

Chemical Control/New Products

Toxicity of Mineral Oil to Codling Moth Eggs on Different Host Plant Surfaces

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Horticultural mineral oil is primarily ovicidal against codling moth, *Cydia pomonella* (L.), and has no or little activity against other life stages (Riedl et al. 1995). Eggs are equally susceptible to mineral oil throughout the incubation period except shortly before hatch when susceptibility drops. Mineral oil kills by interfering with respiration. In studies with oriental fruit moth, *Grapholita molesta* (Busck), it was shown that mineral oil causes egg mortality by depressing the respiratory rate. The duration of respiratory depression and the amount of oil on the egg determine whether mortality occurs. In addition, there is recent evidence that the toxicity of oil is influenced by the substrate on which eggs are laid. Riedl et al. (1995) observed that codling moth eggs laid on waxed paper were three times as susceptible to mineral oil as eggs on the surface of apples. This suggests that the efficiency of mineral oil to depress respiration may vary with the different host plant surfaces on which eggs are laid. In the field, eggs are laid on the upper and lower side of leaves, on the fruit, and also on woody tissue of the fruit spur. The proportion of eggs laid on the different plant parts varies with the host. On apple, as well as pear, leaves are the preferred oviposition sites (Wood 1965, Westigard et al. 1979).

If mineral oil is to become an alternative control for codling moth, its toxicity to eggs on different host plant surfaces must be well understood. Therefore, our main objective was to compare the toxicity of mineral oil to eggs on fruit, leaves and woody tissue of apple and pear.

The following is a brief summary of results obtained in 1994. Eggs laid on the apple surface (Red Delicious) were as susceptible to mineral oil as eggs laid on pear (Bartlett). Mineral oil applied topically to eggs on leaves caused no mortality. Apparently eggs can still respire through the leaf tissue, even at high rates of topically applied oil. It needs to be examined whether neonates which hatch from oil-treated eggs develop normally. On apple, about 30% of eggs are laid on the fruit and the remainder on the upper and lower leaf surface (Wood 1965). On pear, the proportion of eggs on the fruit is only 11%; the majority (>70%) is laid on the lower leaf surface (Westigard et al. 1979). Therefore, oil may not be a very effective ovicide on apples (and even less effective on pears) since the majority of eggs are laid on leaves (partially supported by Exxon).

Codling Moth Control With Mineral Oil Using Different Concentrations and Spray Volumes

The purpose of these tests was to verify results from our laboratory studies on the ovicidal activity of mineral oil and determine if control in the field can be improved by varying the concentration and spray volume. Moths from the laboratory culture were allowed to oviposit on small Red Delicious apples and on apple leaves. Apples with eggs were suspended at four points in the canopy, leaves with eggs were stapled to leaves on the tree. Dilute handgun and

airblast applications were evaluated at 0.5, 1.0, 2.0 and 4.0% of mineral oil. A new set of apples and leaves with eggs was placed in the tree after every spray treatment. In addition, different spray volumes from 50 to 400 gpa at a constant rate of oil/acre (4 gal) were compared. Results are preliminary since not all tests or replications are completed. As in our laboratory tests, oil was ovicidal only against eggs laid on the fruit but not against eggs on foliage. Dilute spraying by handgun was as effective as dilute spraying by airblast. Additional tests using different spray volumes will be conducted in 1995 (partially supported by Exxon).