

## Implementation Programs

### Five Year Summary of the W. Parker Heights CAMP Project

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The five-year (1995-1999) Codling moth (CM) Areawide (AW) Management Project in W. Parker Hts., Washington, was one of five pilot projects established in 1995. Acceptable codling moth control was achieved in all years of the project with the use of hand-applied mating disruption dispensers, and greatly reduced numbers of organophosphate (OP) pesticide applications compared to conventionally managed orchards (Conv) in the same region. Fruit damage from CM was generally 50 to 75% less in AW than in Conv orchards (never exceeding 1% in any year in either regime) until 1999 when damage levels were 0.8% in Conv (equaling highest previous level) and 0.7% in AW orchards (exceeding highest previous level by 300+%). Number of OP applications for CM control in Conv orchards averaged a steady 5.6 over the five year period. AW orchards reduced OP cover sprays from an average of 5.5 before the project began to 3.1 in the first year of the project and down to 0.2 in the final year (mean of 1.25 over the five years). Mean first generation pheromone trap captures followed the same trends in both programs. Average numbers of trapped male CM were at their highest levels in 1995 and 1998, at their lowest levels in 1997 and 1999 and at intermediate levels in 1996. Fruit damage levels also followed similar patterns in both programs, with the highest damage levels in 1999, a year of the lowest pressure based on conventional CM trap captures. CM flight patterns in AW orchards were delayed and of longer duration, particularly in the first generation.

Pandemis leafroller population levels in both programs, as measured by trapped males in pheromone traps, decreased in 1996 relative to 1995, and then increased each year to a seasonal mean of 700 (AW) to 900 (Conv) moths per trap. Mean numbers of trapped moths were higher in AW blocks in the first two years of the project. The trend was reversed and of higher magnitude in the final three years, with Conv blocks averaging about 200 more males per trap each year. Leafroller larval surveys indicated much higher in-orchard populations in AW blocks in 1995, 1996, and 1999, while Conv orchards had higher larval levels in 1998. Larval populations were lowest and at the same levels for both programs in 1997. Fruit damage levels correlated strongly with larval estimates, with AW orchards sustaining higher amounts of damage to fruit in 1995 and 1996. Conv orchards had higher levels of fruit damage from leafroller feeding in 1998 and 1999, while damage levels were at the lowest and about the same for both programs in 1997. Damage levels from leafroller, fruitworm and cutworm pests have varied over the duration of the project and could become an increasing problem. Basic biological knowledge leading to effective monitoring and control methods is still needed for these pests.

Among secondary pest populations, a few trends were evident. White apple leafhopper levels along with egg parasitism rates were consistently higher in AW orchards. Western

tentiform leafminer levels were significantly higher in Conv orchards, while parasitism rates were about the same. Apple rust mites and predatory mite species were more abundant in AW orchards (predatory mite levels were typically twice as high in AW blocks). European red, two-spot and McDaniel mite levels were up to 8 times higher in Conv orchards. There were no clear differences in aphid or insect predator populations between the two systems. The secondary pest "effects" in the AW project orchards, particularly aphid and leafhopper results, are perhaps less intense than predicted before the project began. This suggests some level of adaptation to OP use by the impacted pest and beneficial species. The mite and leafminer systems certainly appeared to benefit from the AW approach.

Pear psylla control was achieved adequately in both systems and Conv orchards typically had higher mean numbers of predators. However AW orchards used an average of one less pesticide application directed at psylla for the season, and both early and late season psylla populations were significantly lower (90% lower was not uncommon). When predator to psylla ratios were examined, we found that AW orchards repeatedly had much higher ratios at different periods of the season in all years. This along with possible adaptations by psylla to OP use could explain large postharvest psylla levels in Conv relative to AW orchards. The lack of immigration into the AW orchards clearly results in much lower spring populations; this can be attributed to the large and somewhat isolated area and temperatures below activity thresholds for psylla during much of the fall and winter. The uncharacteristically mild winter of 1998-1999 resulted in an increase in spring psylla populations in AW orchards. Peak spring psylla densities in AW blocks in 1999 averaged about 12 per tray compared to about 23 per tray for Conv blocks and an average of 1-3 per tray in AW blocks from 1996-1998.

European red mite levels in pear were much higher in Conv orchards in all years after 1995 and followed a similar pattern as pear psylla. Red mite levels in the pre-bloom period were consistently low in AW orchards, while late season flare-ups were common in Conv blocks.

Grape mealybug was first detected in pear in 1997 and apple in 1999. Levels increased in pear in 1998 and 1999, however numbers were not high enough to require treatment, except for one early season application in an AW block. Levels were higher in AW blocks and peaked in mid-August.

The W. Parker Hts. CAMP project was successful in limiting fruit damage from all insect pests to well below commercially acceptable levels. Organophosphate insecticide use against CM was reduced 75 to 95% and density of mating disruption dispensers to 200 per acre. Benefits were seen for secondary pest management in apple and particularly for pear psylla and European red mite in pear. By the third year of the project, the average cost of the pest management program in areawide project orchards was reduced compared to conventional apple and pear orchards.