

Pink Root on Your Onion Transplants: To Plant or Not to Plant?

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Word on the Black Dirt in Orange County is that many growers are receiving Arizona-grown onion plants that are heavily infected with pink root. There is not an easy answer to the question of whether or not to plant the infected onions and what, if anything, should be used to treat the plants before planting. However, here are some things to consider when making your decision about whether or not to plant.

1) Send a sample to the Cornell Plant Disease Diagnostic Clinic:

Before you do anything else, send a bundle of 25-50 plants that are showing symptoms to the Diagnostic Clinic in Ithaca. If you need assistance filling out the paperwork (available at <http://plantclinic.cornell.edu/pddcforms/2015pddcsubmissionform.pdf> and included here), please contact me at eg572@cornell.edu. Samples should be wrapped in dry paper towels, placed in an UNSEALED Ziploc or plastic bag, then mailed in a rigid box container to the clinic along with the completed paperwork, including the check for \$30. This step is crucial if you decide to reject plants and seek a refund from your supplier and to help inform how to manage the plants in the field if you decide to plant (another fungal disease, fusarium basal rot, can also cause onion roots to turn a pinkish color).

2) Understand the risk:

a) In the long-term: Pink root is caused by the fungus *Phoma terrestris*. This fungus can survive in the soil for many years on other crops, especially some cereal grains. If you decide to plant onions that



are infected with pink root, you risk infecting that field and future susceptible crops that you might plant in that field. If a heavy infestation of pink root develops in a single field, you must be extra careful not to transfer soil on tractors, equipment, vehicles, and crew from the infected field to non-infected fields. It is advisable not to plant any alliums other host crops in heavily infected fields for 3-5 years. All of the Cornell onion pathologists that were consulted strongly recommended not to plant infected onion plants for these reasons. However, if you've ever had pink root on your onions in the past, chances are you already have a healthy population of *Phoma terrestris* in your fields and will not be introducing the pathogen for the first time. You will likely, however, be making an existing problem worse.

b) In the short-term: Chances are, your crop planted from infected transplants is going to be smaller than normal. It is rare for pink root to kill an onion crop, but the damage to the roots reduces the ability to take up the water and nutrients necessary

to promote big bulb development. How much smaller the crop is will depend a lot on the weather: warmer drier weather increases the stress on pink-root infected onions and leads to smaller bulbs.

3) Dip, drench, spray:

If you get a positive confirmation from the Diagnostic Clinic that you have pink root, but decide to plant anyway, here are some options for how to treat those transplants. Even if you select only the plants that visually appear not to be infected with pink root, chances are that they have some of the fungus present on the plants and precautions should be taken to avoid spreading it in the field.



- a. **Pre-plant dips:** These are going to fall into three categories: 1) fungicides, 2) disinfectants, and 3) biopesticide inoculants. Basically, you want to decide whether to try to just kill as much of the pink root as possible, crowd out the pink root pathogen by introducing beneficial microorganisms, or some combination of both strategies. Here are some specific products to consider:
 - i. **Fungicides:** Researchers at the University of Georgia studied the impact of three fungicides used as pre-plant root dips in 2009: Endura (boscalid), Topsin (thiophanate methyl), and Switch (cyprodinil + fludioxinil).ⁱ While Endura showed the best results, unfortunately none of these chemicals is labeled for pre-plant dips.
 - ii. **Disinfectants:** OxiDate 2.0 (peroxyacetic acid + hydrogen peroxide) is labeled for pre-plant dip for control of several fungal pathogens at a dilution of 1:100. OxiDate 2.0 is not labeled for management of pink root, but is for *Fusarium* and *Rhizoctonia*, both potential onion pathogens.
 - iii. **Biopesticides:** There are a number of new biopesticide formulations that contain numerous beneficial microorganisms that can effectively crowd out pathogens like pink root, though again, no research has been done on the ability of these products to work to control *Phoma terrestris*. Research in Turkey from 2007 demonstrated great potential for *Trichoderma* species to provide suppression of *Fusarium* basal rot of onions.ⁱⁱ Similar research from Egypt in 2012 showed that *Trichoderma* can help reduce the incidence of white rot on onions in field and even showed some promise for *Bacillus subtilis* strains in improving onion yield in white rot-infested conditions.ⁱⁱⁱ Products that include *Trichoderma* species and are labeled for pre-plant dip on onions for managing *Fusarium* and *Rhizoctonia* include RootShield Plus WP and Bio-Tam. TerraGrow from BioSafe Systems includes both *Trichoderma* species and *Bacillus subtilis* strains and is labeled for pre-plant dip of onions. Finally, the product Double Nickel 55 (*Bacillus amyloliquefaciens* strain D747) is also labeled for root dips on onions for the suite of damping off pathogens and could be effective against pink root.
- b. **Soil furrow drenches:** Most fungicides already in an onion grower's arsenal can be used as a soil furrow drench at planting. Unfortunately, again, very little research has been done on how well these chemistries work on pink root. Research out of Michigan State in 2012 showed that the new DuPont penthiopyrad active ingredient was effective at *Phoma terrestris*, but there is no formulation currently available in the U.S.^{iv} The fungicides listed in the plant dip section ARE labeled for soil drench, so we might assume that the effective control achieved by Endura as a

