FUNGICIDE EFFICACY AGAINST BOTRYOSPHAERIA CANKER ON LEYLAND CYPRESS

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INTRODUCTION

Leyland cypress (*Cupressocyparis × leylandii* Dallim.) has been the green industries' standard and the most popular screening evergreen used on the market. Leyland cypress is not native to North America, and has a USDA hardiness zone rating from 6 through 10A (Dirr, 1998). Botryosphaeria canker is a major disease of Leyland cypress especially in Southeastern landscapes, and it is found extensively throughout Georgia. Canker diseases on landscape plants, particularly Leyland cypress, are reported to be associated with drought stress (Stouts, 1973) and wounding (Sinclair et al., 1987; Tisserat et al., 1991). Symptoms of Botryosphaeria canker are reddish-brown branch discoloration; branch dieback; and sunken, sometimes resinous branch and trunk cankers (Windham et al., 1996). Botryosphaeria cankers can be found on almost all woody landscape plants. There are several species of fungi that cause Botryosphaeria cankers. The predominant species recovered from plant samples submitted to the UGA Plant Disease Clinic is *Lasiodiplodia theobromae* (Pat.) Griffon & Maubl. (syn. *Botryosphaeria rhodina* and *Botrydiplodia theobromae*) (Jean Williams-Woodward, personal communication). This fungus enters plant tissues through wounds and produces a canker that can expand both longitudinally and horizontally to girdle branches. Management of Botryosphaeria canker is limited to pruning and removing infected branches and attempts to reduce plant stress and wounding. Fungicide control is limited to non-existent. Genetic resistance to this disease is also minimal for woody landscape plant taxa (Sandrock et al., 2000).

MATERIALS AND METHODS

Plant Material

Leyland cypress rooted liners were obtained from a local nursery (Griffith Propagation Nursery, Watkinsville, GA). Liners were transplanted into 6-inch plastic pots filled with 90% composted pine bark and 10% sand rooting medium. Stem diameter of the plants at planting were 1 cm. Plants were maintained in the UGA Plant Pathology greenhouse for the duration of the trial. Plants were hand-irrigated using a watering wand directed toward the rooting medium twice daily.

Inoculum production and inoculation

An isolate of *Lasiodiplodia theobromae* originally recovered from Leyland cypress was used in this study. The fungus was grown on potato dextrose agar (PDA) (BD Difco; Fisher Scientific) petri plates for 3 weeks at 22°C on the laboratory bench. Prior to inoculation, 8.75 mm circular plugs were cut into the agar plates using a sterile #4 cork borer. Plants were inoculated by selecting an area of the main stem and scarring the area with a wood rasp to create a wound 10-mm in length along the stem. Wounding broke through the bark into the cambial tissues, but did not wound deeply to the center of the stem. Immediately after wounding, an agar plug was aseptically removed from the petri plate and placed directly over the wound with the fungal growth in contact with the cambial tissue. Sterile distilled water was used to moisten a square of sterile gauze padding, which was placed over the agar plug and held in place by wrapping with parafilm (Parafilm M™ Wrapping Film, Fisher Scientific) to completely cover the fungal plug and gauze (Figure 1). The parafilm and gauze was removed two weeks after inoculation to allow for canker development.

Fungicide Treatment	Rate per 100 gal	Leyland Cypress		
		Canker length (mm)[1]	Canker width (mm)[2]	Disease Severity Rating[3]
Water	-----	20.6 a[4]	5.5	3.7 a
BAS 75007F	6 fl. oz	18.5 ab	4.8	3.7 a
BAS 75007F	8 fl. oz	14.7 b	5.3	3.0 a
BAS 75007F	10 fl. oz	14.4 b	4.5	2.0 b
Banner Maxx	8 fl. oz	17.5 ab	4.7	3.7 a

[1] Mean canker length measured in mm for six single-plant replications of each fungicide treatment.

[2] Mean canker width measured in mm for six single-plant replications of each fungicide treatment.

