Rhizoctonia Root Rot and Phytophthora Root Rot Fungicide Trials B 1999

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Objective: To evaluate labeled fungicides for their effectiveness in controlling root rot caused by *Rhizoctonia solani* and *Phytophthora nicotiana* pv. *parasitica* in container-grown junipers and azaleas.

Methods:
Azalea 'Snow' and juniper 'Blue Pacific' liners were planted into 1-gal containers in a 9:1 pine bark: sand medium on 18 June 1999. Eight fungicide and biorational products were tested for their effectiveness at reducing Rhizoctonia root rot and eight products were evaluated for control of Phytophthora root rot (Table 1). Granular fungicides were incorporated into the potting medium at planting. All other fungicides and biorational products were drenched onto plants by 25 June 1999, prior to pathogen inoculation.

Juniper and azalea plants were inoculated with either *Rhizoctonia solani* or *Phytophthora nicotiana* pv. *parasitica* on 2 July 1999 by placing six *Rhizoctonia*-infested oat grains 1.5-cm deep in a 3-cm radius from the base of the plant stem in each container or by placing 1 g. of *Phytophthora*-infested cornmeal/sand mixture into each pot and disturbing the soil to incorporate the fungus below the soil line. Ten single-plant replications per product treatment were arranged in a completely randomized design in full-sun at the Center for Applied Nursery Research in Dearing, GA. Containers were irrigated once a day during June and twice a day in July-August for 1 hour at each irrigation period.

Fungicides were reapplied 6 weeks after initial treatment depending upon the fungicide label and the status of the test. Plant Health Care Products (Compete, Yuccah, Biopak Plus) were reapplied every two weeks as directed.

Treatment effects were determined by foliage and root dry weights for juniper and only foliage dry weight for azalea. Plants were washed of potting medium beginning 16 October for azalea and 24 October for juniper, forced air dried at 80 C for 4 days, and weighed.

Results:
In the absence of a root rot pathogen, the Plant Health Care product Compete resulted in statistically larger azalea plants based upon foliage dry weight than most of the fungicides evaluated in this trial (Table 2). There was limited statistical difference among fungicide treatments on plants inoculated with either *Rhizoctonia* or *Phytophthora*. This could be due to variability within treatment replications or possible lack of infection in some plants.

The only product that resulted in a statistical difference with the *Rhizoctonia*-inoculated control (inoculated plants that received no fungicide treatment) was the Plant Health Care product Biopak. Although Biopak Plus treated plants were smaller than the inoculated control, the foliage weight was not statistically different from that of any of the other fungicide treatments. None of the fungicide treatments appears to have reduced disease or increased plant growth compared to the *Rhizoctonia*-inoculated control.

Table 1. Fungicide and biorational products evaluated for control of root rot caused by *Rhizoctonia solani* and *Phytophthora nicotiana* pv. *parasitica*

Pathogen Inoculation	Fungicide Treatment	Application Rate
None	Banrot WP	6 oz./100 gal
None	Banrot G	Soil incorporated: 10 lb./1000 cu.ft
None	Terraclor WP	6 oz./100 gal
None	Defend G	Soil incorporated: 15 lb./1000 cu.ft
None	Cleary 3336	WP: 12 oz./100 gal
None	Subdue Maxx	1 fl.oz/100 gal (or 15 drops/gal)
None	Truban	6 oz./100 gal
None	Compete	2 Tbsp/gal w/ 4 Tbsp Yuccah/gal
None	Biopak Plus	Per label for nursery crops
None	Yuccah	4 Tbsp/gal
None	Aliette	Foliar spray: 2.5 lbs/100 gal
Rhizoctonia	Banrot WP	6 oz./100 gal
Rhizoctonia	Banrot G	Soil incorporated: 10 lb./1000 cu.ft
Rhizoctonia	Terraclor	6 oz./100 gal
Rhizoctonia	Defend G	Soil incorporated: 15 lb./1000 cu.ft
Rhizoctonia	Cleary 3336	WP: 12 oz./100 gal
Rhizoctonia	Compete	2 Tbsp/gal w/ 4 Tbsp Yuccah/gal
Rhizoctonia	Biopak Plus	Per label for nursery crops
Rhizoctonia	Yuccah	4 Tbsp/gal
Phytophthora	Banrot WP	6 oz./100 gal
Phytophthora	Banrot G	Soil incorporated: 10 lb./1000 cu.ft
Phytophthora	Subdue Maxx	1 fl.oz/100 gal (or 15 drops/gal)
Phytophthora	Truban	6 oz./100 gal
Phytophthora	Compete	2 Tbsp/gal w/ 4 Tbsp Yuccah/gal
Phytophthora	Biopak Plus	Per label for nursery crops
Phytophthora	Yuccah	4 Tbsp/gal

Phytophthora	Aliette	Foliar spray: 2.5 lbs/100 gal

Fungicide treatment to control Phytophthora root rot also had no effect in reducing disease and increasing plant growth compared to the *Phytophthora*-inoculated control (Table 2). Surprisingly, several fungicide treatments resulted in statistically smaller plants than the inoculated control including Subdue Maxx and Aliette.

