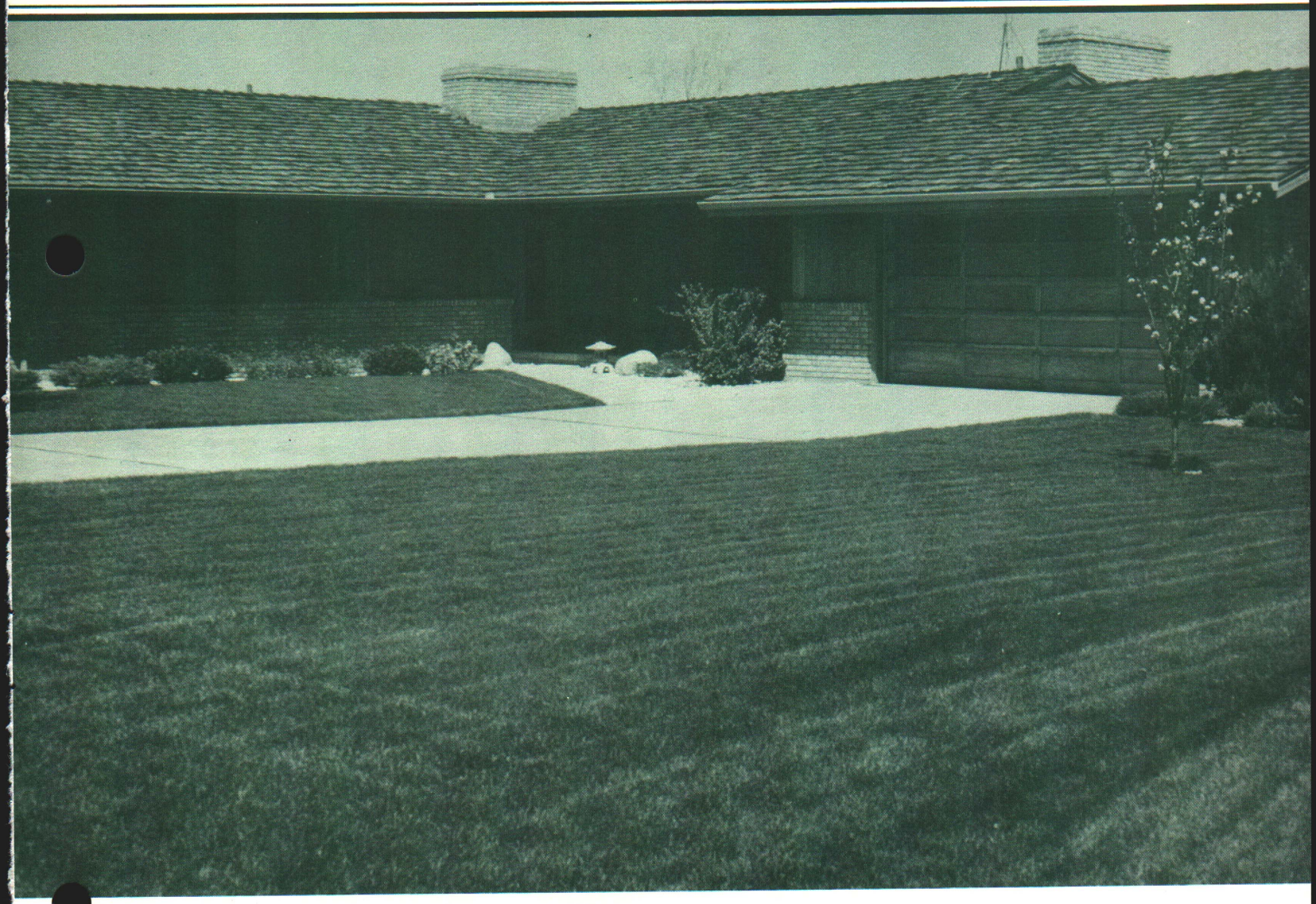
Michigan Lawn Care
Michigan State University
Cooperative Extension Service
Farm Science Series
James M. Beard, Paul E. Rieke, David P. Martin and Robert S. Shearman Crop and Soil Sciences Department
May 1972
8 pages

Extension Bulletin E-646
Farm Science Series, May, 1972

Michigan LAWN CARE



COOPERATIVE EXTENSION SERVICE • MICHIGAN STATE UNIVERSITY

Michigan LAWN CARE

By James B. Beard, Paul E. Rieke, David P. Martin and Robert S. Shearman, Crop and Soil Sciences Dept.

