Chemical Control/New Products

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

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Laboratory and field studies have been conducted since 1991 to evaluate the potential of horticultural mineral oils for control of codling moth on apples and pears. Oil is primarily ovicidal against codling moth and has no or little activity against other life stages. Oil has to be applied topically to be effective. The toxicity of oil to eggs is strongly influenced by the substrate on which eggs are laid. In laboratory tests, the LC_{50} for eggs on fruit ranged from 1.3 to 1.6% (v/v). There was no difference in the toxicity to eggs on the surface of apples or pears. However, the toxicity of oil applied to eggs on leaves was much lower and varied with the age of the eggs at the time of treatment. Young eggs in the white stage of development were susceptible to oil. However, oil applied to eggs in the red ring stage on either apple or pear leaves (upper and lower side) had no toxicity at rates ranging from 0.25 to 8.0%. Oil can be expected to be a better ovicide against codling moth on those cultivars where a significant proportion of eggs are laid on the fruit.

Field tests confirmed the laboratory results. Dilute sprays of oil were effective against eggs on the fruit but mortality on leaves was low. There was no difference in egg mortality between handgun and radial airblast applications (400 GPA). Also, spray volumes from 100 to 400 GPA were equally effective. These studies suggest that field rates would have to be increased to 4.0% to achieve 80 to 90% egg mortality. At this rate the risk of phytotoxicity is unacceptably high. Even lower rates such as 1.0% can be phytotoxic to sensitive cultivars. For instance, oil sprays applied six times over the season caused severe russet to Newtown apples. Codling moth damage was reduced from 40% in the control to 20% in the oil treatment which was still unacceptable. Summer use of oil has benefits for mite, leafhopper, and pear psylla control.