Table 2. Foliage dry weight of azalea following fungicide and biorational treatments to control *Rhizoctonia solani* and *Phytophthora nicotiana* pv. *parasitica* root rot

Fungicide Treatment	Pathogen Inoculation		
	Non-Inoculated	*Rhizoctonia*	*Phytophthora*
None	67.0 ab[1]	68.2 a	69.9 a
Banrot WP	59.4 a-d	58.4 ab	56.0 abc
Banrot G	43.1 d	52.2 ab	58.3 abc
Terraclor WP	44.9 cd	54.4 ab	
Defend G	56.3 bcd	59.4 ab	
Cleary=s 3336	54.2 bcd	49.8 ab	
Subdue Maxx	55.0 bcd		43.2 c
Truban	60.3 abc		57.8 abc
Compete	73.2 a	60.7 ab	68.5 ab
Biopak Plus	47.5 cd	48.0 b	63.1 ab
Yuccah	55.7 bcd	56.8 ab	61.3 ab
Aliette	52.5 bcd		54.0 bc

[1] Numbers within columns followed by the same letter are not statistically different based upon Tukey=s HSD means separation test and *P=0.05*.

There was virtually no statistical difference between the pathogen-inoculated control and fungicide treatments for juniper foliage or root dry weights (Tables 3 and 4). This is most likely due to plant (replication) variability within each treatment. Numerically (but not statistically), all fungicide and biorational treatments resulted in larger plants than the *Rhizoctonia*-inoculated control, with Compete treatment producing the largest plants (Table 3). Although Compete treatment resulted in larger plants,

use of it in container nurseries to control root rot would be limited because of the frequency in which the product was applied. No nursery can afford to drench their plants every 2 weeks.

Several of the fungicide treatments to control Phytophthora root rot resulted in numerically (but not statistically) larger plants than the inoculated control with Subdue Maxx treatment producing the largest plants based upon foliage and root dry weights (Tables 3 and 4).

Table 3. Foliage dry weight of juniper following fungicide and biorational treatments to control *Rhizoctonia solani* and *Phytophthora nicotiana* pv. *parasitica* root rot

Fungicide Treatment	Pathogen Inoculation		
	Non-Inoculated	***Rhizoctonia***	***Phytophthora***
None	55.6 a[1]	38.8 a	35.3 a
Banrot WP	42.5 a	59.5 a	44.5 a
Banrot G	43.2 a	47.3 a	36.2 a
Terraclor WP	63.9 a	53.3 a	
Defend G	50.6 a	56.7 a	
Cleary=s 3336	45.7 a	41.6 a	
Subdue Maxx	64.6 a		52.2 a
Truban	60.4 a		32.8 a
Compete	48.4 a	76.4 a	40.9 a
Biopak Plus	62.8 a	45.4 a	38.6 a
Yuccah	64.5 a	57.2 a	38.8 a
Aliette	62.3 a		41.3 a

[1] Numbers within columns followed by the same letter are not statistically different based upon Tukey=s HSD means separation test and *P=0.05*.

Table 4. Root dry weight of juniper following fungicide and biorational treatments to control *Rhizoctonia solani* and *Phytophthora nicotiana* pv. *parasitica* root rot

Fungicide Treatment	Pathogen Inoculation		
	Non-Inoculated	*Rhizoctonia*	*Phytophthora*
None	23.4 a[1]	14.4 a	15.2 ab
Banrot WP	23.6 a	18.8 a	14.3 b
Banrot G	20.2 a	17.6 a	15.5 ab
Terraclor WP	25.9 a	24.1 a	
Defend G	22.4 a	20.1 a	
Cleary=s 3336	21.4 a	22.3 a	
Subdue Maxx	25.8 a		20.6 a
Truban	22.7 a		17.1 ab
Compete	17.6 a	22.3 a	18.0 ab
Biopak Plus	27.8 a	17.9 a	15.6 ab
Yuccah	23.0 a	17.5 a	16.0 ab
Aliette	25.8 a		14.7 b

[1] Numbers within columns followed by the same letter are not statistically different based upon Tukey=s HSD means separation test and *P=0.05*.