



**DIY Simple Recipe and Applications  
Directions for Fish Friendly Insect  
Control Solution**

**Concentrated  
Foliar Solution for Aquaponics  
Systems and Outdoor Gardening**

**from PFAS LLC**

*DIY Simple Recipe and Applications Directions for Fish Friendly Insect Control Solution*, Published March 2015 as an eBook by Colle and Phyllis Davis.

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<http://portablefarms.com>

PFAS LLC – Based in the State of Florida, USA,

Published by Concept to Licensing LLC

Thank you for *ordering DIY Simple Recipe and Applications Directions for Fish Friendly Insect Control Solution* - Concentrated Foliar Solution for Aquaponics Systems and Outdoor Gardening from PFAS LLC.

After many years of working the field of aquaponics, I can tell you that if your fish become stressed FOR ANY REASON, it lowers their immune system, and they will not eat. If they don't eat, they don't poop and if they don't poop, your plants will suffer. So do everything you can to keep happy fish and happy plants for a successful farm.

The biggest problem people have with their aquaponics systems is that they OVERFEED THEIR FISH which fouls their water and puts waste into the grow trays which has a negative impact on the plants in the tray. Feed your fish a floating food (Catfish Chow) and only feed them what they can eat in 15 seconds. Feed fish under 3 inches three times per day. After they are adults, feed them once per day. It's plenty of food for optimal health.

Please read the directions carefully regarding the recipe AND the application instructions. You must use as directed to protect both your fish AND your plants.

We have overcome swarms of whiteflies and other insect problems in our farms with this simple formula and we have NEVER had a problem with our fish. However, if you use more often than directed or if you don't rinse plants after the application as suggested, you will encounter problems with the fish and the plants, so please, follow the directions carefully. Also, please remember that an insect will not die UNLESS he is wet with the solution. You can't expect to use the solution on an area and expect insects to die as you would with a harsh insecticide. Our job here is to WET THE INSECT so it disrupts the cell membrane of the insect.

As an additional note, I use this Insect Control Solution around the base of our aquaponics systems to discourage ants. I also walk the parameter of our farms often in search of anthills/colonies and then I pour boiling water down the hole to kill the Queen. Boiling water the best 'organic' solution there is for ants so they don't bring insecticides back into the greenhouse before they eventually die.

Please remember, ANTS BRING APHIDS. If you see an ant, expect aphids which can wipe out your plant population and . . . dirt brings ants. It's best to put your aquaponics systems INDOORS and then fight to keep the insects out of the interior of your greenhouse or structure as clean as possible. Wipe your feet before entering the structure to keep the dust/dirt out. Vacuum the floors often (don't sweep to stir the dust/dirt in the air). We treat our greenhouses like CLEAN ROOMS and wash digging tools after each use. Wear disposable gloves when handling the plants and anything 'fish related' to keep your farm clean. Do NOT keep a garbage can anywhere near your aquaponics system since dead plant leaves or root-detritus attract BUGS of all kinds and the insects will breed and fly back to infect your entire farm.

For better plant health, I also encourage you to use our [Fish Friendly Mineral Rock Dust](#) and our [Fish Friendly Worm Castings](#).

Happy Growing!

O-fish-ally Your friend,

Phyllis Davis

President, [PFAS LLC](#)

Co-Inventor, [Portable Farms® Modular Aquaponics Systems](#) (utility application filed December 24, 2013)

Dean, [Aquaponics University](#)

To View Phyllis Davis' recent [YouTube Video at Inventors Contest](#) (2nd Prize Winner)

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**Whiteflies**



**Aphids**



**Mealy bugs**

This easy-to-make and concentrated Fish Friendly Insect Control Solution uses a mild castile soap to control small, soft-bodied arthropods in aquaponics and can also be used (with a modification in the recipe) for outdoor gardens.

Colle and Phyllis Davis have used this simple technique in Portable Farms® Aquaponics Systems for reducing and eliminating whiteflies, aphids, and mealy bugs as well as discouraging ants from the farms. While this solution will not kill ants on contact, it does discourage them from reappearing after repeated use.

