ALTERNATIVE INSECTICIDES FOR SUSTAINABLE VEGETABLE PRODUCTION

Story by Dr. Ayanava Majumdar, Mike McQueen, Christopher Becker, Willie Datcher and Alfred Jackson

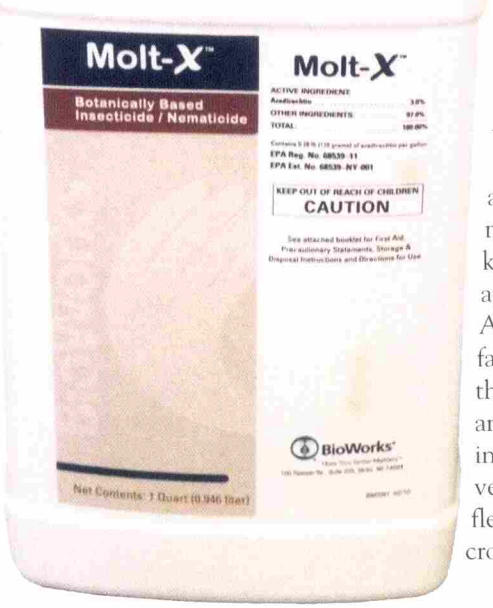
Organic vegetable production in the backyard is a difficult job because there are few (and expensive) choices for pest management, and it takes a lot more planning to be an organic producer than a conventional grower. Organic producers must start out the right way because healthy plants are far less attractive to bugs than weak plants. This article briefly describes some common alternative insecticides that can be used for backyard vegetable production. To start with, here are some basic tenets for sustainable crop production.

One of the best pest management tools for the organic gardener is choosing the right plant variety suitable for your region. Choose vigorous hybrids with multiple disease and insect resistance. This will reduce dependence on alternative insecticides that are generally quite expensive. Be sure to harvest timely and never let the fruits rot on the plants. Pick up and destroy any dropped fruits below the plant (keeping the base of plants clean and airy).

Gardeners can use mechanical and cultural insect control tactics first to reduce or repel insects on crops (prevention is better than cure). For example, gardeners can use trap crops or practice companion planting to confuse insects or to prevent or delay infestation. One can also use pieces of insect nets and row covers to cover fruits or stems to reduce squash bugs and vine borers. Stem collars can also work well to keep cutworms away.

Apply living insecticides the right way. Alternative insecticides that contain living organisms are often slow-acting and don't last very long after application. Gardeners typically apply insecticides to the tops of the leaves and miss spraying the undersides. Living insecticides, such as DiPel and Thuricide, contain live bacterial cells and the cells die in a few minutes if applied on the upper leaf surfaces. This is due to the high solar radiation and foliar temperature common in the South. Botanical insecticides such as neem and pyrethrin are also susceptible to solar radiation and rainfall. Therefore, it is better to apply organic insecticides to the underside of leaves during evening hours in order to extend the life of the products (avoid insecticide applications if temperatures reach above 85 F). It is also a good idea to treat the bottom stems and soil at the plant base with insecticides to contaminate insects jumping off the plant during spray. Many beneficial insects hunt on top of leaves, so treating the underside would minimize insecticide exposure.

Rotate, rotate, rotate! Make sure that you alternate different insecticides so that insects do not become resistant to them. Insecticide rotation with soft products also protects the beneficial insects. When buying insecticides, purchase two to three different products at a time after careful planning; rotate different classes of insecticides to avoid insecticide resistance. Store insecticides in a cool, dark place in your house where they can stay for a year or more. Make sure you know the target insect before applying any insecticide.



ALTERNATIVE INSECTICIDES FOR VEGETABLE PESTS

Here is a brief description of select alternative insecticides that do not require a restricted use permit for purchase and use. Some products may come in large packaging, making them expensive; you might want to compare prices online. Check the insecticide labels for proper application rates and timing. Pay close attention to the preharvest interval mentioned on the labels.

