

Chemical Control/New products

## COMPARISON OF APPLICATION METHODS FOR CONTROL OF INSECTS

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An experimental Prop-tec tower sprayer and an industry standard Rears Pak-blast airblast sprayer were compared in a replicated, small plot test against codling moth and larger unreplicated blocks against the lacanobia fruitworm. Furthermore, a field-aged residue comparison was made in which both sprayer technologies were compared at equivalent volumes of water (100 gal/acre) as well as comparing a 100 gal/acre and 30 gal/acre application with the Prop-tec. The field-aged residue test was done in cooperation with DuPont Chemical Co. The residue test included a leaf disk bioassay with pandemis leafroller and a whole apple bioassay with codling moth. Foliage and fruit samples were also removed from sample trees and sent to DuPont's chemical laboratory for residue analysis. This procedure provides important chemical deposition information as well as a measure of relative coverage of the sprayer technologies. At issue with all tests was whether or not the ultra-low volume technology utilized by the Prop-tec design would increase chemical deposition while ensuring satisfactory coverage to maintain insect control. To ensure validity of the test procedure, chemicals were selected that must be ingested to cause mortality. It is generally regarded that coverage is of most importance with stomach poisons. In all insect control tests the Prop-tec sprayer utilizing ultra-low volumes performed statistically equivalent to the standard airblast sprayer technology. Benefits of the Prop-tec technology should include more control of the spray "curtain" and better insecticide deposition on target foliage, thus reducing drift and waste. Furthermore, the economics of ultra low-volume spraying with the Prop-tec were obvious with regard to application time.

**Codling moth control:** The Prop-tec and Rears Pak-blast sprayers were compared using methoxyfenozide (Intrepid 2SC, Rohm and Haas) to control second generation codling moth (CM) larvae. The test was conducted in an apple orchard at the Tree Fruit Research and Extension Center Columbia View plots near Orondo, Washington. Plots were three rows wide and five trees long and consisted of different varieties in each block of trees. One Gala and one Delicious tree in each 5-tree sample area were stripped of all CM injured fruit from the previous generation. The two sprayers delivered Intrepid 2SC as follows: Pak-blast sprayer at 1.75 mph, hollow cone nozzles, 100 gpa; Prop-tec sprayer at 4 mph, low-volume rotary nozzles, 20 gpa. All treatments were sprayed 19 Jul (1250°D<sup>1</sup>) with two subsequent applications on a 14-day schedule (2 Aug and 19 Aug). CM injury was evaluated by examining 100 fruits per replicate (50 from each of the two sample trees) on 11 Sep and recording the number of CM stings and entries.

**Results:** Codling moth pressure was heavy in the plots with 60.7% of the apples in the untreated controls having either codling moth stings or entries at harvest. Both of the Intrepid 2SC treatments significantly reduced codling moth injury relative to an untreated control. There were no statistically significant differences between the treated plots. It should be noted that in both Intrepid 2SC treatments the number of codling moth stings, or shallow and possibly unsuccessful entries, was significantly higher than the untreated control.

Treatment	Rate (Product/acre)	Sprayer-gal/acre	Avg % CM inj - 11 Sep		
			Stings	Entries	Total
Intrepid	10 fl oz	Prop-tec 20 gpa	18.0 a	20.3 b	38.3 b
Intrepid	10 fl oz	Pak-blast 100 gpa	17.3 a	12.3 b	29.7 b
Untreated			7.0 b	53.7 a	60.7 a

<sup>1</sup>°D = accumulated degree-days after first moth capture in pheromone trap (biofix), calculated from daily maximum and minimum temperatures using the method described by Baskerville and Emin (Ecol. 50: 514-516, 1969).

<sup>2</sup>Means in the same column followed by the same letter are not significantly different (p=0.05, Student-Newman-Keuls).

### **Prop-tec vs. Pac-blast for lacanobia control**

The Prop-tec and Rears Pak-blast sprayers were compared using tebufenozide (Confirm 2F, Rohm and Haas) to control lacanobia larvae of the first generation. The Pak-blast sprayer driven at 1.75 mph used conventional airblast technology at 100 gpa and the Prop-tec sprayer driven at 4 mph used an ultra-low volume rate of 30 gpa. Lacanobia densities were moderate and fairly evenly distributed throughout the test orchard. Each of the Confirm 2F plots reduced lacanobia densities and resulting shoot infestation relative to the untreated control.

Treatment	Rate (form/acre)	Application	Post-treatment evaluation (SE)		
			28 Jun	2 Aug	
			larvae/tray	% Inf. shoots	% Fruit inj.
Confirm 2F	10 fl oz	Prop-tec 30 g	0.04 (0.04)	8.3 (0.7)	0.0 (0.0)
Confirm 2F	20 fl oz	Prop-tec 30 g	0.06 (0.02)	6.8 (2.6)	0.1 (0.1)
Confirm 2F	10 fl oz	Pak-blast 100 g	0.04 (0.04)	2.9 (0.5)	0.0 (0.0)
Confirm 2F	20 fl oz	Pak-blast 100 g	0.06 (0.02)	3.4 (0.2)	0.0 (0.0)
Untreated	none	none	0.32 (0.08)	21.5 (10.7)	0.0 (0.0)

Experimental design of large blocks divided in-half for sampling limited statistical analysis.

### **Prop-tec vs. Pak-blast for residue deposition and residual activity**

The Prop-tec and Rears Pak-blast sprayers were compared using indoxcarb (Avaunt 30WDG DuPont Chemical Co.) for relative spray deposition and coverage. The Pak-blast sprayer driven at 1.75 mph used conventional airblast technology at 100 gpa and the Prop-tec sprayer driven at 4 mph used a low volume rate of 100 gal/acre and an ultra-low volume rate of 30 gpa. Leaf-disk bioassays were used to evaluate residual activity of Avaunt against leafrollers and whole fruit bioassays were used to evaluate residual activity against codling moth larvae. Each treatment of Avaunt 30WDG caused a high level of mortality of pandemis leafroller with each application technology and at each sample location and date. There were no clear significant trends noted in the one factor analysis of the data. Further, a full-factorial analysis of sprayer effect, volume effect and location effect revealed no significant differences. Codling moth suppression was not as dramatic as leafroller. Statistically significant differences among treatments and sample locations at each sample date were evident; however, no clear trends were apparent. Laboratory analysis of residues may shed important information regarding deposition on apples versus foliage.