[3] Disease severity was assessed using a 1-5 rating scale, where 1 = healed wound, no infection noted; 2 = wound expansion, but stem callusing almost healed wound; 3 = wound expanded and oozing (for Leyland cypress), minor callus formation; 4 = wound expanded more than ½ diameter or stem, girdling occurring; and 5 = dead stem.

[4] Numbers followed by the same letter are significantly different ($P \leq 0.05$) using Oneway analysis of variance. Means were separated using Student's t-test for least significant difference.

Figure 1. Leyland cypress stem inoculation site containing wound, agar plug *of Lasiodiplodia theobromae*, moistened gauze wrapped completely in Parafilm to maintain moisture.

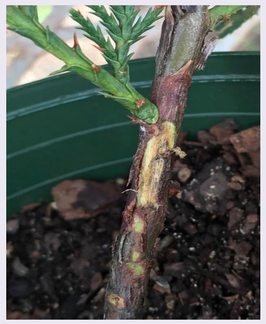

Figure 2. Inoculated Leyland cypress stem wound two weeks after inoculation following removal of gauze and parafilm wrapping.

Figure 3. Inoculated Leyland cypress stem six weeks after inoculation. Sap oozing and stem discoloration beyond the wound site is evident.

REFERENCES

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EXPERIMENTAL DESIGN

The protocol for the fungicide product evaluation consisted of five treatments with six single-plant replications per treatment per plant species. The trial protocol was conducted separately on both Leyland cypress and Japanese privet. The trial protocol consisted of five treatments including a non-fungicide (water) treatment, three rates (6, 8, and 10 fl. oz/100 gal) of the experimental fungicide BAS 75007F (BASF Corp., Research Triangle Park, NC), and one rate (8 fl. oz/100 gal) of Banner Maxx (propiconazole; Syngenta Crop Protection LLC, Greensboro, NC). Treatments were placed in a randomized complete block design on the greenhouse bench covering an area of approximately 4' X 5' of bench space. Fungicide treatments were applied to the foliage and stems using hand-held pump sprayers until run-off. Plants were treated twice at 14-day intervals prior to inoculation to assure uptake of the fungicide within plant tissues. After inoculation, two additional fungicide applications were made at 14-day intervals. Plants were treated for a total of four applications over a 56-day period. Greenhouse temperatures ranged from 24-30°C during the day to 21-24°C at night for the duration of the trial. Plants were monitored throughout the experiment for indications of canker development such as stem discoloration, sunken tissue, resin flow and callus formation. Botryosphaeria canker development was measured 6-weeks after inoculation by measuring canker length and width (mm).

RESULTS

Evidence of infection and canker development was evident following the removal of the parafilm and gauze wrapping two weeks after inoculation (Figure 2 and 3). Infection resulted in the death of one Leyland cypress stem in each of the water-only, Banner Maxx, and the 8 fl. oz/100 gal rate of the experimental fungicide, BAS 75007F, treated plants. All fungicide treatments reduced canker development as measured by canker length (mm) for the inoculated Leyland cypress (Table 1); however, only the BAS 75007F at the mid to high rate (8 to 10 fl. oz/100 gal) compared to the water-only control significantly reduced canker expansion along the stem. These two rates of BAS 75005F also significantly reduce disease severity symptoms compared to the Banner Maxx and the water-only control. BAS 75007F at the lowest rate (6 fl. oz/100 gal) was not significantly different from the Banner Maxx treated plants nor the water-only control. Canker width on Leyland cypress was not significantly different among the fungicide treatments. Data from this trial suggests that the mid to higher rates of the experimental product, BAS 75005F, are more effective in reducing Botryosphaeria canker on Leyland cypress compared to an industry standard, Banner Maxx, and no fungicide treatment. The experimental product, BAS 75005F, did reduced canker development compared to either no fungicide or the Banner Maxx treatments. A definitive recommendation on the best rate to use against Botryospheria canker cannot be determined from the study. It's my opinion that the mid to higher rates should be used as there was more canker development evident on Leyland cypress and callusing at the wound sites of the Japanese privet may have hindered accurate canker measurement.