Contents

The lawn is one of the most important features of the grounds landscape. A quality lawn provides an attractive setting for home, business, institutional, or industrial buildings. For the enthusiast, it can be a show place. For others, the lawn functions to stabilize mud and dust problems, muffle noise, dissipate heat, reduce glare and visual pollution and provides a playing surface for recreation.

Lawns may be maintained at different quality levels depending upon the turfgrass species selected, quality desired and time and money available. For a satisfactory turf, follow these four vital principles of lawn care: (1) select turfgrasses adapted to the specific environmental and soil conditions, (2) insure proper soil conditions, including adequate surface and internal drainage, (3) practice proper mowing height and frequency, and (4) fertilize to meet the minimum nutritional requirements of the turf.

Additional cultural practices may be required to maintain or improve turfgrass quality when specific problems arise: (a) irrigation to avoid drought, (b) cultivation to correct soil compaction, (c) de-thatching, if a thatch problem develops, and (d) control of serious or objectionable turfgrasses weeds, insects, or diseases. These turfgrass cultural practices will be discussed in the following sections.

MOWING

One of the essential cultural practices is proper mowing. Height and frequency of mowing are equally important in maintaining a quality turf.

Cutting Height

Height of cut should be adjusted to the turfgrass species. Excessively close mowing results in a shallow root system and weakened turf which is prone to weed invasion. The preferred cutting height for most Kentucky bluegrass and fine leaved fescue cultivars (varieties) is 1.5 to 2.0 inches. In contrast, the low-growing bentgrasses can be mowed at a height of 0.3 to 0.8 inch, to minimize thatching.

Place the mower on a hard, level surface and adjust the bed knife (reel) or rotary blade edge to the desired height of cut. Height of cut should not be altered in late fall. Permitting the turf to grow excessively high will result in increased snow mold disease problems, while excessively short mowing will increase the chance of winter injury.

Frequency

Frequency of mowing should be adjusted to the growth rate of the turf. Do not remove more than one-quarter to one-third of the total leaf area at any one mowing. Varying the direction of mowing will improve the appearance of the turf.

Clippings

By returning leaf clippings, plant nutrients are re-utilized and, to a more limited extent, organic matter is added for improved soil structure, enhancing water movement into the soil. Clippings should be removed if an excessive amount of clipping residue excludes light from the turf, or the clipping residue interferes with recreational activities. These problems can generally be avoided and clippings returned if the proper mowing frequency is practiced.

Mowing Equipment

The mower should be kept sharp and properly adjusted. Continuous cutting with a dull mower results in reduced vigor and quality of the turf. Reel type mowers provide a better quality cut and turfgrass appearance than rotary mowers. The rotary mower is more effective in cutting tall grass and grass with seedheads.

FERTILIZATION

Soil Testing

A vigorous, attractive turf requires adequate fertilization. A reliable soil test for pH, phosphorus, and potassium made at five-year intervals can be helpful in planning a program for fertilizing a lawn. A representative soil sample can be obtained by collecting 15 to 20 small samples with a narrow garden tool or soil probe from widely scattered areas in the lawn. They should be taken to a depth of 2 to 3 inches with the turf and thatch discarded. Avoid contamination by using clean equipment. The soil should be mixed well, air-dried, and sent to a reputable soil testing laboratory for analysis. Specify whether the soil is from a new or an established lawn. Your county extension agricultural agent can supply a soil sample box for mailing the sample to the Michigan State University Soil Testing Laboratory.

What's in the Bag?

In selecting an appropriate turfgrass fertilizer, one must know what is in the fertilizer bag. State law in Michigan requires that each fertilizer bag be labelled with the percentage of nitrogen (N), available phosphoric acid (P_2O_5) and water soluble potash (K_2O), respectively. Thus:

20-5-10	
Total nitrogen	**20%**
Available phosphoric acid	**5%**
Water soluble potash	**10%**

Additional information may also be given — type of nitrogen (water-insoluble nitrogen, urea, ammoniacal, etc.) and presence of other nutrients (such as iron, a micro-nutrient), fungicides, and herbicides.

In selecting a fertilization program, consider soil test results, kind of soil, turfgrass species and cultivar, time of year, clipping removal or return, irrigation practices, type and cost of fertilizer, and the intensity of culture desired. A well fertilized, attractive lawn will require more frequent mowing and more intensive care.

