

ROOTING OUT ROOT DISEASE

by Mark J. Arena, Clemson University

Replicated experiments with RootShield (*Trichoderma harzianum* strain T-22), a biological fungicide, has provided experience that should prove valuable to greenhouse producers. The work grew out of collaboration between Clemson University Extension Service and Baucom's Nursery in Summerville, SC. Hands-on observations were later confirmed by formal experiments.

In August of 1998, Clemson University Extension Agent Mark J. Arena began trialing RootShield at Baucom's Nursery Summerville, SC. RootShield, at that point in time, was labeled for control of *Pythium*, *Rhizoctonia*, and *Fusarium*. It works by colonizing the roots of a plant and then killing off other pathogens that attack those roots. It is important to stress that this is a preventative action; existing disease(s) cannot be cured. A drench application was used in this work.

The first experiment was conducted on fall pansies. Pansies are susceptible to the three pathogens for which RootShield is labeled (1998 label); *Thielaviopsis* can be an additional problem in the heat of summer, however, recent scientific findings are suggesting that RootShield can control this pathogen as well. Pansy plugs were brought in and transplanted into 606 flats, then transferred to the greenhouse to root out before being placed outdoors. The day after transplanting, several varieties were treated with Rootshield drench at the recommended rate and marked. All other plugs were treated with Banrot 40 WP at the recommended rate. Ten days later, all plugs were moved outdoors and grown under a shade cloth. All plugs that were treated with Banrot received an additional fungicidal drench of Subdue Maxx plus Cleary's 3336 four weeks later.

The plants' roots were evaluated when they were scheduled to be shipped. In all cases, plants treated with RootShield produced either comparable or better quality roots than those treated with the chemical fungicides (See picture #1). We continued this trial for the entire fall pansy production schedule with consistent results. With poinsettia production approaching, Arena decided to set-up a

scientific experiment using controls, replications, and experimental design in order to perform "pure research". As most of us know, *Pythium* is probably the major pathogen of poinsettia roots and often shows up during the production season. Vegetative cuttings of 'Spotlight Dark Red' were used for this experiment. At root initiation, four treatments were used having twenty replications:

Treatment 1: no chemicals applied

Treatment 2: one application of Banrot

Treatment 3: one application of Banrot followed by monthly drenches of Subdue Maxx plus Cleary's 3336

Treatment 4: one application of RootShield

All treatments were used at the recommended label rate. All of these plants were maintained under Baucom's standard poinsettias production program. During the third week of September, water collectors were placed under the plants to prevent them from drying out. In general, these collectors held about 3/8" of water after the overhead boom had watered the plants. On average, the water would remain in the collectors for about four hours. On 1 December 1999, all plants were evaluated for root development and growth.

The results of this experiment once again demonstrated the effectiveness of RootShield (See picture #2). Based on visual observations, Treatment 4 (one drench of RootShield) had developed the best root system (statistics showed no significant difference in dry weights between RootShield and treatment #3, preventative fungicide program). Root quality and quantity were excellent. Roots had great branching, excellent color, and good root hair development.

In addition, to this research, Rootshield was tested on several other poinsettia varieties, with various pot sizes. Rootshield performed as well and, on certain varieties, far better than the preventative fungicides. Due to all the positive results and benefits Rootshield offers, Baucom's has now been treating all of their plugs with

PHOTO 1.



Left - 1 drench of RootShield; Right - 1 drench of Banrot followed by a drench of Subdue Maxx plus Cleary's 3336.

PHOTO 2.



Control 1 appl Banrot 1 appl Banrot + mon. drenches 1 appl Rootshield

Rootshield. Since these results, Baucom's Nursery and several other nurseries in my area have moved away from a chemical fungicide program and are using Rootshield.

I know there have been, and are, concerns and questions with this product. However, my experiences and those of the growers at Baucom's have been very positive without any negative effects on the plants. We had to make some minor adjustments with equipment to prevent damage to injectors. However, with the new decanting process, this problem seems to be resolved. Overall, Rootshield has been an asset to the operation. Baucom's has benefited from this product in several ways. First, the drench application has reduced the overall cost of the fungicide program by 60%. Second, by increasing employee safety with a zero REI period (it's also recognized by the National Organic Society as biologically safe for organic production). Finally, by reducing environmental concerns by using a biological fungicide compared to chemical fungicides.

Rootshield offers us a slight comfort zone knowing it's actively seeking out detrimental fungus and protecting the root system from others. But Rootshield will not protect a plant from improper growing practices. The grower must continue to be attentive to cultural practices. There's always a chance that we may produce an environment favorable to disease. For example, we continually scout for and correct situations such as growing plants in a low spot of the floor, which produces a puddle and opens the roots to damaging pathogens. In addition we constantly monitor for root quality.

In closing, I would like to offer some advice for readers when using Rootshield. Some of the more important facts to remember are:

- 1) Use the product correctly. For example, Rootshield is only a preventative not a curative. This means roots must be healthy and disease free at the time of application or it may not work effectively.
- 2) Time and type of application. Determine when and what type of application is going to be most effective for your situation. With Rootshield the sooner it is applied the better. Every day that the roots are not protected just increases the chances for root problems.
- 3) Education. The user needs to clearly understand how this product functions and/or operates. This also means understanding the equipment that will be used for its application.
- 4) Second Application. It is recommend that a second application of Rootshield be made at half strength ninety days after the initial treatment.

If growers follow these guidelines and label directions I am sure they will benefit as much from this product as we have. Good luck and here's to healthy roots.

Clemson Extension Service would like to express their thanks to both Baucom's and BioWorks for their support on this project. If growers are interested in additional information on this product they can either check out BioWorks Web site at <http://www.bioworksbiocontrol.com> or contact Mark Arena at 1-843-719-4140 or marena@clermson.edu. The sole intention of this article is to provide information on a product that was beneficial to the industry. This article is not intended to be a promotion for BioWorks or their products. Arena is currently expanding his research on biologicals and other natural products that offer protection to roots. He hopes to offer additional information on these products in the near future.



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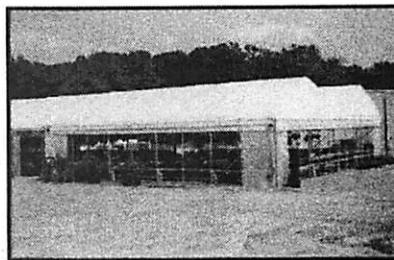
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