



On Making Homemade Insecticidal Soap

We've actually consulted with the Ontario Ministry of the Environment, and they have asked that we not recommend homemade solutions. Homemade products have not been tested for safety and impact on non-target species. They can do more harm than good. In addition, there is an added concern that no instructions or warnings are included with homemade recipes. E.g. how often to use, dangers to aquatic life, general safety

The "Dirt" on Soaps!

The problem is 'dish soaps' used in the home are not designed to be used on plants. And some 'dish soaps' are not soaps—they are actually **detergents**. Many have additives that provide fragrance, soften hands, improve rinsing or disinfect. Some are formulated as salts using **sodium** that can be harmful to plants. Commercial insecticidal soaps use **potassium**, which is less disruptive to salt balances and the movement of water from the roots to the leaves.

What is a Soap?

A soap is made from the action of an alkali such as sodium hydroxide or potassium hydroxide on a fat. Fats consist mainly of fatty acids of varying lengths. These are chains of carbon and hydrogen atoms with a reactive oxygen tail. **Short chain fatty acids** tend to be **damaging** to plants (**phytotoxic**). For example, acetic acid or vinegar (C₂H₄O₂) is a very short chain fatty acid that is used as an herbicide. **Insecticidal soaps** are based on **long-chain fatty acids** (10–18 carbon atoms) of **potassium** (rather than **sodium**) salts. An example would be potassium laurate C₁₂H₂₃KO₂. Some dish soaps are made with **sodium** palmitate: C₁₆H₃₁NaO₂. It has the right fatty acid, but the **sodium** is not good. Excess sodium in the soil causes salt stress (some plants are more sensitive than others to sodium). In addition, it is likely to have other additives that have not been tested for safety on plants or their impacts on non-target species. Be particularly cautious around **vegetables** that can absorb these compounds with unknown consequences.

The Problem with Detergents

A detergent is more problematic. It is an **ammonium** or **sulphonate** salt of long-chain fatty acid like sodium lauryl sulfate: CH₃(CH₂)₁₂-OS(O)₂-O⁻ Na⁺. Detergents are more likely to be **phytotoxic** and there is some research **suggesting detergents can harm plants when absorbed through roots** (e.g. corn shows impairment to "light-harvesting pigments and cell viability." Environ Monit Assess. 2018 Oct 18;190(11):651). All this is to say, understanding the chemistry and composition of a product is important.

Colorado State University Extension notes:

*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. They are also substantially less expensive. However, **there is increased risk of plant injury with these products.** They are not designed*

for use 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.

Homeowners may want to refer to information published by the University of Illinois demonstrating the [effectiveness of various commercially known soaps and detergents](#) which includes information regarding solution rates. Typical solution rates for making sprays are in the 1 to 2% range of soap to water. Sprays should never be used near ponds or in the vicinity of aquatic life. Frequency of spraying will depend of many factors including the life cycle of the insect pest. Insecticidal soap is only effective when contact is made with the pest, so it may be important to spray the top and undersides of leaves. Both soaps and detergents can damage the leaf cuticle by stripping naturally occurring protective oils and waxes from leaves. For some plants, loosing this layer can be deadly. For others, thinning the layers can simply make them more susceptible to fungal diseases and herbivory. This is why individual plants should always be tested for sensitivity before attempting any spraying.

Insecticidal soaps created with the proper chemical formulations and with detailed instructions for use (as well as warnings) are readily available in stores. There is also a plethora of naturally occurring bio-pesticides like Btk available to home gardeners. These can be used when alternative strategies and disease levels merit their use. Any pesticide should only be used if the level of pest or disease threatens the survival of a plant. They should not be used where cultural or physical or mechanical measures can be applied. A simple spray of water may be enough to dislodge pests without resorting to any pesticide use, e.g. frequent misting will reduce spider mite populations in houseplants. Prevention is the key!

Remember that all pesticides have the capacity to impact non-target species and great care should be taken to limit their use and target the problem. With the plunging numbers of insects around the globe, this is an issue that concerns us all.

- Effectiveness of Nonlabeled Soaps and Detergents - University of Illinois Extension http://hyg.ipm.illinois.edu/pastpest/200520e.html?fbclid=IwAR3Mxd9k8dI8nDWj1Kv6-KHZn90VPbQ1K3K3_nMj3AYgYGiKxz2j5Ax3JB
- Insect Control: Soaps and Detergents Quick Facts - Colorado State University Extension https://extension.colostate.edu/topic-areas/insects/insect-control-soaps-and-detergents-5-547/?fbclid=IwAR1wCpT-EAYdgYMZDTGfK1fL8dlVeg_Xl5rfUT6foZJISctL7-x28wWjdKU
- The risks of homemade pesticides- Government of Canada <https://www.canada.ca/en/health-canada/services/about-pesticides/homemade-pesticides.html>
- Pesticides – General Government of Canada <https://www.ccohs.ca/oshanswers/chemicals/pesticides/general.html>