

## Special Types of Pesticides<sup>1</sup>

---

Frederick M. Fishel<sup>2</sup>

*This guide discusses some unique materials that are used as pesticides.*

Some types of pesticides do not belong to any specific chemical groups. Some of these are synthetically manufactured; some occur naturally in the environment, and others are produced by living organisms. These pesticides include antibiotics, anticoagulants, botanicals, insect dusts, insect growth regulators, microbials, petroleum oils, pheromones, plant hormones, and soaps.

### Antibiotics

Antibiotics can be produced naturally or synthetically. One common antibiotic is penicillin, widely used to control bacterial infections in humans and animals. Penicillin is produced by the fungi, *Penicillium* spp. Streptomycin, used as a bactericide, is synthetically produced, but also occurs naturally. Terramycin, used to control several plant diseases caused by bacteria, is another example of an antibiotic.

### Anticoagulants

In the medical field, anticoagulants are also known as “blood thinners.” In the pest control industry, they are a tool used for vertebrate control, primarily rats and mice. Because they interfere with blood-clotting in mammals, the vertebrate pest that has ingested an anticoagulant will die from blood loss. Some anticoagulants require a vertebrate pest to feed several times on them; others are effective after only one feeding.

### Botanicals

Some plants naturally produce substances that are poisonous to insects and other organisms. One of the earliest detected botanicals was pyrethrum when it was noticed that early cultivars of chrysanthemums appeared to have fewer insects in their vicinity. The oil responsible for the repelling action of pyrethrum is produced in the center of the flower heads. To extract the oil, the flowers are dried, dissolved and refined. Many formulations of pyrethrum products also contain a synergist which prevents insects from metabolizing the pyrethrum within their systems. There are a wide range of uses of pyrethrins, including indoor bug bombs, pet flea sprays and tick

---

1. This document is PI-47, one of a series of the Pesticide Information Office, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Original publication date June 2005. Visit the EDIS Web Site at <http://edis.ifas.ufl.edu>.

2. Frederick M. Fishel, Associate Professor, Agronomy Department, and Director, Pesticide Information Office; Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL 32611.

**Use pesticides safely. Read and follow directions on the manufacturer's label.**

dips, head lice treatment in humans, and garden insect control. Rotenone, highly toxic to fish, is used as a piscicide; but, it also has insecticidal properties. It is produced by the roots, stems and leaves of several plant species. Sabadilla, a low toxicity botanical for control of insects, is derived from the seeds of sabadilla lily, *Schoenocaulon officinale*. Ryania is a botanical insecticide made from the ground stems of *Ryania speciosa*, a native plant of tropical America. Nicotine, extracted from tobacco, was widely used as an insecticide in past years; but, its use has declined since newer synthetic insecticides were introduced. Strychnine is a highly toxic material used primarily for rat control. It is derived from the plant, *Strychnos nux vomica*, found in southern Asia and Australia. Hellebore is made from the dried rhizomes of several species of lily plants, many of which occur in the United States. It controls several species of insects, does not have a great amount of insecticidal activity and is broken down rapidly in sunlight.

### Inert Dusts

There are several types of these materials which act as desiccants. Inert dusts are used to control insects in several ways. One manner is through their physical activity. The dusts are abrasive and scratch the insects waxy body coating, causing a water loss. Another method is that they absorb the waxy body coating because of their affinity for moisture, which also dries the insect. They are low in toxicity, but inhaling them can cause respiratory tract irritation. Some formulations of inert dusts have an additive which assists the dust in clinging to the outer surface of the pest's body. Because of their low toxicity, they may be the best choice where limitations exist for applying more highly toxic pesticides. Boric acid powders are a logical choice for cockroach control in hard to reach places such as underneath appliances in structural pest control settings. Several disadvantages are that they leave visible residues on surfaces and they lose their effectiveness if they become wet. Other materials that are used as desiccants include diatomaceous earth and silica gel.

