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G85-751 Thatch Prevention and Control (Revised July 1992)

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Thatch Prevention and Control

This NebGuide describes how thatch accumulation damages turfgrass sites, and gives methods for removing accumulations and preventing their reoccurrence.

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Thatch is a problem on many turfgrass sites. It consists of a tightly intermingled layer of dead and decaying turfgrass tissues derived from stems, roots and leaves. Thatch has a high lignin content and resists microbial breakdown. Located between the green vegetation and soil surface (*Figure 1*), thatch accumulates when production of turfgrass organic matter exceeds decomposition.

Figure 1. (38K JPG) Thatch is a layer of dead and decaying tissue located between the green vegetation and the soil surface.

To determine thatch accumulation, cut a pie-shaped wedge of grass and soil from the turf, remove it and measure the organic matter that has accumulated *(Figure 2)*. If this layer exceeds 1/2 inch, steps need to be taken to reduce it. Measure the accumulation from several areas in the turf, since thatch is normally not uniformly distributed.

Figure 2. (28K JPG) Thatch accumulation can be determined by cutting several pie-shaped wedges from the turf and measuring the organic debris accumulated between the green vegetation and soil surface.

A small thatch layer (less than 1/2 inch) can be beneficial because it increases the turf's resiliency, improves its wear tolerance, and insulates it against soil temperature changes. When thatch layers exceed 1/2 inch, however, the disadvantages generally outweigh the advantages. The turf's susceptibility to heat, cold, and drought increase with excess thatch accumulation, and localized dry spots, scalping, disease, and insects may become problems. As thatch accumulates, there is a tendency for root and rhizome

growth to occur primarily in the thatch layer rather than in the soil (*Figure 3*). This results in a weakened, poorly rooted turf that is prone to stress injury and requires increased management.

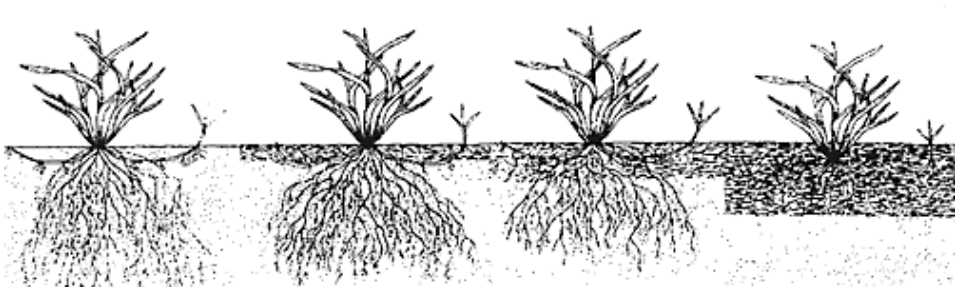


Figure 3. As thatch accumulates, turfgrass roots grow in the thatch rather than in the soil, resulting in weakened turfs that are prone to stress injury.

Turfgrass species and cultivars differ in their thatching tendencies (*Tables I and II*). This is due primarily to different growth rates and different cell wall contents. Lignin is one component of the cell wall that resists breakdown. Vigorous cultivars with high lignin content accumulate thatch more rapidly than those with less vigorous growth and lower lignin content. Blending cultivars with varying thatching tendencies is recommended to reduce the thatch buildup rate. Blends should be based on cultivars having superior site adaptation and reduced thatching tendency.

Table I.Thatching tendency of turfgrass species found in Nebraska turfs.		
High	*Medium*	*Low*
Zoysiagrass	Kentucky bluegrass	Perennial ryegrass
Bermudagrass	Creeping bentgrass	Tall fescue
Creeping red fescue	Hard fescue	Buffalograss
	Chewings fescue	

Table II. Relative thatch accumulation rates among Kentucky bluegrass cultivars.		
High	*Medium*	*Low*
Baron	Adelphi	Rugby
Birka	Aquila	Park
Cheri	Bensun	S. Dakota Common
Glade	Majestic	Vantage
Midnight	Monopoly	
Sydsport	Parade	
Touchdown	Ram I	
Victa	Shasta	

Plant parts also differ in cell wall content, with lignin levels being greatest in roots, rhizomes, and stolons, intermediate in leaf sheaths, and lowest in leaf blades. Leaf clippings contribute very little to thatch

accumulation, justifying the recommendation that clippings should be recycled back into the lawn rather than bagged. Dead and decaying roots, rhizomes, stolons, and shoots are major contributors to thatch since these structures are high in lignin content and resist decomposition.

Thatch Removal

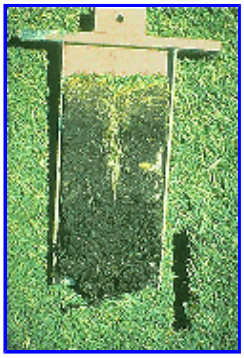
Remove thatch during periods of active turfgrass growth. This encourages recovery from injury that may occur during dethatching. Cool season turfgrasses, such as Kentucky bluegrass, grow best in spring and fall. Thatch removal in these turfs is best done in spring prior to green-up or in the fall after Labor Day. Remove thatch when at least 30 days of favorable growing conditions are anticipated afterward. This will ensure turfgrass recovery and minimize potential stresses associated with dethatching. Mow the turf closely (1 1/2 to 2 inches) prior to dethatching. Remove clippings and thatch debris immediately.

