

SUMMARY OF ENTOMOLOGY TESTS USING A NEW ULV SPRAYER
TECHNOLOGY

Jay Brunner¹, Gary Van Ee² and Mike Doerr¹

¹ Washington State University
Tree Fruit Research and Extension Center
Wenatchee, WA

² Michigan State University
Department of Engineering
E. Lansing, MI

There are several ways to reduce pesticide use but one that has not been explored in any great detail in Washington is sprayer technology. Dr. Gary Van Ee of Michigan State University, a well know agricultural engineer, has spent a great deal of his career working on improving sprayer technology. While on sabbatical leave in Wenatchee, he examined the principles of sprayer technology as it relates to several different aspects of fruit production in the Pacific Northwest. Improved sprayer technology may provide opportunities to reduce pesticide application costs, reduce rates of some pesticides and improve performance of certain agricultural chemicals.

Scientists at WSU Tree Fruit Research and Extension Center tested two types of experimental sprayers over a variety of uses. Although different in design the Proptec and the Curtec sprayers delivered pesticides using very similar technology to produce uniform small droplets. The general experimental design was to compare the small droplet-tower sprayers delivering pesticide at 30 gals/acre (10X concentrate) while traveling at 4 mph with a conventional sprayer delivering a full dilute spray of 300 gal/acre traveling 1.5 mph. Tests included a dormant oil spray against San Jose Scale, field-aged residue tests against leafroller (results in table 1 and 2 below), and plant growth regulator activity on apple. Table 1 shows very little difference between the two sprayers. The chemicals tested have three very different modes of action, but all three must be ingested to be effective. Success 2 SC (spinosad) acts on the neuromuscular junction, Dipel WDG (*Bacillus thuringiensis kurstaki*) is a stomach poison and Confirm 2 F (tebufenozide) is an insect growth regulator. Coverage is critical to the effective application of these insecticides. Table 2 estimates the relative proportion of active ingredient deposited on test trees by the two competing sprayer technologies. The sprayers were loaded with a copper fungicide and both sprayers were calibrated to deliver the same quantity of material. Targets were placed at various locations in a series of trees. After application the targets were removed from the trees and the copper residue was washed from the targets. Analysis of the rinsade generated these data. The conventional sprayer deposited about 70% as much copper as the Curtec. The two

sprayers deposited similar amounts of product in the lower and middle portion of the tree with the Curtec sprayer depositing significantly more high in the tree.

Table 1. Test of application strategy and concentration on field-aged residues against obliquebanded leafroller neonates, 1999.

Treatment	Rate/100 gal 28DAT	Applicator ²	Avg. corr. % mortality ²			
			1 DAT	7 DAT	14 DAT	
Success 2 SC	6 fl oz	Rears	100.0c	100.0d	96.7d	89.7c
Success 2 SC	60 fl oz	Curtec	100.0c	100.0d	95.8d	81.0c
Dipel WDG	2 lbs	Rears	99.0c	82.2c	56.8c	24.6b
Dipel WDG	20 lbs	Curtec	90.3b	68.6b	44.2b	24.0b
Confirm 2 F ¹	18 fl oz	Rears	98.1c	98.1d	93.9d	90.2c
Confirm 2 F ¹	180 fl oz	Curtec	97.1c	98.1d	98.1d	90.8c

Means in the same column followed by the same letter not significantly different (Fisher's Protected LSD, $p=0.05$). Any mean followed by the letter 'a' not significantly different from the untreated control.

¹ Latron B-1956 was added to both Confirm 2 F treatments at a rate of 8 fl oz/100 gal.

² Rears applicator- Rears Pack-Blast PTO airblast sprayer applying product at 300 gal/acre as a dilute spray (tractor traveling 1.5 mph). Curtec applicator- Applying product at 30 gal/acre as a 10X concentrate spray (tractor traveling 4 mph).

Table 2. Test of application strategy on theoretical deposition of active ingredient as measured with copper, 1999.

Height	Locale	Relative measure of Cu (ppm)	
		Rears	Curtec
High	East	0.70	1.47
	Middle	0.41	1.34
	West	<u>0.94</u>	<u>1.50</u>
Average of High sites		0.68a	1.44b
Middle	East	0.76	0.96
	Middle	0.54	0.71
	West	<u>0.70</u>	<u>0.58</u>
Average of Middle sites		0.66a	0.75a
Low	East	0.68	0.91
	Middle	0.71	1.06
	West	<u>0.79</u>	<u>0.53</u>
Average of Low sites		0.73a	0.83a
Average of each test site		0.69a	1.01b

Means in the same ROW followed by the same letter not significantly different (paired t-test, $p=0.05$).