Applying Nitrogen

Turfgrasses are most responsive to nitrogen, providing adequate levels of the other nutrients are present. Suggested annual nitrogen requirements for the major turfgrasses used in Michigan are given in Table 1. A range for nitrogen is indicated because of variations in soil, climatic, and cultural conditions. Higher quality turfs can often be obtained with higher nitrogen rates than suggested in Table 1, but increased mowing, increased leaching, and in some cases, increased disease susceptibility may result. Nitrogen needs may be reduced by 20 to 40 percent if clippings are returned.

Table 1. Annual Nitrogen Requirement for Turfgrasses in Michigan Lawns when Clippings are Removed.

Turfgrass Species	Pounds of Nitrogen per 1000 sq. ft.
Merion Kentucky bluegrass	5 to 7
Bentgrass	3 to 6
Kentucky bluegrass (Delta, Kenblue, Park)	2 to 4
Other Kentucky bluegrasses	3 to 5
Red and chewings fecsues, sunny areas	2 to 4
Red and chewings fescues, shaded areas	1 to 2*

**Additional fertilization of the trees should be practiced by deep root feeding.*

As a general rule, apply no more than 1.5 pounds of water soluble nitrogen per 1000 square feet to a turf at one time. Greater amounts can cause excessive growth, increase the danger of foliar burn, and impair root growth.

Fertilizing Turfs Adjacent to Lakes or Streams

Take special care when selecting a turfgrass species and a fertilization program for sandy areas near lakes or streams. A low maintenance turfgrass, such as red fescue, and lower nitrogen application rates are recommended. Judicious irrigation should be practiced to reduce the possibility of leaching nitrogen. This is especially important on sandy soils. Fertilizers containing phosphorus should be used only when needed as determined by soil test results.

Kind of Fertilizer to Use

Two important factors to consider in selecting a fertilizer: (a) the ratio of nitrogen to phosphoric acid and potash, and (b) the type of nitrogen included in the fertilizer.

The ratio of a fertilizer is shown in the analysis. Two common turfgrass analyses are 20-5-10 and 16-8-8 which have ratios of 4-1-2 and 2-1-1, respectively. Turfgrass fertilizers should normally be higher in nitrogen than phosphoric acid and potash.

Nitrogen sources can be classified into four general groups. Characteristics of some of the common nitrogen carriers are given in Table 2. The soluble carriers (organic and inorganic) require lighter, more frequent applications to maintain the desired growth throughout the season. The natural organic carriers have a slower release rate so that nitrogen availability is extended over a longer period of time. Certain natural organics cause an odor problem as they decompose. Ureaformaldehyde (UF) is a synthetic organic which possesses slow release properties. Turfgrass fertilizers may contain varying percentages of water-insoluble nitrogen (WIN), which are listed on the fertilizer bag. Many specialty turfgrass fertilizers contain both water-soluble and WIN forms to provide quick response and slow release characteristics, respectively. Do not confuse ureaformaldehyde (slow-acting) with urea (fast-acting) nitrogen.

Liquid fertilizers can be used effectively, if properly applied. Usually, they contain soluble, fast-acting nitrogen materials, but ureaformaldehyde can also be applied in liquid form.

Based on Soil Test

A 1-1-1 ratio fertilizer (such as 12-12-12) is suggested when the soil test indicates that the phosphorus (P) and potassium (K) levels are low. If P and K tests are medium, use a 2-1-1 ratio fertilizer (such as 16-8-8). When P and K soil tests are both high, consider using a 4:1:1 or 4:1:2 ratio fertilizer (such as 24-6-6 or 20-5-10) or a fertilizer containing only nitrogen as described in Table 2.

An iron deficiency may exist if the turf remains a yellow-green color after fertilizing with nitrogen. This is especially true if the soil pH is 7.5, or greater. An iron deficiency can be corrected by spraying at 2-week intervals with 4 ounces of iron sulfate dissolved in 5 gallons of water, per 1000 square feet of lawn. Do not allow the iron sulfate on clothes, concrete walls, or buildings since it will discolor them. Chelated iron compounds can also be used, following the manufacturer's directions for application rates.

Without a Soil Test

A fertilizer high in nitrogen, but containing some phosphorus and potassium should be applied at least once a year on an established lawn. Subsequent fertilizations may be with the same fertilizer or with a nitrogen carrier only. Rates of nitrogen application can be determined from Tables 1 and 2.

