

Insecticidal Soaps

What is a soap? Chemically, soap is a salt of a fatty acid used in a variety of products. Soaps are key components of most lubricants and greases. That may seem paradoxical since soap is what we use to wash grease off. What we usually call “soap”, are what the industry terms “toilet soaps”. These soaps

are made by mixing oils or fats with a strong alkali (potassium hydroxide or sodium hydroxide). This results in saponification – fats are converted to fatty acid salts and glycerol is released. Okay. Enough with the chemistry.

Soaps have been used in various ways for insect control for over 200 years. Their popularity waned as the production and use of chemical insecticides gained popularity. Recently, the concerns about overuse, environmental impact and development of insect resistance with these chemical insecticides has led to an increase in the use of softer ways of controlling insect pests. This includes horticultural oils, Neem, diatomaceous earth (see next month’s GNO Gardening) and insecticidal soaps. Commercially available insecticidal soaps will usually list potassium salts of fatty acids as the active ingredient. These are long-chain fatty acids (10-18 carbon atoms). Shorter chain fatty acids tend to be phytotoxic meaning that they can cause damage to plants. This is a good reason to purchase commercial insecticidal soap products rather than going the homemade route. Supermarket soaps don’t tell you how long the carbon chain is and it can be challenging and costly to find out. Besides, commercial insecticidal soaps aren’t very expensive. Commercial insecticidal soaps come as concentrates

or RTU (ready-to-use). RTU’s typically contain 1-2% active ingredients. Concentrates are usually diluted to similar rates for use. Insecticidal soaps are strictly contact insecticides. That means that you need to achieve virtually 100% coverage to get good control. Be sure to apply to both sides of all leaves, plus the trunk, stems, buds and developing fruit. There is also no residual activity. If the insect isn’t present and covered when you spray, then you get no control. Lack of adequate coverage is usually the reason users are disappointed with the results of using insecticidal soaps. Insecticidal soaps are most effective if applied when conditions are favorable for slow drying (e.g. early morning). The longer they persist in a wet condition on the plant, the better control you’ll get (don’t use on hot sunny days). Water conditions of diluting a concentrated insecticidal soap can also influence effectiveness. Insecticidal soaps work best if diluted with soft water; hard water (high mineral content) will lead to reduced effectiveness, may increase the chance of phytotoxicity and could result in “soap scum” (a precipitate formed when the metals in the water react with the fatty acids). Because insecticidal soaps have zero residual activity, they must be reapplied frequently. This lack of residual activity during high insect pressure can also lead users to believe that the product is not working. They spray their plants one day and two days later they are still covered with aphids. Because there is no residual activity, as soon as the product dries, new pests can move in to replace the ones killed by the insecticidal

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Insecticidal soaps can be applied using a hand pump sprayer, compressed air sprayers or hose end applicators like the one pictured above.

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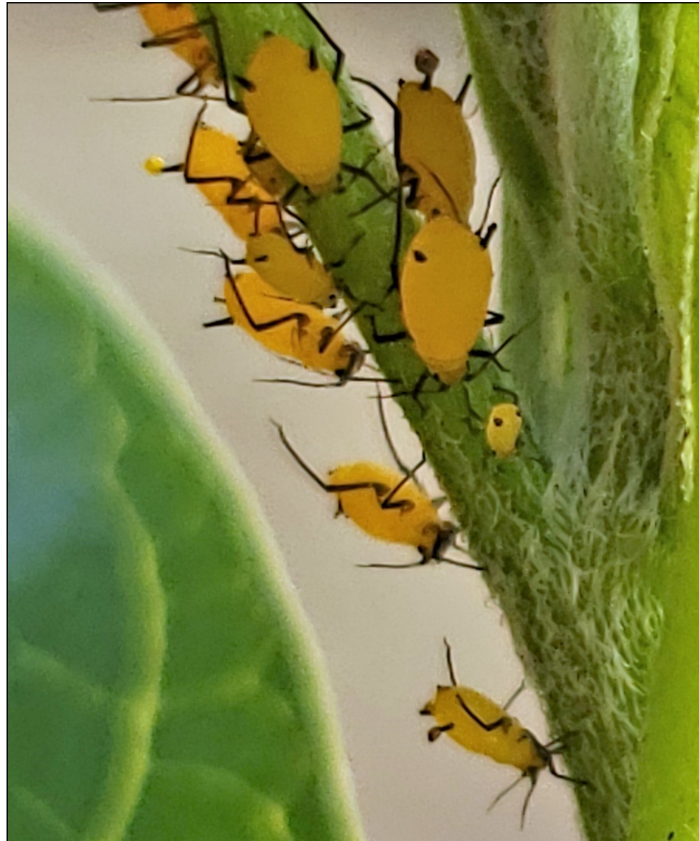
soap application and it looks as though the application had no effect. If you want to use insecticidal soaps, be prepared to reapply.

Insecticidal soaps are most effective against soft-bodied insects such as aphids, adelgids, lacebugs, leafhoppers, mealybugs, thrips, sawfly larvae, scale insects (particularly scale crawlers), plant bugs, psyllids, spider mites and whiteflies. Different products will have different lists of insects controlled on the label. Insecticidal soaps have little effect on insect eggs or hard-bodied insects. They have no mammalian toxicity but are toxic to fish and aquatic organisms and should not be used near bodies of water. There are several modes of action

associated with insecticidal soaps. The fatty acids disrupt the structure and permeability of the insects' cell membranes, the cell contents leak from the damaged cells, and the insect quickly dies. They can also block the insect breathing holes (spiracles) and suffocate the insect. They may also wash off the waxy coating on some insects which leads to dehydration.

Insecticidal soaps may cause phytotoxicity 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 those in 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



Aphids like these feeding on a plant can be easily controlled with insecticidal soaps. Photo by Katrina Dunaway

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, redbud, river birch, schefflera, Zebra plant and some succulents may be sensitive. The open blooms or flowers of many plants may also be injured. Glaucous bloom on spruces and waxy bloom on grapes may be altered.

When uncertain, spot treat a portion of the cultivar, and wait at least 24 hours to see if any phytotoxic symptoms develop before treating an entire group of plants. Rinse plants with a clean water spray if they show signs of wilting or leaf edge browning within a few hours of treatment.

Insecticidal soaps can be a very effective alternative to chemical insecticides if used properly and insect resistance will not occur. But remember: 1) they are contact insecticides and full coverage is requisite for good control: 2) there is no residual activity and reapplication will most likely be needed and 3) some plants are sensitive. There are a number of products available from Safer Brand, Espoma, Natria, Monterey and Bonide to name a few.

~Dr. Joe Willis