

Rhizoctonia Rising

Fungicides and Rhizoctonia: What's working?

By A. R. Chase
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Stem rot on pentas showing collapse of infected stem. (All photos courtesy of A. R. Chase)



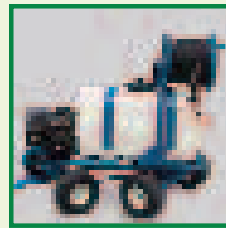
Damping-off on gomphrena caused by Rhizoctonia stem rot.

Rhizoctonia spp. cause root, stem and foliar diseases on many of our most important container produced ornamentals. *Rhizoctonia* spp. usually attack the stems of plants at the soil line, causing girdling and death of the tops. The pathogen commonly causes damping-off of bedding plants, stem rot of cutting propagated plants (like poinsettia) and aerial blights of woody shrubs. Root rots are seen less often.

In the Southern United States, Rhizoctonia can attack leaves, especially when plants are grown close together and kept moist, decimating entire stock beds or flats in a few days when conditions are hot and wet. In other areas of the country, the nurseryman creates ideal conditions for Rhizoctonia diseases by growing plants in covered structures that are heated and irrigated overhead. Severe disease development can occur in less than one week, so plants should be scouted and monitored for symptoms at least once a week. Brown,

irregularly shaped spots form anywhere on foliage or stems. Lower leaves of cuttings are sometimes invaded where they touch the surface of the rooting medium. When humidity is high, the web-like brown mycelium of the pathogen covers infected portions of the plant. This fungal mycelium can be seen many times in aerial blight and sometimes when flats of seedling crops are attacked.

Rhizoctonia stem rot causes brown cankers at the soil line. The cankers are sunken and dry appearing and can cause the plant tops to collapse. Root rot may occur in some cases but is less common than Pythium root injury. Root rot caused by Rhizoctonia appears much like root rots caused by other fungi, with roots becoming brown, somewhat softened, and finally disintegrating. An accurate laboratory diagnosis is therefore crucial, since fungicides that control Pythium do not control Rhizoctonia and visa versa. You must also keep in mind that mixed infections, cases where



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two pathogens are active, are also common. Only an accurate diagnosis will allow you to choose the best and most complete control strategies. Be sure to watch plants for above ground signs of root rot: yellow or pale green leaves, small leaves, wilting and stunting.

Soil-borne pathogens such as *Rhizoctonia spp.* can escape notice and cause serious losses before they are identified. Prevention is therefore the key to controlling *Rhizoctonia* diseases. Use healthy plants, new or steam-pasteurized pots and potting media and avoid placing plants directly on the ground. If you follow these steps the fungicides you apply will have the greatest chance of working.

FUNGICIDE OVERVIEW

Fungicides continue to be an important part of ornamental plant production despite our best efforts to use cultural and biological controls. As mentioned earlier, *Rhizoctonia spp.* occur in the potting medium and can cause stem and leaf diseases, making it important to deliver the fungicide to the soil surface.

Incorporated granules will not necessarily do the job. Figure 2, below, lists results of trials conducted by many researchers over the past 10 years or so. Three of the diseases most often used for testing fungicide performance are impatiens damping-off or canker, poinsettia cutting rot and vinca damping-off or canker. These are summarized in the figure.

Banrot 40WP (The Scotts Co.) has been a good product for *Rhizoctonia* for many years but due to sometimes low use rates, may give poor control. The product must be drenched, and foliage must be irrigated after application to prevent plant injury.

Chipco 26019 and Chipco 26GT (Bayer Environmental Science) can both be sprayed or drenched, thus giving usually very good to excellent control of most *Rhizoctonia* diseases. Do not use as a drench on impatiens; also, it has been found to cause leaf damage to some petunias cultivars.

Daconil Ultrex (Syngenta) can give very good to excellent control of aerial forms of *Rhizoctonia* but must not be

drenched due to phytotoxicity to roots of many plants.

Heritage (Syngenta) has worked better for *Rhizoctonia* than Compass O, which may be due to the upwardly systemic nature of Heritage.

Hurricane (Syngenta) is a combination of Medallion and Subdue Maxx that will hopefully be labeled for ornamental use soon. One of its active ingredients (fludioxinil) is excellent for *Rhizoctonia* disease control both above and below ground.

Insignia (BASF Corp.) falls into the same chemical class as Heritage and should be labeled on ornamentals next year. Limited testing to date indicates a lesser degree of efficacy than Heritage on *Rhizoctonia* diseases.

