



**BioWorks®**

How You Grow Matters™

[www.bioworksinc.com](http://www.bioworksinc.com) / 800-877-9443



# KEEP IT CLEAN

## Clean, healthy plants yield clean, healthy profits

Remember the old saying, “an ounce of prevention is worth a pound of cure?” It certainly fits today’s plant growing industry. The cornerstone of a successful growing operation is proper sanitation. From benches and floors, to tools and equipment, and from employees to plants, a clean organization will boost crop quality and keep customers coming back. The family of BioWorks products prevents and controls diseases and insect pests in a cost-effective and safe manner.

Sustainable production practices are important to an increasing number of growers, retail garden centers and consumers, and BioWorks products answer the needs of environmentally conscious growers. Many are certified by the Organic Materials Review Institute (OMRI), which denotes they are approved for organic production in the United States. All BioWorks products have low REIs.

Give your plants a healthy start and keep them clean throughout the production cycle.

### PROTECT THE ROOTS

To ensure a healthy, attractive crop, start at the bottom – with the roots. Provide long-term protection against root diseases with RootShield® on stock plants, in propagation, on cuttings or on finished plants.



RootShield promotes a healthier root system increasing root mass potential. It reduces the effects of environmental stresses that challenge the root system.

RootShield applied in a preventive manner protects roots from several pathogens including, *Pythium*, *Fusarium*, *Rhizoctonia* and *Thielaviopsis*. It’s available in granular form or a wettable powder and contains spores of *Trichoderma harzianum* strain T-22, which colonizes the root hairs, root surfaces, branching sites and callus tissue.

Within 24 hours of applying RootShield, the spores germinate and begin to grow on

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– DOUG ANDREWS,  
ALEX R. MASSON INC.

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and around the root system, forming a shield to protect the plant. As it grows, RootShield releases enzymes that dissolve the cell walls of fungal pathogens. It grows on the roots within a pH range of 4-8 and at soil temperatures of 48° to 97°.

With its very low toxicity profile, RootShield has a 0-hour REI and it’s cost effective because it reduces or eliminates the need for



chemical fungicide applications. Both RootShield formulations are OMRI Listed.

“Growing with RootShield resulted in a tremendous difference in our crop,” said Doug Andrews of Alex R. Masson in New Mexico. “Roots were thicker, whiter and more vigorous than I can remember.”

RootShield WP is easily applied through many means, including an injector with a watering wand, an overhead boom, watering tunnels, a Chapin® tube system, drip tape or emitter systems, sprayers and ebb-and-flood systems. The granular version may be blended into growing media and field soil or top dressed. RootShield is compatible with all bark, coir, peat-based and soil-less mixes.

A RootShield application will protect your crop for approximately 10-12 weeks. A second application, which can be made at half-rate, provides extended protection. A second application may be used on long-term crops when growers shift-up plants to a larger container, when a crop comes out of dormancy or during extended periods of plant stress.

### FOLIAR PROTECTION

Now that you’ve got a weapon against root pathogens with RootShield, it’s time to think about foliar issues. Because prevention is the more prudent route, use MilStop® before you see signs of disease. This water-soluble, broad-spectrum foliar fungicide prevents powdery mildew, Alternaria blight, Anthracnose, black spot, Botrytis blight, Cercospora leaf spot, downy mildew, Phomopsis blight and Septoria leaf spot. MilStop inhibits enzymes involved in fungal cell wall formation by altering the pH on the leaf surface, without restricting plant growth.

If powdery mildew is already present, use MilStop as a curative product. It kills powdery mildew on contact by pulling water from spores and their growing strands. MilStop also provides residual protection up to two weeks.

MilStop is OMRI Listed, has a 1-hour REI and can be used in a rotation with chemicals. It’s a cost-effective product because it comes pre-formulated with surfactants. McClen-don’s Select in Peoria, Ariz., uses CEASE® and MilStop to control and eradicate powdery mildew in chard and carrot crops.

