Thatch prevention and control in home lawns

W. Michael Colt, William J. Johnston, and Susan M. Bell

Homeowners want healthy, vigorous, and attractive lawns throughout the growing season. However, as lawns age, excessive thatch may accumulate and reduce the health, vigor, and attractiveness of lawns.

Thatch more than one-half inch thick can cause a droughty, disease-prone, and pest-infested lawn.

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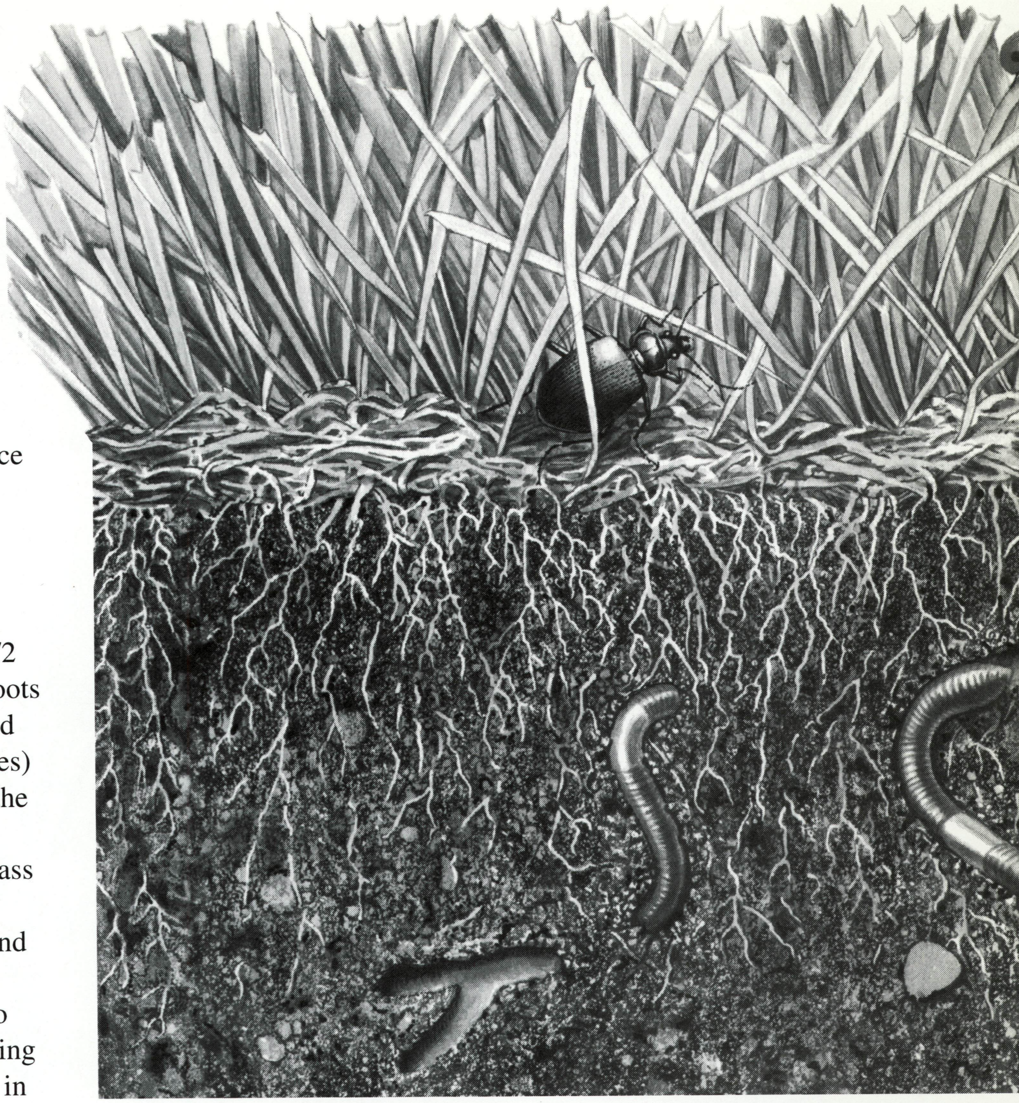
What is thatch?

