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Thatch and Mat Must Be Minimized

Peter H. Dernoeden

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 inch; 3.8 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 environ-**

mental 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 or 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. 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, are 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 (*Agrostis 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**


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Diagnosing and Controlling Billbugs

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Use a liquid application and apply only a light post-treatment watering, 1/8 inch (3.2 mm) or less, to keep the residues in the upper thatch where adult billbugs reside. Deploying the latter strategy after mid-May, however, may result in turf damage because females will already have laid some eggs.

Control becomes more difficult after mid-June, when larvae have moved into the soil to feed on the crown and

roots. Insecticides labeled for grubs and billbugs, e.g., halofenzide, imidacloprid, bendiocarb (Turcam®), carbaryl (Seven®), or diazinon (but not for golf courses and sod farms), followed by sufficient watering to move the residues to the root zone, provide some control at that time. Such treatments may be too late to prevent turf damage, however, because the billbug larvae may already have damaged the plant crowns. 

Thatch and Mat Must Be Minimized

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(*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 quadratined 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 is also beneficial in promoting soil aeration and root growth.

During the summer the 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 optimum playing conditions. It is very important to keep the turf as dry as possible during the summer. **Deep and infrequent irrigation will improve the environmental**

stress tolerance of turf, help to discourage pests, minimize problems associated with large divots and deep ball marks, and enable creeping bentgrass (*Agrostis stolonifera*) to compete more effectively with annual bluegrass.

Fertilizer management is also 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/1,000 ft²; 5–6 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 to 60% suppression of dollar spot and brown patch (*Rhizoctonia solani*). Natural organic fertilizers are good N-sources and they are safe. Natural organic N-sources, however, are not generally 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. 