Avoid thatch removal during summer when turfs are heat or drought stressed. High temperatures and drought stress slow growth, reduce recuperative rate, and encourage weed encroachment. Remove thatch from warm season turfgrasses, such as zoysiagrass, after they have obtained 100 percent green-up in the spring, but no later than Aug. 1.

Figure 4. (55K JPG) Power rakes remove thatch mechanically with rigid wire tines or steel blades that slice through the turf and lift organic matter to the surface for removal.

Thatch can be removed by hand raking or by using a power rake. Hand raking is laborious and is practical only for small areas. Power rakes (*Figure 4*) can be rented, or the service can be hired from a professional lawn care company. Power rakes use rigid wire tines or steel blades to lift thatch debris and a small amount of soil to the lawn surface. The soil should have some moisture for best results. Power raking during excessive soil moisture conditions tears and pulls the turf from the soil instead of slicing and lifting the thatch debris as desired.

After dethatching in the spring, apply a preemergence herbicide to prevent the potential encroachment of crabgrass. This application can be done in combination with a light fertilization (0.5 lb N/1,000 sq ft). A late summer or fall raking does not require the preemergence herbicide application, but should be followed with fertilization, usually at a rate of 0.75 to 1.0 lb N/1,000 sq ft.



Figures 5a and 5b. (48K JPG and 40K JPG) Core cultivation removes cores of soil, which modifies the physical characteristics of thatch.

Soil incorporation also enhances breakdown by improving physical properties of thatch and introducing microorganisms. Soil cultivation (i.e., coring, slicing, and spiking) should be done regularly to minimize thatch accumulation. Most turfgrasses growing on heavy clay or highly disturbed soils require annual cultivation to restrict thatch buildup.

Core cultivation (aerification) can be used to minimize and reduce thatch accumulation, to modify its physical characteristics, and to remove certain amounts of thatch (*Figures 5a and 5b*).

Core cultivation is not as effective as power raking in removing thatch debris, but it is less injurious and disruptive. Soil cores are removed during cultivation. These cores can be allowed to break down and

redistribute soil throughout the thatch. The soil modifies the physical structure of the thatch, making it a better growing medium (*Table III*).

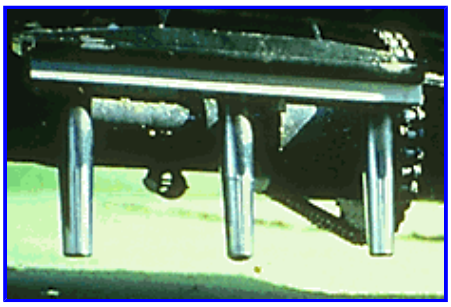


Figure 6. Large scale core cultivation (26K JPG).

Table III. A comparison of physical properties of thatch, sand, and soil.

	Thatch	*Sand*	*Soil*
Aeration	Good	Good	Fair
Compaction	Resistant	Moderately Resistant	Susceptible
Moisture Retention	Poor	Poor	Good
Nutrient Retention	Poor	Poor	Good

Controlling Thatch Accumulation

Thatch accumulation can be minimized by using proper cultural practices and selecting appropriate turfgrasses. This is not easily accomplished, since vigorous, well-adapted turfgrasses with high total cell wall content are most desirable, but are also most prone to thatch buildup. These grasses require more careful management to reduce thatching tendency.

Proper mowing frequency and height are the principle cultural practices that can be used to reduce thatching tendency. Mowing frequency should be dictated by the turfgrass growth rate. No more than one third of the leaf blade should be removed with any mowing. If proper mowing frequency is maintained, clippings do not need to be removed. Turfgrass leaf clippings contribute very little to thatch buildup. They contain low levels of lignin, break down rapidly, and recycle nutrients slowly when returned to the turf. As mowing height increases, thatching tendency increases. It is best to cycle mowing height from low in the spring to high in the summer, and back to low in the fall. This reduces thatching tendency and minimizes environmental stress and weed encroachment.

Apply fertilizers at rates and in programs that meet, but do not exceed, the nutritional needs of the turf. Excessive nitrogen applications may result in organic matter production rates that exceed breakdown, encouraging thatch accumulation. Avoid light, frequent irrigations. It is best to irrigate turfs deeply and infrequently, watering when the turf shows moderate signs of moisture stress.

Use pesticides only as needed. Thatch accumulation can be minimized by avoiding unnecessary use of pesticides. Pesticides may affect desirable microorganism and earthworm populations. Earthworms digest thatch, improve soil aeration and drainage, and introduce soil and microorganisms into thatch. They play an important role in thatch control and, where feasible, should be encouraged through proper management.

It is important to consider all of the factors that contribute to thatch accumulation. Thatch prevention and control is not an occasional practice. It requires proper management to encourage organic matter

decomposition rather than accumulation. Reducing thatch is a beneficial practice, contributing to a healthier turf and reduced maintenance costs.

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