***Bacillus thuringiensis* (or Bt):** Bt is a stomach poison that paralyzes an insect's midgut and causes infection in the body that kills the host. Bt in liquid form is easier to apply using a regular sprayer than Bt dust. Apply living insecticides on the lower leaf surfaces and in shady areas to prolong the life of the product. Caterpillars have to eat the leaves and get enough inoculum to be infected, causing slow death. Growing a cover crop between vegetable rows is one way of reducing heat reflected from the soil and Bt applied under cover crops persists longer than on open ground.

Photos courtesy of Dr. A.

DiPel DF formulation (Valent BioSciences Corporation) is a popular product for use against caterpillars on vegetable crops. DiPel should be applied when insects are small.

Beauveria bassiana: This is another living insecticide that has spores of a fungus and is effective against aphids, thrips, whiteflies, etc. BotaniGard ES is a formulation that has been tested by the authors and found very effective against aphids in cool-season crops. Mycotrol O is an organic formulation and may be purchased online by home gardeners and small farmers. Do not tank mix *Beauveria* with fungicides because it will kill the living spores. Shake the sprayer very well before spraying since the spores may settle out. All living insecticides should be prepared fresh before application.

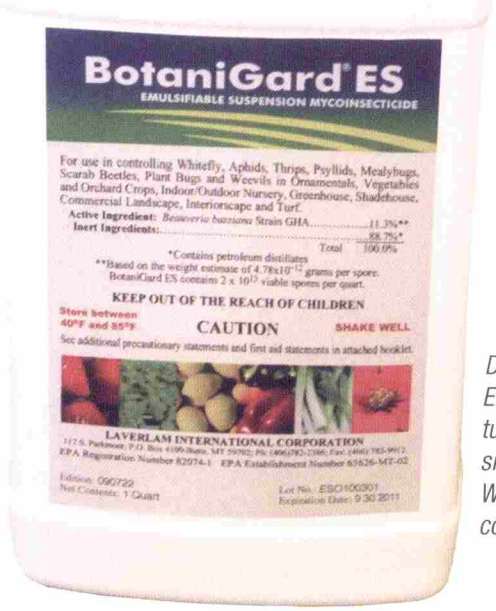
Neem Products: If you find a neem oil-based product with no azadirachtin in it (check the product label), then apply the product as you would any other horticultural oil. Neem oil is a physical poison that can be applied against small insects or caterpillars. Azadirachtin, an insect growth regulator, is the active ingredient in some neem formulations such as Molt-X, Neemix and Aza-Direct. Some of these products are exclusively sold online or at the co-op but are seen rarely in garden centers. Vegetable research in Alabama suggests Molt-X to be most effective when alternated with Bt and *Beauveria* formulations.

Spinosad: Although spinosad is a very effective insecticide against caterpillars, flea beetles and thrips, many gardeners overlook this product on store shelves. Spinosad (sold by Ferti-lome and Bonide) is actually derived from a bacterial fermentation process. Spinosad has a fast knockdown and is an excellent insecticide for alternating with other "softer" products like oils and Bt.

Pyrethrum (pyrethrin): This is a popular botanical insecticide sold as PyGanic – an organic formulation that provides quick knockdown of a variety of insects. Pyrethrin is a contact poison and needs to be applied several times throughout the season to get full control of insects. Pyrethrin ready-to-use sprays are easy to find in stores, but beware of pyrethrin premixes that may cause plant burn in some cases.

Garlic and Cinnamon Extracts: These are insect repellents and do not necessarily kill insects. Cinnamite, a cinnamon-based product, was recently pulled off of the market because it can burn certain plants. Garlic Barrier is an insect repellent sold online by the manufacturer and may provide short-term relief from insects. Check online for availability of these products and try it on a limited area in your garden. Some gardeners suggest using homemade garlic formulations as an insecticide but results may be inconsistent.

This is not an exhaustive list of alternative insecticides and not all alternative insecticides may be organic, so read the pesticide label and contact university extension personnel for specific questions.



BotaniGard Emulsifiable Solution (BioWorks, Inc.) contains spores of the fungus *Beauveria bassiana* and has a broad range of activity against many piercing/sucking insect pests of vegetables.

Molt-X (BioWorks, Inc.) is a good product against aphids and a number of different insects (apply when insects are immature and small sized).

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