



Tiny Invaders

Sooner or later you'll have to do something to protect your plants from marauding pests, even if you grow your botanical friends in enclosed grow rooms or well-screened greenhouses

Pests often gain entrance to an enclosed growing space by hitching a ride on young plants, equipment and people. Once established pests have a tendency to breed rapidly. Fortunately, growers can take advantage of a good selection of pest-control options.

The first step in controlling any pest problem is to identify the pest causing the problem. Once you know what type of pest you're doing battle with you can plan your attack with so-called "soft" or "hard" control options.

Getting Control

Growers often try to avoid toxic man-made chemical sprays (hard control) in favor of more environmentally friendly techniques such as various forms of integrated pest management (IPM), soaps and oils, repellents, botanical sprays and other "natural" products (soft



Top left: Small numbers of slow-moving pests such as mealy bugs can be controlling by dabbing on pesticides or methylated spirits. *Top right:* Larger soft-bodied insects can be found and disposed off easily on a small number of plants. *Above:* Cool, moist media-based hydroponic system are an attractive home for chewing insect pests such as slugs and snails. Baits may be required in outdoor systems.



Left: Regular plant monitoring of valuable hydroponic plants is the first step to early pest control. Above: Small-scale growers sometimes attempt different methods of pest control such as vacuuming up whitefly insect pests.

control).

IPM is an environmentally sensitive approach to pest management that relies on a combination of common-sense practices. IPM is not a single pest control method but, rather, a group of pest management controls. Perhaps the most basic form is hunt and squish. This technique involves inspecting the plants, finding the pest, grabbing it and disposing of it. Mostly it's used against larger pests such as snails, caterpillars or other slow-moving intruders. It does not work well against pests that are small, fly away or otherwise move rapidly when disturbed such as whiteflies and thrips, or are camouflaged such as scale.

When just one or two plants need to be treated growers can dip a small brush in insecticide or methylated spirits and apply directly onto pests such as mealy bug or scale. This method often works well for valuable indoor plants such as palms where spraying may not be an option.

Pheromone traps are useful for catching adult moths before they have a chance to lay eggs. Some small-scale growers have even tried using hand-held vacuum cleaners against flying pests such as

whiteflies.

Repellents

Garlic sprays and hot pepper wax barrier sprays are widely available on the hydroponic retail and home-gardening market. Some growers prefer to make their own versions. However, results with these products seem to be mixed. Some growers swear by them while others swear at them. Dissatisfied growers have said pests even thrived on foliage treated with these products.

As with all pest-control products, growers should test a small area of plants first and observe the effect before treating the whole system.

Soaps, Oil Sprays and More

Soaps and oils work by smothering the pest—that is, the chemical coating plugs the pest's breathing pores located on its exoskeleton. They also work by creating a

surface that prevents small pests such as mites from moving around and breeding.

Soap and oil sprays have been in use for a long time. Decades ago, washing water would be poured on the garden plants to get some control over such pests. Nowadays, growers can buy concentrates of various soap and oil products, from mineral oils to natural fatty acids. These products can be used on their own or added to certain other pesticides to make a more powerful and persistent bug spray. Some examples are the Safer's brand of garden products, which are widely available.

Soaps and oils are fairly safe for growers to use, store and apply. Some growers rely exclusively on these products. However, regular application over a long time can lead to buildup of oil/soap residue on hydroponic system components, and you'll have to wash it off from time to time.

Following product instructions about application method and timing is important. Soap and oil sprays have been known to damage foliage, particularly on plants grown indoors, in greenhouses or under low light conditions. Some commercial greenhouse growers have certainly suffered foliage damage from heavy use of these



Top: Soft-bodied insects such as aphids can be smothered with soap/oil sprays. **Middle:** Outdoor and even unscreened greenhouses can suffer damage from larger pests such as birds. **Bottom:** Hydroponic blooms can be damaged by some pest control options such as oil sprays.

sprays. Damage usually occurs under certain conditions, such as when humidity is high, which slows the drying time of the spray on the foliage. This sort of problem can be avoided. Growers using a spray for the first time should test a small area of plants first and then check for any damage over the next 2-3 days before treating the whole crop.

