



BioWorks®
How You Grow Matters™



Bulb Protection

What are RootShield® Granules and PlantShield® HC?

- They are EPA-registered, biological root protectant fungicides
- They prevent attack from diseases by growing on the roots and forming a protective “Shield” against disease and environmental stress
- Has proven efficacy that equals chemical fungicides and is nontoxic to workers
- They have a 0-hour REI, no phytotoxicity to plants and are compatible with beneficials
- RootShield Granules can be mixed into your growing media; most media companies will incorporate
- PlantShield HC, a wettable powder, can be dusted, used in dips or drenched onto potted bulbs

Protection from root rots

- RootShield Granules and PlantShield HC protect bulb crops like Lilies, Tulips, Gladiolus and Narcissus
- They actively attack pathogens like *Pythium*, *Fusarium*, and *Rhizoctonia*
- They stop pathogens from damaging roots

Chemical compatibility

- RootShield Granules and PlantShield HC are compatible with many chemical fungicides; all insecticides, miticides, fertilizers, disinfectants and plant growth regulators
- Both products have been used as stand-alone fungicides for root disease control
- They are preventative fungicides. To “cure” existing problems, use appropriate chemical treatment, then follow-up with PlantShield HC.
- Applying chemicals to media containing either product will not harm the active ingredient

Soil temperatures

- Storage conditions for the cooling period (vernalization) will not harm the active fungal ingredient, *Trichoderma harzianum* hybrid strain T22, found in RootShield Granules and PlantShield HC

Watering and leaching

- Heavy watering increases the risk of root disease problems, and should be avoided
- Watering will not leach RootShield Granules or PlantShield HC away from the crop’s root zone
- They will continue to grow on the roots as they expand through the growing media for up to three months

(See “Maintenance Program for Bulb Crops” on next page.)



Maintenance Program for Bulb Crops

Crop Production Phase	Application timing	Rate
Bulb Planting, Growth and Cold Storage	Pre-blend RootShield Granules into your soil mix at the time of planting or drench with PlantShield HC immediately after planting. Bulbs may be dusted with PlantShield HC immediately before planting or may be dipped into a drench slurry (dip). Treated bulbs can be pot or case cooled. Applying RootShield Granules or PlantShield HC at this time is critical for basal root protection, especially if the bulbs are placed at temperatures above 50 F for 2-3 weeks. If bulbs are immediately placed in the cooler, the most effective treatment would be with RootShield granules incorporated into the media or the use of the dry bulb dust.	<i>Granules:</i> 1.25 – 1.5 lb/cu. yd. <i>Drench:</i> 4 – 5 oz/100 gal <i>Bulb dusting:</i> 0.5 – 1.0 lbs/100 lbs. <i>Bulb dip (drench):</i> 0.5 lb/20 gal
Post-Cold Storage and Crop Growth	Apply PlantShield HC immediately after removing the crop from cold storage, or replant into media containing RootShield Granules or top-dress with granules.	<i>Drench:</i> 4 – 5 oz/100 gal <i>Granules:</i> 1.25 - 1.5 lb/cu. yd. <i>Top-dress (granules):</i> 1.5 teaspoons/8-inch pot (water in)
Additional Root Protection	A second application of RootShield Granules or PlantShield HC (at half rate) should be made: <ul style="list-style-type: none"> • If treated before cold storage – treat within 3 weeks after placement in the greenhouse • If treated after cold storage – retreat in 10-11 weeks depending upon the crop 	Use half rates in all treatments <i>Drench:</i> 2 –2.5 oz/100 gal <i>Top-dress (granules):</i> ¾ teaspoon/8-inch pot (water in)

Protection of the stem root system is essential for optimal plant growth and development. Long term protection of the stem root system against disease and environmental stress is optimized with a second application of RootShield Granules or PlantShield HC at half rate. The root disease protection will carry over to the customer buying your product. A full application of RootShield Granules or PlantShield HC costs less than 2 cents per 6-inch pot.

Here is what one grower has experienced with the use of PlantShield HC on Easter lily:

Easter Lily Average Bud Count

With PlantShield HC

Date of Easter	4/20	3/31	4/15	4/23	4/4	4/12
Year	2003	2002	2001	2000	1999	1998
% of Plants with 7 plus blooms	66%	62%	65%	64%	46%	61%

Without PlantShield HC

3/30	4/7	4/19	4/3	412
1997	1996	1995	1994	1993
7%	21%	31%	25%	4%

Grower results with PlantShield HC treated bulbs.