II. Pome Fruits

d. Chemical control

1. White apple leafhopper on apple

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A series of related studies on efficacy and timing of pesticides for white apple leafhopper (WALH) were performed in 1987. The effort described here is a component of an IPM program being developed for leafhoppers in Washington.

The experimental design for the efficacy and timing trials was a randomized complete block with single-tree plots replicated 4 times. Trees were sprayed to the point of drip with a handgun. WALH were sampled by counting the number of nymphs on 20 injured leaves/tree. Results for the efficacy trials are given as % reduction from a pretreatment count to a count made at 3 days (1st generation) and 5 days (2nd generation) after treatment. Results for the timing trials are given as Cumulative Leafhopper Days (CLD's) for the damage incurred by one nymphal generation:

$$CLD = (((npl_{t1}+npl_{t2})/2)*ndays)$$

where nlp_{t1} and npl_{t2} are nymphs/leaf at any two sampling dates, and ndays is the number of intervening days. This method allowed us to simultaneously evaluate the effects of mortality from the spray, residual life of the material, and the damage that was done before the spray went on. Timing studies used endosulfan 1.5 lb (AI)/acre except the split application in the second generation, which used 1.0 lb (AI)/acre.

PESTICIDE EFFICACY: Carbaryl was a very effective material against leafhoppers at rates as low as 0.25 lb (AI)/acre for both generations. Endosulfan was effective at rates as low as 0.75 lb (AI)/acre. Formetanate hydrochloride was effective at the rates tested for the first generation, but a rate higher than 0.92 lb (AI)/acre would be necessary for the second generation. Phosphamidon was effective at the lowest rate tested (0.5 lb (AI)/acre) against the first generation, but was inadequate at the highest rate tested (1 lb (AI)/acre) agianst the second generation (Table 1).

PESTICIDE TIMING: The best timing for the first generation WALH was at petal fall (1 May). The later timings had progressively more damage The best timing for second generation was a split application (28 July and 11 August). There were no significant differences among the single-application treatments, although CLD's for the 4 and 11 August timings were numerically lower (Table 2). Overall, the first generation is easier to control, and can be covered adquately by a single spray. The protracted hatch period of the second generation makes it difficult to control in terms of the total amount of damage. However, if reducing the number of adult WALH in the orchard at harvest is the primary goal, a single application in mid- to late August (before substantial adult emergence) would be adequate.

Table 1. Pesticide efficacy for first and second generation WALH nymphs, Wenatchee, Washington, 1987.

First Generation WALH Control				Second Generation WALH Control			
Treatment & lb (AI)/acre		Timing	% reduct.	Treatment & lb (AI)/acre		Timing	% reduct.
Sevin XLR Plus 4F	0.25	S	100	Sevin XLR Plus 4F	0.25	S	97
Sevin XLR Plus 4F	0.50	S	100	Sevin XLR Plus 4F	0.50	S	99
Sevin XLR Plus 4F	1.00	S	100	Sevin XLR Plus 4F	1.00	S	99
Thiodan 50WP	0.75	S	100	Thiodan 50WP	0.75	S	95
Thiodan 50WP	1.00	S	100	Thiodan 50WP	1.00	S	96
Thiodan 50WP	1.50	S	100	Thiodan 50WP	1.50	S	98
Phosphamidon 8EC	0.50	S	97	Phosphamidon 8EC	0.50	S	30
Phosphamidon 8EC	0.75	S	99	Phosphamidon 8EC	0.75	S	63
Phosphamidon 8EC	1.00	S	100	Phosphamidon 8EC	1.00	S	71
Imidan 50WP	3.00	S	8	Carzol 92SP	0.46	S	76
Zolone 25WP	1.50	S	63	Carzol 92SP	0.92	S	89
Dimethoate 2EC	1.00	S	78	UC-84572 2.1EC+PA-10	0.20	E	32
Carzol 92SP	0.92	S	100	UC-84572 2.1EC+PA-10	0.20	S	85
Carzol 92SP	0.46	S	98	DPX-EY059 50 g/L EC	0.05	E	40
Dimilin 25WP	0.25	E	-76	DPX-EY059 50 g/L EC	0.05	S	66
UC-84572 2.1EC	0.20	S	91	Control	--	-	1
UC-84572 2.1EC	0.20	E	90				
Insegar 25WP	0.13	S	2				
Insegar 25WP	0.13	E	-125				
DPX-EY059 50g/LEC	0.05	S	77				
DPX-EY059 50g/LEC	0.05	E	95				
Control	--	-	-8				

Table 2. Pesticide timing for first and second generation WALH nymphs, Wenatchee, Washington, 1987.

First Generation WALH Timing				Second Generation WALH Timing			
Treatment	lb (AI) per acre	Date Applied	CLD/leaf 5 Jun[z]	Treatment	lb (AI) per acre	Date Applied	CLD/leaf 8 Sep[z]
Thiodan 50WP	1.5	1 May	11.18 d	Thiodan 50WP	1.5	28 Jul	54.57 b
Thiodan 50WP	1.5	8 May	34.66 c	Thiodan 50WP	1.5	04 Aug	40.76 b
Thiodan 50WP	1.5	15 May	61.48 b	Thiodan 50WP	1.5	11 Aug	44.11 b
Thiodan 50WP	1.5	22 May	63.98 b	Thiodan 50WP	1.5	18 Aug	62.41 b
Control	--	--	113.98 a	Thiodan 50WP + Thiodan 50WP	1.0 + 1.0	28 Jul + 11 Aug	14.02 c
				Control	--	--	104.87 a

[z]Means within columns not followed by the same letter are significantly different (Waller-Duncan k-ratio t-test, k-ratio=100).