

Chemical Control/New Products

Effect of Oil on the Behavior and Survival of Leafrollers

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Three highly refined horticultural spray oils (Orhex 692, Orhex 796 and Orhex 892, Exxon Company, USA) were evaluated for their effect on leafroller colonization of apple. Three bioassays were designed to provide "Choice Tests" for adult oviposition and larval colonization.

Test #1. The test was conducted on 1-yr-old apple seedlings planted in 2 gal pots. Orhex 796 was applied at a 1.5% v:v rate to eight trees on 19 Sep. Eight trees were left untreated. The treatment was applied with a handgun sprayer at 300 psi to the point of drip, simulating a dilute spray of approximately 400 gal/acre. Two oil treated and two untreated trees were placed in a 4 ft x 4 ft x 4 ft PVC cage covered by screen material. Four replicates (cages) were set up and treated as separate blocks for analysis. Twenty-five PLR males and females were placed in each of four cages. The PLR females were given a 10-d oviposition period, after which the number of egg masses on each tree was recorded. The egg masses were allowed to hatch, and the number of larvae colonizing each tree was recorded. The number of larvae originating on a tree was calculated by measuring egg mass size. The percentage of larvae colonizing each tree was then calculated.

PLR females laid nearly twice as many egg masses on untreated trees; however, the difference was not statistically significant. The number of F1 larvae colonizing the untreated trees was significantly higher than the oil treated trees, reflecting the greater number of egg masses present. Since the difference in larvae per tree was similar to the difference in egg masses per tree, it appears the oil treatment had no effect on larval colonization. The data on percent larval colonization per tree support this conclusion.

Treatment	Rate (v:v)	Avg. no./tree		Avg % larval colonization
		Egg masses	F1-Larval	
Orhex 796	1.5%	6.8a	126.1a	17.9a
Untreated	none	12.0a	248.8b	16.0a

Means in the same column followed by the same letter not significantly different ($P=0.05$, paired t -test). Actual significance level for "egg masses" column: $P=0.09$.

Test #2. The test was conducted on 1-yr-old apple seedlings planted in 2 gal pots. Orhex 796 was applied at a 1.5% v:v rate to eight trees on 19 Sep; eight trees were left untreated. The trees were moved to a protected area outdoors, and two oil treated and two untreated trees were placed adjacent to one another and left uncaged. PLR egg masses were allowed to hatch in individual petri dishes, and then larvae were transferred to a tree. The neonate larvae were allowed to establish on the trees, then the number per tree was counted. The number of neonate larvae released per tree was estimated by measuring egg mass size.

The number of PLR larvae and larval feeding sites per tree on the untreated trees was 3-4 times higher than on the oil treated trees. The difference in feeding sites per tree was statistically significant, but the difference in larvae per tree was not. There was no difference in the average percent larval colonization. This test suggests that while there may not be an effect of an oil on larval colonization there may be an effect on feeding behavior.

Treatment	Rate (v:v)	Avg. no./tree		Avg % larval colonization
		Feeding sites	Larvae	
Orchex 796	1.5%	6.4a	1.6a	1.1a
Untreated	none	28.6b	4.4a	1.1a

Means in the same column followed by the same letter not significantly different ($P=0.05$, Fisher's Protected LSD).

Test #3. This was a direct choice test using a leaf-disk bioassay method. Potted apple seedlings were sprayed with Orchex 692, Orchex 796 and Orchex 892 at a 1.0% v:v and 2.0% v:v rate. The treatments were applied on 22 Oct with a 1.5 gal hand-held pump sprayer to the point of drip. Ten leaves were collected from each oil treated tree and an untreated control tree at 1 d post-treatment. One punch (2.3 cm diameter) was taken from each leaf. Two punches, one from an oil treated tree and one from an untreated control tree, were placed in a petri dish. The untreated leaf punch was marked with a pen to distinguish treatments. Care was taken that leaf punches did not overlap. Three 1- to 2-d-old leafroller larvae were placed on the leaf disks. Twenty petri dishes were prepared per treatment. Petri dishes were examined after 3 d, and the number of larvae on each leaf punch was recorded.

There was no significant oil treatment or concentration based effect noted in larval preference between oil treated and untreated leaf-disks. Approximately 60% of the PLR larvae were found on the oil treated leaf-disks, whereas the OBLR choice test was closer to 50:50. This test confirmed that there appears to be no effect of oil on leafroller larval colonization of foliage.

Treatment	Avg. % larvae colonizing oil		
	Rate (v:v)	PLR	OBLR
Orchex 796	1.0%	65.8a	47.5a
Orchex 796	2.0%	58.3a	52.5a
Orchex 692	1.0%	51.7a	45.0a
Orchex 692	2.0%	65.8a	59.2a
Orchex 892	1.0%	60.8a	55.8a
Orchex 892	2.0%	65.0a	47.5a

Means in the same column followed by the same letter not significantly different ($P=0.05$, Fisher's Protected LSD).