Spectro (Cleary Chemical Corp.) is a combination of chlorothalonil (like Daconil) and thiophanate methyl (like 3336). It has been excellent in our trials on *Rhizoctonia* on bedding plants when applied as a srench. As with Daconil, it should not be used as a drench.

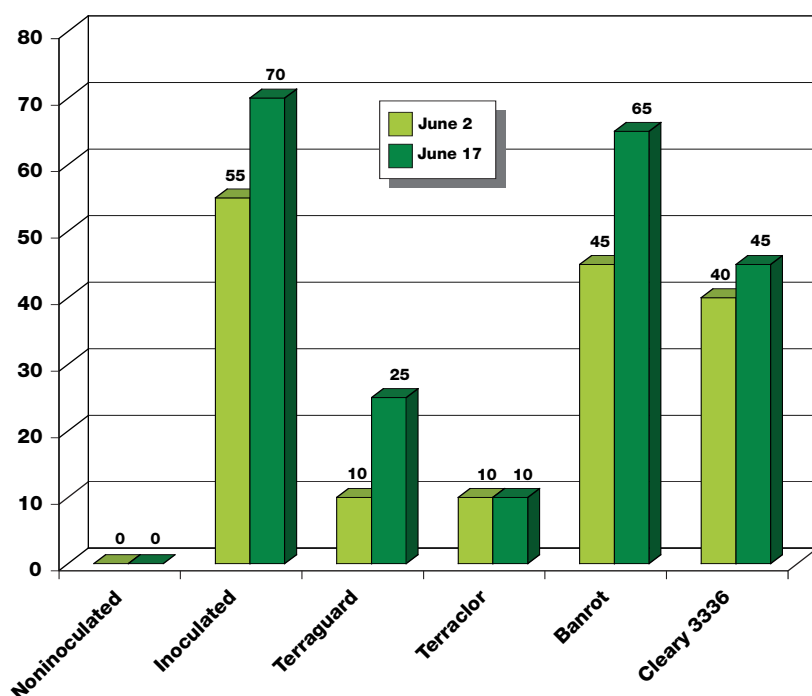
Terraclor (Crompton/Uniroyal) is one of our oldest fungicides for *Rhizoctonia* and remains one of the most effective. It gives a little better control overall than Terraguard (Crompton/Uniroyal, which is in a different chemical class) at comparable rates. Terraguard should not be used as a drench on impatiens.

Thiophanate methyl (the active ingredient of 3336 [Cleary ♦

Figure 2. Results of some efficacy trials on *Rhizoctonia* diseases on ornamentals. These trials were conducted over the past 10 years throughout the United States. The products with overall best results are in bold.

Fungicide	Impatiens damping-off and stem rot	Poinsettia stem rot and root rot	Vinca damping-off and stem rot
Banrot 40WP	Poor at times but usually good to excellent	N/A	Some to good
Chipco 26019 50WP	Good to excellent	Very good	Excellent
Chipco 26GT	N/A	Very good	Excellent
Companion	N/A	N/A	Some
Compass O	N/A	Poor	N/A
Contrast 70WSP	Excellent	Excellent	Very good
Daconil Ultrex	Very good	Some	N/A
Fungo Flo	Excellent	Some	Some to very good
Heritage	Excellent	Excellent	N/A
Hurricane	Excellent	N/A	N/A
Insignia	Some to excellent	N/A	Very good
Medallion 50WP	Excellent	Excellent	Good to excellent
Phyton 27	None	Some	N/A
PlantShield RootShield	Poor	Very good	Poor
Spectro	Excellent	N/A	Excellent
Terraneb	Excellent	N/A	N/A
Terraclor 75WP	Some to excellent	Good	Excellent
Terraguard 50W 3336	Good to excellent	N/A	Excellent
	Some to excellent	Very good to excellent	Good to excellent

Figure 1. Effect of some common fungicides on *Rhizoctonia* stem canker on snapdragons in a study at the Long Island Hort Research & Extension Center. The percentage of plants with stem canker was determined on June 2 and 17, 2003.



