Fusarium Patch = *Microdochium* Patch = Pink Snow Mold

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Winter is on the way and unfortunately there is no shortage of cold temperature-related diseases. Among the most common and destructive cold weather diseases of turf is *Fusarium* patch. The causal agent is the fungus *Microdochium nivale,* which was formally known as *Fusarium nivale.* This disease may be referred to by at least three different names. This is because of two reasons: (1) the disease may occur in the presence or absence of snow, and (2) the taxonomy or Latin binomial for the pathogen has been changed numerous times. Traditionally, the disease was known as *Fusarium* patch in the United Kingdom and as pink snow mold in the United States. Some pathologists argued that pink snow mold was an inappropriate name because the disease can occur in the absence of snow. Henceforth, the names *Fusarium* patch and pink snow mold were adopted to refer to the disease when it occurred either in the absence or presence of snow, respectively. To confuse matters, mycologists reclassified *F. nivale* as *Gerlachia nivalis* around 1980. In 1983, *G. nivalis* was declared a misnomer and the binomial *Microdochium nivale* was accepted. Hence, the names *Fusarium* patch, *Gerlachia* patch, and *Microdochium* patch appear in the literature, and all refer to the same disease. The latter genera represent the asexual stage of the pathogen. To further confound the issue, each of these asexual binomials also were assigned a sexual binomial. For example, the sexual binomial for *M. nivale* is *Monographella nivalis.* Since 1849, the pathogen has been given at least ten Latin binomials (Smith, Jackson, and Woolhouse, 1989). Therefore, *Fusarium* patch, *Microdochium* patch, and pink snow mold are all commonly used names for basically the same disease. For simplicity, many pathologists have decided to use the traditional name of *Fusarium* patch to refer to this disease, regardless of whether it is or is not associated with snow cover.

Fusarium patch attacks a wide range of turfgrass species under snow, at snow melt, or during extended periods of wet, overcast weather including: perennial ryegrass (*Lolium perenne*), bluegrasses (*Poa* spp.), bentgrasses (*Agrostis* spp.), and the fescues (*Festuca* spp.). **This disease generally is most destructive to annual bluegrass (*Poa annua*) and bentgrasses.** *Fusarium* patch is especially destructive to creeping bentgrass (*Agrostis stolonifera*) seedlings the first autumn to spring period following seeding. This is due to the overstimulation of growth and succulent tissues resulting from high levels of nitrogen fertilizer applied during establishment, as well as the immaturity of the plants. The disease can be especially severe when seedlings are covered with geo-thermal and other types of blankets. It is therefore important to check under blankets frequently.

Conditions favoring *Fusarium* patch include low (32–45°F; 0–7°C) to moderate (46–65°F; 8–21°C) temperatures; high relative humidity; abundant moisture; prolonged, deep snow; snow fallen on unfrozen ground; wet or poorly drained sites; wet shade; lush turf stimulated by late season applications of excessively high amounts of nitrogen fertilizer; and alkaline soil conditions. **Prolonged periods of cool to cold, overcast, and rainy weather are particularly conducive to disease development.** The disease may appear anytime between autumn and spring. In some maritime climates—such as the British Isles; Pacific Northwest, United States; and British Columbia, Canada—*Fusarium* patch can develop year round. In some U.S. regions, such as in the Mid-Atlantic states, the disease most often appears in April or May. May outbreaks of *Fusarium* patch often surprise or confuse superintendents because they think of this disease as a "snow mold."

Symptoms of *Fusarium* patch on close-cut putting greens initially appear as small, pink or reddish-brown spots or patches of 1 to 3 in. (2–8 cm) in diameter. Most fully developed patches are 3 to 8 in. (8–21 cm) in diameter, but some patches may range from 1 to 2 ft (30–60 cm) in diameter and coalesce. Reddish-brown rings or frog-eyes can occur, particularly in bentgrass seedlings. Large, circular patches are most likely to appear when the disease develops underneath a deep snow cover. The pink color of diseased turf at the edge of the patches is produced by the pinkish or salmon color of the mycelium. The mycelium mats leaves, and the plants eventually collapse and die. Matted leaves have a tan or white color, but on close inspection they may display a pale, pinkish cast.

On mature bentgrass or annual bluegrass putting greens, tees and fairways, *Fusarium* patch initially appears as circular spots or patches to 1 to 3 in. (2–8 cm) in diameter. These patches generally have a pink or reddish-brown color and may increase in size to 6 or more inches (≥16 cm) in diameter. During the early stages of the disease in the absence of snow, however, the small spots (1–2 in. diameter; 2.5–5.0 cm) may have whitish-tan center with a pink or reddish-brown fringe. Yellow patches or rings bordered by a reddish-brown periphery can easily be confused with yellow patch (i.e., *Rhizoctonia cerealis*). Hence, when in doubt, send a sample to a diagnostic lab. Gray-colored smoke rings at the edge of affected spots or patches also may be associated with *Fusarium* patch. Mycelium on the leaf blades produces fruiting bodies called sporodochia on which huge numbers of crescent-shaped spores are borne. These white or salmon-pink colored sporodochia are very tiny and appear as flecks on necrotic (dead) tissue. These flecks may be seen with a hand lens when the disease is active, but generally cannot be seen on dried tissue. The spores are easily spread by water, machinery and foot traffic. Therefore, blighting can appear in streaks or even straight lines when spores are carried on the wheels of

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mowers. This streaking-effect often is confused with a *Pythium* disease, especially during late spring outbreaks of *Fusarium* patch. When damage occurs under snow, the extent of injury usually is more severe than without snow cover. After snow recedes, the patches are bleached white and may or may not have a pink fringe. Normally, most plants in affected patches under snow are killed.

