

EVALUATION OF INSECTICIDES FOR WALNUT HUSK FLY MANAGEMENT – 2013

William W. Coates, Robert A. Van Steenwyk, and Caroline R. Wise

ABSTRACT

Leverage 360, CHA-062 (high rate), Malathion 57%, IKI-3106, Calypso, Athena followed by Brigadier, Brigadier followed by Brigade, Stallion followed by Brigadier, Belay, Danitol, and Assail all provided acceptable control of walnut husk fly (WHF) when applied at 3 week intervals (4 total sprays) by handgun with a finished spray volume of 300 gallons per acre. Of these, Leverage 360, IKI-3106 (high rate), Calypso and Stallion followed by Brigadier provided excellent control with WHF damage of 1.2 percent or less when the treated check had 22.4% damage. The worst performance was provided by the three rates of CHA-062, a new low-VOC formulation of Malathion that does not appear to perform as well as the conventional Malathion 57%.

OBJECTIVES

The objective of this project is to continue testing new products or combinations of older products for WHF management in comparison to existing standard insecticides. This may provide more efficacious products as well as provide alternatives to existing products if pesticide registrations are lost or products discontinued.

SIGNIFICANT FINDINGS

- All experimental treatments provided acceptable to excellent control of WHF with the exception of the low and middle rates of CHA-062. Superior control was provided by Leverage 360, IKI-3106 (high rate), Calypso and Stallion followed by Brigadier.
- CHA-062, a new low-VOC formulation of malathion does not appear to be a good material for WHF control.
- Walnut growers will be able to control WHF even with the eventual loss of some older control materials.

PROCEDURES

This project was conducted in a ‘Hartley’ orchard just south of Hollister, CA with a known history of severe WHF damage. Two Trécé AM/NB traps baited with ammonium carbonate in a UC-supercharged lure were monitored from May 23 until after commercial harvest. The ammonium carbonate was replaced weekly and traps were replaced as needed.

Treatments were applied three days after the first substantial fly captures on June 17 and at about three week intervals (7/8, 7/31, 8/23) for the rest of the season for a total of 4 applications. Foliar sprays were applied with a hand-gun orchard sprayer operating at 250 psi with a finished spray volume of approximately 300 gallons per acre. There were four single-tree replicates per treatment in a randomized complete block design.

Materials applied consisted of Leverage 360 (imidacloprid + β -cyfluthrin), CHA-062 (low VOC malathion), IKI-3106 (cyclaniliprole), Calypso (thiacloprid), Athena (bifenthrin + avermectin B1) followed by Brigadier (bifenthrin + imidacloprid), Brigadier (bifenthrin + imidacloprid) followed by Brigade (bifenthrin), Stallion (zeta-cypermethrin + chlorpyrifos) followed by Brigadier (bifenthrin + imidacloprid), Belay (clothianidin), Danitol (fenpropathrin) and Assail (acetamiprid) (Table 1). CHA-062 and IKI-3106 are not currently registered for use on walnuts. All materials were combined with NuLure and Athena followed by Brigadier, Brigadier followed by Brigade, Stallion followed by Brigadier, Belay, Danitol, and Assail had added Dyne-Amic. Belay and Danitol also had added Latron B-1956. The treated check was sprayed with NuLure and Dyne-Amic.

Malathion, CHA-062 and chlorpyrifos are organophosphate insecticides; imidacloprid, thiacloprid, clothianidin and acetamiprid are neonicotinoid insecticides; β -cyfluthrin, bifenthrin, zeta-cypermethrin and fenpropathrin are pyrethroid insecticides, cyclaniliprole is a diamide insecticide and avermectin B1 is a bacterial fermentation product.

WHF damage was evaluated by visual examination of 125 nuts per replicate on the tree on September 24 just prior to commercial harvest. All of the nuts that were found to be infested were removed from the tree and dissected to determine larval instar.

RESULTS

WHF adults were caught in traps throughout the trapping season but were at a very low level prior to June 14 and from October 4 onwards (Figure 1). A relatively high WHF population was present from late June until mid-September.

The infestation of walnuts by WHF was very low in all treated trees, despite the relatively high WHF population (Table 2). There was no significant difference between any experimental treatment and the treated check in 2nd and 3rd instar larvae and total infestation from these instars was less than 1%. All experimental materials had significantly lower mean percent-emerged larvae as compared to the treated check. Leverage 360, the high rate of IKI-3106, Calypso and Stallion followed by Brigadier had significantly lower mean percent emerged-larvae than the middle rate of CHA-062, but were not significantly different than any other treatments. All experimental materials had significantly lower mean total percent infestation as compared to the treated check. Leverage 360 had significantly lower mean total percent infestation than the low and middle rates of CHA-062 and the treated check. IKI-3106 (high), Stallion followed by Brigadier and Calypso all had significantly lower mean percent total infestation than the middle rate of CHA-062 and the treated check. The high percentage of emerged larvae as a component of total WHF damage indicates most damage occurred in mid-season, typical of the ‘Hartley’ variety.

