

GROWING KNOWLEDGE

Series content is coordinated by Dr. Jay Pscheidt, professor of botany and plant pathology at Oregon State University in Corvallis, Oregon.



An ongoing series provided by Oregon State University in collaboration with the United States Department of Agriculture and in partnership with the Oregon Association of Nurseries



Figure 1: These Impatiens have collapsed due to *Rhizoctonia* sp. PHOTO BY STACY FISHER, 1990.

Villains of the greenhouse

When seedlings fail, *Rhizoctonia* damping-off, root and stem rot may be the cause

BY JAY W. PSCHIEDT

THERE IS SO MUCH hope for the future when we plant seeds, but that can be dashed when they don't emerge, or when they fall over soon after popping out of the media.

There are many fungi that live and survive in the soil that can be responsible. The usual suspects include *Rhizoctonia* species, *Fusarium* spp., and *Pythium* spp. Each is favored by different conditions, even though symptoms are similar. In this article, we will focus on diseases of greenhouse-grown ornamentals caused by *Rhizoctonia*.

Many different hosts are susceptible to these fungi including *Alyssum*, carnation, *Coleus*, *Crocasmia*, *Delphinium*, Douglas fir,

ginseng, impatiens, lily, pansy, petunia, poinsettia, snapdragon, and tulip.

Symptoms

Poor emergence or seedling collapse are indicative of damping-off. Seeds or emerging radicles may become rotted. After emergence, stems, roots, and cotyledons may rot at or below the soil.

A light brown fungal growth (mycelium) may grow over the entire seedling and over large sections of trays. Cuttings might develop a brown dry canker on the stem at the infection site. The canker enlarges up the stem and down into roots, followed by



wilting and cutting death.

Older plants can develop stem lesions, crown and root rots. Lesions on older plants are drier (compared to those by other organisms), reddish-brown to dark-brown and become slightly sunken. Lesions generally occur near the soil/media line. Stem and root lesions often are shallow, but may extend deeper in young stem or root tissue. Sometimes a brown fungal or web-like growth may be visible with a hand lens on the surface of the lesions. These older plants wilt, collapse, and die if these lesions girdle the stem.

Densely planted seedlings or plants may develop a web blight where this fungus grows over and mats the leaves. It can also occur when leaves are in contact with the soil medium. In poinsettia, brown-cankered crown rots can occur without root rot. Longitudinal cracking and a dry appearance of the rotted crown tissue often develop on older plants.

Cuttings may be attacked by the fungus during rooting, where it enters through physical wounds or wounds from salt accumulation at the soil line. Other fungi such as *Fusarium*, *Pythium* and *Phytophthora* are also frequently involved with damping-off and cutting rots.

It is not easy to tell these organisms apart by visual inspection, so send them to the Oregon State University Plant Clinic (<https://bpp.oregonstate.edu/plant-clinic>) for diagnosis.

The fungus

Rhizoctonia spp. are soilborne fungi that survive from crop to crop as very small, dense, tightly-packed structures called sclerotia. These fungi can also survive as microscopic strands (mycelia) that colonize bits of organic matter.

Roots become infected as they grow past these survival structures. The fungus then grows along the root surface and forms an aggregation called an infection cushion. This aggregation then pushes into the root where it colonizes and kills the tissue.

The fungus can form knots of mycelium that develop into sclerotia. These are released into the soil as plant debris decomposes. *Rhizoctonia* can also grow across the soil/media surface to attack the base of stems or leaves in contact with the ground.

The fungus can be spread by water, contaminated tools, transportation of infected plants, and propagation of infected plants. Disease is favored by high air temperatures, soil temperatures between

62°F and 79°F and moderately moist soils. Wounding, poor sanitation, and high nitrogen fertility favor disease development.

Management

Good sanitation and cultural practices are essential, including clean growing surfaces, clean water, and handling practices along with soilless media.

First things first: Start with culture-indexed plants free of the pathogen. This includes the purchase of new, clean seeds.

Next, plan to use a new soilless potting mix. If you must use soil or reuse media it has to be steam-treated for at least 30 minutes at 180°F.

Once it has been purchased or treated, keep field soil out of contact with clean media. Also, avoid reusing pots or trays from a previous crop for propagation. If pots or trays must be reused, then wash off all debris and soak in a sanitizing solution or treat with aerated steam for 30 minutes. Disinfect any tools and equipment that might be used and contaminate the media.