### Insect Growth Regulators

Also known as IGRs, they are chemicals that cause a disruption of the normal development of an

insect. Natural growth hormones produced by an insect regulate the normal life stages. Synthetic IGRs interrupt the activity of the natural hormones. This interruption may prevent insects from reaching the adult stage or force insects to reach the adult stage before they are capable of reproducing. Several of these products, including the active ingredients, hydroxyurea and methoxyurea, are used for control of structural pests such as cockroaches, ants, fleas and stored grain insects and control of vector pests, including mosquitoes.

### Microbials

Microbial pesticides are produced by combining a microorganism with other components to form the formulation. The bacterium, *Bacillus*, has various strains which target specific groups of insect pests and has been used since the 1960s. Another bacterium, *Agrobacterium radiobacter*, controls a bacterium that is responsible for crown gall in a number of woody plant species. Some fungi, viruses and nematodes are available for control of various weeds, mites and insect pests. Because of the low toxicity posed by microbial pesticides to humans, lack of nontarget organism effects, and pest specificity, their use has gained popularity in recent years.

### Petroleum Oils

Several highly refined petroleum oils are used in Florida's field and greenhouse agricultural production systems for control of pests including aphids, mites, scales and whiteflies. Those oils which are highly refined destroy insects and insect-like pests by suffocation. In citrus, oils have activity on the fungal pathogen responsible for causing greasy spot disease. Some of the lower refined oils have herbicidal activity by destroying plant cell membranes. The safety and effectiveness of various petroleum oils depends upon their chemical and physical properties, such as composition and distillation temperature and range. Attention should be given to the limitations on using these materials as there are problems with tank-mixing certain pesticides and application restrictions.

## Phermones

Pheromones are chemicals produced by animals that stimulate behavior in other animals of the same species. For example, mating by many species of insects is dependent upon their locating suitable mates through detection of pheromones. Practical uses of synthetic pheromones are that they are suitable to monitor insect populations within a site. For the purposes of monitoring, pheromones are placed inside of traps to serve as an attractant. They have been used to attract insects to a site that will be treated with pesticides for their control and used to disrupt mating in some instances.

## Plant Growth Regulators

Like animals, plants naturally produce hormones and growth regulators that control their development, including branching, rooting, flowering, fruit-set, leaf abscission and dormancy. In Florida, plant growth regulators are most regularly used in the nursery industry. In some instances the hormones and plant growth regulators are manufactured synthetically; in other instances, they are derived from the plants. Synthesized hormones and regulators mimic their natural counterparts or they may cause the target plant to produce some type of desired effect. Some pesticides, such as carbaryl and 2,4-D, used primarily for insect and weed control, respectively, also have growth regulation effects under certain circumstances. For example, 2,4-D has been used in potato production to redden the skins while carbaryl has been used as a fruit thinning agent.

## Soaps

Insecticidal soaps target some species of insects in horticultural crops by disrupting their cell membranes. They are practically nontoxic to many organisms, including humans. They do have limitations in that they work only upon contact, thus drying renders them ineffective. Other limitations are that thorough coverage is required; repeat applications are required and some phytotoxicity may occur.

## Additional Information

Buss, Eileen A. and Sydney G. Park-Brown. 2002. Natural products for insect pest management. UF/IFAS EDIS Document ENY-350. <http://edis.ifas.ufl.edu/IN197>. Visited June 6, 2005.

Koehler, P.G., F.M. Oi and D. Branscome. 2003. Cockroaches and their management. UF/IFAS EDIS Document ENY-214. <http://edis.ifas.ufl.edu/IG082>. Visited June 6, 2005.

Miller, D.M. and P.G. Koehler. 2003. Least toxic methods of cockroach control. UF IFAS EDIS Document ENY-258. <http://edis.ifas.ufl.edu/IG105>. Visited June 6, 2005.

Weinzierl, R., T. Henn and P.G. Koehler. 1997. Insect attractants and traps. UF/IFAS EDIS Document ENY-277. <http://edis.ifas.ufl.edu/IN080>. Visited June 6, 2005.

Weinzierl, R., T. Henn and P.G. Koehler. 1997. Microbial insecticides. UF/IFAS EDIS Document ENY-275. <http://edis.ifas.ufl.edu/IN081>. Visited June 6, 2005.