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A New Rhizoctonia Fungus on Turfgrass in Ontario

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The fungal genus Rhizoctonia contains many species, which cause diseases of plants (Tredway and Burpee 2001, Smiley et al. 2005). Turf diseases include brown patch caused by R. solani and yellow patch caused by R. cerealis. Other Rhizoctonia species which cause diseases on turfgrass are R. zeae and R. oryzae. These two organisms are probably variants of a single fungal species named Waitea circinata (Oniki et al.) and both cause a single disease that has several different names, including hot weather brown patch, leaf and sheath spot, leaf and sheath rot, leaf and sheath blight, sheath spot, Rhizoctonia patch or brown ring patch, among others. For simplicity, it will be referred to in this article as sheath spot.

Characteristics

According to the excellent book on turfgrass diseases by Professors Smiley, Clarke and Dernoeden (2005), these Rhizoctonia species all share similar microscopic characteristics such as hyphae with right angle branching including a constriction at the branch point (Figure 1). The hyphae of the different Rhizoctonia species are similar and are not easily distinguished without further testing such as staining of the nuclei and examination of the cytoplasm (Leiner and Carling 1994). When the fungi are grown on an artificial media in the lab, the mycelium of R. zeae is white to buff, while that of R. solani is usually darker brown. Rhizoctonia zeae will also form orange to brown sclerotia up to one mm across (Figure 2), while R. solani from turf forms dark brown larger sclerotia.

Sheath spot may occur when temperatures exceed 27 C, but can still progress when temperatures exceed 32 C, unlike brown patch, which may be halted by higher temperatures. From a distance, the symptoms of sheath spot (Figure 3) may resemble those of yellow patch (Figure 4) or brown patch (Figure 5). Closer up, infected leaves are yellow and then brown, but do not pull off easily from the stem, the way plants infected with brown patch may (Elliott 2001). In high-cut, warm-season grasses, R. zeae has been associated with foliar symptoms that are similar to brown patch lesions caused by R. solani, appearing as water soaked areas on the lower portions of leaf sheaths. On creeping bentgrass greens, sheath spot may appear as grey to yellow arcs or circles (Figure 3), resembling yellow patch, but under hot weather conditions when yellow patch does not regularly occur. Sheath spot does not usually form a purple smoke ring common with brown patch, nor do patches take on a bronze or orange colour also common to brown patch.

Toda et al. (2005) described disease patches as circular or irregular small patches of tan to yellow-brown ranging from 100 to 500 mm (four to 20 in.) in diameter, where the outer margins turned brown, but the patch centers recovered. In California, Wong (2005) observed that unlike yellow patch, rings of sheath spot will become necrotic and cause lasting damage on greens. Just as with other Rhizoctonia diseases, high levels of nitrogen fertilization often enhance the disease. In the U.S., R. zeae on turf has been found in the Southeast (Elliott 2001, Royals 2002), Northeast (Mitkowski 2003, Dicklow 2005), Midwest (Elliott 1999, Conway et al. 2000) and California (Wong 2005). In Canada, it was found in turf samples submitted to the B.C. Ministry

of Agriculture from 2001 to 2003 (Joshi 2002, 2003, 2004). It has not been previously documented in any other part of Canada.

Outbreak in Ontario

In late May 2004, a disease appeared on all 18 greens at a golf course near Toronto, looking very much like yellow patch caused by R. cerealis. Yellow narrow rings (25 mm, 1 in.) enclosing areas ranging up to about 300 mm (12 in.) across, began appearing at the end of May when temperatures climbed above 25 C. Turf samples sent to a diagnostic clinic were diagnosed as R. cerealis. The symptoms matched this disease, but the timing and weather conditions did not. In addition, the superintendent applied a number of fungicides (*e.g.* propiconozole and iprodione) normally used to control yellow patch, but the treatments were not successful. The disease persisted until the end of July.

In late May 2005, the disease appeared again at the same golf course just as the weather turned hot again. Communications with a superintendent in B.C. revealed he had previously observed an outbreak of a similar-looking disease, which was identified as being caused by R. zeae and which had been controlled by azoxystrobin treatments. A mixture of azoxystrobin and chlorothalonil was then applied at the Toronto area golf course, which seemed to suppress the disease within a week. The disease re-appeared the first of week of July, and a sample was brought to the University of Guelph where an isolate was obtained. DNA sequencing was performed to reveal the fungus was indeed R. zeae. The rings were most visible with heavy dew, and no smoke ring was observed. An application of fosetyl-Al, iprodione and trifloxystrobin was made to protect against various turf diseases, as well as a wetting agent a few days later. The disease disappeared by mid-July and did not re-appear for the rest of the summer.

In both years, the disease generally appeared a week to 10 days after the end of the cool wet spring, when the weather warmed up dramatically. The patches occurred generally in the same areas, but the outbreak in 2005 was more severe than in 2004, with a greater number of rings. However, the rings did not seem to increase in size once they appeared. The greens at this course were comprised of 60 per cent annual bluegrass and 40 per cent creeping bentgrass.

Control

According to Dr. Paul Vincelli (2005), the fungicides that control brown patch (caused by R. solani) will generally control sheath spot (caused by R. zeae), and among these, the strobilurins are the most effective chemicals to control an outbreak. There have been notable failures with thiophanate-methyl, especially at temperatures over 32 C. In growth chamber studies, R. zeae caused more disease on creeping bentgrass at 32 or 34 C, than did R. solani. In addition, field populations of R. zeae also increased after applications of thiophanate-methyl (Royals 2002). Field studies in South Carolina suggest azoxystrobin or a combination of chlorothalonil and fosetyl-Al will control sheath spot caused by R. zeae (Vincelli 2005).

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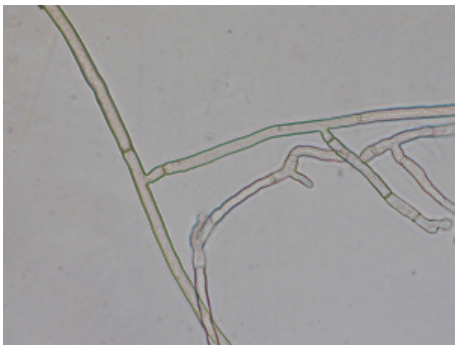

Figure 1. Hyphae of species of Rhizoctonia show right angle branching where one segment grows out of another piece at a 90 degree angle. Furthermore at the branch point, the branching hypha is narrower.

Figure 2. Sclerotia of Rhizoctonia zeae formed at the base of stems of creeping bentgrass. Live green tissue can still be seen at the top of the plant.

Figure 3. Rings of sheath spot caused by Rhizoctonia zeae on a mixed annual bluegrass/creeping bentgrass putting green. How many rings can you see?

Figure 4. Yellow patch caused by Rhizoctonia cerealis on a creeping bentgrass fairway in early May.

Figure 5. Brown patch caused by Rhizoctonia solani at the edge of a creeping bentgrass green with a purplish smoke ring visible in the morning dew.