“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.” - [Colorado State University Insect Control: Soaps and Detergents](#) - by W.S. Cranshaw

**PFAS LLC RECOMMENDED Directions:**

- Use 1.5 Tablespoons of Dr. Bronner's Un-Scented Baby Mild Pure-Castile Liquid Soap per gallon of water.
- **PFAS LLC recommends less soap in an aquaponics solution than use in outdoor garden mixtures to protect the fish in the tanks. Outdoor garden mixtures may use 2.5 Tablespoons per gallon but that amount may harm or kill the fish in aquaponics systems.**
- Mix well. Put soap and water into a spray container and spray directly on plants where insects are present as a foliar spray. Create a range from 18" to 24" from the nozzle to the plant. Unless an insect is covered and made wet with the solution, it will have no impact on the insect.
- Spray on top and underside of leaves where insects are present.
- **After spraying solution, let dry for two hours and then spray plants lightly with the mist from a garden hose.**
- For areas or plants that are infested with insects, repeat spraying/rinsing action again in four to seven days.
- Apply solution between 6:00 AM and 10:00 AM.
- Do not spray plants if the temperature is above 85 Degrees F as it will cause plant damage.
- Encourage plants to dry after each treatment by turning on a fan to promote drying.

**WARNING**

**KEEP OUT OF REACH OF CHILDREN** – Flush eyes well for 15 minutes with clean water. If irritation continues, seek professional medical care.

Dr. Bronner's Un-Scented Baby Mild Pure-Castile Liquid Soap is available at many retail outlets such as health food stores and Wal-Mart. It is also available online. Active Ingredients: 95% Coconut oil, potassium hydroxide, olive, hemp and jojoba oils, citric acid, tocopherol.

This product is fish friendly ONLY if used as recommended. If this product is not used as recommended, it will kill fish.

Some plants may not like the soapy solution and the plants can suffer from phytotoxicity so test one plant in an infested area and see if it results in injury from spraying. According to the University of Florida:

### [PHYTOTOXICITY OF PESTICIDES TO PLANTS](#)

– D.E. Short, Extension Entomologist University of Florida

Plant Damage due to application of pesticides to plants is known as phytotoxicity. Pesticide phytotoxicity appears in several ways on ornamental plants, but probably 5 types of damage most commonly occur.

- 1). Burn--This type of damage may appear on the tip, the margin, as spots on the leaf or the entire leaf surface may appear burned. The growing tip or bud may also be killed.
- 2). Necrosis (or death of the plant tissue)--Similar to burn and affecting plants in the same manner.
- 3). Chlorosis (a yellowing or bleaching effect)--May appear as spots, tip yellowing, or as a general chlorosis of the entire leaf.
- 4). Leaf distortion--May appear as curling, crinkling, or cupping of the leaf.
- 5). Stunting or other abnormal growth.

### [Colorado State University](#)

### [Insect Control: Soaps and Detergents](#)

by W.S. Cranshaw 1

- 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.
- The ease of use, safety and selective action of soaps 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 increased interest in and use of these products. This change is due to a better understanding of

how to use soaps most effectively and a desire 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-Detergent Sprays

Soaps and detergents act strictly as contact insecticides, with no residual effect. To be effective, sprays must be applied directly to and thoroughly cover the insect.

Several insecticidal soaps are 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. Soaps are chemically similar to liquid hand soaps. However, there are many features of commercial insecticidal soap products that distinguish them from the dishwashing liquids or soaps that are sometimes substituted. Insecticidal soaps sold for control of insects:

- are selected to control insects;
- are selected to minimize potential plant injury; and
- 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. 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. 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 to 3 percent (Table

#### 1) Susceptible Insects

Most research with insecticidal soaps and detergents has involved control of plant pests. In general, these sprays are 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 very susceptible to soap sprays. Predatory mites, often important in control of spider mites, are an exception: a beneficial group of organisms easily killed by soaps.

## 2) Application

One of the most serious potential drawbacks to the use of soap-detergent sprays is their potential to cause plant injury -- their 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 to 3 percent suggested on label instructions. To reduce leaf injury, wash plants within a couple of hours after the application. 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 may be needed at relatively short intervals (four to seven days) to control certain pests, such as spider mites and scale crawlers. Also, application must be thorough and completely wet the pest. This usually means spraying undersides of leaves and other protected sites. Insects that cannot be completely wetted, such as aphids within curled leaves, will not be controlled.

- 3) 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 decreases if hard-water sources are used. Insecticidal soaps may also be more effective if 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. As with all pesticides, however, there are limitations and hazards associated with their use. Understand these limitations, and carefully follow all label instructions.

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

Percent dilution desired      Approximate amount of soap to add to water to produce:

	Gallon	Quart	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.

1Colorado State University Extension entomologist and professor, bioagricultural sciences and pest management. 12/96. Reviewed 3/08. Colorado State University, U.S. Department of Agriculture and Colorado counties cooperating. CSU Extension programs are available to all without discrimination. No endorsement of products mentioned is intended nor is criticism implied of products not mentioned.