HOME & GARDEN

Insect control: soaps and detergents

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Quick Facts...

Soaps can be used to control a wide range of plant pests. Small, soft-bodied arthropods such as aphids, mealybugs, psyllids and spider mites are most susceptible to soaps. Larger insects, including most beneficial species, tend to be little affected by soap sprays.

The ease of use, safety and selective action of soaps are strong advantages that appeal to many people.

Limitations of soaps include the need to wet the insect during application, absence of any residual effectiveness and potential to damage some plants.

Soaps or detergents used for control of insects are applied as dilute sprays, mixed with water to produce a concentration of about 2 percent.

Soaps have been used to control insects for more than 200 years. Recently, there has been a great increase in interest and use of these products. This change is due to a better understanding of how to use soaps most effectively for pest control and a desire of many consumers to try insecticides that are easier and safer to use than many currently available alternatives.

How soaps and detergents kill insects is still poorly understood. In most cases, control results from disruption of the cell membranes of the insect. Soaps and detergents may also remove the protective waxes that cover the insect, causing death through excess loss of water.

Soap and detergents act strictly as contact insecticides, with no residual effect. As a result, to be effective, sprays must be applied directly to, and throughly cover, the insect.

Several **insecticidal soaps** are produced and distributed for control of insects and mites. Available under a variety of trade names, the active ingredient of all is "potassium salt of fatty acids." As such, they are similar chemically to liquid hand soaps. However, there are many features of commercial insecticidal soap products that may distinguish them from dishwashing liquids or soaps that are sometimes substituted. Insecticidal soaps sold for control of insects: (1) are selected to control insects; (2) are selected to minimize potential plant injury; and (3) are of consistent manufacture.

Some household soaps and detergents also make effective insecticides. In particular, certain brands of hand soaps and liquid dishwashing detergents can be effective for this purpose. These are also substantially less expensive. However, *there is increased risk of plant injury with these products*, as they are not selected to be used on plants. (Dry dish soaps and all clothes-washing detergents are too harsh to be used on plants.) Also many soaps and detergents are poor insecticides. Identifying safe and effective soap-detergent combinations for insect control requires experimentation. Regardless of what product is used, soap-detergent sprays are always applied diluted with water, typically at a concentration of around 2 percent to 3 percent (Table 1).

Soap-Detergent Sprays

Most research with insecticidal soaps and detergents has involved control of plant pests. In general, these sprays are most effective against most small, soft-bodied arthropods, such as aphids, young scales, whiteflies, psyllids, mealybugs and spider mites. Larger insects, such as caterpillars, sawflies and beetle larvae, generally are immune to soap sprays. However, a few large insects, including boxelder bugs and Japanese beetles, are susceptible.

Insecticidal soaps are considered selective insecticides because of their minimal adverse effects on other organisms. Lady beetles, green lacewings, pollinating bees and most other beneficial insects are not susceptible to soap

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sprays. Predatory mites, often important in control of spider mites, are an exception, a beneficial group of organisms easily killed by soaps.

One of the most serious potential drawbacks to the use of soap-detergent sprays is their potential to cause plant injury (*phytotoxicity*). Certain plants are sensitive to these sprays and may be seriously injured. For example, most commercial insecticidal soaps list plants such as hawthorn, sweet pea, cherries and plum as being sensitive to soaps. Portulaca and certain tomato varieties also are sometimes damaged by insecticidal soaps. The risk of plant damage is greater with homemade preparations of household soaps or detergents. When in doubt, test soap-detergent sprays for phytotoxicity problems on a small area a day or two before an extensive area is treated.

Plant injury can be reduced by using sprays that are diluted more than the 2 percent to 3 percent suggested on label instructions. Also, wash plants within a couple of hours after the application to reduce leaf injury. Limiting the number of soap applications can also be important, as leaf damage can accumulate with repeated exposure.

However, because of the short residual action, repeat applications at relatively short intervals (four to seven days) to control certain pests, such as spider mites and scale crawlers. Also, application must be thorough with complete wetting of the pest. This usually involves spraying undersides of leaves and other protected sites. Insects that can not be completely wetted, such as aphids within curled leaves, will not be controlled.

Environmental factors also can affect use of soaps. In particular, soaps (but not synthetic detergents) are affected by the presence of minerals found in "hard" water, which results in chemical changes producing insoluble soaps (soap scum). Control is decreased if hard-water sources are used. Insecticidal soaps may also be more effective when applied during periods when drying is not overly rapid, such as early or late in the day.

Soaps and detergents can offer a relatively safe and easy means to control many insect pests. However, there are limitations and hazards associated with their use, as with all pesticides. By understanding these limitations, and carefully following all label instructions, these products can be used optimally.

Table 1: Approximate mix to produce various dilute soap sprays.

Percent dilution desired	Approximate amount of soap to add to water to produce: 1 gallon	1 quart	1 pint
1	2-1/2 Tbsp (-)	2 tsp (+)	1 tsp (+)
2	5 Tbsp (-)	4 tsp (+)	2 tsp (+)
3	8 Tbsp (+)	2 Tbsp (+)	1 Tbsp (+)
4	10 Tbsp (-)	2-1/2 Tbsp (+)	4 tsp (+)

(+) Will produce a solution of slightly higher concentration than indicated.

(-) Will produce a solution of slightly lower concentration than indicated.

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