Project Number: 95-PTB

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FINAL REPORT

PEACH TWIG BORER CONTROL IN ALMONDS BY BLOOM-TIME SPRAYS OF CRYOLITE VS BACILLUS THURINGIENSIS

Richard L. Coviello, Farm Advisor
Univ. of California Cooperative Extension, Fresno County

INTRODUCTION

Peach twig borer (PTB) causes significant losses to the almond industry every year through yield losses and quality reduction. It is usually controlled by the use of dormant sprays and in-season treatments of organophosphate insecticides. In-season treatments are disruptive, often causing outbreaks of spider mites. Dormant sprays are under scrutiny as potential causes of aerial contamination and as a possible hazard to certain avian species. Dormant sprays may, therefore, be curtailed or severely restricted in the future, reducing the available PTB management tools.

An alternative to dormant sprays for PTB control was developed using Bacillus thuringiensis (B. t.) insecticides applied during the bloom period. This application controlled overwintering larvae emerging from their hibernaculae to feed on the developing shoots. Cryolite insecticide is a non-disruptive stomach poison, like B. t., which has often given superior control of insects when compared with B. t. In a trial conducted by the P. I. in 1993, two bloom sprays of cryolite gave numerically better control of PTB than two bloom sprays of B. t. (unpublished data). The objective of this trial is to evaluate cryolite more fully as a control of PTB compared to B. t. insecticides.

METHODS AND MATERIALS

Cryolite is not registered on and does not have a residue tolerance established for almonds. Therefore, the experiment was conducted in a second-leaf non-bearing orchard. The varieties were Nonpariel, Sonora and Carmel planted NP : S : NP : C. Plots were four rows by seven trees comprising approximately 0.32 acres and replicated four times. All trees in each plot received the treatments. The two inside rows of each plot were Nonpareils and Sonoras. The center five trees of each of the two middle rows were sampled in each plot. Treatments are shown in Table 1. Treatments were applied with a PTO operated air blast sprayer at a spray rate of 60 gallons per acre.

Treatments were timed to PTB emergence from their hibernaculae with applications being made at approximately 20%-40% emergence and a second treatment at 80% to 100% emergence. These timings normally correspond to the tree phenological events of early bloom and petal fall. Cold rainy weather this spring resulted in an unusually late emergence compared to the tree phenology. The first treatment occurred during full bloom and the second occurred at the end of petal fall. Efficacy was evaluated by counting twig strikes from the overwintering brood on five Nonpariel and five Sonora trees per plot. Twig strike counts were made on 13 April before damage from the first seasonal brood should have become evident. It was assumed that all noticeable strikes would have been caused by larvae from the overwintering brood. The same trees were banded around the trunk with corrugated cardboard to trap pupating larvae. Cardboard bands were installed on 4 April.

Treatments were selected to test the cryolite formulations at economically competitive rates to the registered B.t. products. Previous studies (unpublished data) showed that two applications of cryolite were better than a single application at twice the rate applied at early bloom. We wished to determine if the efficacy of a single application could be increased if it were delayed

to petal fall. Dipel ES-NT is a modified formulation of the currently registered Dipel ES and was included for comparison.

RESULTS AND DISCUSSION

Results of strike counts are shown in Table 2 and Figure 1. Treatment 3, the Kryocide at 1 x 10 lbs./A, was not applied due to weather conditions which developed on the day of applications. These plots were used as a second untreated check. The combined average for untreated trees was 11.7 strikes per tree overall, 10.2 on the Nonpareils and 13.5 on the Sonoras.

Both cryolite products and the B.t. products significantly reduced twig strikes below the untreated checks. The B.t. products were significantly better than the cryolite products reducing twig strikes approximately 54% to 72% below the check. There was no difference between applying cryolite once or twice during bloom reducing strikes by approximately 27% below the check. Dipel ES-NT was significantly less effective than Dipel ES on the Sonora variety and the combined average giving about half the control of Dipel ES.

The cardboard bands were installed too late to trap much of the pupating larvae. First PTB pheromone trap catches in the area were approximately 1 April which was before the bands were installed. As a result, pupal counts in the bands were very low (ca. 1 / tree) and there were no differences between treatments.

Table 1. Treatments and application dates.