Thatch is an accumulation of dead and partly decomposed leaves, stems, and roots above the soil surface but below the green leaves. The majority of thatch accumulation results from stems. Leaf clippings usually break down before they can accumulate as thatch. The most vigorously growing grasses tend to produce the most thatch.



Why worry about thatch?

When thatch is more than 1/2 inch deep, most of the grass roots (and underground stems, called rhizomes, in some grass species) grow in the thatch and not in the soil. Because thatch has little water-holding capacity, the grass will be more susceptible to drought. Thatch offers roots and grass crowns little protection from temperature extremes, so summer heat and winter freezing are more likely to kill grasses in thatchy lawns. In addition, an increase in thatch will promote the incidence of diseases such as Pythium blight and the overwintering of certain insects such as sod webworm and adult billbugs. Finally, the effectiveness of certain pesticides and the efficiency of fertilizers are greatly hampered when thatch is excessive.

What causes thatch?

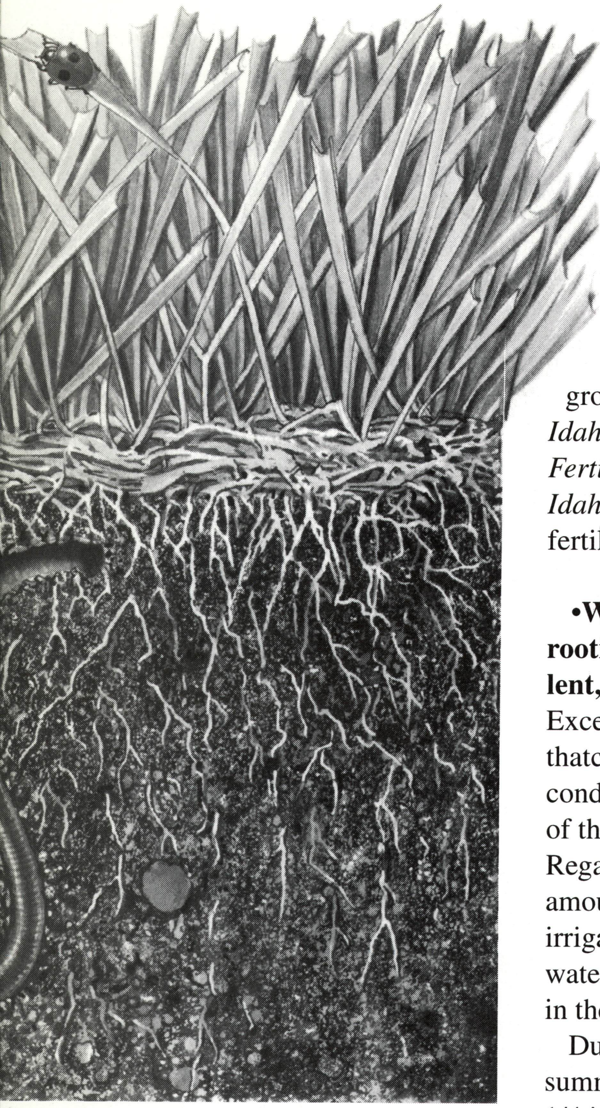
Thatch accumulates when the rate of shoot-leaf production exceeds the rate of shoot-leaf decomposition by microbes. Grass species and even specific cultivars differ in the rate of thatch formation. Some grass species and cultivars thatch faster than others because of their vigorous growth habits; others thatch faster because their plant tissue resists decomposition. Bunch-type grasses such as perennial ryegrass, tall fescue, and fine-leaf fescue cultivars do not produce as much thatch as the stoloniferous bentgrasses or the rhizomatous Kentucky bluegrasses. Still, fast-growing bentgrasses and Kentucky bluegrasses can produce attractive lawns when thatch development is prevented or controlled.

