

Understanding Thatch in the Home Lawn

by David D. Minner and Eldon Everhart

Thatch is a layer of living and dead roots, crowns, and lower shoots that forms between the soil surface and green vegetation. Moderate thatch formation is a normal development in lawns; however, problems can occur when the thatch layer is excessive. A balance must be maintained with thatch. Seldom is thatch directly responsible for turf death; however, it usually leads to other disease, water, and rooting problems that eventually kill grass. Too much thatch can cause turf problems, but a moderate amount of thatch is beneficial.

Beneficial aspects of moderate thatch:

- Acts as a mulch that shades the surface to reduce high summer soil temperature and evaporation, and competes with annual weeds such as crabgrass.
- Supplies food source and habitat for beneficial microbes.
- Supplies organic matter that earthworms incorporate into the soil.
- Acts as a living filter to reduce groundwater contamination.
- Provides a protective layer that reduces turf injury from traffic.

Detrimental aspects of excessive thatch:

- Harbors disease-causing fungi and turf insects.
- Causes shallow root development.
- Interferes with movement of air, water, and nutrients into the soil.
- Increases potential for scalp mowing.

What causes thatch?

Like many systems in nature, a balance must be maintained. Lawns with less than a $\frac{1}{2}$ inch of thatch seldom have thatch-related problems. When the rate of shoot production is equal to the rate of microbial decomposition, thatch is properly balanced and an excessive build up is avoided. There are two ways your lawn's thatch can be out of balance. First, plant material is produced too fast for a normal population of microbes to break it down. Second, the grass may be growing at a normal rate, but the microbes are not functioning properly. Biomass production can be influenced by controlling fertilizer and irrigation. Microbial populations are more responsive to uncontrollable environmental factors such as temperature and soil type.



Figure 1. Thatch is a distinct layer of spongy brown organic matter consisting of living and dead roots, crowns, and lower shoots.

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- Excessive nitrogen fertilizer causes dark greening of grass that most people find attractive, and it also makes grass shoots grow faster. Greater shoot production also means more plant debris as shoots naturally die. Thatch develops when microbes can not decay the dead plant tissue fast enough.
- Excessive and frequent watering keeps a zone of high moisture near the surface where thatch accumulates. When thatch is kept moist, roots and shoots begin to

actually grow within the thatch layer instead of the soil. Compared to soil, thatch is a poor growing medium because it does not store water or nutrients. Roots and plants growing exclusively in the thatch have a greater chance of dying when thatch inevitably dries out. This further accelerates thatch formation as more dead plant debris accumulates in the thatch layer. Excessive irrigation can further aid in thatch accumulation by creating waterlogged soil conditions that inhibit breakdown of thatch by aerobic microorganisms.

