

BioWorks Products

Pepper Production – Field and Greenhouse

ROOT DISEASE CONTROL

RootShield[®] PLUS⁺ | OMRI Listed

RootShield PLUS⁺ (*Trichoderma harzianum* strain T-22, *Trichoderma virens* strain G-41), is a preventative biological fungicide for control of disease caused by *Fusarium*, *Phytophthora*, *Pythium* and *Rhizoctonia spp.* The wettable powder (WP) formulation can be applied as a drench to transplants or larger plants, used in a suspension to dip transplants into before transplanting in the greenhouse or field, or applied through drip irrigation systems. The granular (G) formulation can be incorporated into growing mix or field soil.

RootShield PLUS⁺ WP Rates:

- Drench: 6 oz/100 gallons of water. Apply this at the rate of 50 gallons to 800 square feet of transplant trays. For plants in 4-inch square or larger rockwool blocks, use 100 gallons of drench suspension per 400 square feet. For plants in large pots, drench at the rate of 10–12 fl oz per gallon of pot size. For plants in the field where drip irrigation is not utilized, apply as a root zone drench or irrigation at 8 oz/100 gallons or 1–2 lb/acre.
- Dip: 6 oz suspended in 20 gallons of water. Maintain agitation of the dip suspension. Submerge for 30 seconds. Transplants or the whole plug tray can be dipped, if desired. Change out dip suspension as it is used up or becomes difficult to use because of fouling with organic matter. Can be tank mixed with ON-Gard[®] and BotaniGard[®] 22WP for dipping of transplants.
- Drip irrigation application: 6 oz/100 gallons or 1-2 lb/acre. Ensure that all filters are in place. Run RootShield PLUS⁺ towards the end of the irrigation cycle, flush irrigation lines with clear water after application.
- 10-12 week residual. 0-hour REI (drench or drip irrigation), 4-hour REI (dip), 0-day PHI.

RootShield PLUS⁺ Granules Rates:

- Growing Mix: 1.5-3 lb/cu yd
- Field: 5-12 lb/acre. Apply granules using a metering device mounted to deliver granules into the furrow just behind the furrow opener. Apply at seeding, transplanting or to established crops as a side dress and incorporated into soil.

FOLIAR DISEASE CONTROL

BotryStop[™] | OMRI Listed

BotryStop is a Biofungicide used for the preventative control of *Botrytis* and *Sclerotinia* diseases. The active component is *Ulocladium oudemansii* U3 Strain is a non-pathogenic saprophytic fungus that aggressively competes for the same physical space as the plant pathogens, thus preventing crop damage. BotryStop is non-invasive and causes no harm to live plant tissue. With this mechanism of action, it is highly unlikely that resistance to BotryStop will develop.

BotryStop Rates:

Foliar Spray: 2-4 lbs per acre in at least 50 gallons of water. The most commonly used rate is 3 lb/acre.

- Use sufficient water volume to provide good coverage, wetting and saturation of the plant
- Fill tank halfway, begin agitation, add desired amount of BotryStop and then add a compatible non-ionic surfactant for proper product wetting and spreading. Refer to the “BotryStop Compatibility Sheet” for product compatibility.
- Use spray mixture immediately. Do not allow spray mixture to stand overnight or for prolonged periods.

Storage and Shelf Life:

- Product must be stored refrigerated. Do not freeze. During storage, keep the bag closed, with excess air removed and away from non-compatible products.
- Under proper storage conditions, shelf life 12 months
- 4-hour REI, 0-day PHI

CEASE[®] | OMRI Listed

CEASE (*Bacillus subtilis* QST strain 713) is a dependable biological fungicide and bactericide to add to a program for enclosed space production (greenhouse and high tunnel). It can be applied to foliage or soil for control of a broad spectrum of diseases. CEASE is compatible in a tank mix with MilStop for foliar applications.

CEASE Rates:

- CEASE can be applied in as often as 3-day intervals. It is recommended to spray at 7-day intervals for prevention when conditions are optimum for disease. While the rate range for CEASE is from 2-8 quarts/100 gallons, the most commonly used rate is 4 quarts.
- Tank mix with MilStop: CEASE/MilStop tank mixes have shown excellent control of *Botrytis* powdery mildew and other foliar diseases. Use MilStop at 1.25 lb/100 gallons plus CEASE at 2 quarts/100 gallons/acre (preventative), increasing the rate to 3 lb/100 gallons MilStop plus 6 quarts/100 gallons CEASE/acre for curative control of powdery mildew and *Botrytis*.
- 4-hour REI, 0-day PHI.

MilStop[®] | OMRI Listed

MilStop (potassium bicarbonate) is a broad-spectrum foliar fungicide that can prevent *Botrytis* powdery mildew and other foliar diseases. It also eradicates powdery mildew when applied early in the infection period. MilStop is an excellent tank mix partner with CEASE for greenhouse peppers to increase disease prevention effectiveness. For outdoor peppers, Serenade ASO can be used.

