



Controlling and Preventing Thatch

William J. Carlos, Horticulturist, University of Nevada Cooperative Extension
Rodney Davis, Extension Educator, Battle Mountain
Wayne S. Johnson, Associate Professor, State IPM Specialist

What is Thatch?

Thatch is a layer of tight brown spongy organic material found just above the soil line in turf. The majority of thatch is made up of an accumulation of partly decomposed stems and roots of grass. Thatch tends to be more of a problem in sod-forming grasses, such as Kentucky bluegrass, fine fescue and Bermuda grass. Thatch rarely occurs in bunch grasses, such as tall fescue.

What Causes Thatch?

Thatch is caused by many things.

- Poor soil conditions
- Sandy soils
- Excessive clay-type soils
- Dry soil
- Compacted soils
- Over-watering
- Water-logged soils, ponding
- Salty soils and soils with a high pH
- Reduced soil microorganisms
- Infrequent or excessive fertilization and high cutting
- Continual and repeated applications of certain pesticides

- Cultivars of Kentucky bluegrass listed in the table below.

High Producing Cultivars	Medium Producing Cultivars	Low Producing Thatch Cultivars
Baron Birka Cheri Glade Midnight Sydsport Touchdown Victa	Adelphi Aquila Bensun Majestic Monopoly Parade Ram I Shasta	Rugby Park S. Dakota Vantage

Cultivars of Kentucky bluegrass that produce the most and least amount of thatch.

Understanding the Layers of Thatch

There are two distinct layers of thatch. The first layer is found at the base of the grass plant near the soil surface. It is primarily composed of dead leaves, roots and shoots (lignin) and is easily removed with a power rake (Figure 1).



Fig. 1. Commercial power rake.

The second layer, the mat layer, is the most difficult to control and remove. The mat layer is found above the soil line and below the crown of the grass (Figure 2). It is comprised of intermingled decaying roots and shoots. When this layer becomes thick, it can hold water, like a sponge. However, if it becomes dry, it will shed water.



Fig. 2. Layer of thatch, mat and soil line.

Benefits and Problems With Thatch

Some thatch is beneficial. Thatch is durable and increases wear tolerance. Thatch also insulates the roots and the growing points (crowns) of grass against extreme temperatures. However, when thatch becomes thicker than 1/2 inch, it creates a favorable environment for pests and disease. The dead leaves, stems and roots found in the thatch layer can harbor diseases. Both thatch and the mat layer create ideal conditions for insects to feed and over winter (billbugs and melting-out disease).

A buildup of thatch greater than 1/2 inch also interferes with mowing. Over time, the wheels of the lawn mower can make wheel ruts if the mowing patterns

are not changed weekly. Ruts lower the wheels and the cutting blade. When the mower wheels follow the ruts, the blade cuts the lawn close to the ground, scalping it. This damages the crown of the lawn and take months to recover.

How Do I Know I Have Thatch?

Use a knife or shovel and cut a plug 2 inches or 3 inches round and 2 inches to 3 inches below the soil line. Inspect the sample and note the various colors and layers of the soil and organic matter (Figure 2). If the layer above the soil line is dark, spongy, and greater than 1/2 inch thick, you will need to begin managing the thatch. If the thatch layer is greater than 1, inch it will be difficult to correct and the lawn may have to be removed. After you have inspected the plug, firmly replace it when you are finished.

Managing Thatch/Mat Layer

To reduce thatch/mat, do not overwater the lawn. Apply water in short, frequent cycles rather than long ones. This helps to force roots to grow deep into the soil. If water stands on the surfaces after watering, correct the drainage by installing an underground drainage system or change the grade of the soil or reduce the duration of the cycles, but increase the frequency.

For salty soils, aerate the lawn, then water to leach salts past the root system. Again, use short and frequent irrigation cycles.

To correct the pH problem, use sulfur-type fertilizer or spread a thin layer of compost or soil amendments on the lawn after aerating. Both treatments can help lower the pH to 6.0 pH or 7.0 pH over time. Top-dressing also increases microorganisms that help break down thatch.

Mowing

Mow lawns weekly and remove only one-third of the leaf blade at one time. If the lawn is mowed weekly at a 2-inch to 2 ½-inch height, leaving only one-third of the leaf blade, clippings can be left without contributing to the thatch layer. However, if lawns are mowed infrequently, and clippings are left, thatch will accumulate.

Fertilization

Apply fertilizer at the recommended rate. Too much nitrogen fertilizer will over-stimulate root and shoot growth. The roots and shoot will build up faster than they can decompose. Fertilize early in the spring and during late summer and fall, making at least three to four applications per year. When using a mulching mower, reduce fertilizer rates by one-third. For more information on lawn care, please ask for Fact Sheet 88-71, Turf Maintenance.