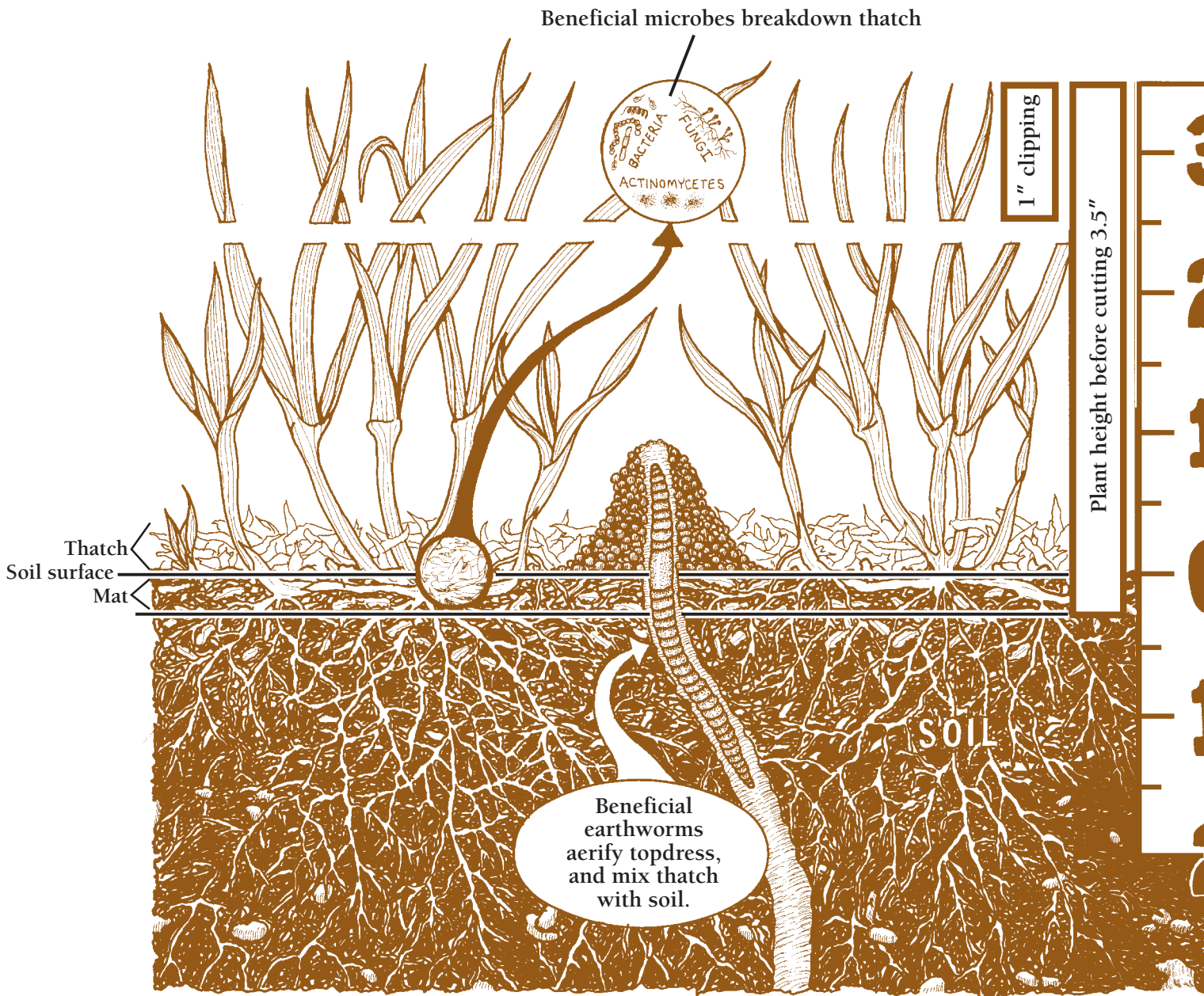


Figure 2. A beneficial thatch and mat in a balanced lawn (left) compared with an excessive thatch in an unbalanced lawn (right)

- Subsoils lacking in organic matter, microbes, and earthworms tend to build up thatch quickly since roots and shoots preferentially grow near the surface where organic matter is accumulating. Sod that is laid over subsoil is especially susceptible to thatching if the new growth remains in the sod layer instead of the subsoil. After sodding, and when roots have sufficiently tacked down, a hollow coring will help prevent shallow rooting caused by sod layering. Incorporate organic matter, topsoil, and fertilizer into the subsoil before sodding to encourage deeper rooting.

- Earthworms are extremely beneficial and make a major contribution to soil aeration and thatch reduction. Since earthworms are so beneficial there are no pesticides specifically labeled to control them, even when their casting creates a problem. Earthworms are sometimes the victim as a nontarget organism when pesticides are used to control other pests in turf. Certain insecticides (carbaryl, chlorpyrifos, fenvalerate, guthion, methomyl, nicotine, and propoxur) and fungicides (benomyl and captan) are highly toxic to earthworms. To avoid damaging earthworms and potential thatch buildup, make no



more than a single application from any one of these products each year. Earthworms can recover if repeated use is avoided.

- Infrequent mowing of tall grass will contribute to thatch accumulation. The rule for mowing is to mow at a height and frequency so that no more than one-third of the grass height is removed at any single mowing. For example a lawn that grows to a 3-inch height can be cut back to a 2-inch height, leaving the one-inch clippings to easily filter into the grass canopy. **Grass clippings are not a primary cause of thatch**, and they should not be collected in an attempt to prevent thatch buildup. Leaf tissue readily breaks down in a lawn compared to the more stable crown and shoot issue. Mulching-type mowers chop clippings into smaller pieces that easily filter into the grass canopy and decompose faster. Clippings will only contribute to thatch accumulation if there is already a preexisting thatch problem. Once thatch builds to beyond one-half inch there is minimal contact between soil microbes and the top of the thatch surface. Consequently, clippings that fall on top of thatch are slow to break down and may contribute to further thatch development. Where thatch is known to be a problem, clippings can be removed along with other thatch-reducing measures. Once thatch has been sufficiently reduced, clippings should no longer be collected.

Insects and thatch

Have you ever wondered why the best looking lawn on the block often has the most pest problems? When given a choice, adult insects are often attracted to lush growth that occurs when lawns are given too much nitrogen and water. After finding a lush lawn, egg-laying adult insects are often treated to a thick layer of thatch that makes a nice home for their young larva. Insects are attracted to thatch because it provides high humidity when wet, temperature moderation, and a food source of living and dead organic matter. Overwatering will allow succulent roots and shoots to actually grow in the moist thatch where they are easily fed upon. Thatch also provides excellent habitat for sod webworms and bluegrass billbugs. In fact, sod webworms have great difficulty surviving in bare soil, so thatch is very important to continued populations of this insect.

The most important effect that thatch has on insects is interfering with pesticide movement. Soil insects, such as white grubs, are especially difficult to control in thatchy lawns because organic matter binds and restricts

chemical control. As much as 95 percent of all insecticide types get bound in thatch and do not even reach the soil where most grubs are located.

Diseases and thatch

Fungi are pathogenic organisms that attack turfgrass plants and cause disease. When they are not attacking plants they live in a resting stage or as saprophytes and feed on dead organic matter created from thatch. Fungi get moisture from thatch. Wetting and drying cycles in thatch cause enormous numbers of spores to be produced. Stripe smut, leafspot melting-out, and Summer Patch are diseases especially favored by excessive thatch accumulation. Severe loss of turf can occur when Summer Patch invades a thatchy Kentucky bluegrass lawn. Thatch harbors the pathogen and allows the fungus to directly attack shoots and roots that are growing in the thatch. The disorder is first noticed in early summer when thatch dries, reaches a temperature of 70°F, and causes turf to wilt in sunken patches. By mid to late summer, 6- to 12-inch diameter tan patches of dead grass appear to encircle a smaller patch of green living grass ("frog eye patch symptom"). At this point the tan grass is usually dead and will require reseeding or regrowth from adjacent living areas. Because thatch clearly makes Summer Patch more destructive it is important to reduce disease severity by preventing thatch accumulation. Perennial ryegrass and tall fescue produce limited thatch and are not severely affected by Summer Patch.

File: Horticulture and Landscape Architecture 3-1

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Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Stanley R. Johnson, director, Cooperative Extension Service, Iowa State University of Science and Technology, Ames, Iowa.