Insecticidal Soaps

Insecticidal soaps can be a valuable tool to manage insect and mite pests on **greenhouse vegetables, herbs, bedding plants, flowers, and indoor plants.** Soaps control many targeted pests with fewer potential adverse effects to the user, beneficial insects and the environment compared to more traditional pesticides. To be most effective, it's important to understand how insecticidal soaps "work," their mode of action, and to recognize their benefits and limitations. The target audience of this fact sheet is commercial greenhouse growers and retailers.

What is insecticidal soap?
Insecticidal soaps are potassium salts of fatty acids. A soap is made from the action of an alkali such as potassium hydroxide on a fat. Fats consist mainly of fatty acids. Commercial products contain a blend of selected fatty acid chain lengths.

How do insecticidal soaps work?
Insecticidal soaps work only on direct contact with the target pests. The most common soaps are made of the potassium salts of fatty acids. The fatty acids disrupt the structure and permeability of the insects' cell membranes. The cell contents can leak from the damaged cells, and the insect quickly dies. There is no residual insecticidal activity once the spray application has dried. Insecticidal soaps rapidly degrade and wash off leaf surfaces.

Benefits of Insecticidal Soap
Insecticidal soaps are most effective on soft-bodied pests especially spider mites, aphids, and whiteflies but also leafhoppers, mealybugs, thrips, scale insects (especially scale crawlers), and caterpillars. Crawlers, nymphs, or larvae tend to be more susceptible. However, insecticidal soap has less effect against insect eggs. It also tends to be less effective against hard-bodied pests such as beetles. Some insecticidal soaps are labeled for suppression of powdery mildew on certain plants.

Soaps have low mammalian toxicity. However, they can be mildly irritating to the skin or eyes. Insecticidal soaps are biodegradable, do not persist in the environment, and they do not contain any organic solvents. Many formulations of insecticidal soap can be used on various food crops up to the day of harvest.

Limitations in the Use of Insecticidal Soap
As mentioned earlier, once an insecticidal soap spray has dried, there is no residual activity because insecticidal soaps work only on **contact.** If an insect has not been coated with the spray, it will not be affected by walking over or ingesting plant material that has been treated with soap.

As with any contact insecticide, familiarity with the biology and life cycle of the targeted pest will lead to more effective management. For example, insecticidal soaps are useful in controlling lace bug nymphs but will have no effect against lace bug eggs. In addition, all stages of the lace bug are found on the undersides of leaves. Spraying only on the upper surfaces will have no effect, as the treatment will not come in contact with the targeted pest. Regular scouting to detect when the lace bug nymphs hatch from the eggs will determine the best time for treatment.

Direct sprays of insecticidal soap are very harmful to nymphs and adults of the beneficial predatory mites, such as *Phytoseiulus persimilis, Neoseiulus cucumeris* and *Neoseiulus californicus.*

Plants that may be sensitive to applications
Insecticidal soaps may cause phytotoxicity (causing plant injury) symptoms, such as yellow or brown spotting on the leaves, burned tips or leaf scorch on certain sensitive plants.

Plant sensitivity can be influenced by pest pressure, cultivar, plant vigor, environmental conditions, spray concentration, pH of spray mixture as well as the timing, number, and frequency of applications.

Plants under stress such as hot (greater than 90 °F), humid or drought conditions, young transplants, unrooted cuttings, and plants with soft young growth are more likely to develop phytotoxic symptoms and should not be treated with soap. Do not apply to very sensitive plants such as horse chestnut, Japanese maple, mountain ash, bleeding heart or sweet peas.

Begonia, chrysanthemum, Crown of thorns, cucumber, delicate ferns, narrow leaf evergreens (especially when stressed or when tender new growth is present), dieffenbachia, fuchsia, gardenia, impatiens, jade plant, lantana, ornamental ivy, palms, poinsettia, schefflera, Zebra plant and **some succulents** may be sensitive. The open blooms or flowers of many plants may also be injured.

When uncertain, spot treat a portion of the cultivar, and wait at least 24 hours to see if any phytotoxicity (plant damaging) symptoms develop before treating an entire group of plants.

Do not use dishwashing soaps and detergents. They are designed to remove grease from dishes and may cause plant damage by dissolving the waxy cuticle on plant leaf surfaces. There is increased risk of plant injury with the use of dishwashing soaps and detergents (not registered as a pesticide) when used as a spray.

How to Apply
Insecticidal soaps should be applied when conditions favor slow drying to maximize effectiveness, e.g., in the early morning hours with dew coverage or in the early

evening. Avoid treating with soaps on hot sunny afternoons which promote rapid drying. Thorough coverage is vital for the soap to be effective: Spray thoroughly, but not beyond the point of runoff. Repeat applications may also be needed as determined by follow up scouting.

Insecticidal soap mixed in hard water with a high mineral content may be less effective and more toxic to the treated plants. A precipitate (soup scum) may be formed when the metal ions (e.g., calcium, iron, or magnesium) found in hard water bind to the fatty acids in the soap.

In summary, soaps are effective tools in an integrated approach toward pest management if they are used properly with an understanding of their limitations and benefits. Carefully follow all label instructions.

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