Core cultivation or core aeration

Core cultivation or core aeration is one of the best methods to control thatch. Although coring does not remove much thatch and mat (only 10 percent when done correctly with 2-inch spacing), the holes that are left allow water, roots, oxygen and fertilizer to move deep into the soil, instead of growing near the surface.

Aeration removes ¼-inch to ½-inch diameter cores of thatch/mat and soil. The cores should be 2 inches to 4 inches long to be effective.

Aerate when roots are actively growing, in spring (mid-March to the end of April) or in fall (early September) and when 30 or more days of favorable growing conditions will follow. Soak the lawn a few days before aerating. This will allow the hollow tines of the core

aerating equipment to penetrate to their full depth. However, don't overwater. If the soil is too moist, the cores will be pressed into the bottom of the aeration hole, causing soil compaction. If the soil is too dry, the aerator will not penetrate to the full depth and results will be minimal. Avoid aerating in the heat of summer, when the lawn is semi-dormant and root development is minimal, as damage to the lawn can occur.

After aerating, leave the cores. They will dissolve with each watering and function similar to top-dressing, helping to reduce thatch (Figure 3).



Fig. 3. Cores from an aerator.

To control thatch over time, top dress with compost or other well-rotted organic matter after aerating. According to studies, repeated applications of top dressing significantly reduced thatch. Apply 1/2 yard of organic material, which is about 1/8 of an inch thick for every 1000 square feet of lawn. Sweep or rake the topsoil into the holes. The soil microorganisms will slowly break down thatch. The top-dressing also provides some nutrients, helps suppress diseases, and improves the lawn's root system.

Power Raking or Dethatching

Power rakes, dethatchers or vertical mowers remove dead leaves, roots and stems found at the surface. Ridged or flexible blades are lowered above the crown of the grass (Figure 4). The power

rake whirls the blades in a circular motion, pulling up dry, dead, straw-colored leaves. Current research indicates this practice has been used for years with mixed results. However, current research also indicates power raking frequently and shallowly can be beneficial.



Fig. 4. Underside of a power rake, showing the blades.

Setting the blades too low, where the soil is raked to the surface, can damage the crown of the plant and slow the lawns recovery. Also, do not set the blades too low in shaded areas, where thatch is generally thin and does not require a low setting to pull it up.

To remove large quantities of thatch, two to four passes in different directions may be required. Do not dethatch when the lawn is wet. Wet sod will be pulled up, damaging the lawn.

Dethatching attachments available for home lawn mowers can also be used to remove thatch. Some attachments are secured to the front of the mower and made of wire tines. The tines “comb-out” the dead grass as the mower moves forward. Because the mower and attachments are less powerful than

power rakes, more passes are necessary to remove a significant amount of thatch.

The best times to dethatch are spring and fall (Mid-March through the mid-May and early September) or when there are 30 or more days of favorable cool growing conditions will follow. Do not thatch in the middle of summer when the lawn is semi-dormant and not vigorously growing because recovery may be slow.

Summary

Correcting unfavorable soil conditions, choosing cultivars that produce little or no thatch, mowing frequently, applying the appropriate amount of fertilizer at the right time of year, core aerating and power raking, top-dressing, and properly irrigating are ways to control thatch.

References:

- Beard, J.B. 1983. Turf Management of Golf Courses. Macmillian Publishing Company. New York.
- Branaranayake, W., Qian Y.L., Ojina, D.S., and Follett R.F. 2003. Estimation of Soil Organic Carbon Changes in Turfgrass Systems Using CENTURY Model. *Agronomy Journal*. 95: 558-663
- Callahan, M. L, Sanders L.W., Parham, M.J., Harper, C.A., Lester L.D. and McDonald E.R. 1998. *Crops Science*. 38:181-187.
- Kosiki, T., Skinner, V. 2004. Lawn Care. Fact Sheet. No 7.202. Colorado State University Cooperative Extension. Fort Collins, Co.
- Pound, W. E., Street, J.R. 2004. Thatch: The Accumulation in Lawns. Fact Sheet HYG-4008. Ohio State University.
- Taylor, R.G., Gray, J., Abernathy, S. 1998. Thatch Management For Home Lawns. Texas Agriculture Extension Service. College Station, TX.

The University of Nevada, Reno is an Equal Employment Opportunity/Affirmative Action employer and does not discriminate on the basis of race, color, religion, sex, age, creed, national origin, veteran status, physical or mental disability, or sexual orientation in any program or activity it operates. The University of Nevada employs only United States citizens and aliens lawfully authorized to work in the United States.

Use or nonuse or chemical names does not imply product endorsement by the University of Nevada Cooperative Extension.