MilStop Rates:

- Outdoor foliar spray: Application rates start at 2.5 lb/100 gallons/acre for preventative application and up to 5 lb/100 gallons/acre for curative.
- Enclosed space application: Rates can be as low as 1.25 lb/100 gallons for preventative applications. Apply weekly during periods of high disease potential. Use up to 3 lb/100 gallons/acre for curative applications to eradicate powdery mildew and *Botrytis*.
 - Tank mix with CEASE: CEASE/MilStop tank mixes have shown excellent control of *Botrytis* powdery mildew and other foliar diseases. Use MilStop at 1.25 lb/100 gallons plus CEASE at 2 quarts/100 gallons (preventative), increasing the rate to 3 lbs/100 gallons MilStop plus 6 quarts/100 gallons/acre CEASE for curative control of powdery mildew and *Botrytis*.
- 1-hour REI, 0-day PHI (4-hour REI when mixed with CEASE).

INSECT CONTROL

BotaniGard[®] / Mycotrol[®]

BotaniGard, or for organic use, Mycotrol (WSDA Certified Organic), can be utilized in rotations or tank mixes for enclosed space or outdoor production. This effective biological insecticide, containing *Beauveria bassiana* strain GHA, is used to control Lygus bugs (early instars only), aphids, thrips, whiteflies, psyllids and other pests. Another reliable option for enclosed space production, such as greenhouse or high tunnel, is BotaniGard 22WP, or for organic use, Mycotrol WPO (WSDA Certified Organic).

BotaniGard ES/Mycotrol ESO Rates:

- Outdoor foliar spray: At first detection of target pest, apply ¼ to 1 quarts/acre in 5-100 gallons of water. Spray to wet, but avoid runoff. Repeat application at 5-10-day intervals. Shorten interval to 3-5 days when populations are high, especially with whiteflies and aphids. Repeat applications for as long as pest pressure persists.
- Enclosed space production (greenhouse and high tunnel) foliar spray: At first detection of target pest, apply ½ – 2 quarts/100 gallons of water. Spray to wet, but avoid runoff. Repeat application at 5-10 day intervals. Shorten interval to 3-5 days when populations are high, especially with aphids and whiteflies. Repeat applications for as long as pest pressure persists.
- 4-hour REI, 0-day PHI.

BotaniGard 22WP/Mycotrol WPO Rates:

- Enclosed space production (greenhouse and high tunnel) foliar spray: at first detection of target pest, apply 1/2 - 1 lb/100 gallons of water per acre. Spray to wet, but avoid runoff. Repeat applications at 5-10 day intervals. Shorten interval to 3-5 days when populations are high, especially with aphids and whiteflies. Repeat applications for as long as pest pressure persists.
- Dip: 6 oz suspended in 20 gallons of water. (NOTE: Do not use BotaniGard ES or Mycotrol ESO for dipping.) Maintain agitation of the dip suspension. Submerge for 30 seconds. Transplants or the whole plug tray can be dipped, if desired. Change out dip solution as it is used up or becomes difficult to use because of fouling with organic matter. Can be tank mixed with ON-Gard[®] and RootShield *PLUS*⁺ WP.
- 4-hour REI, 0-day PHI.

Tank mix or rotation with Molt-X:

- Both BotaniGard/Mycotrol formulations can be tank mixed with Molt-X as an effective combination on the labeled pests. Use the recommended rates of BotaniGard/Mycotrol indicated above and Molt-X at 4 fl oz/100 gallons. When tank mixing, include Molt-X in every other application.
- In rotation, use the 8–10 fl oz rate of Molt-X, 5–7 days after a BotaniGard/Mycotrol application.

BotaniGard[®] MAXX

BotaniGard MAXX is a unique combination product containing natural Pyrethrins and *Beauveria bassiana* strain GHA. This combination represents the latest generation of biorationals for insect control. The dual active ingredient formulation offers both synergy and multiple modes of action that work to kill damaging insect and mite pests. BotaniGard MAXX is an excellent rotation partner with BotaniGard/Mycotrol. When insect pressure is high, use BotaniGard MAXX for quick knockdown, then follow up with typical BotaniGard/Mycotrol use.

