FEATURE ARTICLE

Large Patch of Zoysiagrass

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Large patch (also known as zoysia patch and Rhizoctonia blight) is caused by the fungus *Rhizoctonia solani.* Diseases of turf incited by *R. solani* are generally referred to as brown patch. This is not the case for zoysiagrass, primarily because the disease was once believed to have been caused by a root pathogen, and thus was initially named zoysia patch. Eventually, the name large patch was assigned after *R. solani* was shown to be the causal agent. The disease primarily occurs in 'Meyer' Japanese zoysiagrass (*Zoysia japonica*) grown on golf course fairways and sod farms in transition zone regions of the United States. Most of the newer and finer-textured zoysiagrass cultivars (i.e., *Z. matrella* and *Z. tenuifolia*) are very susceptible to large patch. The disease appears during extended rainy overcast periods, particularly in late autumn and early spring. *Rhizoctonia solani* is most damaging to cool-season grasses during periods of high humidity and high-temperature stress. High temperatures impair the vigor of cool-season grasses in the summer, giving *R. solani* a competitive advantage. Conversely, warm-season grasses, including zoysiagrass, centipedegrass (*Eremochloa ophiuroides*), and St. Augustinegrass (*Stenotaphrum secundatum*), are rendered susceptible to *R. solani* when cool temperatures slow their growth in the autumn and spring. Hence, zoysiagrass and other warm-season grasses are predisposed to *R. solani* as their growth slows in response to cool temperatures prior to autumn dormancy and at spring greenup.

Symptoms. The disease is characterized by large rings of circular patches that range from 2 to 10 ft (0.6–3.0 m) or more in diameter. Patches are brown, yellow, or orange in color. At the periphery of patches, the turf may exhibit a brilliant orange color. The "orange firing" symptom is most prevalent in the autumn. When weather conditions are especially favorable for the disease, a "smoke ring" may also appear at the periphery of patches. Patches and rings tend to develop in the same areas from year to year. Large rings or areas of dead turf are similar in appearance to those associated with fairy rings. In severe cases, rings or patches of dead or thinned-out turf may remain evident in the summer due to slow recovery of the damaged turf.

Unlike brown patch in cool-season grasses, *R. solani* attacks basal portions of zoysiagrass leaf sheaths in the thatch region, producing small reddish-brown or black lesions. Eyespot lesions may appear on basal stems and stolons. Leaves are blighted, and stems may be infected and tillers killed. Turf within affected areas thins-out, and 85 to 90% of the shoots may die. Diseased shoots are easily detached from the stolons. Turf within these large, almost dead-appearing rings or patches, eventually recovers, but the process is very slow. As temperatures increase in the spring, the disease subsides and stolon growth results in a slow improvement in turf density. These symptoms are similar to those observed in St. Augustinegrass and centipedegrass affected by brown patch in the spring or autumn.

Management. Increasing mowing height to 1.5 to 2.0 in. (4.0–5.0 cm) prior to the onset of cool and wet weather in the autumn is perhaps the most effective means of slowing or reducing disease progress and enhancing turf recovery in the spring. This may be unacceptable on fairways at some golf clubs, but the autumn mowing height should be increased above 1.0 inch (2.5 cm) where the disease is chronic. Core aerification and vertical cutting affected sites following spring greenup and active growth of the turf stimulates stolon growth and helps to reduce thatch. Thatch reduction is important because most damage to tillers occurs primarily within the thatch layer. Redistribution of soil from cores also assists in thatch degradation. Do not apply any nitrogen fertilizer or perform core aerification or vertical cutting until disease activity has ceased. Research conducted in Kansas indicated that most nitrogen fertilizers including urea and composted turkey litter help to stimulate recovery, but they do not appear to suppress disease development. Spring application of water-soluble N-sources can enhance large patch when the disease is still active. The total amount of nitrogen applied to zoysiagrass generally should not exceed 2.0 lb N/1,000 ft^2 per year (100 kg N/ha). Nitrogen should be applied to damaged turf after the disease subsides, using a water-soluble N-source at 0.5 lb N/1,000 ft^2 (25 kg/ha) every two weeks until recovery has occurred. Try not to exceed the 2.0 lb N/1,000 ft^2 annual limit. Large patch is also enhanced by overwatering in the spring and autumn, and tends to be most severe in poorly drained or shaded sites. Hence, irrigate only when a turf shows signs of wilt and avoid night irrigation. The use of wetting agents may help

