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**Researcher:** Joshua Doe/Central University **Date:** 3/28/2011

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**Project Title:** Efficacy of Management Tools for Pythium Root Rot

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**Protocol #:** 10-017 **PRnumbers:** 29879, 29880, 29881, 29882, 29883, 29884, 29885, 29887, 29888, 29889, 29890, 29891, 29892, 30069

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### **Narrative Summary (Results/Discussion)**

*Please keep text to one page if possible. Include summary of trial results and a brief discussion including how any changes from the protocol may have affected results. Results for multiple PRnumbers can be summarized together, but please list all PRNumbers in the header and in the summary data table.*

Disease pressure was high in both the *Pythium ultimum* and *P. mamillatum* test. Shortly after germination of the seed, damping off was evident on some of the seedlings in both tests. As seedlings grew, additional damping off/root rot occurred that resulted in additional mortality during the 35-day-long test. By the end of the test, the average number of healthy seedlings in each pot ranged from 8.2 to 0.2 in the *P. ultimum* tests. The ANOVA analysis of the data from this test indicated that there was a highly significant ( $P < 0.001$ ) treatment effect, but no block effect ( $P = 0.9759$ ). Compared to the inoculated checks, drench applications of Subdue MAXX, Fenstop, Adorn and Segway had significantly higher numbers of healthy seedlings per pot (Table 1). At the end of the *P. mamillatum* test, the average number of healthy seedlings in each pot ranged from 8.6 to 0.0. The ANOVA analysis of the data from this test indicated that there was a highly significant ( $P < 0.001$ ) treatment effect, but no block effect ( $P = 0.7193$ ). Compared to the inoculated checks, drench applications of Terrazole L, Subdue MAXX, Segway, and Evito had significantly higher numbers of healthy seedlings per pot (Table 1). There was also some seedling mortality of in the non-inoculated check treatments, particularly in the *P. mamillatum* test. *Pythium* was not isolated from any of these symptomatic seedlings. The data from these trials suggest that the effectiveness of some fungicides in controlling Pythium root rot may vary, depending on the species of *Pythium*. No evidence of phytotoxicity was observed during either of these tests.

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**Results Table**

Please insert results table here. Include PRnumbers for each treatment if multiple PRnumbers are included in this summary. Please include statistics.

Table 1. Effect of fungicide treatments on the number of healthy Douglas-fir seedlings growing in potting mix infested with *Pythium ultimum* or *P. mamillatum*.

PR No	TRT/PRODUCT	Rate/ 100 gal	# of healthy seedlings	
			<i>P. ultimum</i>	<i>P. mamillatum</i>
29880	Adorn 4FL (V-10161)	2 fl oz	7.4ab	2.0cde
29888	Aliette 80 WDG	9.6 oz	5.2abcde	1.8cde
29881	BW240 WP	6 oz	2.6bcde	0.8de
29882	CG100	9.6 fl oz	4.0abcde	1.8cde
29883	Evito (Disarm 480 SC)	0.4 fl oz	6.6abc	5.4abc
29884	Fenstop	10 fl oz	8.2a	3.8bcd
29885	Heritage 50 WG	0.9 oz	4.2abcde	2.8cde
29887	Magellan	12 fl oz	4.6abcde	0.6de
29891	Pageant 38WG	12 oz	6.0abcd	3.6bcde
29892	Remedier (Tenet)	2.5 oz	0.2e	0.0e
29892	Remedier (Tenet)	7.5 oz	0.2e	0.0e
29879	Rotation BW240 WP/ Magellan	6 oz + 12 oz	0.8de	1.2de
29889	Segway	3 fl oz	7.0ab	7.2ab
29890	Subdue MAXX FV	2 fl oz	8.8a	8.0a
30069	Terrazole L	7 fl oz	6.2abcd	8.6a
-	Inoculated Check	-	1.3cde	0.6de
-	Non-inoculated check	-	7.6ab	3.0bcd

<sup>1</sup>Data collected 35 days after seeding (January 26, 2011).

<sup>2</sup>Numbers in columns followed by the same letter are not significantly different, P<0.001, Tukey's Studentized Range (HSD) Test.



# Ornamental Horticulture Program Research Report Form

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### Materials & Methods/Recordkeeping

Please fill out the information below or attach a separate document with comparable information.

**Name(s) of Personnel Conducting Research:** Joshua Doe and Jasmine Buck  
**Location of Trial (city/state):** Central City, Iowa  
**Use Site (greenhouse/shadehouse/field container/etc):** Greenhouse

### Crop History

**Crop Cultivar/Variety:** Douglas fir  
**Date of Seeding:** December 22, 2010  
**Date of Emergence:** Click here to enter text.  
**Date of Transplanting:** Click here to enter text.  
**Potting Mix:** Weyerhaeuser Conifer Seedling Mixture of 85% pasteurized peat moss and 15% perlite which contained 15.5 lbs/yd proprietary fertilizer and 10 lbs/yd 16-5-11 slow release fertilizer  
**Pot size & spacing:** 3.25" x 3.25" (TS 3.5 pot)  
**Row spacing:** Click here to enter text.

### Product(s) applied prior to start of experiment:

Product	Rate	Application Type	Date of Application	Crop Growth Stage	Application Volume
Sun Gro Horticulture Multicote Fertilizer 20-5-6	6 lbs/cubic yard	Soil Incorporation	After Soil Sterilization	Prior to sowing	N/A

Add more rows as needed.