Soaps and oils may need frequent application as they have no systemic action—that is, they don't get inside the plant to poison insects as they feed. Any new pests flying or hitching a ride into the hydroponic growing area won't be controlled until another spray is applied.

Diatomaceous earth or similar mineral compounds are sold as natural or non-chemical insecticides. Diatomaceous earth is actually the skeletal remains of single cell freshwater plants called diatoms. Dusting lightly on insects or affected areas provides a desiccant action on the insects themselves and also an abrasive layer that slows crawling insects such as slugs and worms. The downside is the dusty residue on hydroponic fruits or vegetables must be washed off.

Biological Control

Commercial grower and small-scale hydroponic growers can usually buy small quantities of bio-pesticides. One of the most well known and highly effective are products made from the bacterium *Bacillus thuringiensis*. Bt spray, once applied to the plants, is ingested by the caterpillars as they feed. A bacterial toxin is produced in the alkaline digestive system of the caterpillar, which causes the pest to stop feeding and results in dehydration and death within a few days.

There are a number of different strains of Bt used for different insects. New growers often make the mistake of using a product containing a Bt strain for caterpillars on other insect pests such as fungus gnat larvae or Colorado beetle larvae. It's important to get the right product and Bt strain for each pest as the Bt strain that kills fungus gnats in products such as Gnatrol is different from that used in caterpillar control products such as Dipel. Colorado potato beetle larvae are controlled by yet another different strain of Bt, and contained in products such as M-track.

There is also a range of other biological-control products. Some are derived from fungal pathogens of various insects. Under the right conditions they can give effective control. As with all biological-control options, environmental conditions can be important. Sometimes the fungal pathogen of the pest being applied needs high humidity or other conditions to be able to thrive, reproduce and successfully control the pest, which probably explains why some growers have had good success with these products and others have not.

Beauveria bassiana is a common soil-borne fungus, and strains of this organism are commercially available under a number of trade names. These are effective against whitefly eggs, immature and adult pests. Good coverage is required to ensure the spores make contact with the pest to begin the infection process. *Verticillium lecanii* is another fungus which has been formulated into

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a product to control whitefly. The spores of these fungi develop inside the whitefly, killing it. The spores then erupt through the insect's outer layer to produce more spores for further infection.

Growers with pest problems should seriously consider trialling bio-pesticides since they can be highly effective against pests but are harmless to growers.

Botanical Extracts

Growers often assume softer pesticides are safer because they're made with plant extracts. But the truth is they can be more toxic to humans than some of the synthetic chemical pesticides on the market. Sprays containing botanical extracts need the same careful handling and application.

Botanical extracts commonly used for pest control in hydroponic systems include pyrethrum, derived from a daisy (*Chrysanthemum cinaeraefolium*), and neem oil, extracted from the seed kernels of the Indian neem tree (*Azadiracta indica*).

Pyrethrum, often combined with other compounds to increase its effectiveness, can be used to control a wide range of pests.

Neem oil or various extracts of neem are sold as an oil, solvent extract and as a ground product. Neem spray acts primarily as an insect growth regulator, meaning it stops the insect's life cycle by disrupting molting. Neem pest-control products including neem oil, bio-neem and Einstein Oil can be found in many hydroponic retail shops. Since neem is effective on particularly difficult pests such as whitefly and mites it's a good general purpose spray option for small-scale growers.

In the next "Beginner's Corner" I'll talk more about integrated pest management techniques, chemical pesticides and application methods. 🌿

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Resources

GrowEZHydro

www.growezhydro.com

Nature's control

www.naturescontrol.com

Buglogical Control Systems

www.buglogical.com

Plant'it Earth

www.plantitearth.com

Harvest Moon

www.hmoonhydro.com



Top: Enclosed areas such as growrooms and hobby greenhouse are not safe from pest attack. **Middle:** It's not a good idea to use toxic pest-control sprays on ornamental hydroponic plants grown indoors. **Bottom:** Keeping a close check on pest populations is important in deciding at which stage a spray application is required.