EFFECT OF ALTERNATE YEAR DORMANT PHOSPHATE/OIL APPLICATIONS ON SAN JOSE SCALE AND PEACH TWIG BORER CONTROL IN FRENCH PRUNE

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INTRODUCTION

The "dormant spray", usually a phosphate insecticide combined with a spray oil, is the most important in the deciduous fruit grower's insect control program. This "clean-up" spray kills scales, peach twig borers (PTB) and aphid and mite eggs; prune growers employing a thorough dormant insecticide control program rarely have to apply in-season insecticides or acaricide.

Dormant sprays have come under increasing criticism. The shear volume of insecticide application at this time of year presents environmental concerns; most all deciduous fruit growers apply this spray during foggy periods of winter; insecticides applied at that time often become suspended in the fog causing health hazards to both humans and animals, especially raptors.

Alternate year dormant insect control, which would reduce pesticide load, may be feasible. If one accomplishes a thorough job of insect control with a dormant spray one year, sufficient pest recovery may not occur within the next growing season to present an economic problem the following season. Such a practice, if successful, would both halve the pesticide load into the environment and grower insecticide costs. Here we report results of a fifth year of a six year experiment designed to test the feasibility for alternate year dormant sprays.

METHODS

A mature, 32.4 ac Improved French prune orchard in Woodville, CA that had received annual dormant insecticide treatments was selected for the experiment. In 1992, the entire block was treated in February (dormant) with a spray of Diazinon and oil to ensure uniform, sub-economic scale and PTB levels for the onset of differential treatments the next winter. In Fall of 1992, the orchard was divided into 20, 1.62 ac plots and the following treatments replicated five times into a randomized complete block design: 1) no dormant spray; 2) annual February dormant treatment; 3) dormant treatment February 1993, 1995, 1997; and 4) dormant treatment February 1994, 1996, 1998. The first test year of treatments were applied in February 1993, the second in February 1994 and the third in February 1995. All experimental treatments were sprayed with Supracide 2E at a rate of 1 gallon product per acre in 200 gallons of water. In 1997 Supracide 25 WP and 1% Volck Supreme 01 were applied. The experiment is designed to run through the 1998 growing season.

Percentage of San Jose Scale (SJS) and Peach Twig Borer (PTB) infested fruit were determined close to harvest (8/6/93 and 8/1/94, 8/6/96 and 7/28/97) by sampling 25 individual fruits from 10 trees within each experimental plot (i.e., 250 fruits per replicate). Dead and live SJS status were further determined in the dormant season preceding the next experimental insecticide application (12/28/93, 2/15/94, 2/15/95, 2/10/96 and 2/26/97) by counting scales on 5 fruiting twigs from each of 5 trees within each replicate.

RESULTS AND DISCUSSION

Prune fruit infestation: Average number of SJS and PTB infested fruit for the 1993, 1994, 1995, 1996 and 1997 season is presented in Table 1.

In 1993, following the February treatment, significant reduction in SJS on the mature fruit occurred in treatments where the dormant spray was applied. Although resulting damage was not believed economic, PTB damage to fruit was detected but damage was light and no significant difference occurred with or without treatment (see Table 1).

In 1994, following treatment of those plots untreated the year before or those treated annually, numerically different, but not significantly less, SJS infested fruit occurred. It is of interest that fruit from trees treated or not treated in 1993 and not 1994 had increased scale infestation from the previous season but still quite light when compared to the untreated control. As in 1993, no significant difference in PTB occurred between any treatment.

In 1995, SJS infested fruits were substantially less than in 1994. Differences between treatments were insignificant. PTB infested fruit were few with no significant difference between treated treatments but all higher than the control.

In 1996, again significant differences in scale infested fruit occurred between trees treated the previous dormant season. However, percent infestation (not shown) is quite low and not thought to be economic even with the highest levels detected. It is of interest that scale infested fruit in the non-treated treatment remain low. No difference in peach twig borer infested fruit existed between treatments with average percent infestation ranging from 2% - 2.7%, not economically significant (Table 1).

In 1997, no significant difference in scale infested fruit was measured. Numerically, plots designated to be treated in February 1997 had the lowest numbers of scale infested fruits (Table 1). Peach twig borer infested fruits were almost non-existent in 1997 (Table 1).

Twig infestation: Effect of alternate year dormant sprays on San Jose Scale infested twigs for years 1993, '94, and '95 is presented tin Table 2.

In December of 1993, significant reductions in average numbers of dead scale per 125 twigs from the 1993 February treatments occurred when compared to the untreated treatments. Number of live scale on twigs from annually treated trees were not significantly different from those treatments receiving no dormant treatment the previous February, although numerical differences were substantial, see Table 2.

In 1994, prior to treatment, significantly higher numbers of dead scale occurred on untreated twigs than on untreated twigs from the untreated and 1993 treated trees had significantly higher numbers of live scale (Table 2).

In 1995, again the untreated trees had significantly higher numbers of dead scale than did the treated

trees regardless of year treated. Annually treated trees had significantly less live scale than either alternate year program or the untreated controls.

