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Problems with Disease on New Greens High Sand Content Greens and Pythium-Induced Root Dysfunction

by Clinton F. Hodges, Iowa State Univ.

A *Pythium* disease of creeping bentgrass has been recognized that attacks the roots of plants grown in high-sand content greens. The disease occurs primarily on old golf courses where the greens have been rebuilt with sand the disease is rarely found, however, on newly constructed golf courses with sand greens. Creeping bentgrass, established on renovated greens in the fall of the growing season, grows well and establishes a good cover by winter. The grass grows well during the mild periods of spring and early summer of the following year. With the arrival of hot, humid weather, the turf begins to die in a pattern typical of *Pythium*-induced "cottony blight" or "foliar blight". Close examination of diseased plants, however, fails to show any *Pythium* infection of above ground portions of the plants.

Examination of root systems of diseased plants reveals white, normal appearing roots that are field diagnosed as being healthy. No lesions or rot are present on the roots. When such roots are incubated under laboratory conditions, *Pythium* species frequently grow from the root tips, cortical cells, and vascular system within 6 to 12 h. The *Pythium*-infected roots can result in the complete killing of a green within 7 to 10 days. Case histories of greens that have been attacked show that the disease may reoccur up to three growing seasons after the first outbreak of the problem. After three years, the disease may cease to be a problem or may occur at a much reduced level of activity.

Research has established that *Pythium arrhenomanes* and *P. aristosporum* are the pathogens responsible for the disease. *P. arrhenomanes* is the more common of the pathogens and occurs in all regions of the North American continent. This species causes a root rot of cereals in Canada and the northern U.S. and has been a severe pathogen of the roots of sugarcane in the Southern U.S. *P. aristosporum* is restricted to the cooler regions of the north central and northwest U.S. and Japan. This pathogen causes snow blight of cereals and grasses in Japan.

Inoculation of creeping bentgrass roots with either *Pythium* species in controlled studies results in severe reduction of plant growth. Total weight of plants with roots infected by *P. arrhenomanes* or *P. aristosporum* is 16% and 32% respectively, of healthy control plants. Examination of roots 3 to 4 weeks after inoculation reveals *Pythium* mycelium in root hairs and in somewhat swollen regions behind root tips. It seems that root hairs and root tips provide the primary sites for infection. Roots examined 8 weeks after inoculation are completely penetrated by the mycelium; the pathogens are found in abundance in the cortex, vascular tissue, and root tips. Some root tips are devitalized and the roots may be slightly buff-colored compared to healthy roots. It is remarkable, however, that with the extensive infection of the roots there is no rot and visible lesions are extremely rare. The fact that growth of infected plants is severely reduced and that there are no rotted roots suggests that the reduction in growth of infected plants is due to the inability of infected roots to function properly. Infection may interfere with water uptake and/or other metabolic functions of the root. Because infection seems to interfere with root function, the disease is referred to as a "*Pythium* induced root dysfunction."

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