

Chemical Control/New Products

Effect of Orhex 796 Horticultural Mineral Oil on the Oviposition Inhibition of White Apple Leafhopper *Typhlocyba pomaria* McAtee

D. Fernandez, E. Beers and J. Dunley

Washington State University Tree Fruit Research and Extension Center, Wenatchee, WA

Keywords: white apple leafhopper, *Typhlocyba pomaria*, horticultural mineral oil, Orhex, apple

Materials and Methods

A series of laboratory bioassays (testing rates, types, and residue ages of oil) was performed during 1997 and 1998 in order to observe possible effects of horticultural mineral oil on white apple leafhopper (*Typhlocyba pomaria* McAtee) oviposition. Dormant apple trees (EMLA 111 liners) from Treco Co.—Oregon were held in a glasshouse until the peak of 1st field generation adult flight. The trees were grown in individual 6 inch pots with peat-vermiculite-perlite mix and watered twice weekly or as needed. Insect cages to contain the adult leafhoppers on the tree were constructed. The cages were made using rigid wooden rings on the top, covered with black cardboard and a piece of 0.9 m x 0.35 m of organdy cloth to provide the body of the cage. A 0.80 m strip of hook and loop fastener (Velcro®) was sewed to the long sides of the fabric, and the whole piece was attached to the wood ring forming a tube. A 3 mm aluminum wire was attached to the pot to hold the cage up and minimize contact with the tree. The bottom of the cage was secured with a rubber band around the pot over the organdy. On the day the tests began, the trees were sprayed as follows:

Six trees per treatment were sprayed with mineral oil (Orhex 796 in distilled water) and six trees per bioassay were treated with distilled water as a check. All the treatments were sprayed to runoff with a hand-sprayer (Optimum®, model 1401-RL Flo-Master®). The spray residues were allowed to dry for several hours, then were moved from the greenhouse into a growth room (25.6°C; 16:8 [light:dark]), and covered with the cages.

Heavily infested 'Delicious' apple blocks at WSU Columbia View and WSU TFREC were used as collection sites for the WALH adults. The collection was made with a hand-held vacuum (Black & Decker Dust Buster® modified by Bioquip, Gardena, CA), powered by a 12-volt NiCd battery. During 1997 bioassays, the adults were separated into batches in a cold lab kept at 3.3°C, and by using carbon dioxide to stun them. They were aspirated into individual plastic vials. The vials containing adults were brought out into room temperature (22.2°C) and placed on the floor of the cages. After bringing the adults to the lab, they were sexed and checked for parasitoids using carbon dioxide (CO₂) and a binocular microscope (1998 only). Only nonparasitized females were placed in vials (10 females/vial) and stored in a cold room at 3.3°C. The vials with the leafhoppers were taken from the cold room and opened inside the cages, and turned down on small Petri dishes attached to one side of the cages to allow all females to exit the vials. Those that were not able to fly dropped in the open Petri dish. The cages were closed and watered by a tube with water and a moist cotton plug inserted in the side of the cage.

In all the bioassays, the WALH females were allowed to oviposit for 3 days. After that time, the cages were opened, the insects collected, and placed in individual vials with 70% alcohol, recording the number of dead, alive, and those that were not able to leave the vials or the Petri dishes, depending on the technique.

The cages were partially opened and checked weekly in order to observe the presence of newly hatched WALH nymphs. Nymphs were counted and removed from the cages. This procedure was followed until no new nymphs were found for 2 consecutive weeks. The variable analyzed was total number of nymphs and total number of nymphs per viable adult (that is, those that could have contributed to oviposition). In the latter category are either individuals found alive or individuals found dead, but able to leave the vials or the Petri dishes (presumed alive at time of release). The data from nymphs per adult and viable adults was transformed by $\ln(y+0.5)$ due to nonhomogeneity of variances. The data were analyzed using PROC GLM of SAS, using a completely randomized model.

Results and Discussion

Bioassay A: No significant differences were found among the treatment.

Bioassay B: There were no differences in either the mean of total nymphs, however, when the nymph figures were corrected for the number of adults, the check had significantly higher number of nymphs/adult than the 4% rate Orchex, with the 1% and 2% rate treatments intermediate.

Bioassay C: Similar to the other two bioassays, the number of live, dead and dead-in-vial adults varied considerably among the various treatments. There appears to be a trend to have a higher number of nymphs/adult in the check, and in general to have greater nymphal survival with older residues; however, these differences were not statistically significant. Certainly, the unknown age and sex of the adults presents a problem in the results of these 3 tests. Also the lifespan of the adults found dead was unknown and, although the greatest care was taken in handling the adults, there was still considerable mortality.

Bioassay D: Oil treatment provided a significant reduction in nymphs when compared with the check. After the modifications made to the technique used in previous tests, the difference in number of viable adults in both treatments was not significant. Although there is still room for improvement in technique, the results observed in the last test are very promising. The statistically significant differences found between the Check and Orchex 796 (2% v/v) encourage us to look forward to testing more doses in order to find a dose-response curve.

