

Thatch and Mat Must Be Minimized

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Thatch refers to an organic layer found in turf above the soil surface. This organic layer is composed of living, dead or partially decomposed stems, roots and leaves. At one time, a 0.5 inch (13 mm) thatch layer was considered desirable on greens. Today, due in part to lower mowing heights, a thatch depth of less than 0.3 inch (10 mm) is suggested. Mat refers to a layer of mixed topdressing and organic matter (usually old stem tissue and roots) that develops below the thatch layer. On extremely well managed putting greens there may be more mat than thatch. Under low mowing (<5/32"; 7 mm), thatch and mat layers can become extremely dense making it very difficult to brush-in topdressing. Mat layers can be just as detrimental as thatch in the summertime and both need to be aggressively managed.

Some thatch is desirable because it provides cushion for equipment, people and impact of a ball. Dense thatch, however, is detrimental. Thatch reduces the environmental stress tolerance of turf, predisposes plants to supraoptimal heating in summer, and promotes disease and insect pests. When a thatch layer becomes thick, the stem-bases of plants develop in the thatch rather than at or below the soil line. Stems developing in thatch are far less insulated from extremes of hot or cold and wet and dry weather conditions. All roots emanate from stems and they also are more vulnerable to environmental extremes when they become largely restricted to the thatch layer.

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Furthermore, buds that produce the new shoots, tillers and roots also are jeopardized by virtue of being exposed to environmental extremes in thatch rather than insulated by soil. Hence, the most important plant tissues (i.e., the growing point and/or meristems, and roots) are more vulnerable to desiccation during drought, freezing temperatures in winter, and supraoptimal temperatures in the summer. Wet thatch in particular contributes to scald damage during hot, rainy periods or when turf is excessively irrigated during the summer. Green plants in coring holes, surrounded by brown turf in the summer, is a good indicator of a thatch and/or mat problem. This is because the coring hole provides an opening unobstructed by thatch or mat, which allows for better water infiltration and air exchange. The surrounding damaged turf with a thatch or mat layer holds water. The water absorbs and transfers heat from the sun, which builds to lethal levels causing scald during periods of high temperature stress.

Thatch also provides harborage for insect pests and pathogens. Black cutworms (*Agrotis ipsilon*), chinch bugs (*Blissus* spp), sod webworms (several species), black

turfgrass *Ataenius* (*A. spretulus*) and other insect pests find thatch a suitable medium in which to survive. Most pathogens can survive unfavorable periods as spores, sclerotia, fruiting bodies or as mycelium embedded in dead organic matter. Pathogens often live saprophytically on dead organic matter in thatch and soil during environmental periods that are unfavorable for infection of plant tissues. In particular, pathogens causing dollar spot (*Sclerotinia homoeocarpa*), leaf spot (*Bipolaris* spp and *Drechslera* spp), and anthracnose (*Colletotrichum graminicola*) survive-in and build-up their populations in the presence of thatch. Wet thatch also provides the moist conditions needed by algae and moss to proliferate. Furthermore, thatchy or puffy stands are predisposed to scalping.

Today's high standards for quality golf turf require that thatch and mat layers be aggressively minimized. These organic layers are managed through a combination of aerifications, topdressing, and proper fertility and irrigation practices. Putting greens should be cored with wide diameter tines and heavily topdressed in the spring and again in late-summer prior to the time annual bluegrass (*Poa annua*) seeds germinate. During the golfing season, putting greens with significant thatch or mat layers should be quadranted and lightly topdressed on a 3- to 4-week interval. During wet periods, greens may be spiked frequently to promote water drainage and air exchange with the soil. Water injection aeration also is beneficial in promoting soil aeration and root growth.

During the summer, turf should be irrigated deeply and infrequently. Research conducted at Texas A & M University by Dr. Richard White and coworkers has shown that deep and infrequent irrigation results in less thatch build-up and a reduction in algae and disease problems. Too many golf course superintendents are irrigating nightly for a set period of time. This practice keeps thatch and mat layers saturated thereby promoting algae, moss, black layer, scald, large divots, scalping and generally less than op-



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imum playing conditions. It is very important to keep turf as dry as possible during the summer. Deep and infrequent irrigation improves the environmental stress tolerance of turf, helps to discourage pests, minimizes problems associated with large divots and deep ball marks, and enables creeping bentgrass (*Agrostis stolonifera*) to compete more effectively with annual bluegrass.

Fertilizer management, also, is important in minimizing thatch. Most of the annual nitrogen used on cool-season grasses should be applied during the autumn months. During the summer, light applications of nitrogen (0.1 - 0.2 lb N/1000ft²; 5-10 kg N ha⁻¹), known as spoon-feeding or foliar feeding, should be applied every 2 to 3 weeks. Spoon-feeding promotes vigor, particularly in creeping bentgrass, thus enabling the turf to more effectively compete with annual bluegrass and to more rapidly recover from divots, ball marks and mechanical damage. Spoon-feeding with water soluble N-sources, such as urea and ammonium sulfate, is preferred. Use of the aforementioned N-sources has been shown to provide as much as 30% suppression of dollar spot. Natural organic fertilizers are good N-sources and they are safe. Natural organic N-sources, however, are generally not superior to low rate applications of water soluble N-sources in promoting summertime vigor. Research conducted at the University of Maryland does not provide strong evidence that natural organic N-sources are better at promoting thatch degradation, promoting soil microbial activity or reducing diseases, when compared to synthetic slow release fertilizers or urea. Indeed, some composted sewage sludges that contain large wood chips and some dehydrated manures can promote thatch and dollar spot.



of practice. So the application rates and reporting seemed to be resolved with little contention. At this writing, the final "Nutrient Management Plan Policy Checklist" is awaiting approval by the full commission.

However, "cost-share" has been a dividing issue, not only among the commission, but also among the superintendents who have worked on the nutrient management plan. Most agricultural operations will be eligible for some cost-share, but it is too easy to claim that "the rich country clubs" should not be entitled to any financial assistance. In fact, some superintendents have stated outright that their clubs do not intend to seek reimbursement for the program if available. However, commissioner Brown has fought hard for some assistance, particularly for some of the smaller golf operations in the state. Indeed, one of the premises of the law is financial assistance for those who demonstrate financial need to comply with the law. At present, this is the largest outstanding issue that has not been settled. In what has turned out to be a tight budget year for Delaware, this promises to be a dogfight.

The Nutrient Management Commission should conclude its work with golf courses soon and have the final version ready for implementation by 2003. It does plan on using the same process on other groups, such as container nurseries and lawn care companies. Compliance with the plan should not be difficult; in fact, most golf facilities already perform the soil-testing requirement.

Three of the superintendents that have been at the forefront of this issue will be featured in GCSAA's "Golf and Grassroots" government relations forum at the conference and show in Orlando this February. "Buddy" O'Neill, CGCS, (Wild Quail G&CC) and Paul Stead, CGCS (Deerfield G&TC) will join Ed Brown, CGCS (Rehoboth Beach CC) in the session, discussing the formulation of the nutrient management plan.

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