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Figure 3. Efficacy of some fungicides for control of *Rhizoctonia* stem canker on *Impatiens wallerana* 'Super Elfin Salmon'. Fungicides were applied on a 14-day interval. (Trial conducted at Long Island Horticultural Research & Extension Center, Cornell University in 2002)

Treatment	Rate per 100 gal.	% plants with stem canker	% plants dead
Noninoculated	N/A	0 a	0 a
Inoculated	N/A	91.7 d	79.2 d
Insignia 02 F 21.9 WP	1 oz.	37.5 ab	12.5 ab
Insignia 02 F 21.9 WP	2 oz.	16.7 ab	16.7 ab
Insignia 02 F 21.9 WP	4 oz.	20.8 ab	12.5 ab
Insignia 02 F21.9 WP	6 oz.	12.5 a	4.2 a
Cleary's 3336 50 WP	12 oz.	37.5 bc	29.2 bc
Cleary's 3336 50 WP	16 oz.	54.2 c	37.5 c
Heritage 50WDG	1 oz.	0 a	0 a
Heritage 50WDG	2 oz.	0 a	0 a

Note: Numbers within a column followed by the same letter are not significantly different.

Chemical Corp.), OHP-6672 [Olympic Horticultural Products] and Fungo [The Scotts Co.]) has provided excellent control of *Rhizoctonia* disease in our trials until the past two years (see below for an explanation).

TRIAL FOCUS

In 2002, a trial at Cornell's Long Island Hort Research & Extension Center evaluated efficacy of different rates of strobilurins (Insignia and Heritage) compared to a thiophanate-methyl fungicide (Cleary's 3336 WP). Plugs of *Impatiens wallerana* 'Super Elfin Salmon' were established in #804 packs in MetroMix 360 on April 23. They were given fungicide drenches and inoculated with the pathogen the next day. Drenches were made at ½ pint per sq.ft. (surface area). Inoculations were made by placing agar discs from a culture of *Rhizoctonia solani* one inch from the stem of each plant. Treatments were reapplied on May 13, and plants were rated for disease severity on May 17.

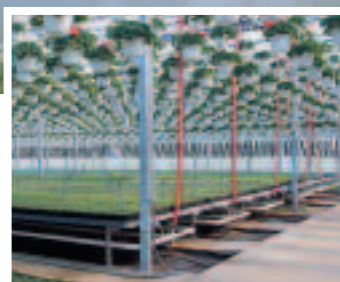
By May 17, over 90 percent of the plants in untreated controls showed stem cankers (see Figure 3, above). All of the treatments suppressed *Rhizoctonia* disease. The best performance was from the Heritage drenches, as these completely prevented symptoms. Insignia at the highest rate tested was statistically similar to Heritage but allowed some canker development. Plants treated with 3336 showed less disease than the untreated controls, but symptoms were not as well suppressed as they were in the strobilurin treatments, even though the full range of labeled rates was tested.

In a 2003 Cornell trial, we compared Terraguard, Terraclor, Cleary's 3336 WP and Banrot WP for effectiveness against *Rhizoctonia* stem rot on snapdragons. On May 16, the day after transplanting to #804 trays in ProMix BX, snapdragon 'Rocket Golden' were treated with fungicides and inoculated with agar discs from cultures of *R. solani* (as described above). Drench treatments were made once, at ½ pint per sq.ft., using 4 oz. per 100 gal. for all but the Banrot treatment, which was made at 8 oz. per 100 gal. Snapdragons were rated for symptoms on June 2 and 17.

Disease developed readily in the inoculated controls: 70 percent of the plants developed stem cankers by June 17. All but the two thiophanate-methyl treatments (Banrot and 3336) gave significant reduction of disease incidence compared to the controls. Terraguard (triflumizole) and Terraclor (PCNB) treatments were statistically similar to one another with regard to symptoms, vigor rating and dry weight. Fungicides with the active ingredient thiophanate methyl did not perform as well as the other *Rhizoctonia* control treatments in this trial. The 3336 was

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Fungal hyphae of *Rhizoctonia solani* on *impatiens* stem and flat surfaces.

applied at a turf application rate (4 oz. per 100 gal.) rather than a flower disease control rate (8-16 oz. per 100 gal.), so this lower rate might easily explain the lower effectiveness. The Banrot applications, however, were made at the high end of the labeled bedding plant rates.

The results of these two trials suggest that thiophanate methyl materials may need to be used at the highest label rate and shortest interval to give disease suppression comparable to other *Rhizoctonia* control material. In contrast, one advantage of Terraclor appears to be its long-lasting effect in the growing medium...re-treatment is not advisable, nor is it needed.

CONCLUSIONS

There are a multitude of products with activity against *Rhizoctonia*. Some, like Terraclor have been around for many years, while others are relatively new, to our industry at least. These products fall into a wide range of chemical classes making rotation a distinct possibility. Although resistance in *Rhizoctonia spp.* attacking ornamentals has not been reported to our knowledge, it is always better to be safe than sorry. As always — read the labels! They are the law and actually very helpful once they are deciphered. GPN

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