Rotenone

Another common botanical insecticide is rotenone, which is obtained from the roots of South American legumes. It acts as a stomach poison and can effectively control leaf-feeding insects such as beetles and aphids. A synergist, such as PBO or MGK-264, may be included to increase the effectiveness of rotenone. Rotenone is moderately toxic to mammals but is extremely toxic to fish. It is used as a fish poison in water management programs. Rotenone degrades rapidly in air and sunlight and when mixed with soap or lime.

Sabadilla

Sabadilla is derived from the seeds of the sabadilla lily, a tropical lily found in South America. Sold under the trade names of "Red Dog" and "Natural Guard," sabadilla is a contact and stomach poison that can control caterpillars, leafhoppers, thrips, stink bugs, and squash bugs. It is labelled to control vegetable pests.

Because sabadilla breaks down rapidly in sunlight, no residue is left after application. Synergists also are added to sabadilla to increase insect mortality. Sabadilla is toxic to humans and is extremely toxic to honeybees. Avoid applying sabadilla when bees are present.

Neem

Neem is a relatively new botanical insecticide in the United States even though it has been used in India for centuries. The neem active ingredient azadirachtin is extracted from neem tree seeds; it has both insecticidal and fungicidal activity. Neem acts as an insect repellent, feeding deterrent, and growth regulator. It is most effective when used early in the insect pest's life cycle. Apply neem as soon as eggs hatch, when immature stages are present.

For more information on selection, planting, cultural practices, and environmental quality, contact your Iowa State University Extension county office. If you want to learn more about horticulture through training and volunteer work, ask your ISU Extension office for information about the ISU Extension Master Gardener program.

These additional titles are available in the Reiman Garden series.

RG 201 *Integrated Pest Management for Vegetable Gardens*
RG 202 *Understanding Pesticide Labeling*
RG 203 *Choose Pesticides Wisely*
RG 204 *Apply Pesticides Safely*
RG 205 *Store Pesticides Safely*
RG 206 *Questions about Composting*
RG 207 *Nonchemical Pest Control for the Home Lawn and Garden*

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REIMAN GARDENS
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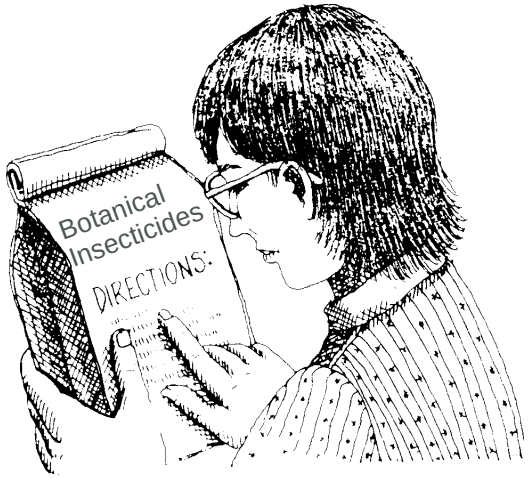
Botanical Insecticides in the Home Garden



IOWA STATE UNIVERSITY
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Botanical insecticides are naturally occurring insect toxins extracted from plants. Several such chemicals have been formulated for insect management in the home garden. They act quickly, causing immediate paralysis, death, or cessation of feeding. Many botanical insecticides, but not all, are less toxic than synthetic pesticides to mammals and plants (see table below). Botanical insecticides also tend to break down rapidly in the environment.

Botanical insecticides do have drawbacks. Because of their rapid degradation, botanical insecticides must be applied frequently and precisely. Many are broad-spectrum insecticides and will harm beneficial insects. Several botanical insecticides also are harmful to fish or other wildlife. Botanical insecticides are often more expensive to purchase than synthetic pesticides.

Toxicities of Selected Insecticides

Insecticide	Chemical Family	Oral LD_{50}[1]
Carbaryl (Sevin)	carbamate	246-283
Diazinon	organophosphate	1,250
Malathion	organophosphate	5,500
MGK 264	synergist	4,980
Neem	botanical	10,000
Permethrin	pyrethroid	430-4,000
Piperonyl butoxide (PBO)	synergist	>7,500
Pyrethrins (Pyrethrum)	botanical	1,500
Resmethrin	pyrethroid	>2,500
Rotenone	botanical	132-1,500
Sabadilla	botanical	4,000[2]

[1]Oral LD_{50}: the median lethal dose, in milligrams of toxicant per kilogram of body weight of the test animal (rat), that kills 50 percent of the population of test animals. A lower LD_{50} indicates a more toxic substance. These values were obtained from *Farm Chemical Handbook '96,* volume 82, Meister Publishing Company, Willoughby, OH.

[2]T. Henn and Rick Weinzierl. 1989. Alternatives in Insect Management: Botanical Insecticides and Insecticidal Soaps. University of Illinois CES, circular 1296, p. 6.

Commercial preparations of some botanical insecticides include a synergist such as PBO (piperonyl butoxide) or MGK 264 (N-octyl bicycloheptene dicarboximide) to increase the insecticide's effectiveness. Both of these compounds have low mammalian toxicity but are not accepted by some organic certification programs. Without the addition of a synergist, the activity of some active ingredients (for example, pyrethrin) is too low for practical use.

Applicators may be poisoned by careless handling or misuse of botanical insecticides. Always follow the label directions and wear recommended protective clothing.

Pyrethrins

Pyrethrins are common botanical insecticides derived from the dried flower heads of the daisy *Chrysanthemum cinerariaefolium*, which is grown in Kenya and Ecuador. Pyrethrins (six related insecticidal compounds that occur naturally in the crude flower dust) are contact poisons that knock down insects immediately. The addition of PBO greatly increases insect mortality. Pyrethrins act as stomach poisons and are labelled to control ants, aphids, roaches, fleas, and ticks. Apply pyrethrins frequently. They degrade rapidly, leaving little or no residual activity. Avoid mixing a pyrethrin compound with soap solutions as soap accelerates the degradation of the pyrethrin.

Pyrethroids, such as resmethrin and permethrin, are synthetic compounds that are closely related to natural pyrethrins. Pyrethroids tend to be more toxic to insects and to persist in the environment longer than pyrethrins. Because of their effectiveness, pyrethroids are applied at lower rates than other synthetic insecticides.