

***“How To Win The War On Bugs”***  
**Pest Control for Aquaponics**

**Define “Pests”**



# Insects

- Identify your bug/insect before using **any** biopesticides
- Employ an insect identification key such as the key at this web address: (<http://www.insectidentification.org/insect-key.asp>). It walks you through a simple set of questions such as: “Does the bug have six or eight legs?”, “Does the bug have wings or no wings?”
- Use the LATIN name of the bug/insect to identify it with, because the same bug may have many “common” names.
- After identifying the bug, match the bug’s Latin name against the list for each biopesticide in the manual, and pick which one to use .



**Grasshoppers, beetles, caterpillars, and slugs chew on leaves, stems, and fruit.**







Older slug damage  
The leaf edge has  
yellowed and appears  
more rounded

Fresh bite marks  
left by a large (and  
hungry) slug



**Aphids, leafhoppers, thrips, mites, whiteflies, and scales suck plant sap**



**Caterpillars, rot and twig borers, weevils, and leafminers bore and make tunnels in plant tissue**







# Gall Wasps

*G. Hoops 2008 ©*





# Ants and Aphids





# Spider Mites



*Tetranychus cinnabarinus*



*Tetranychus urticae*



Spider Mite Predator  
*Phytoseiulus persimilis*



# Mealy Bugs





# Beneficials











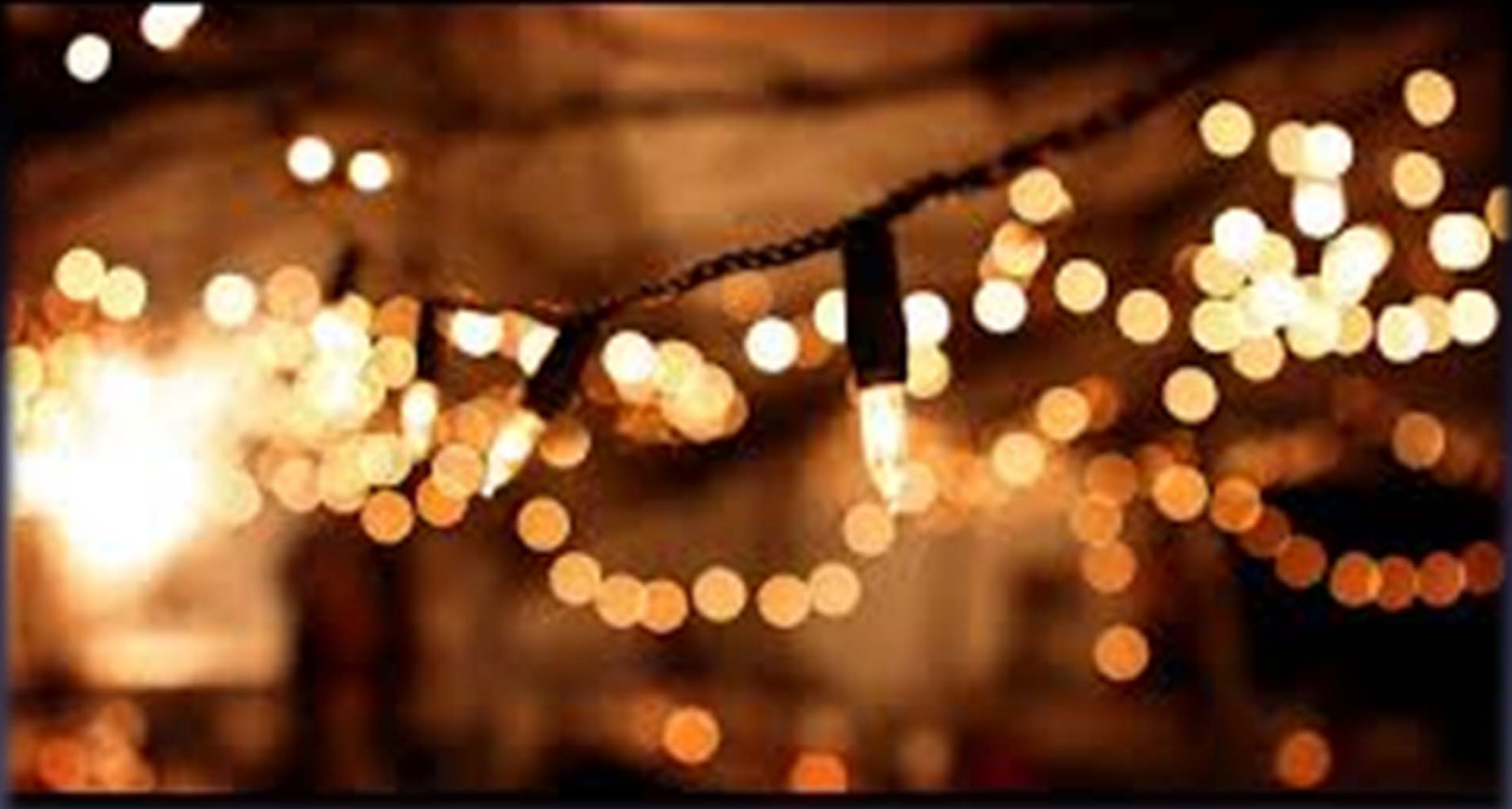
*Cryptolaemus montrouzieri*



Parasitic Wasps



# Christmas Lights





# Floating Row Covers





# Weed Mat



# Diatomaceous Earth



# Diatomaceous Earth



A Dustin-Mizer can be used (with or without fan spray nozzle) to dust DE onto flowers, melons, cucurbits (cucumbers, zucchini, squash). This kills the parasitic wasp that lays its eggs in the blossom end, and is one of the causes of "blossom end rot".



