Factors Affecting Propagule Germination in Two Pythium Species Pathogenic to Turfgrasses

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Pythium root rot is a major problem for turf managers in the Northeast. It spreads rapidly through wet soil and causes severe damage in cool or warm weather. Several species of Pythium have been implicated as causes of root rot. Two of the most important seem to be *P. graminicola*, the most virulent species found on turf in the Northeast, and *P. torulosum*, the most common.

This project is intended to study how these two species propagate themselves. Most of the work to this point has been done with oospores, the long-lived sexual spores of Pythium. Since oospores are believed to be the primary means by which these organisms survive in turfgrass soils, understanding how they behave will tell us much about the way diseases caused by these two Pythium species develops. This will enable us to formulate better strategies for controlling Pythium root rot in the field.

Factors influencing germination of oospores were examined in a series of experiments using seed and root extracts from creeping bentgrass and perennial ryegrass. Oospores were grown on a culture medium developed in the laboratory for the culture of other Pythium species.

Germinability of *P. torulosum* oospores was found to depend on the age of the cultures. Oospores from seven-, eight- and nine-day-old cultures did not germinate, whereas by the time cultures were 12-16 days old, significant oospore germination was observed. *P. torulosum* oospores of this age will germinate at a moderate rate in distilled water, but adding ryegrass root exudate, ryegrass seed exudate or bentgrass seed exudate increases germination rates to as high as 80% (see figure 1). After about three weeks, germination rates leveled off.

P. graminicola oospores are much less germinable than *P. torulosum*. Cultures as old as 22 days show little or no germinability either in distilled water or exudate. Glucose, which has been shown to stimulate propagule germination in other Pythium species, does not stimulate oospore of either species to germinate.

The extremely high germinability of *P. torulosum* oospores may account for the high populations consistently recovered from turf. This species is ubiquitous in both healthy and diseased turfgrass stands. Conversely, *P. graminicola* oospores do not germinate readily, and it is not frequently recovered from turfgrass roots. However, the *P. graminicola* isolates that can be recovered tend to be much more virulent than *P. torulosum* in laboratory and greenhouse tests. The reasons for this are unclear at the moment.

At this point, there are still many unanswered questions about the spread of Pythium root rot. In particular, what role do other propagules (such as sporangia and zoospores) play in the course of Pythium root rot disease? *P. graminicola* sporangia, for example, germinate as infrequently as oospores. Future research will be directed toward developing an understanding of how other Pythium propagules behave and the role that they play in disease development. Additional studies will focus on more specific aspects of the infection process in turfgrass plants.

Figure 1