



## Horticultural Oils

Today's highly refined horticultural or mineral oils can be a valuable tool to manage insect and mite pests on fruits, berries, vegetables, roses, flowering shrubs, ornamentals, and houseplants. Horticultural oils can also control certain diseases such as powdery mildew on susceptible plants.



### What Are Horticultural Oils?

Horticultural oils are made from a complex mixture of petroleum hydrocarbons produced from paraffinic crude oil. Horticultural oils are from 92 to 99 percent pure. After distillation and filtration, they are formulated with an emulsifier to blend with water.

Plant based oils are also available that may contain soybean, cottonseed, sesame, neem or other oils. Some may also contain essential oils from herbs and spices. These oils are less refined and may cause more plant damage than the more highly refined horticultural oils.

### Dormant and Summer Oils

Since the 1880's horticultural spray oils were primarily used as "dormant oils" applied before bud break in the spring to control pests on fruit and shade trees. Dormant oil are very effective against the eggs of certain mites, and scale insects that overwinter on fruit and shade trees.

A new generation of more highly refined horticultural oils also known as "all seasons spray oils" or summer oils can be safely used on many plants, including vegetables during the growing season.

## How Do Oils Work?

Horticultural oils are applied as sprays with direct contact needed to ensure complete and thorough coverage of the targeted insect or mite pest.

Horticultural oils work by suffocation when the spray forms a coating of oil on the insect's body, blocking the spiracles or breathing opening.

Horticultural oils also may interact with insect fatty acids disrupting cell membranes and metabolism.

They may also have repellent properties acting as an antifeedant (discouraging feeding) for the euonymus webworm and some leafrollers.

Horticultural oils can also be used against powdery mildew whose fungal strands or hyphae grow on the surface of plant leaves on susceptible plants.

## What Pests Are Controlled?

Horticultural oils are most effective against many soft bodied pests including aphids, adelgids, spider mites, scale insects, greenhouse whiteflies, mealybugs, plant bugs, lace bugs and some caterpillars. Horticultural oil can also be used against powdery mildew on certain plants.

## Benefits of Horticultural Oils

Horticultural oils are also safe to mammals (including humans), some birds and reptiles. Horticultural oils are not selective so will kill any susceptible beneficial insects, as well as pests, that are coated by the oil. For example, when treating for spider mites, predatory mite eggs will be killed by the oil as easily as spider mite eggs. However, horticultural oil evaporates rapidly, and, when dried, it will have little toxic activity. Thus, beneficial insects may safely reenter oil treated areas after the spray residue has dried. Spot treatments with oil will minimize the impact on beneficial insects, because only those individuals covered by the oil will be affected. Because oils work by smothering (mechanically), there is less chance that insects or mites will develop resistance to the oils. Some formulations can be used by organic gardeners.

## Limitations of Horticultural Oils

In spite of these benefits, many potential users do not use horticultural oils because of a concern that phytotoxicity (plant damage or browning or burning of the leaves) will occur. The heavier, less-purified dormant oils used in the past, were more likely to cause phytotoxic reactions than the more highly refined oils in use today. Superior horticultural oils can now be safely used on more than forty-five different types of woody ornamentals, as well as various fruits, berries, and vegetables. Because there is little residual effect, oils may need to be re-applied (consult label for more information). Spray in the morning or evening to avoid contact with foraging bees.

## How to Apply

Dormant and delayed dormant Applications - can be applied before buds break or a delayed dormant application when buds are open at the tip and showing 1/16 to 1/2 inch of green tissue. Do not apply 48 hours before or after a freeze occurs or is predicted. Usually a higher rate of oil is applied for the dormant application that is listed on the label.

Summer Applications – can be applied to certain woody ornamentals (see label), as well as vegetables, berries, flowers etc.

Mix with water according to label directions and spray so that there is thorough coverage.

## Precautions When Using Oils

The potential for plant damage depends upon plant timing, plant species, temperature and type of oil. Some precautions are:

- Avoid drift to sensitive plants.
- Avoid using on sensitive plants.
- Treating plants that are under moisture or drought stress during the summer may result in marginal leaf burns.
- Do not apply when temperatures are above 90° F.
- Oil sprays also should be avoided when the relative humidity is high (over 90% for 48 hours), or rain likely, because the slower drying time of the oil on the foliage may cause phytotoxicity.

- During summer, leave at least a two-week interval between treatments.
- Do not use on transplants or apply to tender young shoots.
- Avoid dormant oil treatments in the fall, before true dormancy has taken place, or twig and shoot dieback on deciduous plants may occur the following spring.
- Do not apply when temperatures are below 40 °F because the emulsion breaks down.
- Do not apply with sulfur sprays or sulfur containing products or within 2 weeks of a sulfur spray because it reacts with oils to form plant damaging compounds causing foliar injury and leaf drop. Some plants may be more sensitive than others, however, and the interval required between sulfur and oil sprays may be even longer; always consult the fungicide label for any special precautions
- Do not use on open blooms. Treating bedding plants in flower may result in spotting of the flowers.
- Oil sprays on wax begonia and coleus may cause pitting and speckling of the foliage.
- Do not use on ferns.

## Symptoms of Plant Damage

Phytotoxic symptoms may first appear as a general chlorosis as the foliage turns a light yellow. Treated leaves may appear water-soaked, turn dark purple and drop from the plant.

## Plants That May Be Sensitive to Horticultural Oils

Two classes of woody ornamentals sensitive to oil when applied under seasonal conditions.

### Oil Sensitive Plants

Plant	Time of Treatment
Maples (Japanese, Silver, Sugar)	Dormant
Hickories	Dormant
Black Walnut, Japanese Walnut	Dormant
Cryptomeria	Anytime
Smoketree	Summer
Some Azaleas	Summer
Brambles (Rubus)	Summer
Butternut	Summer/Dormant
Blue Spruce/ Koster Spruce	Will lose blue color*
Alberta Spruce	Late summer

### Plants with a Tendency Toward Sensitivity

Plant	Time of Treatment
Beech	Dormant
Japanese Holly	Summer/Dormant
Redbud	Dormant
Savin Junipers	Summer, Spring
Photinia sp.	Summer
Spruce; Norway, White	Dormant
Douglas Fir	Dormant, Flowering time

Table adapted from: Johnson, W.T. 1985. Horticultural Oils, J. of Environmental Horticulture. 3(4): 188 - 191.

\*Treating blue spruce or blue rug junipers, results in a temporary loss of blue color although they will not be damaged permanently. Oil will remove bloom on grapes.

If uncertain of the reaction of a cultivar, spot treat with oil before infestations occur. This will determine if horticultural oil can be safely used should pest problems develop later.

## Plant Based Oils

Some plant based oils are commercially available including vegetable oils such as cottonseed and soybean oil. Some may also contain essential oils from herbs and spices such as thyme, mint or cinnamon. These oils are less refined and may cause more phytotoxicity (plant damage) than the more highly refined horticultural oils.

## Neem Based Oils

Neem oil works in a number of different ways. The oil forms a coating on the insect's body, blocking the breathing openings and suffocating the insect. It also has a repellent effect on certain insects and mites. Neem oil prevents the germination and penetration of some fungal spores. In one study, researchers discovered that a one percent neem oil treatment was effective in managing powdery mildew on hydrangeas, lilacs and phlox.

In Summary, horticultural oils are an effective low toxicity alternative for managing pests when they are used properly with an understanding of their benefits and limitations. Read and follow all label precautions.

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