When to Fertilize

A minimum of two fertilizer applications per year should be made — in the spring (April-May) and late

Table 2. Representative Nitrogen Sources for Turf.

Type of Fertilizer	Common Name	Nitrogen Content	Lbs. Needed to equal 1 lb. of Nitrogen	Nitrogen Release Rate	Remarks
1. Water Soluble, Inorganic	Ammonium nitrate	33%	3	Rapid	Most effective for rapid green-up and growth when soil temperature is below 55-60° F. (before May 15). Strongly acidifying on soil. May cause burning of turf if not watered-in immediately.
	Ammonium sulfate	20%	5		
2. Water Soluble, Organic	Urea	45%	2.2	Rapid	Slightly less available than soluble, inorganic forms when soil temperature is below 55-60° F., but other characteristics are similar. May cause burning of turf, if not watered-in immediately.
3. Water Insoluble, Natural Organic	Processed sewage sludge	5-6%	20-17	Moderately slow	Also contains some phosphorus. Release to available nitrogen forms most rapid when soil temperature is above 55-60° F. Minimum danger of burning turf.
	Tankage	5-10%	20-10		
	Seed meals	5%	20		
4. Water Insoluble, Synthetic Organic	Ureaformaldehydes	38%	2.6	Slow	Slow nitrogen release until soil temperature is above 55-60° F. Normally mixed with soluble, readily available forms. Minimum danger of burning turf when used alone.

summer (late August). Late-April, early-June, and late-August dates are suggested when three applications are desired. A light nitrogen application may be needed in early July if the lawn did not receive enough nitrogen in the spring to maintain vigor and color through the summer. When rates as high as 5 to 7 pounds of nitrogen per 1000 square feet are used for Merion Kentucky bluegrass or bentgrass, four or more applications are suggested, especially if soluble carriers are used.

Soluble nitrogen fertilizers applied in early spring (April) stimulate rapid growth, requiring frequent mowing. Small open areas in the turf will fill in during this rapid growth period so that there is less opportunity for weed invasion. Early spring fertilization rates can be reduced or delayed until early May if the turf is of adequate density and has not suffered winter injury.

Late-summer fertilization should be completed before September 10. Later applications may prevent winter hardening of the turf and increase susceptibility to winter injury. A late summer fertilization is important to thicken turfs which may have been thinned by damage from diseases, insects, heat stress, or drought.

How to Apply

Fertilizer materials should be applied with care. Always apply fertilizer uniformly over the area when the leaves are dry. If fertilizer is spilled, remove it immediately (a vacuum sweeper works well). Water-in fertilizers, especially soluble materials, if the turf is actively growing (April 1 to October 15).

Centrifugal (broadcast-type) fertilizer spreaders usually distribute the material more rapidly with a minimal overlapping problem compared to gravity (drop-type) spreaders. The latter are safer if herbicide-fertilizer mixtures are applied around susceptible shrubs and trees. Hand application is tedious and should be done with care to avoid foliar burning of the turf.

Recommendations on the fertilizer bag or the chart supplied with the spreader should be used to determine the proper spreader setting for the application rate desired.

Fertilizer-Pesticide Mixtures

Combinations of fertilizers with pesticides are commercially available. They can be used efficiently and conveniently for pest control and fertilization when applied at the proper rate and time. These materials should be applied only when needed for weed or disease control. Carefully follow the directions on the label for rate and method of application. Do not use these mixtures on vegetable gardens or ornamental plantings.

Centrifugal (broadcast) type fertilizer spreaders distribute materials rapidly with minimal overlapping.

LIMING

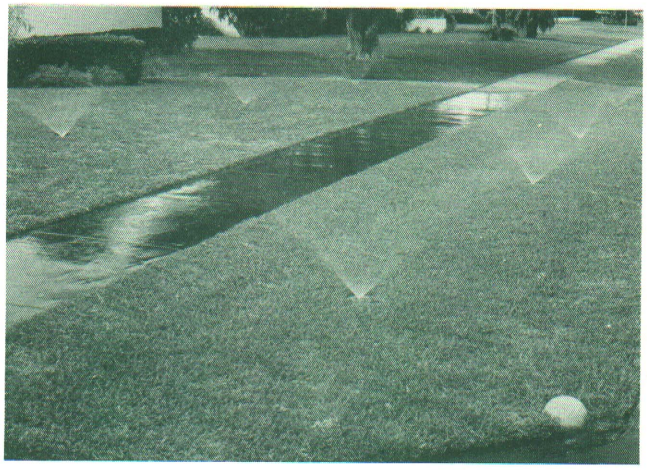
Lawn soils should not be limed unless they are strongly acidic, with pH 5.5 or below, as indicated by a soil test. Regular irrigation from many water sources in Michigan may supply enough lime. As a result, it is seldom necessary to apply lime to an established lawn which has been irrigated with such water. Finely ground limestone may be broadcast during the dormant winter period at the rate of 25 to 50 pounds per 1000 square feet to correct an acidic soil condition.

