Chemical Control/New Products

Effect of Insecticidal Oil on Codling Moth

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A highly refined insecticidal oil, Orchex 796, formulated by and obtained from Exxon, was evaluated for its ability to control CM in combination with pheromone mating disruption over the entire season. Oil at 1.5 gal per 100 gal water (1.5% concentration), for a total of 6 gal per acre, was applied six times during the summer. Three applications were directed at eggs (the target stage) of the first CM generation, and three applications were made to control the second generation. The initial application in each generation was timed using degree-day accumulations to coincide with the beginning of CM egg hatch. Subsequent applications were made every two weeks following the first. Pheromone application was a combination of 400 Isomate-C+ and 200 Isomate-C dispensers per acre over the entire test area. The test was conducted in an apple orchard at the Tree Fruit Research and Extension Center, Columbia View orchard. The trees were 15-year-old spur type Red Delicious on dwarfing roots. Treatments were applied to 1/4-acre plots replicated four times in a randomized complete block. All treatments were applied with a speed sprayer as a dilute spray of 400 gal per acre. An evaluation of CM damage was made on 7 Jul after the first generation by visually checking 50 apples from 10 trees in each replicate. At harvest, on 6 Sep, all fruit from four trees per replicate was examined for insect injury and sunburn damage. Fruit samples for quality analysis were collected on 13 Sep. Approximately 25 apples were selected from the west side of a tree and placed in a bag, from which a blind random sample of 10 apples was selected. Fruit from 10 trees from each replicate was sampled in this manner. From these samples, three 10-fruit subsamples were selected by picking blind one fruit from each bag three times. These 10-fruit samples were run through a series of fruit quality analyses. One yellow sticky trap was placed in each replicate for five days, and the number of WALH and *Anagrus* sp. was recorded.

Total CM injury was significantly less in the oil-treated blocks. Reduction in damage relative to the pheromone-only blocks was approximately 50% (Table 1). This level of control was consistent with results from an independent set of small plot trials conducted at a different location. The other insect that showed significantly less damage in the oil blocks was PLR. Damage in this case was reduced by 95%. There was no significant difference in fruit injury levels from either CAMP or LG (Table 2). There were significantly fewer WALH trapped in the oil-treated plots (Table 3). For this reason, a comparison of absolute *Anagrus* numbers would be irrelevant so a ratio of the number of *Anagrus*:WALH was calculated. The ratio of *Anagrus:*WALH was significantly higher in the pheromone-only plots, suggesting that the oil treatment may have had some effect on *Anagrus*. However, it is also possible that oil reduced WALH densities enough that *Anagrus* densities were limited by a lack of hosts. WALH damage on leaves in the oil plots was noticeably less than in the pheromone-only plots. Because WALH adults are highly mobile, they may have been preferentially collected on yellow sticky traps compared to *Anagrus.* Fruit in the oil plots did not have any more sunburn than fruit in the pheromone-only plot (Table 4). Fruit quality observations consistently showed apples from the oil-treated plots to be significantly redder, larger and, in general, more mature (Table 5) than those from the pheromone-only plots. Whether the early maturation of fruit is a disadvantage or advantage is yet to be determined and may vary by apple variety. There was no phytotoxicity observed on foliage or fruit although some summer applications were made on days when temperatures exceeded 100°F. Summer oil applications provided significant codling moth suppression, unexpectedly suppressed populations of other pests, and did affect the quality of fruit.

Table 1. Control of the codling moth with summer oil applications in pheromone-treated orchards, 1994.

	Average percent CM injury					
	1st generation			2nd generation		
Treatment	Stings	Entries	Total	Stings	Entries	Total
Pheromone + oil (Orchex 796)	0.0	0.5a	0.5a	0.1a	1.7a	1.8a
Pheromone	0.0	3.9a	3.9a	0.3a	3.2b	3.5b

Means in the same column followed by the same letter are not significantly different (Fisher's Protected LSD, P=0.05).

Table 2. Effects of summer oil applications on secondary pests, 1994.

	Average percent injury		
Treatment	LR	Camp	Lygus
Pheromone + oil (Orchex 796)	0.6a	0.2a	0.2a
Pheromone	10.8b	0.1a	0.3a

Means in the same column followed by the same letter are not significantly different (Fisher's Protected LSD, P=0.05).

Table 3. Effects of summer oil applications on secondary pests and parasitism, 1994.

	Average adults per trap		Ratio
Treatment	WALH	*Anagrus*	*Anagrus*:WALH
Pheromone + oil (Orchex 796)	275.8a	2.3a	0.014a
Pheromone	494.8b	20.0b	0.045b

Means in the same column followed by the same letter are not significantly different (Fisher's Protected LSD, P=0.05).

Table 4. Effects of summer oil applications on fruit quality, 1994.

Treatment	Average % sunburn
Pheromone + oil (Orchex 796)	0.9a
Pheromone	0.7a

Means in the same column followed by the same letter are not significantly different (Fisher's Protected LSD, P=0.05).

Table 5. Effects of summer oil applications on fruit firmness, internal quality and weight, 1994.

Treatment	Firmness (lbs)	Soluble solids	Titratable acids	Weight (g)	Starch
Oil	15.27a	11.85b	0.260b	224.4b	2.8b
No oil	16.66b	11.27a	0.248a	199.0a	2.3a

Means in the same column followed by the same letter are not significantly different (Fisher's Protected LSD, P=0.05).