Numbers of live and dead San Jose Scale occurring on twigs prior to dormant treatments in 1996 are presented in Table 2. Continually non-treated trees had a significantly, albeit low, higher number of dead scab than the other treatments; no parasites were detected. No significant difference in live San Jose scale was measured.

Twigs sampled in January 1997, prior to treatment revealed no significant difference in live or dead San Jose scale populations. A numerically higher level of parasitism occurred in the non-treated plots.

All plots in this experiment were examined for the presence of mealy plum aphid and leaf curl aphid; a dormant spray kills these aphids' eggs and often, in absence of such a spray, this pest develops to economic levels. No infestation from either of these pests was noted in any treatment.

CONCLUSIONS

This is a fifth year progress report of an experiment designed to run six years. Results so far indicate that alternate year dormant insecticide sprays to control SJS and PTB appear to provide control of these pests for more than one year. Aphids have not, as yet, emerged as a problem in the block following three years of no treatment and alternate year treatment.

SUMMARY

In 1992, a six year experiment was initiated to test feasibility of dormant sprays applied biennially as an alternative to each year for San Jose Scale and Peach Twig Borer (PTB) control. Such a practice, if effective, would halve the pesticide load prune growers contribute to the environment with a coincident, and similar, reduction in grower costs.

In the late winter of 1992, all experimental trees were sprayed to begin the experiment with low insect populations. In late winter of 1993, alternate year treatments were begun and insect control compared with annual or no treatment. In late winter of 1994, the second year of the experiment, trees designated to be sprayed with every other year but not sprayed in 1993, were sprayed whereas those sprayed in 1993 were left untreated. In 1995, trees treated in 1993 were retreated and those treated in 1994 left untreated and so on through 1997. Insect control in each of those treatments were compared to trees untreated or those treated each year.

Fruit infestation by SJS was lower following treatment, significantly so in 1993, than that from untreated trees. Economic fruit damage did not occur due to lack of treatment in any one year. Fruits from trees left untreated two years in a row had increased scale in 1994 but lower levels in 1995. No differences in PTB damage occurred between any treatment in 1993, 1994, 1996 or 1997, but did in 1995.

Fruiting twigs sampled pretreatment each year had variable, albeit light, dead and live scale

populations. Aphids were not observed to develop in any untreated plot.

Table 1. Effect of alternate year dormant sprays on insect infestation of french prune fruits.

Fruit Damage

Avg. No. of San Jose Scale infested fruit/250 frt[1/]

Treatment	1993	1994	1995	1996	1997	1998
No Dormant Spray (Control)	58.0 a	63	1.4	17.6 a	11.8	
Annual Dormant Spray	4.0 b	10	1.6	2.0 b	5.0	
Dormant Spray '93, '95, '97	10.0 b	19	1	21.9 a	5.4	
Dormant Spray '94, '96, '98	54.0 a	7	17	2.0 b	36.6	
LSD P=.01	7.5	ns	ns	13.6	ns	

Avg. No. of Peach Twig Borer Infested Fruit/250 frt.[1/]

Treatment	1993	1994	1995	1996	1997	1998
No Dormant Spray (Control)	5	0	lb	5.0	.8	
Annual Dormant Spray	2	1	2ab	6.8	.8	
Dormant Spray '93, '95, '97	10	1	1.8ab	6.8	.8	
Dormant Spray '94, '96, '98	3	0	3a	6.6	.8	
	ns	ns		ns	ns	

[1/] 25 Fruit/tree from 10 trees/rep = 250 fruit/rep; counted: 8/6/93, 8/1/94, 8/10/95, 8/6/96 and 7/28/97.

Table 2. Effect of Alternate Year Dormant Year Sprays on San Jose Scale Infestation of French Prune Twigs.

Twig Infestation (new wood) [1/]
No. Dead San Jose Scale per 125 twigs

Treatment	1993	1994	1995	1996	1997	1998
No Dormant Spray (Control)	16.0 a	99 a	168 a	2.6	3.8	
Annual Dormant Spray	0.0 b	11 b	25 b	1.6	3.8	
Dormant Spray '93, '95, '97	5.0 b	35 b	68 b	1.0	1.0	
Dormant Spray '94, '96, '98	52.0 a	24 b	51 b	.6	0.8	
LSD P = .05	24	7.42		ns	ns	

 # No. Live San Jose Scale per 125 twigs (new wood)

Treatment	1993	1994	1995	1996	1997	1998
No Dormant Spray (Control)	68	55.0 a	87 a	.4	70.8	
Annual Dormant Spray	0	15.0 b	25 c	.4	26.2	
Dormant Spray '93, '95, '97	0	35.0 ab	59 ab	0	64.0	
Dormant Spray '94, '96, '98	72	22.0 b	40 bc	.8	25.0	
LSD p=.05	ns	4.98		ns	ns	

[1/]5 twigs from 5 trees = 25 twigs/rep, 5 reps/treatment; Sampled 12/93, 2/95, 2/96 and 1/97 (pre treatment)