IRRIGATION

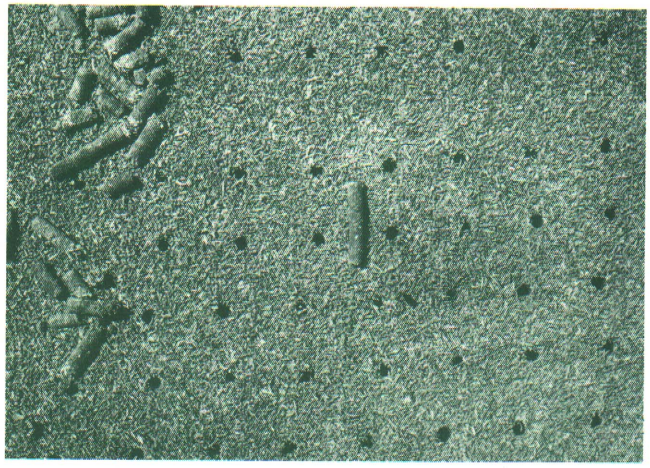
Adequate water is essential for optimum turfgrass growth, density, and color. Leaves wilt when the water needs of the turf are greater than the soil can provide. Irrigate before, or at the time wilt first appears. Thoroughly wet the soil to a depth of 6 to 8 inches. This may require irrigating one area for several hours, depending on the equipment and water pressure. Shallow, frequent watering may result in shallow rooting and increased disease problems.

About one inch of water per week (rainfall plus irrigation) is usually required to maintain a desirable turf during the hot summer months in Michigan. A deep-rooted turf can obtain water from a large volume of soil; thus, less frequent irrigation is required than for a shallow-rooted turf. More frequent irrigation is required on sandy soils.

Water should be applied only as fast as the soil can absorb it and as uniformly as possible. Too much water can be just as detrimental as too little. Some areas may require more water than others because of slope, exposure to wind, competition with trees, or soil variability. The preferred time to irrigate is between sunrise and midday, in order to minimize disease problems.



Irrigation is essential for maintenance of optimum turfgrass growth, color, and density. Apply water deeply and infrequently to encourage deep rooting of the turf.



Coring, one of several ways to cultivate an established turf, involves removal of a soil core. Cores are then broken apart and redistributed as a topdressing with a steel drag mat.

CULTIVATION

Soil compaction is most common on fine-textured, poorly drained soils and in areas of concentrated traffic. A compacted soil condition results in restricted water and air movement, causing a shallow root system and reduced turfgrass quality. Compaction problems can be alleviated by mechanical cultivation which creates openings for air, water, and nutrient movement into the soil. Types of turfgrass cultivation include coring, slicing, and spiking. Equally-spaced cores of soil are removed in coring and then broken apart and distributed with a steel drag. Slicing and spiking employ solid knives which punch openings in the soil. Spiking is more superficial and short-term in effect than coring or slicing, which penetrate to a depth of 2 to 4 inches.

In small areas, cultivation can be accomplished with hand tools or powered cultivators. The frequency of cultivation will depend upon the intensity of traffic and the resulting severity of compaction. Cultivate during periods of active turfgrass growth, such as the spring or early fall. A minimum of one cultivation per year is desirable on intensively used turfs growing on fine-textured (clay) soils.

THATCHING

Thatch consists of a tightly intermingled layer of living and dead stems, leaves and roots of the turfgrass plant that develop between the green vegetation and the soil surface. Thatch is primarily a problem on intensively cultured turfs characterized by high nitrogen fertilization rates, vigorous growth, and frequent irrigation. Vigorous growing turfgrasses, such as creeping bentgrass and Merion Kentucky bluegrass, or acidic, poorly aerated soils tend to have a more rapid thatch accumulation rate.