- dip may translate into successful management as a furrow drench. There is a disinfectant that is marketed in tandem with TerraGrow called TerraClean (peroxyacetic acid + hydrogen dioxide) that can be applied in furrow. A study from Colorado State in 2011 showed TerraClean to have similar efficacy on reducing pink root infection as a combined application of Ridomil Gold Copper (copper hydroxide + mefenoxam) + Quadris FL (azoxystrobin).^v Some *Bacillus subtilis* formulations, like Serenade ASO and Companion, have label recommendations for soil drenches as well.
- c. Post-transplant treatments: Depending upon weather conditions in season, supplemental foliar fungicide applications may need to target pink root development. Since the pink root pathogen spread most readily under hot and dry conditions, growers will likely already be applying fungicides for foliar disease control that will likely help curb the spread of pink root. However, it may also be advisable to spray some of the new Induced Systemic Resistance products on 10-14 day intervals beginning after transplant to help trigger the plant's defense systems. The most widely studied product in this class is Regalia (extract of *Reynoutria sachalinensis*) and is compatible with most tank mixes, including other biopesticides mentioned above.
 - d. Combining strategies: A word of caution on combining disinfectant and/or fungicide applications with biopesticides: remember that the active ingredients of the biocontrol products are living organisms and will likely not survive if application times are too close in time. Make sure to allow plants dipped in disinfectant time to fully dry before dipping in biopesticides. Similarly, a biocontrol inoculated plant transplanted into a fungicide drenched furrow will likely not see the benefit of the inoculation.

4) Plan for next year:

Hopefully, this won't be an annual problem for growers transplanting onions purchased from out-of-state. However, there are some varieties that are more resistant to pink root than others and should be considered for selection to grow transplants for planting into fields where pink root pressure has been heavy. Though Highlander is a popular early variety for transplant crops, it is particularly susceptible to pink root. Meg McGrath, Cornell Vegetable Pathologist, maintains active lists of resistant varieties available for download from the VegMD website:

<http://vegetablemendonline.ppath.cornell.edu/Tables/TableList.htm>. The severity of pink root on onions decreases significantly after rotating out of host crops for 3-5 years as well, so it might be time to trade ground with a neighbor growing mixed vegetables if you choose to plant and have a severe outbreak of *Phoma terrestris* in that field.

If you decide to plant your infected onions and are interested in participating in a research study to try to gather information on the efficacy of some of the biopesticide products mentioned above, please contact me at eg572@cornell.edu for more information.

ⁱ Sanders, F. Jr. 2010. Effect of fungicide dip treatments on pink root disease and yield of transplanted sweet onions in Georgia. (Abstr.) Phytopathology 100, No.6 (Suppl. 1):S113.

