Efficacy of Pyrethroid Products, Rates, and Formulations on Control of Adult Japanese Beetle Feeding

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Nature of Work: The objective of this study was to evaluate the efficacy of selected pyrethroid products, rates, and formulations on the control of adult Japanese beetle feeding. Two taxa of highly preferred host trees, 'Red Splendor' crabapple (Malus 'Red Splendor') and 'Okame' cherry (Prunus x 'Okame'), were used in the study (Ranney and Walgenbach, 1992). Crabapple trees were approximately 2' in crown diameter, 6.5' high, and spaced 5.5' apart in rows. Cherries were approximately 18" in crown diameter, 30" tall, and spaced 4' apart in rows. Plots with 'Red Splendor' crabapple and 'Okame 'cherry were separate and considered separate experiments. Each experiment was arranged as a randomized complete block design with 5 individual tree replicates. Treatments were applied on the morning of July 7, 1995 at 9-10:30 AM. Weather was partly cloudy, 75°F, with wind of 0-5 MPH. Formulations were 1) Tame 2.4 EC (0.84ml/l; 0.64 tsp/gal), 2) Tame 2.4 EC (1.25 ml/l; 0.95 tsp/gal), 3) Tame 2.4 EC (0.84 ml/l; 0.64 tsp/gal) and Orthene TTO (0.8 g/l; 0.11 ounces/gal), 4) Deltamethrin DTM 5SC (0.30 ml/l; 0.23 tsp/gal), 5) Saga TLM 40 WP (0.04 g/l; 0.005 ounces/gal), 6) Deltamethrin DMT 0.05D (2.4 g/sq. m; 0.07 oz./sq. yd.), 7) Tempo2 24.3% EC (0.12 ml/ l; 0.09 tsp/gal), and 8) Contro - H_2O. Each crabapple tree received approximately 0.2 L (0.05 gal) per tree and each cherry tree receive approximately 0.15 L (0.04 gal) per tree. Liquid formulations were applied with a Solo backpack sprayer. Deltamethrin dust was applied with a Chapin Duster. Visual ratings of percent defoliation (skeletonization) were conducted each week for 4 weeks following treatment. Any defoliation observed on the date of treatment was subtracted from subsequent determinations. Adult Japanese beetles began emerging the last week of June with the highest populations observed in the 2nd and 3rd weeks of July. Few adult beetles remained after July. In general, the population of adult Japanese was considerably less than for other years. For example, in nearby test plots, defoliation by Japanese beetles was approximately 35% for untreated 'Red Splendor' crabapples this year while defoliation has been as high as 83% in prior years.

Results and Discussion: 'Red Splendor'Crabapples. At 7 days after treatment, all products, with the exception of DTM dust significantly reduced feeding injury compared to the control (Table 1). On subsequent dates, feeding injury on plants treated with the low rate of Tame increased and was no longer significantly different from the untreated plants, suggesting that this rate may be inadequate for longer term control. At 28 days after treatment, feeding damage on untreated 'Red Splendor' crabapples resulted in 28% defoliation. At this time, all treatments, with the exception of DTM dust and low rate of Tame, were still effective in reducing injury compared to the control. Plants treated with the high rate of Tame, Tame + Orthene, Tempo2, Saga, and DTM, were not significantly different on any of the dates. Dead beetles were not observed on or near any of the trees. There were no symptoms of phytotoxicity on any of the plants.

'Okame' Cherries. Feeding intensity on these plants was low in our study. Defoliation of control plants was only 5% at 28 days after treatment (Table 2). There were no significant differences between the control and any of the treatments nor was there any significant differences among the treatments. The presence of what appeared to be a more preferred host plant ('Red Splendor' Crabapple) in an adjacent plot, may have reduced feeding pressure on these plants. There were no signs of phytotoxicity on any of the plants.

Significance to Industry: Under the moderate insect pressure experienced in this study, a number of pyrethroid based products provided single application control (deterrency) for adult Japanese beetles. For a highly polyphagous pest like Japanese beetle, application of an apparent antifeedant, such as these pyrethroids, may to be an effective method for deterring pests from susceptible crops. Tame 2.4 EC (1.25 ml/l; 0.95 tsp/gal), Tame 2.4 EC (0.84 ml/l; 0.64 tsp/gal) combined with Orthene TTO 75 SP (0.8 g/l; 0.11 ounces/gal), Tempo2 (0.12 ml/l; 0.09 tsp/gal), Saga 40 WP (0.04 g/l; 0.005 ounces/gal), and Deltamethrin 5SC (0.30 ml/l; 0.23 tsp/gal) were effective, but not significantly different, in reducing defoliation by adult Japanese beetles.

