Horticultural oils are used in the garden to control insects and mites for over 100 years: when used appropriately, it is one of the best insecticides we have. In the past, petroleum oils caused leaf burn. Modern oils minimize this problem. If properly applied these modern oils will not harm plants and are effective in controlling soft-bodied, slow moving insects and mites. Because of the way they kill pest insects, oils cause minimal harm to beneficial insects.

Now-a-days most horticultural oils are made from highly refined petroleum (listed as paraffinic oil or mineral oil). In the past, the petroleum oils could burn the plant leaves because these oils contains both saturated and unsaturated hydrocarbons and sulfur. The unsaturated hydrocarbons combine with sulfur in the oil to form a sulfuric acid/oil mixture that can burn leaves and tender shoots. Today’s horticultural oils have little sulfur and are 92% to 96% unsaturated oil.

You can also buy some non-petroleum based oils at the stores; these oils are made from many different oils including fish oils and/or vegetable oils. Some of the common vegetable oils used are canola oil, sesame oil, neem seed oil, cottonseed oil, corn oil, rosemary oil, clove oil and soybean oil. They work as well as the petroleum oils but can also burn plants if not used correctly. Vegetable oils do not have the problem with sulfur that petroleum oils do.

The amount of sulfur is important in petroleum-based oils. Unfortunately, for us, labels do not measure how much sulfur is in an oil directly but rather give a value for unsulfonated residue (UR). It is given as a percent and has a very complicated technical definition. For our purposes, you should look for UR values above 92%: within the range of 92% to 96% the higher the number the better. These oils can be sprayed any time of year and will not case leaf burn if used according to the label.

Older gardeners will remember using or reading about dormant oils and summer oils. Dormant oils were those that were only used in the winter on dormant plants. Dormant oils are heaver oils: they have 50% to 90% unsaturated oil and UR values less than 92%. They burn plants more easily than the lighter summer oils. Summer oils are what we call horticultural oils and are used on growing plants. Today “dormant” or “summer” are terms with no meaning. Oils are called “Year-Round Spray oils”, “All Season oils”, “Ultrafine” or sometimes “Superior or Supreme oils”. These oils can be used at any time of the year on dormant plants or growing plants.

Volck oil has always been considered to be a dormant oil by many “old-time” gardeners. Modern Volck oil has a UR rating of 92%, just under the value at which it would be an All-Season oil. It can be used in the winter on dormant plants or in the summer on citrus trees and some selected shrubs.
When you purchase petroleum oil read the label carefully. Many will give the UR value and you should buy only those above 92%. Some labels will not mention the UR value. For these oils, you only have the name to go by. But, always read the label to see what plants you should not spray with the oils and what insects can be controlled by the product.

Emulsifiers must be added to the horticultural oils so they mix well with water: without the emulsifier, oil and water do not mix. Oils you buy have the emulsifier already added and are mixed with water before application. Always follow the label on the bottle when mixing but generally use two to three tablespoons of oil to one gallon of water. Homemade vegetable mixtures are not nearly as effective and can be dangerous to your plants. If you do not have the appropriate emulsifiers, even if well shaken the oil-water will not spread evenly on the plant leaf. Even if it looks like it covers the leaf, the oil will bead up and since it does not cover the insects, it is ineffective. The beaded up oil can also cause leaf sunburn as the oil magnifies the sun.

Oils are most effect against soft-bodied insects such as aphids, mealybugs, scale, leafhoppers, mites, and insect eggs. These are some of the most common pests of our plants so these oils are very useful insecticides. Scientists think that these oils work by suffocating the insects. Killing the eggs is similar, the oil smothers the insect egg and prevents gas exchange into and out of the egg thus killing the egg. In addition, a diluted oil when mixed with baking soda can be sprayed on powdery mildew to control that fungus.

The oil-water mix must be in contact with the insect or egg in order to kill it. When spraying, always spray both the top and bottom of leaves and around the entire stem. Spray until the mixture drips off the plant. For best results, you should spray in the morning when the sun is not so bright. Never spray in the heat of the day especially in the central Florida summer. Do not spray plants or leaves that show wilting or drought stress: you can cause irreparable harm to the plant. If you have used sulfur on the plant for any reason within the last couple of months do not spray it again with oil, you can burn the plant.

Horticultural oils do not stay around more than a day or so: the light oils evaporate quickly. This property is the pesticides’ residual. Oils have little or no residual. However, while they are on the leaves, they can block foraging insects from attacking leaves.

Neem oil is a special oil: it is not only an insecticide and miticide (acting like other oils), it is an insect growth regulator and has some anti-fungal activity as well. It comes from the seeds of a fast growing, evergreen tree (Azadirachta indica) native to the south and southern portion of India. Unlike other horticultural oils where the active ingredient is the oil, neem oil has several chemically active ingredients. The major active ingredients in this oil are azadirachtin and salannin, but there are at least 33 other ingredients that also adversely affect insects. These natural chemicals are feeding deterrents and growth regulators (growth regulators prevent young larvae from molting and becoming adults, thus killing them). Neem oil also causes a suppression of the number of eggs produced by females and sometimes cause sterility. It is also a fungicide and effective against powdery mildew.
Modern horticultural oils are inexpensive, safe and easy to use. They are effective against most soft-bodied insects that attack our plants. For these kinds of insects, they should be our first choice of insecticides.

For further information see: [http://edis.ifas.ufl.edu/in197](http://edis.ifas.ufl.edu/in197) from the University of Florida and [http://www.ces.ncsu.edu/depts/ent/notes/Other/not45.html](http://www.ces.ncsu.edu/depts/ent/notes/Other/not45.html) from the University of North Carolina and [http://www.colostate.edu/Depts/CoopExt/4DMG/PHC/hortoil.htm](http://www.colostate.edu/Depts/CoopExt/4DMG/PHC/hortoil.htm) from Colorado State University.