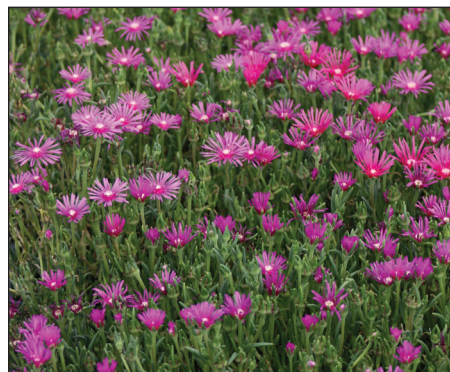
“As an organic grower, we continue to have great success with BioWorks products,” said Robert McClendon.

## TOP-TO-BOTTOM DEFENSE

Fight off both fungal and bacterial pathogens with CEASE, which performs as well as copper-based products without phytotoxicity or residues. CEASE is based on a naturally occurring, patented strain of *Bacillus subtilis* (strain QST 713). CEASE gives preventative control of common fungal diseases such as Botrytis, powdery mildew, Anthracnose, *Alternaria* and *Entomosporium*. It also prevents bacterial pathogens including *Pseudomonas*, *Erwinia* and *Xanthomonas* spp., as well as soil pathogens *Rhizoctonia*, *Pythium*, *Fusarium* and *Phytophthora* spp.

CEASE is an excellent choice for a resistance management program, because the product prevents diseases through multiple modes of action. For growers who use chemical fungicides with a single site of action, rotate CEASE into the program to avoid resistance.

“A well-designed resistance management strategy will help maintain the commercial life of pest control products and reduce environmental impacts associated with the



The family of BioWorks products are labeled for use on many plants, including perennials.

misuse of chemicals,” said Randy Martin, Ph.D., Director of Product Development at BioWorks. “Resistance management should be a broad-based effort and include multiple tactics – chemical, biological and cultural.”

CEASE is compatible with a wide range of pesticides, fertilizers and adjuvants.

It offers a 4-hour REI and a 0-day pre-harvest interval. It’s safe for beneficial insects and bees, and is OMRI listed.



BioWorks products are a good fit for outdoor nursery production.

## APPLICATIONS AT A GLANCE

### ROOTSHIELD

Use RootShield on bedding plants, flowering plants, ornamentals, bulbs, vegetables and trees. (See label for full details.)



Use RootShield in propagation beds, established beds, in containers and in landscapes. (Application rates are available at [www.bioworksinc.com/products/rootshield.php](http://www.bioworksinc.com/products/rootshield.php).)

### MILSTOP

Use MilStop on annuals and perennials, foliage plants, groundcovers, woody ornamentals, shade trees, herbaceous ornamentals, and ornamental fruit and nut trees. (See label for full details.)



MilStop may be applied in the greenhouse, in shadehouses, interiorscapes, container production, field production and in the landscape. (Application rates are available at [www.bioworksinc.com/products/milstop.php](http://www.bioworksinc.com/products/milstop.php).)

### CEASE

Use CEASE on bedding plants, flowering potted plants, tropical foliage, container-grown trees and shrubs, and vegetables grown under cover. (See label for full details.)



Apply CEASE in the greenhouse, in shadehouses, interiorscapes, container production, field production and in the landscape. (Application rates are available at [www.bioworksinc.com/products/cease.php](http://www.bioworksinc.com/products/cease.php).)



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## SUPPRESS THE PESTS

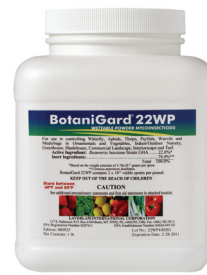
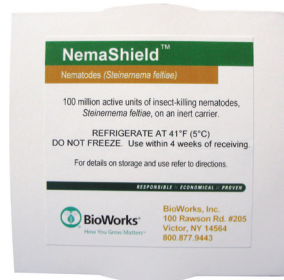
Clean plants, and ultimately clean production, not only refer to disease suppression, but also keeping insect pests at bay. BioWorks offers biological control options to fight some of the most problematic insects.

