

#### IV. Chemical Control/New Products

##### a. Chemical control

##### 1. Summer oil for apple pest control

J. F. Brunner, Gary Grove, Betsy Beers, John Dunley,  
M. J. Doerr, Bruce Hill  
WSU Tree Fruit Research and Extension Center  
1100 North Western Avenue, Wenatchee, WA 98801

**Entomology results:** Effects of summer oils were examined against the **codling moth** in a replicated single-tree test as well as in several large blocks. In the small block test, three different oils were applied at two rates (1 and 2%). Each oil/rate treatment was applied eight times during the season, four against each codling moth generation. Codling moth densities were extremely high in the test block, but all oil treatments suppressed damage. The most significant effects were noted against the first codling moth generation although at harvest injury to fruit was significantly less than in the untreated check though not as good as the Guthion treatment. White apple leafhopper and pandemis leafroller populations were also suppressed in the small block test. In a large organic orchard (60 acres), oil (Orchex-796 @ 1%) was combined with Ryania and mating disruption to provide excellent codling moth control. In 1994 mating disruption alone did not provide adequate control, as fruit injury at harvest exceeded 10%. In 1995 fruit injury at harvest was low, and fruit finish on both Delicious and Golden Delicious was excellent. Oil (Orchex-796 @ 1%) was also used in the SARE project as part of a no-neuroactive insecticide program. It was used to suppress codling moth along a border in two SARE orchards and as a complete cover spray in another. The addition of oil sprays in these situations complemented mating disruption sufficiently to provide acceptable codling moth control with no fruit marking.

**Leafroller** densities have been suppressed by oil treatments timed to control codling moth. The stage of leafroller affected by the oil treatments is thought to be the egg. To confirm this hypothesis, a bioassay using Orchex-796 was conducted. Pandemis and obliquebanded leafroller moths laid eggs on apple foliage in the laboratory. Leaves were removed and dipped in different concentrations of oil (0.05% to 4.0%). Egg hatch was monitored for 14 days and mortality recorded. Response was similar with both leafroller species. High pandemis leafroller egg mortality occurred at 2% and 4% oil concentrations, with little effect at lower concentrations. Obliquebanded leafroller eggs were more susceptible with high mortality, >90% at 2% and 4%, but also with some mortality at 0.5% concentration. The bioassay technique provided repeatable results so will be used to compare other oils in 1996. Preliminary field tests showed the effects of oil on leafroller eggs; however, the effect on young larvae is also a possibility that needs examination.

**Mites** - The test was conducted in a 2-year-old orchard of Redchief/M.26 with Golden Delicious/MAC.9 pollenizers. Replicate blocks were based on a pretreatment population count of European red mite. Treatments were applied with a handgun to the point of drip on 16 August. Samples consisted of five leaves/tree picked at random throughout the canopy. The three oils (Orchex 796, Orchex 692, WS-2928) provided the best knockdown of all the treatments tested (all zeros on 23 August); however, there was some rebound in the Orchex 692 and WS-2928 treatments on 30 August and 6 September. The populations of this eriophyid mite were quite variable before treatment. Post-treatment counts were generally low, but the population dropped in the check as well. Mortality of *T. occidentalis* was substantial in the three oil treatments, indicating that some contact toxicity may be responsible; however, these treatments also experienced a severe decline in prey populations.

**Leafhopper** - In trials against the overwintering generation, pretreatment populations of leafhoppers ranged from 2-3 nymphs/leaf. Oils applied at the standard timing reduced nymph populations to levels significantly lower than the check by the second and third weeks post-



treatment. There was no difference in oils at the same rate, a slight effect of oil rate (2% better than 1%) and a strong effect of timing, standard being better than end of egg hatch.

In trials against the summer leafhopper generation, treatments were applied in July or mid-August. In the July timing, three oil treatments (2% rate), Orchex 692 (1%), and WS-2928E (1%) had means significantly lower than the check two weeks following application. For a given oil, there were no differences between the 1% and 2% rates, and for a given rate there were no differences among the oils. All three oils at both rates, with the exception of WS-2928E (1%), significantly reduced leafhopper populations relative to the check during the primary part of the post-treatment period. There were no differences between the 1% and 2% rates of the individual oils. Overall, the oils did a fair job of suppressing leafhopper populations. For the July timing, initial suppression was good but populations rose again, presumably as new nymphs appeared. Suppression of nymphs at the later timing was generally equivalent to that of the early timing; either timing would be sufficient. Timing the treatments for mid-August might eliminate more of the larger instars, thus minimizing damage.

**Plant pathology results:** Oil sprays for the control of powdery mildew of apple at Quincy, WA were applied to first-year Royal Gala apple trees. Sprays were applied to runoff with a backpack sprayer operating at about 100 psi. Applications were made on 3, 17, and 31 July and 14 and 28 August. There were five trees per replication arranged in a randomized complete block design. On 8 August and 5 September foliar mildew incidence ratings were taken by determining the proportion of terminals per tree infected with powdery mildew. Foliar mildew incidence at the first and second ratings was 52 and 65% on the untreated control, respectively. Incidence on oil-treated trees ranged from 10% (Orchex 682, 2% v:v) to 35% (several treatments), and 20.0% (Orchex 682 2% v:v) to 55.0% (Orchex 792 E 1% v:v), respectively. Orchex 682 at 2% v:v provided mildew control superior to the untreated control on both evaluation dates. Disease pressure was heavy. There was no observable phytotoxicity.