ⁱⁱ Coşkuntuna, A., Özer, N. Biological control of onion basal rot disease using *Trichoderma harzianum* and induction of antifungal compounds in onion set following seed treatment. Crop Prot., 27 (2008), pp. 330–336.

ⁱⁱⁱ Shalaby, M.E., Ghoniem, K.E. & El-Diehi, M.A. Biological and fungicidal antagonism of *Sclerotium cepivorum* for controlling onion white rot disease. Ann Microbiol (2013) 63: 1579. doi:10.1007/s13213-013-0621-1

^{iv} WIRIYAJITSOMBOON, P., Hausbeck, M.K. 2016. Susceptibility of onion cultivars to pink root and efficacy of fungicide drenches. (Abstr.) Phytopathology 106(Suppl. 1):S1.9. <http://dx.doi.org/10.1094/PHYTO-106-1-S1.9>

^v Schwartz, Howard F., Otto, K., McMillan, Mark. 2011. Evaluation of TerraClean 5.0 for control of pink root in onions. <http://www.biosafesystems.com/PDFs/TerraClean5.0%20Onion%20Pink%20Root%20Tech%20Sheet.pdf>

Plant Disease Diagnostic Clinic Sample Submission Form



Cornell University

Please mail samples and payment to: Plant Disease Diagnostic Clinic, 334 Plant Science Building, Ithaca, NY 14853

In-state (out of state): basic \$30 (\$50); turf or nematode \$50 (\$70); or see full list of fees at: plantclinic.cornell.edu

Location Where Sample Was Taken	Referring Agent (i.e. CCE Agent, Consultant, Arborist...)
Home Owner <input type="checkbox"/> Commercial Grower <input type="checkbox"/> Business name (if any): _____ Person to contact: _____ Address: _____ _____ Phone: _____ Fax: _____ Email: _____ County: _____	Business: _____ Agent: _____ Address: _____ _____ Phone: _____ Fax: _____ Email: _____

Describe the nature and extent of the problem:

Collection date: _____

Scientific Name: _____ **Common Name:** _____

Disease Symptoms:	Affected Parts:	Distribution on Site:	Planting:	Additional Information:
wilting <input type="checkbox"/>	stems <input type="checkbox"/>	entire field <input type="checkbox"/>	garden <input type="checkbox"/>	Number of acres or plants affected?
yellowing <input type="checkbox"/>	leaves/needles <input type="checkbox"/>	field edge <input type="checkbox"/>	nursery <input type="checkbox"/>	
galls <input type="checkbox"/>	branches/twigs <input type="checkbox"/>	random <input type="checkbox"/>	orchard <input type="checkbox"/>	Approx. date problem appeared?
dieback <input type="checkbox"/>	flowers <input type="checkbox"/>	high areas <input type="checkbox"/>	green <input type="checkbox"/>	Did problem occur gradually?
rot <input type="checkbox"/>	fruit/seeds <input type="checkbox"/>	low areas <input type="checkbox"/>	fairway <input type="checkbox"/>	Getting worse or staying the same?
marginal burns <input type="checkbox"/>	roots/bulb/rhizome <input type="checkbox"/>	by road/drive/building/pool <input type="checkbox"/>	yard <input type="checkbox"/>	Approx. age of plants?
shedding/thinning <input type="checkbox"/>	crown <input type="checkbox"/>	feet away: _____	field <input type="checkbox"/>	Date last transplanted?
leaf spots <input type="checkbox"/>			forest <input type="checkbox"/>	How often watered?
streak <input type="checkbox"/>			greenhouse <input type="checkbox"/>	
mosaic <input type="checkbox"/>			interior <input type="checkbox"/>	
blight <input type="checkbox"/>				
other: _____				
Chemicals/Fertilizers: <i>give rate and date/s of application</i>				Cropping History:

Date Received at the Diagnostic Clinic: _____ By Whom: _____

CU-PDDC-Form-012-001

Approved by: Karen L. Snover-Clift

Effective Date 01/06/15

version 1.1

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