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Evaluation of Hosta Cultivarsfor Resistance to Petiole Rot

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Abstract
Petiole rot of hosta, caused by the soilborne fungi *Sclerotium rolfsii* and *S. rolfsii* var. *delphinii*, appeared first in the southern United States. The rapid spread of petiole rot in the Midwest U.S. during the past decade has caused increasing concern among wholesale producers, retailers, and buyers.

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Introduction

Petiole rot of hosta, caused by the soilborne fungi *Sclerotium rolfsii* and *S. rolfsii* var. *delphinii,* appeared first in the southern United States. The rapid spread of petiole rot in the Midwest U.S. during the past decade has caused increasing concern among wholesale producers, retailers, and buyers.

Petiole rot is difficult and expensive to control in nurseries and landscapes, since the causal fungi can survive in the soil for many years. One of the most dangerous characteristics of the fungi is their ability to spread rapidly from hosta to dozens of other species of annuals and perennials, resulting in widespread loss in nurseries and landscapes. As a result, there is an urgent need to identify sources of petiole rot resistance in hosta to help breeders incorporate resistance genes into popular hosta cultivars.

We recently used a whole-plant greenhouse screening technique to identify hosta cultivars with high levels of resistance to *S. rolfsii* var. *delphinii*. However, this greenhouse test was too time-consuming (3 months) and labor-intensive to screen large numbers of cultivars (there are more than 2,500 named hosta cultivars). A streamlined screening method is needed in order to help hosta breeders, growers, and marketers manage petiole rot cost-effectively.

The objective was to develop a rapid, reliable, and affordable technique to evaluate hosta cultivars for resistance to petiole rot.

Materials and Methods

The same seven hosta cultivars (cvs. Lemon Lime, Munchkin, Nakaiana, Snow Mound, Honeybells, Zounds, and Halcyon) used in the greenhouse resistance evaluation trial were tested outdoors for resistance to petiole rot from May 13 to August 10, 2005 and from May 23 to August 20, 2006.

Bare-root, 3-yr-old, single-eye hosta plants were established in a naturally shaded field plot at the Iowa State University Horticulture Research Station on May 13, 2005 and May 23, 2006, respectively. The study was set in a randomized complete block design with six replications. Within each replication, there were three plants per cultivar for a total of 21 plants (3 plants × 7 cultivars) per replication. The bases of petioles of two plants for each cultivar were inoculated with carrot disks infested with *Sclerotium. rolfsii* var.*delphinii* (Figure 1) on July 4, 2005 and July 11, 2006, respectively. Moistened cotton balls covered the carrot disks to prevent inoculum from drying out. Infested carrot disks and cotton balls were pinned to the soil in order to prevent inoculum from losing contact with the host plants (Figure 2). Non-inoculated control plants of each cultivar provided comparison with inoculated plants. Composted hardwood bark was used to maintain soil moisture.

Disease severity was assessed as percent symptomatic petioles, determined by counting the number of symptomatic petioles per plant and dividing by the total number of petioles per plant. Plants were rated every 5 days from July 8 to August 7, 2005 and from July 15 to August 20, 2006, respectively. Area under the disease progress curve (AUDPC) was calculated from these assessments. AUDPC data were analyzed using the GLM procedure of SAS. The least significant difference test was used to compare AUDPC means among cultivars.

Results and Discussion

A wide range of resistance responses was observed (Table 1). Lemon Lime, Munchkin,

and Nakaiana were most susceptible to petiole rot. Zounds showed moderate resistance. Snow Mound, Halcyon, and Honeybells were most resistant cultivars. In previous greenhouse work, Halcyon was the most resistant cultivar and Zounds, Snow Mound, and Honeybell were the moderate resistant cultivars.

Results of this trial generally validated use of a greenhouse inoculation technique as a realistic way to assess field resistance of hosta cultivars petiole rot.

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Table 1. Area under the disease progress curve (AUDPC) values of hosta cultivars inoculated with *S. rolfsii* var. *delphinii*.

Cultivar	AUDPC[1] (2005)	AUDPC[1] (2006)	Rank in Edmunds et al. (2003)
Nakaiana	2607 a	2012 a	a
Munchkin	2490 a	2137 a	a
Lemon Lime	2460 a	1825 a	a
Zounds	1520 b	N/A	b
Halcyon	1020 c	672 b	c
Snow Mound	972 c	751 b	b
Honeybell	795 c	506 b	b

[1]Means followed by the same letter are not significantly different at P=0.05 according to the least significant difference (LSD) test.

Figure 1. Infested carrot disk.

Figure 2. Inoculum on the base of the petiole.