DISCUSSION

All experimental treatments had significantly lower infestation than the treated check and all treatments were similar to Assail – the grower standard. Leverage 360, the high rate of IKI-3106, and Stallion followed Brigadier all had less than 1% infested nuts while the low and middle rates of CHA-036 had 6.4% and 7.4% infested nuts respectively. The rate response from CHA-062 was weak. The high rate did have a lower percent mean total infestation (4.8%) than the low or middle rates. CHA-062 is an 8EC formulation of malathion while Malathion 57% is a 5EC formulation. The active ingredient of Malathion 57% in 45 fl oz per acre is 1.75 lb malathion while the active ingredient in 40 fl oz of CHA-062 is 2.5 lb malathion but the Malathion 57% out-performed the CHA-062. Thus, it appears the CHA-062 formulation of malathion is not suitable for WHF control. The rate response from IKI-3106 was strong. The low rate of IKI-3106 provided good control of WHF while the high rate provided superior control and was one of the best materials evaluated.

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Table 1. WHF Treatments and Number of Applications, Hollister, CA 2013

Treatment	Rate: formulation/acre	Number of Applications
Leverage 360 ^a	2.8 fl oz	4
CHA-062 8EC ^a	20.0 fl. oz	4
CHA-062 8EC ^a	40.0 fl. oz	4
CHA-062 8EC ^a	80.0 fl. oz	4
Malathion 57% ^a	45.0 fl. oz	4
IKI-3106 0.47SL ^a	11.0 fl. oz	4
IKI-3106 0.47SL ^a	16.4 fl. oz	4
Calypso 4F ^a	8.0 fl. oz	4
Athena ^{a b}	20.0 fl. oz	2
Brigadier ^{a b}	12.8 fl. oz	2
Brigadier ^{a b}	12.8 fl. oz	2
Brigade WSB ^{a b}	16.0 oz	2
Stallion ^{a b}	11.8 fl. oz	2
Brigadier ^{a b}	12.8 fl. oz	2
Belay 2.13 SC ^{a b c}	6.0 fl. oz	4
Danitol 2.4 EC ^{a b c}	21.3 fl. oz	4
Grower standard (Assail 30SG ^{a b})	4.0 oz	4
<u>Treated check^{a b}</u>		

^a NuLure was applied at 48 oz/100 gal.

^b Dyne-Amic 0.0625% v/v

^c Latron B-1956 0.125% v/v

Table 2. Mean percent and larval instar of WHF infestation in Hollister, CA – 2013

Treatment	Rate form/ac	Mean ^a percent infestation			
		2 nd instar larvae	3 rd instar larvae	Emerged larvae	Total infestation
Leverage 360	2.8 fl. oz	0.0 b	0.0 a	0.2 c	0.2 d
CHA-062 8EC	20.0 fl. oz	0.0 b	0.8 a	5.6 bc	6.4 bc
CHA-062 8EC	40.0 fl. oz	0.0 b	0.8 a	6.6 b	7.4 b
CHA-062 8EC	80.0 fl. oz	0.0 b	0.0 a	4.8 bc	4.8 bcd
Malathion 57 %	45.0 fl. oz	0.0 b	0.8 a	2.4 bc	3.2 bcd
IKI-3106 0.47SL	11.0 fl. oz	0.4 a	0.4 a	3.0 bc	3.8 bcd
IKI-3106 0.47SL	16.4 fl. oz	0.0 b	0.0 a	0.4 c	0.4 cd
Calypso 4F	8.0 fl. oz	0.2 ab	0.0 a	1.0 c	1.2 cd
Athena-Brigadier	20.0 fl. oz-12.8 fl. oz	0.0 b	0.0 a	1.8 bc	1.8 bcd
Brigadier-Brigade WSB	12.8 fl. oz-16.0 oz	0.0 b	0.4 a	1.4 bc	1.8 bcd
Stallion-Brigadier	11.8 fl. oz-12.8 fl. oz	0.0 b	0.0 a	0.8 c	0.8 cd
Belay 2.13 SC	6.0 fl. oz	0.0 b	0.0 a	2.0 bc	2.0 bcd
Danitol 2.4 EC	21.3 fl. oz	0.0 b	0.0 a	2.8 bc	2.8 bcd
Assail 30SG	4.0 oz	0.0 b	0.4 a	1.8 bc	2.2 bcd
Treated check	-----	0.2 ab	0.6 a	21.6 a	22.4 a

^aMeans followed by the same letter within a column are not significantly different (Fisher's LSD $P \leq 0.05$)

Figure 1: WHF Trap Catches Hollister, CA 2013