BotaniGard MAXX Rates:

- Enclosed space production (greenhouse and high tunnel):
 - Aphids, Spider Mites, Thrips, and Weevils: ½ - 1 quart /100 gallons spray volume.
 - Other labeled insects: ½ - 1 quart /100 gallons spray volume depending on insect population and foliage density.
 - **DO NOT WET PLANTS TO POINT OF RUNOFF OR DRIP.**
- Field Pepper production:
 - Apply ¼ - 2 quarts /acre in sufficient water to thoroughly cover foliage infested with insects, typically 5 - 100 gallons of water per acre.
 - Final spray volume can be up to 400 gallons/acre. Water volume depends on spray equipment, crop canopy and target pest.
 - **DO NOT WET PLANTS TO POINT OF RUNOFF OR DRIP.**
 - Apply BotaniGard MAXX up to a maximum of 2 quarts/acre for extreme insect pressure or dense foliage.
 - BotaniGard MAXX can be applied aurally at ¼ - 1 quarts/acre. See label for more details.
- Apply BotaniGard MAXX at 5-10-day intervals. High insect populations, especially aphids and whiteflies, may require application at 2-5-day intervals.
- 12-hour REI, 0-day PHI.

Molt-X[®] | OMRI Listed

As an insect growth regulator, Molt-X (azadirachtin) disrupts or slows the development process, which can kill insects directly or increase insect susceptibility to either a tank mix partner or the next rotated insecticide(s).

Molt-X Rates:

- 8-10 fl oz/100 gallons/acre. Maintain tank solution pH between 5.5-6.5. For optimum results, 2 to 3 applications made at 7-10-day intervals are recommended, unless otherwise specified.
- When combining with other insecticides use half the recommended rate of Molt-X.
- 4-hour REI, 0-day PHI.

SuffOil-X[®] | OMRI Listed

SuffOil-X (mineral oil) provides a different mode of action to provide knock-down activity to control aphids, spider mites, thrips, whiteflies, and other soft-bodied pests. This light summer oil suffocates insects and mites resulting in a rapid response. SuffOil-X makes an excellent rotational partner with BotaniGard, BotaniGard MAXX and Molt-X.

SuffOil-X Rates:

- Apply as a foliar spray at 1-2 gallons/100 gallons (1-2% v/v). If reducing water volume per acre, keep concentration at 1-2%. Repeat as often as needed, but keep interval one week apart. No limit to the number of applications. Repeat applications for as long as pest pressure persists.
- Follow standard practices for use of oils and ensure that SuffOil-X[®] can dry within 2 hours of application.
- 4-hour REI, 0-day PHI.

NemaShield[®]

NemaShield is effective for control of root-damaging fungus gnat larvae (commonly *Bradysia* species) in greenhouse production. NemaShield contains the beneficial nematode *Steinernema feltiae* in a clay/gel carrier that is ideally suited for fungus gnat larvae control. It will also control thrips species that spend a portion of their life cycle in the soil or potting media. A properly applied application of NemaShield will kill fungus gnat larvae that are feeding on plant roots.

NemaShield Rates:

- One unit of NemaShield containing 100 million infective stage *Steinernema feltiae* will treat 1100 - 3400 square feet, depending on insect pressure. NemaShield is available in 100 million, 250 million, 500 million and 2 billion nematodes per unit. See the NemaShield label for more details on proper rates and usage.

PLANT NUTRITION

ON-Gard[®] 5-0-0 | OMRI Listed

ON-Gard is an innovative complement to your current fertilizer program. It is 100% plant-derived, 100% water soluble, and consistent in composition. ON-Gard also provides a broad array of plant-based amino acids for increased plant health.

ON-Gard Rates:

- Foliar spray or through drip irrigation: Use ON-Gard at 1-2 quarts/100 gallons (0.25 - 0.5% v/v) as a foliar spray during production or mixed with fertilizers run through a drip system. ON-Gard is tank mixable with most crop inputs, including insecticides and fungicides. Test (jar test) to ensure physical compatibility.
- Dip: ON-Gard can be used alone or combined with RootShield *PLUS*⁺ WP. Use at 1 gallon/100 gallons (1% v/v) in a dip.

Verdanta[®] EcoVita[®] 7-5-10 | OMRI Listed

N-Vita[®] 9-4-3 Organic Fertilizers | OMRI Listed

EcoVita is a general purpose organic fertilizer (7-5-10) suitable for many crops. N-Vita is a higher nitrogen mix (9-4-3). The increased nitrogen promotes foliar growth in many crops. EcoVita and N-Vita are derived from 100% organic sources. These organic nutrient sources provide slow, but continuous release of nutrition to vegetable crops. They are produced using proprietary MINIGRAN[®] Technology that creates a uniform composition in each granule, consisting of the same amount of N, P and K for precise nutrient distribution and availability to plants.

Verdanta EcoVita 7-5-10 Rates:

- Field Peppers.....870 – 2,180 lb/acre
- Greenhouse Peppers.....435 – 1,745 lb/acre

Verdanta N-Vita 9-4-3 Rates:

- Pepper - Base fertilization.....870 – 1,785 lb/acre
- Top dressing.....700 – 1,090 lb/acre