K-STATE Research and Extension
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ALTERNATIVE PESTICIDES AND CONTROL METHODS

A pesticide is any substance or mixture of substances intended to prevent, destroy, repel, or mitigate any insects, rodents, nematodes, fungi, weeds, or other forms of life declared to be pests.

Synthetic chemical pesticides provide many benefits to food production and nutrition, but they also pose some hazards. Some synthetic pesticides may leave undesirable residues in food, water, and the environment when not used properly. Low doses of many pesticides are toxic to humans and other animals. As a result, many homeowners, growers, and researchers are seeking less hazardous alternatives to conventional synthetic pesticides. Following is a list of some of the alternative methods of pest control and their advantages and disadvantages.

Botanical insecticides

Rotenone, pyrethrum, sabadilla, ryania, neem
Advantages--Rapid breakdown; rapid action; low toxicity to mammals and plants.
Disadvantages--Rapid breakdown, requiring more precise timing of and/or more frequent application; cost and availability; lack of test data; lack of state registration of some materials.

Microbial insecticides

Bacillus thuringensis (Bt), (Dipel, Thuricide, Attack, Caterpillar Killer), M-One
Advantages--Selective; nontoxic to wildlife and humans; may establish and provide control in the future.
Disadvantages--Controls only one species or group of insects; timing is critical; special storage and application procedures may be necessary.

Insecticidal soaps

Safer's Insecticidal Soap
Advantages--Rapid breakdown; rapid action; low toxicity to mammals and other animals; low toxicity to most plants; selective, doesn't harm most beneficial insects.
Disadvantages--Rapid breakdown; effective only against insects that come into direct contact with the spray before it dries; phytotoxic to some ornamental plants and houseplants.

Attractants

Pheromones, lures
Advantages--Nonhazardous to humans or other animals; no residues; target specific insects while leaving beneficials unharmed.
Disadvantages--Variable results due to weather, locations; effectiveness limited to specific adult insect populations; expensive, more useful for monitoring the presence of insects than for control in most cases.

Beneficial insects

Ladybugs, green lacewings, syrphid flies, trichogramma wasps, praying mantis
Advantages--Nontoxic to mammals and wildlife. If established, may provide control in subsequent pest generations or seasons.
Disadvantages--Variable results; careful handling required; some beneficials are limited in the kind of insects they will eat; some pests must be allowed to remain in order to provide a food supply for the beneficials.

Fungicides

Sulphur, copper, Bourdeaux mixture
Advantages--Provide fungicidal action and disease control.
Disadvantages--Toxic to mammals, wildlife, and many beneficials. Timing of application is critical. Sulphur should not be used within a month of oil sprays or when temperature is above 80-85^{o} F. Unsafe levels may build up in soil after years of use.

Oils

Dormant oils, horticultural superior oils, Volck
Advantages--No residues on fruit when applied pre-bloom; effectively control many overwintering pests.
Disadvantages--Must be applied while tree is dormant, though lighter-weight oils are being developed for use in spring and summer. Must be applied when temperatures are above 40^{o} F but below 80^{o} F for several hours to avoid injury.

Traps

Tanglefoot, sticky yellow or white boards
Advantages--No residues, nontoxic to mammals, wildlife, and beneficials.

Disadvantages--Can trap both pests and beneficials; some traps are expensive; must be maintained, cleaned, and recoated periodically; effectiveness varies.

Physical barriers

Row covers, netting
Advantages--Nontoxic, no residues. Allow water, air, and sunlight to pass through.
Disadvantages--Row covers prevent pollination of fruits and vegetables by insects; durability varies from 1-3 seasons; considerable damage may result from pests that emerge under row covers.

Diatomaceous earth

Perma-guard
Advantages--Nontoxic to mammals and birds; works by dehydration rather than poisoning; contains beneficial trace minerals.
Disadvantages--Affects beneficials such as ladybugs; complete application required; less effective in humid weather.

Cultivation and hand picking

The least expensive of all control practices. Must be used long before pest damage becomes apparent and at the proper stage of development of the insect.

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