

My Brother's a Fungus (he protects me from trouble, fungal trouble)

Gas prices, fuel prices, everything is going up, except your profit margins. When times get tough, whom do you count on? You count on your family. For years, growers around the country have made RootShield granules and PlantShield wettable powder a part of their family. The active ingredient, *Trichoderma harzianum* strain T-22, has been a "big brother" to these growers by protecting their plants against fungal "bullies" that try to cause harm. Here is what Bill Swanekamp, owner of Kube-Pak (Allentown, NJ) had to say, "For 4 years we have had nothing but tremendous results using RootShield. Our usage of chemical fungicides has been cut 80%".

Grandpa Beroske started Beroske Farms and Greenhouses (Delta, Ohio) in 1939 with extra plants he had left from the family's vegetable fields. By 1955 twin sons Rich and Ron were growing flowers to sell to a local distributor. In 1976 the company moved west to their present location in Fulton County (OH), where they continued to expand their 500,000 sq. ft. greenhouse operation under the direction of Rich's sons, Mike and Ted. Mike's wife, Barb, and cousin, Steve, are also involved in the day-to-day maintenance and operation of the greenhouses. As you can see, this is truly a family run business. In 1999, the Beroske' purchased a soil mixing line and began to incorporate RootShield granules to protect their plants. RootShield has proven itself effective as a disease prevention tool. Having a zero hour reentry allows Mike and Ted to incorporate RootShield right in the mix and have their employees transplanting plugs into the mix minutes later. The Beroskes have made RootShield a successful part of their family.

The active ingredient in RootShield and PlantShield, *Trichoderma harzianum* strain T-22 or "T-22", works on two fronts. It "shields" the root by growing around root hairs and blocking harmful fungi from attacking (Figure 1). This 'squatters right' is key to stopping the harmful fungi. Getting T-22 down at the earliest possible time in production will not allow the pathogens to get the upper hand. Propagation and stepping stage production are the ideal time to incorporate RootShield granules into the mix. As an alternative, PlantShield can be drenched on pots to establish T-22 on the roots and in the soil. The other way that T-22 works is by attacking the pathogens before they damage the roots. Figure 2 shows how a spore of strain T-22 germinates and attacks the pathogen. The picture shows it wrapping itself around the harmful fungus, ultimately "eating it" by producing enzymes.

Two products have been developed that deliver T-22: RootShield, a granule that can be topdressed or incorporated into a growing mix, and PlantShield, a wettable powder that can be applied as a root drench or used as a foliar spray. Because the products are safe (certified for use in organic farming) and effective, most soil mix companies will incorporate the granules in a grower's mix. Strain T-22 will protect the roots for months with a single soil application. However, it is recommend that a maintenance application be made at approximately 3 month intervals to keep T-22 at high levels around the roots and in the soil zone. This is due to the fact that pathogens can occur throughout a growing cycle so it is important to optimize the level of strain T-22. Maintenance

application can be applied at half rate. A major advantage of using RootShield and PlantShield is that they have no restricted entry interval (zero hour REI) and are compatible with all insecticides, fertilizers and most commonly used fungicides.

Strain T-22 is a preventative biological control organism; it will not cure a pre-existing pathogen in plant tissue. Pathogens, already growing inside the plant, will not be attacked by T-22. A chemical fungicide should be used to “clean the problem”, then follow up with T-22 to shield against further problems. Since T-22 is a “living” fungus, it could be overwhelmed under high pathogen levels. T-22 stores best cold, and will last for up to 6 months if stored at 77 F. It should not be stored in a hot shed. PlantShield forms a suspension in water and will not dissolve. Special instructions are available to help the grower enhance the application of the wettable powder.

Because of the persistence of the T-22 in the growing media, a traditional fungicide program can be greatly reduced or eliminated. This saves the grower the cost of the chemical and the labor to apply. “After using RootShield in our cutting & liner mixes, we have virtually eliminated the use of fungicide drenches for *Rhizoctonia*, *Phytophthora* and *Fusarium*. Not only has this significantly reduced the concern & usage of toxic chemical use at our nursery but has also been an economic savings and benefit. We estimate the RootShield application costs 10% of our former fungicide(s) drenching program” (Jeff Rosendale, Rosendale Nursery, Watsonville, CA).

Some of the new poinsettia varieties and even some of the traditional ones are susceptible to root rotting fungi, one of the most prevalent being *Pythium* root rot. For a typical poinsettia crop, it has been estimated that it costs nearly 6 cents to treat a 6-inch pot with fungicides. An application of T-22 costs less than one and a half cents to treat a 6-inch poinsettia plant. Diseases caused by this pathogen can occur at any time during the growing period, which may be from 3 – 5 months and even longer. To combat the problem, growers drench the soil with a combination of fungicides, typically every month. The constant bombardment of the roots with chemicals may stress the plant causing variability in growth and development. In addition, disease resistance is developing, rendering some chemicals ineffective. Growers around the country, for example Van Hoekelen Greenhouses, McAdoo, PA; Lucas Greenhouse, CITY, NJ; Mid-American Growers, CITY, IL; Powell’s Farms, CITY, TX, are using T-22 to protect their poinsettia plants. Patrick Stewart, Plant Master’s Wholesale Nursery (CITY, TX) says “Few growers are given the opportunity to grow more than twenty crops of poinsettias in their career. This year was my fourteenth crop and could only be described as the standard for all preceding or successive crops. Much of this success I attribute to the use of PlantShield. We have used it on the past three crops of poinsettias and have seen tremendous results. Loss to root rot in the final stages have been eliminated and over all loss extremely low. Thanks for an excellent product and help in all areas.”

Golden State Bulb Growers (CITY, CA) has been growing *Zantedaschia* species of colored calla lilies and *Aethiopia* types for decades, battling significant root and bulb disease problems at all phases of growth, harvest, storage and subsequent forcing. Peter Beckman, Research Plant Pathologist says, “For several years I has been trialing (RSD)

RootShield Drench (PlantShield in all states except CA), along with several other biocontrol organisms, to improve our IPM approach to water mold and *Rhizoctonia* control. Although not a panacea, RSD has provided consistent improvement in potted bulb experiments, even in conjunction with other fungicides. We feel we can safely expand our RSD work to larger scale field trials for several reasons: 1) We can still utilize the fungicides currently in use. 2) RSD use should not add pressure toward fungicide resistance. 3) RSD may give more extended disease control periods versus most short-lived fungicides. 4) It does not seem phytotoxic to our crop, and has done no harm.

RootShield and PlantShield have found themselves among the family of growers in the US, and around the world. They use it as a preventative to keep their plants “clean” at a reasonable cost with a safe and effective product. RootShield and PlantShield can: 1) prevent a broad range of pathogens from attacking the root system, 2) grow on the root system of all types of plants, 3) grow in all soil types from 48 – 94 F, 4) grow on the root system protecting it for up to 3 months. Both products are OMRI listed (Organic Material Review Institute) and have zero hour REI (currently 4 hour REI in CA). Ask growers in your area about RootShield or PlantShield. See if they have made them part of their family, you may want to make them part of yours.