Some Pesticides Permitted in Organic Gardening

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If we think organic gardening means vegetables free of any chemical pesticides, we don't have the story quite right.

Organic gardeners can use certain pesticides -- chemicals that are derived from botanical and mineral-bearing sources. These chemicals may be highly toxic, but they break down more rapidly than common chemicals, such as the Sevins, Malathions and 2,4,Ds.

The use of botanical and mineral-bearing pesticides, even though some are toxic, also can be incorporated into an Integrated Pest Management (IPM) approach to growing crops. IPM relies on a variety of pest control means rather than on one product or method. The pesticides discussed below are appropriate to include in IPM programs.

Just as the more common chemicals are given toxicity ratings -- CAUTION, WARNING or DANGER -- so are chemicals from botanical and mineral-bearing sources. "CAUTION" means low toxicity or completely free from danger; "WARNING" means moderately toxic and "DANGER" means highly toxic. The toxicity rating for each pesticide is provided in the paragraphs below.

BOTANICAL PESTICIDES

Nicotine Sulfate

Nicotine is extracted from tobacco or related Nicotiana species and is one of the oldest botanical insecticides in use today. It's also one of the most toxic to warm-blooded animals and it's readily absorbed through the skin. (Wear gloves when applying it, follow label directions and keep pets away from application areas.) It breaks down quickly, however, so it is legally acceptable to use on organically grown crops.

Nicotine sulfate is sold as a 40 percent nicotine sulfate concentrate under trade names that include Black Leaf 40 or Tender Leaf Plant Insect spray. Nicotine kills insects by interfering with the transmitter substance between nerves and muscles. It's commonly used to control aphids, thrips, spider mites and other sucking insecticides on most vegetables, some fruits, flowering plants and ornamental shrubs and trees. Roses are sensitive to nicotine. Choose alternate pest control measures when treating insects on roses.

Nicotine sulfate has a DANGER warning.

Sabadilla
Sabadilla, another botanical insecticide, is derived from the seeds of the sabadilla lily. The active ingredient is an alkaloid known as veratrine.

Sabadilla is considered among the least toxic of botanical insecticides, but its dust can be highly irritating to the eyes and can produce sneezing if inhaled. No residue is left after application of sabadilla because it breaks down rapidly in the sunlight.

Sold under the trade names Red Devil or Natural Guard, Sabadilla is effective against caterpillars, leaf hoppers, thrips, stink bugs and squash bugs. The insecticide is labeled for use on many vegetables. It has been assigned a CAUTION rating.

**Rotenone**

Rotenone is a resinous compound produced by the roots of two members of the Leguminoseae family. Its common use is to control various leaf-feeding caterpillars, beetles, aphids and thrips on a wide variety of vegetables and small fruits. A slow-acting chemical, rotenone requires several days to kill most susceptible insects, but insect feeding stops shortly after exposure.

Rotenone is moderately toxic to most mammals, but is extremely toxic to fish. It's widely used to poison "trash" fish during restocking projects. It has been assigned a CAUTION rating.

**Neem**

Neem is a botanical pesticide derived from the neem tree, a native of India. This tree supplies at least two compounds, azadirachtin and salannin, that have insecticidal activity and other unknown compounds with fungicidal activity. The use of this compound is new in the United States, but neem has been used for more than 4,000 years for medicinal and pest control purposes in India and Africa. It is not highly toxic to mammals.

A neem-based pesticide, Margosan-O, has been shown to control gypsy moths, leaf miners, sweet potato whiteflies, western flower thrips, loopers, caterpillars and mealybugs. This product is labeled for use on ornamentals, foliage plants, trees, shrubs and other non-food crops.

Margosan-O works as an insect growth regulator. The treated insect usually can't molt to its next lifestage and dies. It also may deter egg laying. Do not expect a quick kill.

Neem also can be purchased under the trade name Bioneem (by Safer Products).

**Pyrethrum/Pyrethrins**

Pyrethrum is the most widely used botanical insecticide in the United States. The active ingredient, pyrethrin, is extracted from a chrysanthemum plant, grown primarily in Kenya, Rwanda, Tanzania and Ecuador.

Most insects are highly susceptible to pyrethrin at very low concentrations. The compound acts rapidly on insects, causing immediate knock down. Flying insects drop almost immediately after
exposure. Fast knock down and insect death don't, however, always go hand in hand; many insects recover after the initial knockdown phase.

Insect mortality is increased by mixing pyrethrins with a synergist, such as piperonyl butoxide (PBO) to create pyrethrum. PBO, however, is not certified to be used on organic crops. Growers, who want to meet organic certification standards, should consult with the Colorado Department of Agriculture before using pyrethrin products.

Pyrethrins are highly irritating to insects; as a result, they may be used as "flushing agents," causing insects to come out of hiding, a desirable circumstance when you need to identify an insect that is hiding in the turf grass such as grubs or sod web worm.

Pyrethrum is non-toxic to most mammals, making it among the safest insecticides in use. The Environmental Protection Agency has approved it for more uses than any other insecticide. It's sold under trade names that include Pyrenon, Red Arrow (pyrethrins/rotenone) and Pyrellin (Pyrethrins/rotenone). Pyrethrum has been assigned a CAUTION rating.

Pyrethroids are synthetic materials designed to imitate natural pyrethrum. They can be used on houseplants, but because they are synthetic, they aren't registered to use on organic crops.

**MINERAL-BASED PESTICIDES**

**Sulfur**

Sulfur probably is the oldest known pesticide in use. The Greek poet, Homer, described the benefits of "pest-averting sulfur" 3,000 years ago.

Sulfur can be used as a dust, wettable powder, paste or liquid. Its primary use is to control powdery mildews, certain rusts, leaf blights and fruit rots. Spider mites, psyllids and thrips also are susceptible to sulfur. Most pesticidal sulfur is labeled for vegetables such as beans, potatoes, tomatoes, peas and fruit crops such as grapes, apples, pears, cherries, peaches, plums and prunes.

Sulfur has the potential to cause plant injury in dry 90 degree-plus weather. It's also incompatible with other pesticides. Don't use sulfur on plants within 20-30 days of applying spray oils. Sulfur reacts with the oil to create phytotoxicity.

Sulfur is non-toxic to mammals, but it may irritate eyes and skin. It has been given a CAUTION rating.

**Lime Sulfur**

Lime sulfur is made by boiling lime and sulfur together. The mixture is used as a dormant spray on fruit trees to control diseases such as blight anthracnose, powdery mildew and some insects including scales, thrips and eriophyid mites. Its drawbacks include its rotten-egg smell, its potential to burn exposed skin and eyes and to injure plants if applied when temperatures exceed
80 degrees F. Lime sulfur has been assigned a DANGER rating.

**Bordeaux Mixture**

(This is a natural-based pesticide, but it is not labeled for organic use.)

Bordeaux mixture is produced by a reaction between copper sulfate and calcium hydroxide (lime). It was used first in Bordeaux, France to control downy mildew, hence its name.

Bordeaux mixture is primarily a fungicide that controls bacterial leaf spots, blights, anthracoses, downy mildews and cankers. It also repels many insects. The compound is labeled for use on many vegetables, tree fruits and nut crops.

Bordeaux, as with sulfur and lime sulfur, can be phytotoxic to plants. If applied in cool, wet weather, it may burn leaves or cause russetting of fruit.

Photograph courtesy of Judy Sedbrook.

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