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Literature Cited

1. Ranney, T.G. and J.F. Walgenbach. 1992. Feeding preference of Japanese beetles for taxa of birch, cherry, and crabapple. J. Environ. Hort. 10(3):177-180.

Table 1. Percent defoliation (skeletonization) of foliage of 'Red Splendor' crabapple treated with different insecticides

		Days after Treatment			
Product	Rate of Product	7	14	21	28
Tame	4.73ml/gal	0.4 *[z]	0.5 *	2.3 *	
Tame	3.16ml/gal	0.5 *	1.4 *	2.1 *	2.9 *
+ Orthene	3.04g/gal				
Tempo2	0.45ml/gal	0.8 *	1.6 *	3.3 *	3.1 *
Saga-TLM	0.15g/gal	1.4 *	2.7 *	4.3 *	9.8 *
DTM	1.15ml/gal	3.6 *	6.5	7.1	9.8 *
Tame	3.16ml/gal	2.0 *	5.7	7.1	12.7
DTM Dust	2.4g/sq.m	19.0	24.0	24.0	27.0
Control	-	16.7	19.9	22.4	28.1
$LSD_{0.05}$		11.9	14.8	15.9	16.2

All values are corrected for any initial defoliation at the time of application.
*Indicates value is significantly different from the control, P=0.05.
$LSD_{0.05}$ apply to means within a given column.

Table 2. Percent defoliation (skeletonization) of foliage of 'Okame' cherry treated with different insecticides.

		Days after Treatment			
Product	Rate of Product	7	14	21	28
Tame	4.73ml/gal	0.5[z]	1.0	1.6	1.6
Tame	3.16ml/gal	0.5	0.5	0.5	2.1
+ Orthene	3.04g/gal				
Tempo2	0.45ml/gal	1.0	1.0	2.9	3.4-
Saga-TLM	0.15g/gal	0.0	0.0	1.5	3.8
DTM	1.15gl/gal	0.0	0.0	0.5	1.0
Tame	3.16ml/gal	0.5	0.5	1.0	2.0
DTM Dust	2.4g/sq.m	0.5	1.9	5.6	8.8
Control	-	0.5	0.5	4.6	5.4
$LSD_{0.05}$		1.1	2.1	4.4	5.4

[z] All values are corrected for any initial defoliation at the time of application.

Soil and Foliar Applied Insecticides for the Control of *Proteoteras aesculana* Riley (Lepidoptera: Tortricidae) in Red Maple

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Nature of Work: A shoot boring, caterpillar, *Proteoteras aesculana* Riley, attacks the buds and shoots of red maple. If the terminal bud is destroyed an undesirable forked double leader is produced. Past studies were conducted to determine the proper timing of chemical pest control and the most efficacious insecticides (1,2). A test was designed to further delineate efficacy and timing using soil applied systemic insecticides and foliar applied insecticides (both systemic and not systemic).

A block of seedling red maple at Wanamaker Nursery in Warren County, Tennessee was selected for the test. The distance between rows was five feet. The trees had an average height of approximately five feet and this was the second growing season in the field. The systemic insecticides Di-Syston 15G (5 lb/1000 linear feet) and Pinpoint 15G (13.2 lb/acre) were applied on April 15 and April 17, 1996, respectively. The tree phenology on April 15 for 67.7 percent of the trees ranged from tight bud to half inch green while 32.3 percent ranged from 3/4 inch green to three pair of leaves. Foliar insecticide applications were made on April 24. Tree phenology on April 24 for 9.5 percent of the trees ranged from half inch green to one pair of leaves, 61.9 percent had two pair of leaves and 28.6 percent had three pair of leaves. The insecticides applied as foliar sprays were Orthene Turf, Tree and Ornamental {Orthene T, T & O} 75 SP (0.67 lb/100 gal) plus Tame 2.4 EC Spray (10.67 fl oz/100 gal), Orthene T, T & O 75 SP (1 lb/100 gal), Orthene T, T & O 75 SP (1.33 lb/100 gal), Tame 2.4 EC Spray (10.67 fl oz/100 gal) as a follow-up spray to trees treated on April 17 with Pinpoint 15 G, Talstar T & O 10 WP (0.96 oz/10 gal), and Talstar T & O 10 WP (0.96 oz/10 gal) as a follow-up spray to trees treated on April 15 with Di-Syston 15 G. The foliar sprays were applied at a 25 gal/acre rate using a CO_2 compression sprayer operating at 40 psi, equiped with two TXVS-18 hollow cone nozzles. The treatments of 35 feet of row were replicated four times. There was an average of 16.6 trees per treatment. On May 3, a complete tree inspection for borer damaged shoots was made on all the trees in each treatment. The number of damaged shoots was recorded for each tree inspected.