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**Experiment Information**

**Experimental Design:** Randomized Split Block  
**Number of Reps:** 5, with one pot per treatment/replication

**Materials & Methods:**

*Insert materials & methods here only if information is not presented elsewhere.  
 Include any changes from protocol.*

On September 3, 2010, seed from Weyerhaeuser’s Longview Tree Farm seed orchard was surface sterilized in a 10% bleach solution for 10 minutes. Seed was then stratified at 34°F until time of planting. Tests were conducted to determine the effectiveness of treatments in controlling disease caused by *Pythium ultimum* and *P. mamillatum*. Isolates of *P. ultimum* (isolates 193 and PP249B) and *P. mamillatum* (isolates PD266A & PP 158A) were obtained from Jerry Weiland’s USDA-ARS collection. Isolates were grown on potato dextrose agar (PDA) for one week. Inoculum to inoculate the potting mix in these trials was obtained by taking equal amounts of fully colonized media per isolate from the Petri plates and mixed it in a blender with distilled water at a ratio of 100 mls distilled water for each plate. The volume of steam-pasteurized potting mix needed to fill the pots for each test was measured and inoculum was applied to the potting mix at the rate of 60 ml of the inoculum-slurry per pot on December 15, 2010. The potting mix was then thoroughly mixed prior to filling the pots. Potting mix for the non-inoculated checks was mixed similarly using a slurry solution of PDA only. All of the filled pots were then placed on benches in a greenhouse set at 73F day (6 am to 6 pm) and 65F night (6 pm to 6 am). The initial application of all the treatments, except Remedier and BW240, was applied to the potting mix on December 20, 2010. This was five days after the potting mix had been inoculated with the pathogens. The Remedier and BW240 treatments were applied prior to inoculation of the potting mix on December 7<sup>th</sup> and 12<sup>th</sup>, respectively. This potting mix was inoculated in separate batches from the mix that was used for the other treatments. All treatments were applied as drenches at the rate of 100 to 120 ml/pot. On December 22, 2010 all treatments were planted with 10 seeds per pot. Pots were top-dressed with thin layer of fine vermiculite and maintained in the greenhouse where they received overhead mist irrigation 4 times per day for 3-minute intervals.

**Application Equipment:** Graduated cylinder and measuring cup  
**Product(s) applied during experiment (including treatments, fertilizers, etc):**

Product	Rate(s) Per 100 Gal	Application Type	Date of Application	Crop Growth Stage	Application Volume
Adorn 4FL (V-10161)	2 fl oz	Drench	Dec. 20, 2010	Pre-seeding	100-120 ml/pot
Aliette 80 WDG	9.6 oz	Drench	Dec. 20, 2010	Pre-seeding	100-120 ml/pot
BW240 WP	6 oz	Drench	Dec. 12, 2010	Pre-seeding	100-120 ml/pot
CG100	9.6 fl oz	Drench	Dec. 20, 2010	Pre-seeding	100-120 ml/pot
Evito (Disarm 480 SC)	0.4 fl oz	Drench	Dec. 20, 2010	Pre-seeding	100-120 ml/pot
Fenstop	10 fl oz	Drench	Dec. 20, 2010	Pre-seeding	100-120 ml/pot
Heritage 50 WG	0.9 oz	Drench	Dec. 20, 2010	Pre-seeding	100-120 ml/pot
Pageant 38 WG	12 oz	Drench	Dec. 20, 2010	Pre-seeding	100-120 ml/pot
Magellan	12 fl oz	Drench	Dec. 20, 2010	Pre-seeding	100-120 ml/pot
Remedier (Tenet)	2.5 and 7.5 oz	Drench	Dec. 7, 2010	Pre-seeding	100-120 ml/pot
Segway	3 fl oz	Drench	Dec. 20, 2010	Pre-seeding	100-120 ml/pot
Subdue MAXX FV	2 fl oz	Drench	Dec. 20, 2010	Pre-seeding	100-120 ml/pot
Terrazole L	7 fl oz	Drench	Dec. 20, 2010	Pre-seeding	100-120 ml/pot

*Add more rows as needed.*

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**Data Collected**

*Please describe data collected and scoring system. Also include the dates data were collected.*

Data on symptom development was collected 1x/week for 4 weeks beginning 14 days after seeding. Notes on symptoms were taken and the number of “healthy” seedlings was recorded. Symptoms included damping off, which occurred shortly after emergence of the cotyledon, to root rot which killed the seedlings during the experiment.

Data analysis: Data were analyzed using ANOVA (GLM SAS). Treatment means were separated using Tukey’s Studentized Range (HSD) Test.

**Photos**

*Please embed photos here or send jpg, tiff, or bmp.*

**Raw Data**

*Insert raw data below or send separate file containing raw data.*

Raw data file attached.

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p 6

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Environmental conditions during the experiment:

*Insert temperature, precipitation and/or irrigation, and relative humidity with a minimum of high, low and average daily temperatures. Or send separate file with this information.*

*Include a statement about any significant weather or environmental events during the course of the experiment.*

Plants were maintained in a greenhouse with temperatures set for 73 F day (6 am to 6 pm) and 65 F night (6 pm to 6 am) (see Environmental & Raw Data file). Pots received daily overhead mist irrigation 4 times per day for 3-minute intervals. On January 4, 2011, the seedlings were exposed to supplemental lighting from 12:00 pm – 7:00 pm. The lighting period was increased on January 7, 2011 to 8:00 am - 7:00 pm.

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