During production, use sound horticultural practices that have been successful in your facility. Maintain adequate fertility for moderate plant growth. Monitor >>

NurseryGuide.com



Search:

- Plants
- Companies
- Services & Supplies

**FIND
WHAT
YOU'RE
LOOKING
FOR**



OREGON
ASSOCIATION OF
NURSERIES

Villains of the greenhouse

Figure 3: This *Sisyrinchium* sp. root has *Rhizoctonia* root rot.

OSU PLANT CLINIC IMAGE, 2019.



soluble salt concentrations regularly. Use media pH and soil wetness appropriate for good crop growth. Water plants such that they are not wet for extended periods of time. Also, manage fungus gnats especially during rooting.

Remove plant debris during production and thoroughly clean and sterilize the greenhouse between production cycles.

These cultural control practices reduce or eliminate the need for chemical drenches.

An accurate diagnosis should precede chemical treatment, since most of the chemicals are not effective against all the pathogens that might cause damping-off. If used, treatments must be made before infection occurs. Rotate among fungicides from different groups with different modes of action. Be sure to check labels for crop safety before application.

Many different chemicals are registered for management of *Rhizoctonia*. These include: Affirm WDG applied as a soil drench; Banrot 40 WP (avoid using the granular formulation); Broadform; Chipco 26019 N/G; Empress can be used for cuttings or seedlings; Fame as a soil drench; Heritage; Pageant used as drench; Palladium (as long as excessive runoff is

avoided to small plants, which may result in stunting or chlorosis); ProStar 70 WG; Terraclor 400 (excellent efficacy); and Terraguard SC.

Emblem, Medallion and Spirato GHN are registered but be careful not to use with oils or adjuvants as that can cause plant damage. Thiophanate-methyl-based products, such as Cleary's 3336 EG and OHP 6672 4.5 F, are also registered but have resulted in inconsistent efficacy.

Biological control

Several biocontrol products are registered, and are considered organic, but they must be used in conjunction with other control tactics such as thorough sanitation. The fungal based products include: Asperello T34 (*Trichoderma asperellum* strain T34) which can be incorporated into the potting media but do not mix or use with other fungicides for 10 days; Bio-Tam 2.0 or Tenet WP or Obtego (*Trichoderma asperellum* and *T. gamsii*); Prestop (*Gliocladium catenulatum* strain J1446) can be applied as long as other products are not in the same tank; and RootShield Plus Granules (*Trichoderma harzianum* Rifai strain T-22 and *T. virens*

strain G-41).

The bacterial based products include: Actinovate SP (*Streptomyces lydicus* strain WYEC 108) used as a soil drench; Mycostop (*Streptomyces* Strain K61) which must be applied with enough water to move the product into the root zone; Stargus (*Bacillus amyloliquefaciens* strain F727) as a soil drench where weekly applications were effective in one *Viburnum* trial; Subtilex NG (*Bacillus subtilis* strain MBI 600) as a drench; Triathlon BA (*Bacillus amyloliquefaciens* strain D747);

and Zio (*Pseudomonas chlororaphis* strain AFS009) as a soil drench.

Summary

With good sanitation and attention to the horticultural needs of the crop, these diseases can be avoided. If disease develops, get an accurate diagnosis and follow appropriate recommendations accordingly. ☺

Jay W. Pscheidt is an extension plant pathology specialist and professor of Botany and Plant Pathology with Oregon State University in Corvallis, Ore. He can be reached at pscheidj@science.oregonstate.edu.

References

- Benson, D.M. 1991. Control of *Rhizoctonia* stem rot of Poinsettia during propagation with fungicides that prevent colonization of rooting cubes by *Rhizoctonia solani*. *Plant Disease* 75:394-398.
- Wolcan, S.M., Malbran, I., Mourellos, C.A., Sisterna, M.N., Gonzalez, M.P., Alippi, A.M., Nico, A., and Lori, G.A. 2018. Diseases of Carnation. In McGovern, R.J. and Elmer, W.H. (eds.) *Handbook of Florists' Crops Diseases*. Springer Int.
- Wegulo, S.N., and Chase, A.R. 2018. Diseases of Snapdragon. In McGovern, R.J. and Elmer, W.H. (eds.) *Handbook of Florists' Crops Diseases*. Springer Int.