

Pome Fruits—Implementation

Codling Moth in Pear

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Study site description. MD as a control for CM in pear was evaluated at eight study sites in the Wenatchee area. Test sites were comprised of one or two pheromone treated blocks and a conventionally treated block as a control. Fourteen pear blocks (45.9 acres) were treated with Isomate-C at a rate of either 400 d/a or 250 d/a. In addition, a single block was treated with three applications (160 d/a) of Checkmate-C.

Fruit damage. CM injury to fruit was evaluated prior to harvest. A total of 2000 fruit was non-destructively examined in each block. Each sample consisted of inspecting 10 fruit high in the canopy (above 7 feet) and 10 fruit low in the canopy (below 7 feet) from 100 trees. Control of CM in pheromone treated and insecticide treated blocks is summarized in Table 1. CM injury to fruit at harvest ranged from 0% to 3.6%. Low trap catches indicated that initial densities of CM within and adjacent to most orchards was low. At rates of 400 d/a or 250 d/a, suppression of CM with Isomate-C or Checkmate-C at all low pressure sites resulted in less than 0.1% injury to fruit and control generally equivalent to conventionally treated blocks. Levels of CM injury of 1.6% and 3.6% were recorded in pheromone treated blocks at two sites (W11, W16) with a history of moderate CM pressure. At the site with the highest level of injury (W16), a single treatment of organophosphate insecticides also did not provide adequate control of CM (1.7% injury).

Impact on non-target species. Densities of pear psylla (PP), grape mealybug (GMB), mites and their natural enemies were determined at each site. The densities of PP eggs and nymphs and GMB were determined at cluster bud, petal fall and twice during the summer. Six fruit clusters on each of 20 trees were sampled at cluster bud and petal fall. Thirty leaves (3/shoot/10 shoots) on each of 15 trees were sampled early in the summer, while five leaves on each of 40 trees (1 shoot/tree) were sampled later in the summer. The abundances of adult psylla and psylla predators were estimated by limb tapping. Single limbs on each of 25 trees were tapped in each block during each sample period.

In four of the pheromone mediated "soft" blocks substantial colonization by predators occurred early in the summer, and one or two supplemental treatments with soap and/or diatomaceous earth were sufficient for control of pear psylla (Table 2). The highest levels of predator activity were recorded in the Entiat Valley (W14, W15) and in a single site in Cashmere (W13). Pear blocks at these sites were adjacent to native vegetation, particularly woodlands, that appeared to be good sources of colonists. In contrast, colonization by predators appeared to be reduced at sites, such as W5, that were surrounded by conventionally treated apple and pear orchards. *Deraeocoris brevis*, *Campylomma verbasci* and *Chrysopa nigricornis* were the most abundant predators of pear psylla. Densities of other potential pests, including spider mites and

grape mealybug, were low in all but one of the MD soft blocks (data not shown).

Table 1. Capture of codling moth in pheromone and insecticide treated pear blocks and fruit injury at harvest in 1992.

Site	Block size (acres)	Treatment		Average trap catch (moth/trap) ²	Percent fruit injury ³		
		Dispenser	Rate (d/a) ¹		Interior	Border	Total
W3	4.0	Isomate-C	400	0	0	0	0
	3.8	Isomate-C	400	0.5	0	0	0
	4.0	Conventional		5.0	0	0	0
W5	2.5	Isomate-C	400	4.0	0	0	0
	2.5	Isomate-C	250 + 150	7.0	0	0	0
	1.8	Checkmate-C	160 x 3	2.0	0	0	0
	5.0	Conventional		0	0	0	0
W8	5.0	Isomate-C	400	0			0*
	8.0	Conventional		18.0	0	0	0
W11	2.0	Isomate-C	250 + 150	19.0	0.6	2.7	1.6
W13	2.3	Isomate-C	400	0	0	0	0
	4.0	Conventional		0	0	0	0
W14	3.5	Isomate-C	400	0.5			<0.1*
	3.5	Isomate-C	250	4			<0.1*
	10.0	Conventional		11	0	0	0
W15	3.8	Isomate-C	400	0	<0.1	<0.1	0.1
	4.0	Isomate-C	400	0.5	<0.1	0	<0.1
	8.0	Conventional		1.5	0.1	<0.1	0.1
W16	3.0	Isomate-C	400	2.0*	2.9	4.1	3.6
	10.0	Conventional		66.0	1.2	2.2	1.7

¹d/a=dispensers per acre, multiple applications indicated by an addition (+) or multiplication (x) symbol.

²Seasonal capture of moths in Pherocon 1CP traps baited with codlemone at a dosage of 10 mg (pheromone treated orchards) or 1 mg (non-pheromone treated orchards) and placed within the fruiting canopy of the tree, 1.5 to 2 m. Asterisks indicate that trap catches were recorded only during the first generation.

³Border consists of an area ca. 30 m wide around the perimeter of the orchard. Asterisks indicate that fruit injury was measured at the end of the first generation but not at harvest.

Table 2. Comparison of densities of pear psylla (PP) and its natural enemies (NE) in pheromone and conventionally treated blocks in 1992.

Site	Treatment	Average PP eggs and nymphs per 6 fruit clusters or per 30 leaves				Average PP predators per tray			
		Cluster bud	Petal fall	Early summer	Mid summer	Cluster bud	Petal fall	Early summer	Mid summer
W3	Pheromone		10.2	4.0	6.6	0	0.1	0.3	1.4
	Pheromone	5.4	3.6	27.1	30.0	0	0	0.3	1.2
	Conventional	15.6	0.6	2.2	7.2	0	0	0	0.1
W5	Pheromone	18.0	37.2	79.6	152.4	0.3	0.2	1.1	2.8
	Pheromone	75.0	44.4			0	0		
	Conventional	54.0	24.6	0	12.6	0	0	0	0
W8	Pheromone	8.4	1.8	2.1	2.4	0.1	0.1	1.9	2.9
	Conventional	19.2	0	3.1	3.6	0	0	0	0.3
W13	Pheromone	64.8	90.0	147.4	0	0	0.1	2.1	1.7
	Conventional	36.0	1.8	4.8	1.8	0	0	0.3	0.8
W14	Pheromone	16.8	6.0	15.6	4.8	0.3	0.1	1.3	3.8
	Conventional	21.6	0.6	0.7	12.0	0	0	0	0
W15	Pheromone	22.8	4.8	4.9	21.0	0.1	0.1	1.9	1.1
	Conventional	27.0	1.2	4.2	1.8	0.1	0.1	1.2	1.3
W16	Pheromone	ND	16.2	25.2	0	ND	0	1.3	3.2
	Conventional	ND	31.2	70.1	1.2	ND	0	1.1	1.1