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Research Summary

Turf Versus Ornamental Landscape Nutrient Loss

There are many claims by certain environmental activists that nitrogen leaching is reduced via the use of mixed ornamental species in comparison to a turfed landscape. **An investigation was established to evaluate the nitrogen leaching and runoff loss between a St. Augustinegrass (*Stenotaphrum secundatum*) turf versus a mixed species landscape composed of 11 different dicotyledons.** The alternate mixed ornamental species were chosen by the Florida Yards and Neighborhoods Program based on their theories of low nitrogen requirements. Included were two species of ground covers, one ornamental grass species, six shrub species, and three tree species. Seven of the twelve species were native to Florida. The plot size was 50 m^2 (538 ft^2), with a typical medium-fine sand root zone having a depth of 75 cm (30 inches). The two comparative landscape treatments were replicated four times at the Fort Lauderdale Research and Education Center of the University of Florida. Both surface runoff and subsurface percolate were collected and analyzed for nitrogen content of the ammonia and nitrate fractions. The various species used were commercially available and purchased locally. A eucalyptus mulch was applied to a depth of 7.5 cm (3.0 in.) on all the mixed ornamental species plot areas. Construction of the experimental site was conducted in the autumn of 1998, which included a 10% slope for collection of surface runoff. Irrigation was applied as needed. A 26-3-11 (N-P_2O_5-K_2O) fertilizer was applied at a rate equivalent to 300 kg N ha^{-1} yr^{-1} (6.0 lbs N/1,000 ft^2 yr^{-1}) for the St. Augustinegrass turf and 150 kg N ha^{-1} yr^{-1} (3.0 lb N/1,000 ft^2 yr^{-1}) for the mixed ornamental species. The rates used were typical of those recommended by landscape specialists in Florida.

Results. **The results throughout the first year following installation of the landscapes revealed that the fertilizer nitrogen loss via surface runoff was insignificant.** In contrast, **nitrogen leaching losses were significantly greater on the mixed ornamental species landscape than from the St. Augustinegrass turf,** with annual total losses of 48.3 kg N/hectare versus 4.1 kg N/hectare (0.96 lb vs. 0.08 lb N/1,000 ft^2), respectively. **This represents more than a 10-fold greater loss of nitrogen by leaching from the mixed ornamental landscape compared to the St. Augustinegrass turf during the initial year following establishment.** This occurred even though the turfgrass was fertilized at twice the rate for the mixed ornamental species landscape.

Comments. Obviously these results are the direct opposite of the theories expounded by many so-called environmentalists who have a basic anti-turf philosophy. More studies of this type are needed in other areas of the country to document the true situation relative to nitrogen leaching from turfgrass versus alternate ornamental landscapes. This study was conducted with a high-sand root zone, a condition typical of Florida. Studies with finer-textured soils are also needed. Research has shown that nitrate levels in groundwater are elevated in areas where human population densities are higher. Accusations have been made that this is a result of fertilizing turfgrass areas. In contrast, this study indicates that this in fact is not the case. **It emphasizes the importance of basing strategies for the use of landscapes on sound research rather than ill-conceived theories promoted by well-funded environmental activists.**

Source. J.E. Erickson, J.L. Cisar, J.C. Volin, and G.H. Snyder. 2001. Comparing nitrogen runoff and leaching between newly established St. Augustinegrass turf and an alternative residential landscape. *Crop Sci.* 41:1889–1895.

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to reduce leaf wetness duration and disease severity. Improve drainage and prune or remove trees and brush in sites where large patch is a chronic problem.

Fungicides assist in blight reduction, but generally do not prevent the disease. A fungicide application in late September to mid-October is recommended where the disease is chronic. Azoxystrobin (Heritage®), flutalonil (ProStar®), iprodione (Chipco 26 GT®), PCNB (Penstar®, Terraclor®), myclobutanil (Eagle®), propiconazole (Banner MAXX®), triadimefon (Bayleton®), and triticonazole (Triton®) have been shown to provide satisfactory disease suppression and their use is associated with more rapid turf recovery from the disease. Flutalonil is the preferred fungicide for curative treatment of large patch in the spring. Curative control may require several applications of high fungicides rates. Preventive applications of fungicides to sites where the disease is a chronic problem are the best approach to large patch management.