Thatch prevention

Thatch may develop over a period of several years before noticeable damage occurs. Good cultural practices, starting when the lawn is new, will not prevent thatch indefinitely, but can retard its formation.

• **Make moderate, well-timed fertilizer applications to maintain adequate vigor without excessive growth.** Excessive fertilization, especially with nitrogen fertilizers at the wrong time of the year, such as early spring, may cause excessive shoot growth. Three to 4 pounds of actual nitrogen per 1,000 square feet of lawn per year is adequate for a Kentucky bluegrass-red fescue lawn. If you leave clippings on the lawn, your turf will need approximately 25 percent less nitrogen per year. Besides nitrogen, your lawn may need three other fertilizer elements—phosphorus, potassium, and sulfur.

Apply fertilizer in small amounts of 1/2 to 1 pound nitrogen per



A limited thatch layer serves as a mulch, allows movement of air and water, and promotes beneficial biological activity.

1,000 square feet rather than in larger amounts less frequently. Three-fourths of the total fertilizer amount should be applied in the fall (September to early November) and the balance during late spring (mid-May to mid-June), after the flush of spring growth. (See CIS 911, *Northern Idaho Lawns,* and CIS 846, *Fertilizing Lawns in Southern Idaho*, for additional details about fertilization.)

•Water to encourage deep rooting without causing succulent, unnecessary top growth. Excessive irrigation can promote thatch by creating waterlogged conditions that inhibit breakdown of the thatch by microorganisms. Regardless of the season, the amount of water to apply at each irrigation will depend on the water-holding capacity of the soil in the rooting depth.

During the warmer part of the summer, a lawn requires about 1/4 inch of water per day. The amount to apply per watering and the frequency of watering depend on the soil type and rooting depth. On deep loam, clay loam, and clay soils, apply 2 inches of water at each irrigation and irrigate weekly. Sandy-type soils would need about 1 inch of water every three or four days. Shallow soils and coarse sandy or gravely soils hold less water, so you would apply less water at more frequent intervals.

In spring and fall, the daily water needs of turf are much less than in summer, so adjust your irrigations accordingly.

• Regularly cut grass at the recommended height to maintain vigor. The frequency of mowing depends upon the rate of grass growth, the kind of grass, and the use of the turf (table 1). As a general rule, schedule mowing to remove not more than one-third of the grass at any one time. This will likely require mowing twice weekly in the springtime and at least weekly at other times.

Infrequent mowing of tall grass increases thatch accumulation in many grasses. However, grass clippings need not always be removed. Research has shown that grass clippings are a valuable source of nutrients and that they do *not* contribute to thatch if the lawn is mowed at the proper intervals and cutting heights to produce fine clippings. Refer to CIS 1016, *Don't Bag It! Recycle Your Grass Clippings*, for more details.

Thatch control

Core aeration

Soil compaction is caused by continued foot and equipment

Table 1. Recommended mowing heights

	Mower height (inches)	Maximum grass height before mowing (to remove 1/3 of the grass blade) (inches)
Kentucky bluegrass	1.0 - 2.0	1.5 - 3.0
Perennial ryegrass	1.0 - 2.0	1.5 - 3.0
Tall fescue	2.0 - 3.0	3.0 - 4.5
Fine-leaf fescues	1.0 - 2.0	1.5 - 3.0

traffic. Compaction destroys the soil structure by pressing soil particles closer together and adversely affects oxygen levels and water movement. As a consequence, turfgrasses soon become susceptible to drought, disease, and insect damage. In addition, weed invasion often occurs because some weeds, knotweed for example, survive better than grasses on compacted soils.

Core aeration involves using a machine that punches a hollow tine into the soil, removing 1/4- to 1/2-inch diameter soil cores that are approximately 2 to 4 inches in length. The soil cores are deposited on the surface of the turf and are pulverized and distributed by the next mowing operation. Mixing soil with thatch improves moisture and temperature relations. This, plus the improved aeration, increases microbial activity and aids in thatch decomposition. Adequate irrigation and fertilization also increase thatch decomposition.

