Use of Insecticidal Oils and Soaps for Pest Control

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Petroleum oils and soaps can be used on a variety of plants during all seasons of the year and are excellent alternatives to conventional pesticides for control of many soft-bodied arthropod pests. Such products are safer to workers and the environment, are not phytotoxic to most plant species, and do not induce resistance in the pest. This paper discusses the advantages and limitations of using oils and soaps.

DISCUSSION

Horticultural "petroleum" oils have been used for many years mainly as dormant applications to control a variety of insect pests. These dormant oils were not highly refined and were almost never used during the growing season because of the risk of phytotoxicity that resulted from the impurities included in the products. Also, cheap chemical pesticides that were extremely effective without the risk of phytotoxicity were the products of choice for pest control. Times have changed, and we now know that the use of many conventional pesticides is accompanied by adverse side effects. Water pollution, risk to workers, outbreaks of secondary pests, destruction of beneficial species and other nontarget organisms, and high costs, to name a few, have forced pest management practitioners and the nursery industry to seek alternative control methods. New, more highly refined insecticidal oils and soaps are attractive alternatives to conventional pesticides. In addition soaps and oils are safe to handle, which facilitates spot treatments or custom applications when appropriate.

Miller (1989) discussed in detail the characteristics of horticultural oils. Insecticidal oils are considered as either dormant or summer based on the volatility, unsulfonated residue rating, and viscosity. Phytotoxicity is directly related to the volatility defined as the distillation temperature. Summer oils are more volatile and have lower (around 412°F) distillation temperatures. The unsulfonated residue percentage indicates the purity and should exceed 90% for summer oils. Growers should read the label for the distillation point (volatility) and unsulfonated residue rating to determine the appropriate use for name-brand horticultural oils (Miller, 1989). There are many brands and types available for both summer and dormant use.

Miller (1989) also discussed in detail the characteristics of insecticidal soaps. These compounds are fatty acids derived from plant oils or animal fat. They also may cause phytotoxicity in plants under certain conditions. Some fatty acid soaps (different from insecticidal soaps) are used as herbicides. Soaps are not compatible with concentrated mineral elements, lime sulfur, Bordeaux mixture, copper sulfate, or rotenone (Miller, 1989).

Other papers not concerning soaps and oils not cited in the text are listed below for further information (see Literature Cited). These papers give many species of

plants that soaps and oils have been tested upon for phytotoxicity and control of specific pests.

MAJOR POINTS TO CONSIDER

The major points that should be considered by nursery growers when using soaps and oils are listed below.

1) Soaps and oils that are not labeled with EPA cannot be legally recommended for use as insecticides. Household products have many impurities that are not found in registered products and are not recommended.

2) Dormant oils and summer oils are different in terms of their risk of phytotoxicity.

3) Make sure plants of any species in containers or in the field are not under water stress when oils are applied. Phytotoxicity is related to plant water stress and may show up as a color change, browning, or spotting of leaves. Some junipers lose their dormant season coloration when treated with oil.

4) You can expect from 70 to 85% or better control of most aphids, mites, mealybugs, psyllids, scales, whiteflies, and some caterpillars using summer oil or soap sprays. No residual mortality will occur (repellency to certain insects may occur), only those pests directly contacted by the spray will be killed. Therefore, good coverage is important.

5) Neither soap nor oil sprays have the associated risk of resistance development in the pest species that is found in other pesticides.

6) You may mix horticultural oil and insecticidal soap together. The advantage is that oil suffocates and soap desiccates providing two modes of action and reportedly quicker pest mortality. The disadvantage is higher cost.

7) Oils or soaps when tank mixed with other pesticides often act as a synergist or adjuvant spreading the pesticide and increasing the penetration into the insect. Oils are compatible with most insecticides except carbaryl and dimethoate, but are not compatible with the fungicides captan and Karathane. Oils are fungicidal and decrease the incidence of some mechanically-transmitted viruses (Zinnen and Vachris, 1990). Soaps are not compatible with lime sulfur, copper, or rotenone products. Some soaps are algacides and also kill mosses and liverworts (Puritch, 1981).

8) If you are concerned about phytotoxicity to any plants from oil or soap, do a small plot test under the most extreme conditions you can envision using the products, before applying to large numbers of plants. Plant species that are grown in many cultivars, as for example, poinsettias, will differ in responses by cultivars.

9) Using soap or oil is strongly recommended whenever possible, particularly as preventative or prophylactic sprays when pest levels are low or unknown. Remember that the basis of any pest control program is to monitor plants for pests and apply pesticides when population levels warrant control. Save conventional pesticides for "silver bullet" needs. Oils and soaps are biodegradable, safer to workers, and do not induce pest resistance.

10) Oils and soaps cause less mortality to beneficial insects than most conventional pesticides, but they are not 100% safe. Oils are less selective than soaps. Predatory mites, eggs, and some immature stages of beneficial insects may be killed when covered by oil.

11) All the legally usable chemical tools remaining available to the industry should be managed effectively in some type of rotation. Whenever possible avoid using the same conventional pesticides repeatedly on successive pest generations.

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