Management

***Fusarium* patch injury can be reduced by using a balanced N-P-K fertilizer in the autumn and by avoiding excessive, late-season applications of water-soluble nitrogen.** Ammonium sulfate may be suggested as a nitrogen source where soils are alkaline and *Fusarium* patch is common. Modest amounts (≤1.0 lb N/1000 ft^2; 50 kg N/ha) of ammonium sulfate or other water-soluble nitrogen sources applied in late autumn, however, are not likely to enhance *Fusarium* patch in mature turf. Avoid the use of limestone where the soil pH is above 7.0 since soil alkalinity may encourage this disease. **Continue to mow late in to the autumn to ensure that snow will not mat a tall canopy.** On golf courses, snow fences and windbreaks should be used to prevent snow from drifting onto chronically damaged greens. **Divert skiers and snowmobiles around greens to avoid snow compaction.**

Pentachloronitrobenzene (PCNB, PenStar, Quintozene, Terraclor, Turfcide, others), chlorothalonil (Daconil), azoxystrobin (Heritage), fludioxonil (Medallion), iprodione (Chipco 26 GT), vinclozolin (Curalan, Touche, Vorlan), thiophanate (CL 3336, Fungo), myclobutanil (Eagle), propiconazole (Banner MAXX), triadimefon (Bayleton), and mancozeb (Fore) all have been reported to provide good control of *Fusarium* patch. **Except for possibly PCNB, most fungicides in any given year may provide only marginally acceptable Fusarium patch control when applied alone. Therefore, two or more of these fungicides normally are applied in a tank-mix combination.** Tank-mix combinations improve the level of control as well as provide a more broad spectrum scope of control of *Fusarium* patch, *Typhula* blight (also known as gray snow mold), and yellow patch. Some common tank mixes for the control of snow mold complexes include: PCNB + Chipco 26GT + Daconil; Chipco 26GT + Daconil; or PCNB + one of the following: CL 3336, Curalan, Fungo, Heritage, Medallion, Touche, Vorlan, or a sterol inhibitor (i.e., Banner MAXX, Bayleton, or Eagle). High rates of PCNB can yellow turf, particularly if applied during warm weather. ***Fusarium* patch control is best achieved with a preventive fungicide application made prior to the first major snow storm of the year. Subsequent applications to putting greens or other prone locations should be made during mid-winter thaws and at spring snow melt in areas where the disease is chronic.** As noted previously, turf covered with blankets should be monitored frequently for disease between autumn and spring. During extremely wet or snowy winters, *Fusarium* patch can cause extensive injury to lawns. It is best to spot apply fungicides to lawns where the disease has developed in localized pockets. Widespread blighting of lawns on some occasions may require a blanket fungicide treatment. In most regions of the United States, *Fusarium* patch prevention with fungicides is only warranted for golf course turf, and bentgrass/annual bluegrass bowling greens and tennis courts.

Reference

Smith, J.D., N. Jackson, and A.R. Woolhouse. 1989. *Fungal Diseases of Amenity Turf Grasses.* E. & F.N. Spon, New York.

RESEARCH SUMMARY

Winter Overseeding of High-Density Dwarf Hybrid Bermudagrasses on Putting Greens

Concern has been expressed regarding the ability to establish a winter overseeding of cool-season turfgrasses into the new, very-high density, dwarf bermudagrass (*Cynodon dactylon* x *C. transvaalensis*) cultivars. Comparisons were made in three different warm-season environments including: hot-dry desert, hot-humid inland, and warm-humid coastal areas, using the cultivar Champion. The experimental sites were maintained at a 3.2 mm height of cut, with 3 replications for each of the 6 seed mixtures, 2 preplant methods, and 3 seeding rates. Monthly assessments made following winter overseeding included visual estimates of percent seedling coverage, and visual estimates of turfgrass quality. Shoot densities of the overseeded turfgrasses were counted, and the mat and root depths of the *Cynodon* were measured. Results indicated: (1) the best timing for overseeding should be determined by soil temperature rather than a calendar date; (2) the **optimum mixtures and seeding rates were:** (a) **8 lb/1000 ft^2 (4 kg 100 m^{-2}) of rough bluegrass (*Poa trivialis*) and 2 lb/1000 ft^2 (1 kg 100 m^{-2}) of creeping bentgrass (*Agrostis stolonifera*), followed in 30 days by 2 lb/1000 ft^2 (1 kg 100 m^{-2}) of rough bluegrass,** (b) **10 lb/1000 ft^2 (5 kg 100 m^{-2}) of rough bluegrass and 2 lb/1000 ft^2 (1 kg 100 m^{-2}) of creeping bentgrass, and** (c) **8 lb/1000 ft^2 (4 kg 100 m^{-2}) of rough bluegrass,** (3) **higher winter overseeding rates suppressed the spring root growth of bermudagrass substantially,** and (4) spring transition was successful using timely cultural methods involving lowering the cutting height, increasing the nitrogen rate, and weekly vertical cutting. By SI Sifers and JB Beard, *1999 Agronomy Abstracts,* p. 122.