predators and adult PP (25 taps/block).

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

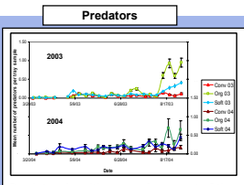




2002 Adult PP densities.

***Adults*: Over the second two seasons, PP populations tended to be higher in ORG than in SOFT and CONV. All programs had lower densities in 2003 and '04 than in '02.**

Predators



Predator densities were low most of the season in all programs. However, late season increases were seen in ORG and SOFT. Densities were higher in 2004.

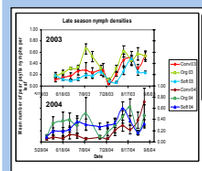
Discussion

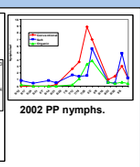
Pear psylla densities were lower in all three programs in 2003 and '04 relative to 2002. PP pressure was slightly higher in 2004 than in '03. PP densities tend to be in higher the ORG program than SOFT and CONV.

Predator densities increased in late-season in the ORG and SOFT programs, which followed increases in PP densities. Predator densities were higher in '04 than in '03, as were PP levels. Overall, the low levels suggest orchards managed for PP will never see large numbers of predators; low PP damage thresholds may restrict the prey base to levels too low to sustain substantial predator populations.

Pear Psylla Nymphs and Eggs

Spurs and leaves were examined for PP eggs and nymphs, Two-spotted spider mites, European red mites, Pear rust mites and Grape mealybugs.

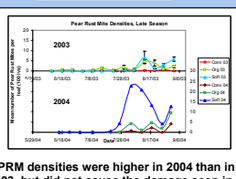




2002 PP nymphs.

***Nymphs*: Differences in PP nymph densities between programs were small and varied through the season. Both nymph and egg densities were lower in 2003 and '04 than in 2002.**

Mites and Other Pests



PRM densities were higher in 2004 than in '03, but did not cause the damage seen in ORG blocks in '03. Population increases began later in the season in '04, possibly reducing damage.

Pest Control Programs

Mean spray costs for insect control programs. Data from 2004 are preliminary, with not all orchards reporting.

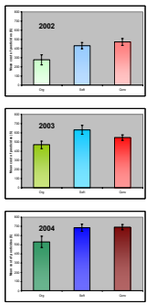


Table 1. Mean numbers of pesticide applications. Data from 2004 are preliminary, with not all orchards reporting.

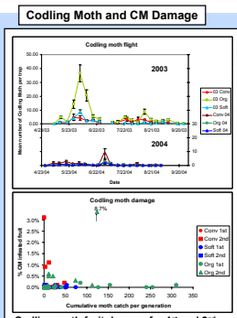
	2003 Conv	2003 Soft	2003 Org	2004 Conv	2004 Soft	2004 Org
Acramite	0.72	0.12			0.18	
Actara	0.30	0.13		0.66	0.17	
Agri-Mek	1.50	0.19		1.08	0.17	
Assail	0.96	0.38		0.85	0.15	
Avaunt	0.36	0.52				
Aza-Direct	0.35	3.54	1.67	1.11	4.81	3.20
Carzol	0.28	0.69		0.57	0.86	
Cyd-X			1.46		0.43	0.88
BT			0.78			0.86
Thiodan	0.61	0.51		0.57	0.11	
Entrust		0.04	1.74			2.59
Esteem	0.50	1.62		1.15	2.07	
Fujimite				0.34	0.15	
Guthion	0.47			1.31		
Imidan	0.39			0.43		
Intrepid	0.42	1.83		1.03	1.82	
Lorsban	0.52			0.43		
Oil	6.87	7.31	8.09	9.01	8.12	7.52
Provado	0.03					
Sulfur	0.13	0.31	2.48	0.57	1.42	3.3
Surround	2.78	1.71	1.90	3.43	1.98	1.72
Total apps per acre	18.05	19.30	18.94	22.55	22.45	20.07
Avg. trips per acre	8.16	8.73	8.79	9.07	8.24	9.21

Mean program costs have increased in each of the past two years, in all programs. Growers who use a SOFT program tend to spend slightly more on pest control than growers using ORG programs, although neither spend amounts significantly different from CONV programs.
In 2004, both the CONV and SOFT programs incorporated more organic tactics than 2003 (Aza-Direct, Cyd-X, Sulfur, Surround).

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.



Codling moth fruit damage for 1st and 2nd flights in 2003.

High trap catch during 1st generation in '03 inspired diligence in CM control programs, which resulted in a dramatic reduction in 2nd gen. populations. Very low flight in '04 is the result of excellent control in '03 and unusual spring weather.

Mean CM damage at harvest (1000 fruit)

	2003	2004
Conv	0.54%	0.01%
Org	0.73%	0.10%
Soft	0.01%	0.03%

Good control of CM also resulted in few damaged fruit in 2003. Two notable occurrences of damage are due to poor pheromone coverage (a CONV block treated with sprayable pheromone), and an inadequate control program (an ORG block where supplemental sprays of spinosad were not used).

Conclusion

Over a three 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 another 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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