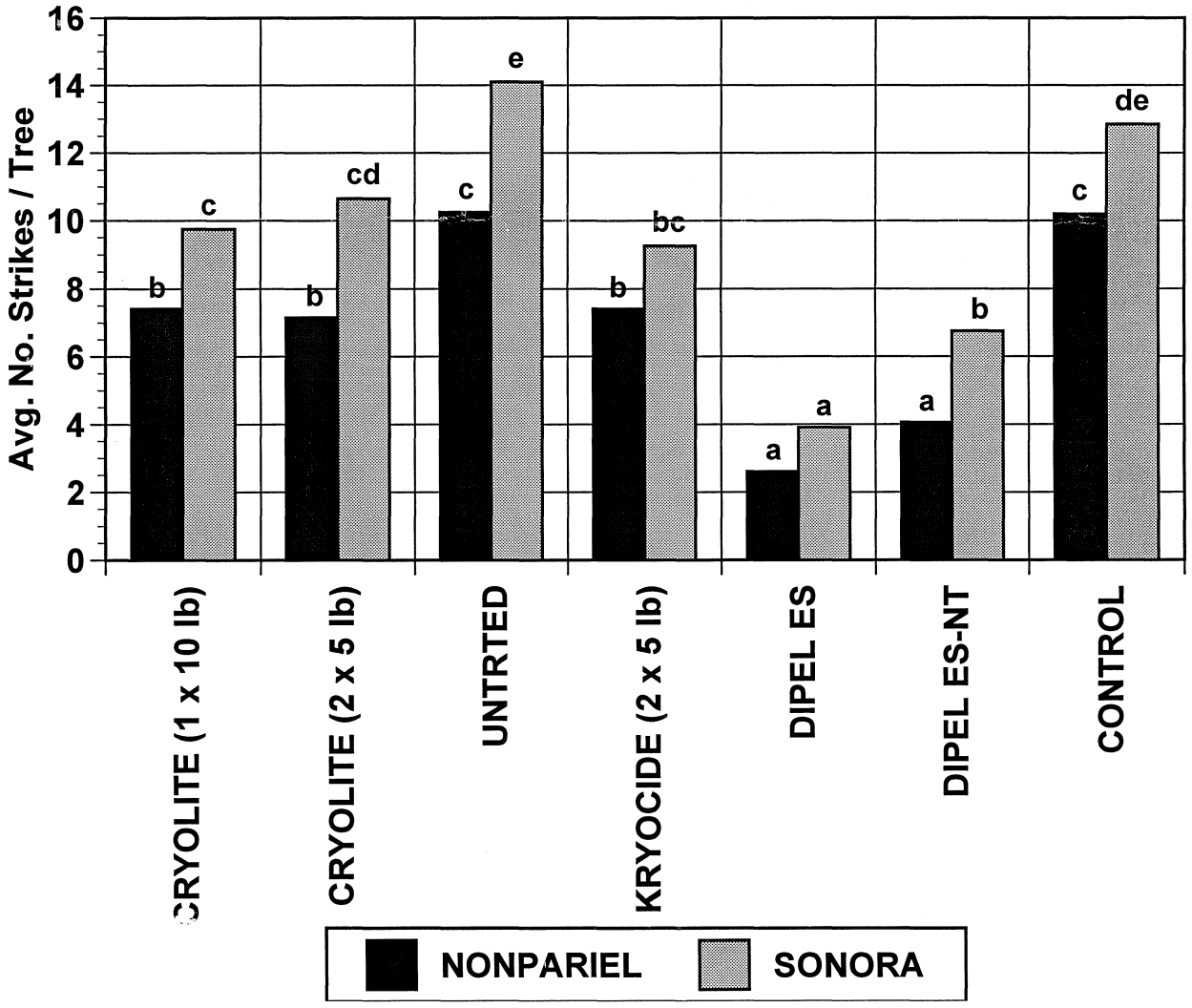
TREATMENTS:	MATERIAL	RATE PRODUCT	TIMING (NOMINAL)	DATE(S) APPLIED
1	Cryolite®	10 lbs/A	Petal fall	3/18,
2	Cryolite	5 lbs/A	Bloom, Petal fall	2/20, 3/18
3	Kryocide®	10 lbs/A	Petal fall	—
4	Kryocide	5 lbs/A	Bloom, Petal fall	2/20, 3/18
5	Dipel ES®	2 pts/A	Bloom, Petal fall	2/20, 3/18
6	Dipel ES-NT®	2 pts/A	Bloom, Petal fall	2/20, 3/18
7	Untreated			

Table 2. Average number of twig strikes per tree.

	AVERAGE NO. STRIKES PER TREE		
TREATMENT	NONPAREIL	SONORA	OVERALL
1 Cryolite 1 x 10 lbs	7.41 b	9.75 c	8.58 c
2 Cryolite 2 x 5 lbs	7.16 b	10.65 cd	8.90 c
3 Untreated	10.25 c	14.1 e	12.17 d
4 Kryocide 2 x 5 lbs	7.40 b	9.25 bc	8.32 c
5 Dipel ES	2.60 a	3.91 a	3.26 a
6 Dipel ES-NT	4.05 a	6.75 b	5.40 b
7 Untreated	10.20 c	12.85 de	11.53 d

Values followed by the same letter(s) are not significantly different (Duncan's New Multiple Range test, $p \leq 0.05$).

FIGURE 1. Number of peach twig borer strikes per tree following treatments. Sampled 13 April, 1995. Columns with the same letter designation are not significantly different (DMRT, $p \leq 0.05$). Comparisons are across treatments, not variety.



Cooperative Extension
University of California

ɔunty of Fresno

1720 SOUTH MAPLE AVE.
FRESNO, CALIFORNIA 93702
TELEPHONE: (209) 456-7285
FAX: (209 456-7575

Almond Board of California
1104 12th Street
Modesto, CA 95354
Attn: Kandi Cruz

March 25, 1996

Dear Ms. Cruz,

Please find the enclosed final report for the funded project completed in 1995. I hope the format is OK for your purposes. Thank you very kindly for your interest and support.

Sincerely,

Richard L. Coviello
Farm Advisor