Core aeration should not be looked upon as a method of removing large amounts of thatch, however. Rather, it is most effective as a means of preventing thatch from developing. Homeowners who have lawns receiving high rates of nitrogen fertilizer and water should seriously consider core aeration at least once per year.

Three kinds of aerifiers are available. Be sure that the type you choose has hollow tines (or spoons) so that it removes a soil core; spiking the soil with solid tines does little to relieve compaction and must be done more frequently.

Power raking

Examine the lawn closely regardless of how healthy it appears. Cut and lift several plugs 2 or 3 inches deep. Examine the profiles of the plugs. If thatch is present, it will appear as a distinct layer of stringy, fibrous, or feltlike mat. When about 1/2 inch of thatch develops in bluegrass, it should be removed mechanically by power raking, or vertical mowing. Thinner thatch layers may be removed by vigorous hand raking.

Lawns with a serious thatch problem may require a severe power raking each year until thatch depth is less than 1/2 inch. When treatment is necessary, at least three to four weeks of good growing weather should follow in order for the lawn to recover. Applying a light rate of fertilizer following power raking will help the grass recover from injury.

Early fall is the best time to power rake a lawn in southern Idaho. Lawns can be power raked in the spring; however, competition from annual grasses such as crabgrass will be much greater while the turfgrass is recovering. Spring power raking is acceptable in cool-season areas of Idaho where competition from summer annual weeds like crabgrass is much less. If you power rake a lawn containing annual weedy grasses in spring, be sure to follow with an application of a good preemergence herbicide for annual weedy grasses.

Miracle products

Research at several universities has shown that "miracle dethatching agents," which can easily be applied on a lawn, are usually ineffective in breaking down thatch.

Further readings

Don't Bag It: Recycle Your Grass Clippings CIS 1016, 50¢

Fertilizing Lawns in Southern Idaho CIS 846, 35¢

Northern Idaho Fertilizer Guide: Northern Idaho Lawns CIS 911, 35¢

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comes in a 4 lb/a.i. per gallon formulation. Your sprayer has a 300 gallon tank and it is calibrated for 10 GPA(gallons per acre). How much material do you add to the tank? You first need to determine how many acres the sprayer will cover per tankful. Then multiply that number times the amount of material per acre needed. For example, a 300 gallon tank divided by 10 gallons per acre output equals 30 acres covered per tank; .5 lb/a.i. per acre recommended divided by 4 lb/a.i. per gallon formulation equals .125 gallon per acre needed, which equals one pint. Therefore, you need 30 pints or 3.75 gallons of material, as the following illustrates.

$$\frac{\text{300 gallon tank}}{\text{10 GPA}} = \text{30 acres per tankful}$$

$$\frac{\text{0.5 lb. a.i. (spray recommendation)}}{\text{4 lb a.i./gal (formulation)}} = \text{.125 gal/acre} = \text{1 pint}$$

$$\text{(128 oz (1 gal)} \times \text{.125} = \text{16 oz or 1 pint)}$$

$$\text{30 acres/tankful} \times \text{1 pt/acre} = \text{30 pts to add to tank} = \text{3.75 gal/tank}$$

If you have a dry material recommendation of 2 lb/a.i. per acre and the material is an 80 percent wettable powder formulation, how much material do you add? Using the same sprayer, you know that you can cover 30 acres per tankful. To determine the amount of material needed per acre, divide the percentage of active ingredient (80%) into the total (100%) and multiply this times the active ingredient needed per acre (2 lb). In this case, we need 2.5 lb per acre or 75 lbs per tankful, as the following illustrates.

$$\frac{100\%}{80\%} \times \text{2 lb a.i.} = \text{2.5 lb of product/acre}$$

$$\text{2.5 lb} \times \text{30 acres/tankful} = \text{75 lb/tankful}$$

Field Calibration Measured Course

To verify whether or not a sprayer is calibrated correctly, a field test can be performed. Measuring the material used over a known acreage can help determine application rates. However, use the following procedure to determine and/or verify the actual application rate, since only a small area is treated.