Keep your propagation program free of fungus gnats and western flower thrips (WFT) with NemaShield. When used properly, NemaShield prevents fungus gnat outbreaks by attacking and killing developing fungus gnats in the potting media. For WFT control, NemaShield kills the prepupae and pupae in the soil, which will decrease adult populations.

Joe Volpe, general manager at Peace Tree Farm in Kintnersville, Pa., dips all the greenhouses incoming liners with NemaShield and Mycotrol O® (the organic version of BotaniGard®).

“We find that this combination controls any insects that may come in with new materials,” Volpe said. “We physically hold the tray of liners under the level of the mixture. By doing this we are able to obtain 100 percent coverage of the foliage as well as the soil, which impacts thrips pupae. We let the plants dry and transplant the next day.”

The NemaShield and Mycotrol O dips allow Volpe to get the crop through to sale without spraying insecticides. “We believe by starting clean, we stay clean. And we’re providing our customers with a clean product without any pesticide residue,” he said.



NemaShield contains *Steinernema feltiae*, a beneficial nematode that is compatible with many pesticides. It’s applied with a sprayer or through an injector, and it has no REI. For more information regarding NemaShield uses, visit [www.bioworksinc.com/products/nemashield.php](http://www.bioworksinc.com/products/nemashield.php).

For insect and mite control, include BotaniGard® and SuffOil-X® in your IPM program. BotaniGard is a mycoinsecticide that contains spores of *Beauveria bassiana* strain GHA, a fungus that fights a variety of soft-bodied pests such as whiteflies, thrips, aphids, psyllids and mealybugs.

It’s registered for use on an extensive number of plants, including bedding plants, perennials, groundcovers, trees and vegetables. (See label for full details. Application rates are available at [www.bioworksinc.com/products/botaniGard-22wp.php](http://www.bioworksinc.com/products/botaniGard-22wp.php).)

BotaniGard is compatible with many beneficial insects. It has a 4-hour REI and a 0-day pre-harvest interval. Use it as a stand-alone, a tank mix partner or in rota-

tion with other insecticides.

SuffOil-X is a pre-emulsified formulated oil that suffocates and kills all life stages of soft-bodied insects and mites. The pre-emulsification process creates small oil droplets that provide uniform coverage reducing burn or stress to the plants. It controls several pests including aphids, leafhoppers, mealybugs, spider mites, webworms and whiteflies.

Use SuffOil-X on greenhouse ornamentals, shade trees, tropical foliage and vegetables. (See label for full details. Application rates are available at [www.bioworksinc.com/products/suffoil-x.php](http://www.bioworksinc.com/products/suffoil-x.php).)

Molt-X® is a botanical insecticide/nematicide that provides broad-spectrum control for many pests including aphids, scale, thrips and fungus gnats. Use Molt-X on a variety of crops in the greenhouse or the nursery. Molt-X can be combined with BotaniGard or SuffOil-X. For technical information, visit [www.bioworksinc.com/products/molt-x.php](http://www.bioworksinc.com/products/molt-x.php). ■

## THE BIOLOGY OF BIOLOGICALS

The beneficial nematode, *Steinernema feltiae*, in NemaShield enters fungus gnat larvae, killing the host insect within a few days. The beneficial nematodes complete their life-cycle, producing a new generation of nematodes to attack additional fungus gnat larvae.

BotaniGard, *Beauveria bassiana* strain GHA, has a unique mode of action — spores adhere to the host, germinate and produce enzymes that attack and dissolve the cuticle.

As an insecticide, SuffOil-X coats and suffocates eggs, larvae, nymphs and adults of soft-bodied insects and mites. As a fungicide, it does not allow the fungal spores or mycelia to attach to the leaf. As a repellent, it temporarily masks the UV emissions from leaves that mobile insects often use as recognition cues for feeding and egg deposition. As a repellent, it also interferes with the transmission of aphid-borne mosaic viruses.

