

**Project No. 93-Y5 - Minimizing Environmental Hazards During Dormant Spraying
of Orchards**

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Objectives: This unique field research project brings together spray engineers, entomologists, chemical and biochemical toxicologists and wildlife biologists to improve recommendations for the integrated pest management of orchards. The goal is to maintain the efficacy of dormant chemical application while reducing its environmental hazards, especially drift and exposure to wildlife. The dormant season spray tests will use the OPs diazinon and carbaryl, and Volck oil.

Field studies of a conventional fan (brand name Oma) and a mast air curtain sprayer (brand name Curtec) will be conducted at sites in the Central Valley west of Fresno. The tests will compare normal and reduced levels of diazinon and carbaryl. The studies will:

1. Measure drift of the chemicals during operation of conventional and mast sprayers in dormant almond orchards.
2. Determine deposition of the chemicals on twigs and branches in a dormant almond orchard.
3. Assess the efficiency of pest control of the treatments.
4. Examine the exposure of caged pigeons when appropriate during the treatments.

Results: The data from the drift measurements are being analyzed.

Although it is difficult to draw conclusions one year at a time, three years of study suggest that growers will be able to reduce either the rate or gallonage of pesticide applied and still achieve a good level of control. Table 1 shows data on deposition on trees and on Peach Twig Borer strikes after application of the organophosphate (OP) diazinon in the 1993 season. Deposition was similar in all treatments. All diazinon treatments resulted in significantly fewer strikes than were found with the untreated control.

Table 1. Control of Peach Twig Borer With Diazinon
Fresno County, February 2-4, 1993

Treatment	Rate	GPA	Deposition	Strikes/Tree
Mast	1.0	25	0.12 ± 0.04 d	0.58 ± 0.71 a
Mast	2.0	25	0.11 ± 0.01 d	0.82 ± 0.81 a
Conventional	4.0	300	0.15 ± 0.03 cd	0.83 ± 0.57 a
Mast	4.0	25	0.19 ± 0.07 cd	0.88 ± 0.33 a
Conventional	4.0	100	0.24 ± 0.13 c	1.21 ± 0.64 a
Conventional	2.0	100	0.11 ± 0.02 d	1.67 ± 0.64 a
Untreated	-	-	-	3.67 ± 1.13 b

Rate: pounds dilute chemical per acre; GPA: gallons water per acre.

Deposition: micrograms/sq.cm.

Deposition and Strikes/Tree values are means ± standard deviations.

Means with the same letter are not significantly different, P>0.05

Pigeons were placed in cages hung from poles in the orchards during dormant spraying and directly exposed to the pesticides. Table 2 shows the percent cholinesterase (ChE) activity of pigeons comparing the levels before and after exposure to diazinon. ChE is an enzyme that is inhibited by OP pesticides. The pigeons exposed to the normal 4 lb/acre rate have a large decrease in enzyme activity, but the pigeons exposed to the lower rates have a small decrease.

Table 2. Cholinesterase Activity of Exposed Pigeons

Diazinon Spray Treatment	Lbs/Acre	% ChE Activity
Control	0	100.2 ± 5.8 a
1/4 Rate	1	88.0 ± 11.1 b
1/2 Rate	2	82.2 ± 18.6 b
Full Rate	4	13.1 ± 18.6 c

% ChE Activity values are means ± standard deviations.

Means with the same letter are not significantly different, P>0.05

Our experiments this winter will focus on a conventional fan sprayer and vary the gallonage and rate of application of the pesticide.