1. Measure off a distance of $^{1}/_{8}$-mile (660 feet or 40 rods). It is best to run the test in the field that will be sprayed, since sinkage in a soft field can change travel speed.
2. Start with a full spray tank. Be sure to eliminate air pockets in the pump, lines, and tank. Water (or the usual carrier) will usually do for calibration, but if you are using a chemical that changes the viscosity of the carrier, you should use the chemical as it will be sprayed.
3. Spray the $^{1}/_{8}$-mile strip, using the gear and throttle setting that you will use while spraying. You should run the engine well into the governed rpm range so that the governor can hold the speed constant.
4. Measure carefully the amount of water needed to refill the tank. Again, be careful to eliminate air pockets in the tank.
5. Calculate the application rate as follows:

   Broadcast:

   $$\frac{\text{Gallons used} \times 66}{\text{Swath width in ft.}} = \text{Gallons per treated acre}$$

   Banding:

   $$\frac{\text{Gallons used} \times 66}{\text{Band width in ft.} \times \text{number of bands}} = \text{Gallons per treated acre}$$

6. Divide tank capacity by gallons per acre determined in step 5. This gives the number of acres covered by one tankful of spray.
7. To determine the amount of chemical to add to each tank, multiply the recommended application rate by the number of acres covered per tankful.

More information on sprayer calibration and spray equipment can be obtained from *Spray Equipment and Calibration* (BUL 658), available for $2 from Agricultural Publications, University of Idaho, Moscow, Idaho 83844-2240, TEL & FAX 208-885-7982; email cking@uidaho.edu. Add 50¢ postage and handling plus 5% Idaho tax in Idaho.

About the Author–

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See the
Useful Formulas and Equivalents
section for conversion of ounces to pints on the back of this publication.

Useful Formulas and Equivalents

1 acre = 43,560 square feet
1 gallon = 128 fluid ounces
1 pint = 16 fluid ounces
1 pound = 16 ounce of weight. (16 fluid ounces of water at 39 degrees Fahrenheit weighs 1 pound)

$$GPA = \frac{5940 \times GPM}{MPH \times W}$$

$$GPM = \frac{GPA \times MPH \times W}{5940}$$

$$\text{Ounces per minute} = \frac{GPA \times MPH \times W \times 32}{1485}$$

MPH = distance traveled (ft) / (88 x minutes)
= distance traveled (ft) / (.47 x seconds)

Rate per Acre	
Oz/Acre	Pints/Acre
4.0	1/4
5.3	1/3
8.0	1/2
10.7	3/4
16.0	1
20.0	1 1/4
24.0	1 1/2
28.0	1 3/4
32.0	2

GPA = Gallons Per Acre
GPM = Gallons Per Minute Per Nozzle
MPH = Miles Per Hour
W = Nozzle Spacing in Inches

Gallons Sprayed per Tankful

Gallons per Acre	Acres per Tankful for Various Capacities in Gallons: 30	50	100	150	200	300	500
5	6.0	10	20	30	40	60	100
6	5.0	8.3	16.7	25	33.3	50	83.3
7	4.3	7.1	14.3	21.4	28.6	42	71.4
8	3.8	6.3	12.5	18.8	25.0	37.5	62.5
9	3.3	5.6	11.1	16.7	22.2	33.3	55.6
10	3.0	5.0	10.0	15.0	20.0	30.0	50.0
15	2.0	3.3	6.7	10.0	13.3	20.0	33.3
20	1.5	2.5	5.0	7.5	10.0	15.0	25.0

To determine acreage actually covered when band spraying, apply the following formula:

$$\textit{Crop acres band sprayed} = \frac{\textit{Acres per tankful x row width (inches)}}{\textit{Width of band (inches)}}$$

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