# Sticky Traps



# BotaniGard® 22WP

WETTABLE POWDER MYCOINSECTICIDE



## *Beauveria bassiana*



untreated whitefly nymphs



BotaniGard - treated whitefly nymphs



**OMRI™**  
**Listed**  
Organic Materials Review Institute



**Mycotrol O**  
**MYCOINSECTICIDE**



# Actinovate



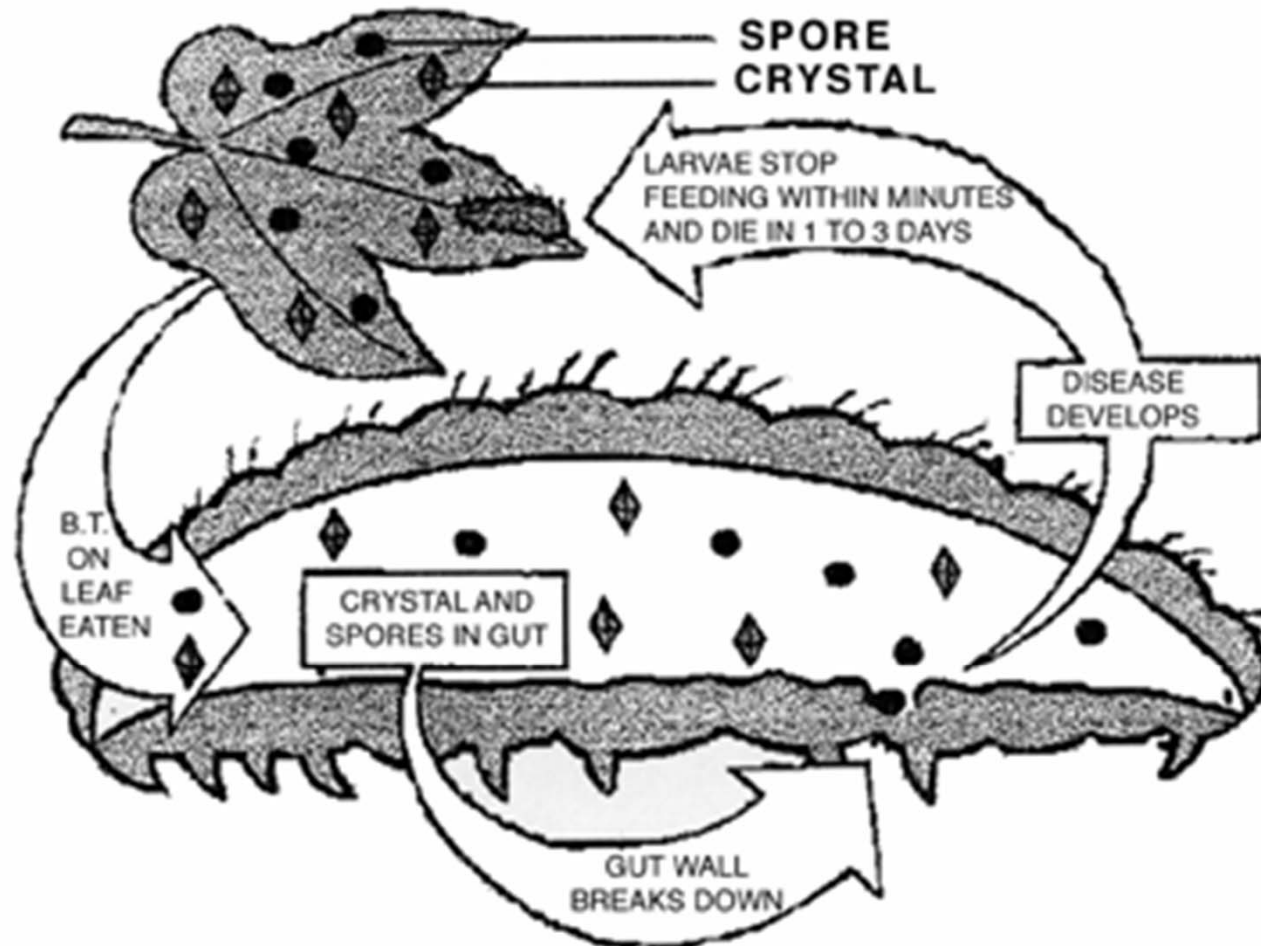


*Bacillus subtilis*





## *Bacillus thuringiensis*, subspecies *Kurstaki*





For  
Agricultural  
Use



FOR ORGANIC GARDENING

OMRI  
Listed



Active Ingredient:

*Bacillus thuringiensis* subspecies *kurstaki* strain SA-12 solids,  
spores and Lepidopteran active toxins (At least 6 million  
viable spores per mg)\*

|                    |         |
|--------------------|---------|
| Other Ingredients: | 98.35%  |
| Total:             | 100.00% |

\*The percent active ingredient does not indicate product performance and potency measurements are not federally standardized.



# Spraying Basics

- Spray in the early morning or the cool of evening. Do not spray when temperatures are above 80°F/27°C! Your plants may “burn” or have a reaction to what you are spraying in hot temperatures known as “phytotoxicity.”
- **Always perform a test on a small portion of your plants.** Wait 24 hours and look carefully for any reaction to the spray. Proceed only if there is no damage.
- Really, truly...**more is not better.** If you are not getting good results don't increase the strength of these remedies without testing first!
- Target just the area you need to treat. Be careful and try not to harm the good guys! You don't want to run off your friends.
- When working with sprays or dusts always protect your exposed skin and face. Use a dust mask, and wear goggles. Some of these ingredients can be irritating to your skin, eyes, and nose, and mouth.

# Intruder Alert!



# *Gammarus*







PRIMOS



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# Sources

- [www.hydro-gardens.com/](http://www.hydro-gardens.com/)
- [www.arbico-organics.com/](http://www.arbico-organics.com/)