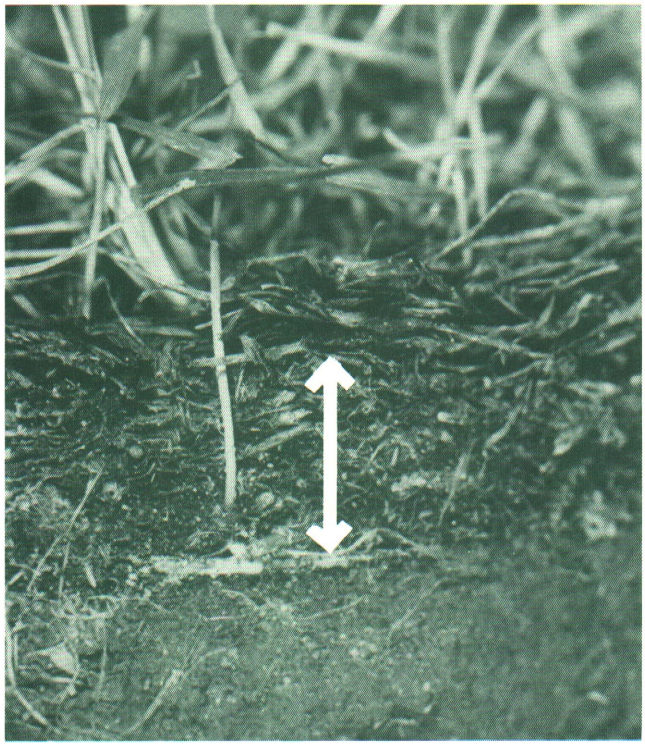
Thatch is undesirable because it: (a) increases turfgrass disease problems such as leafspot, stripe smut, powdery mildew and *Fusarium* blight, (b) reduces drought, cold, and heat tolerance of the turf, (c) impairs air and water movement into the soil, and (d) reduces turfgrass vigor. Thatch depth is best determined by cutting a pie-shaped wedge at least 2 inches deep and examining the vertical cross section. Thatch control should be initiated if the thatch accumulation exceeds one-half inch.

Thatch Control

Vigorous hand raking with a stiff garden rake can be an effective method of thatch removal on small turf areas. Mechanical removal by a vertical de-thatching machine can be very effective. These machines have vertical knives or tines mounted on a power driven reel which removes thatch by a cutting or pulling action. Rental machines are relatively light in weight with a small power unit so that they can be easily transported. It may be necessary to go over a turf several times to remove a heavy thatch, particularly when a light weight de-thatching machine is used.

De-thatch when growing conditions are favorable for rapid recovery. The preferred periods are in September or in early spring prior to the initiation of growth. De-thatching should be practiced annually on intensely maintained turfs. Remove thatch debris immediately by raking or sweeping.

Certain cultural practices will increase the rate of thatch decomposition. Cultivation can be practiced on fine-textured, poorly drained, compacted soils. A light application of ground limestone at 20 to 25 lbs. per 1,000 square feet may stimulate thatch decomposition on acidic soils with a pH below 6.0.



Thatch is a layer of dead vegetation located between the green grass and soil (arrow). Removal of a pie-shaped wedge from the lawn will reveal the depth of thatch.

Thatch removal is best accomplished by using a de-thatching machine having vertical knives or tines. A de-thatching machine is more thorough than hand raking.

SPRING LAWN CARE

Proper spring lawn care is important in establishing an actively growing, quality turf. Rake prior to the first mowing to remove dead grass, leaves, twigs, and other debris. It is particularly important to remove stones, wire, and similar hard objects which can damage mowing equipment and be potentially injurious to people if thrown by a rotary mower.

Much of the dead leaf and stem debris can be cut off for easy removal by adjusting the mower down to one inch for the initial mowing only. This close mowing stimulates earlier spring green-up, but must be done prior to the initiation of spring growth to avoid injuring new shoot growth.

Rolling is a practice which is sometimes required on lawns to smooth uneven areas caused by insects, earthworms, traffic, or the heaving action of winter freezing and thawing. Rolling should be practiced only when necessary since it is basically a compaction process. The best time to roll is very early spring, just after the surface soil zone has thawed.

Other spring lawn care practices to be completed following raking and rolling include thatch removal, if needed, and fertilization. If de-thatching is necessary, do it in early spring prior to the initiation of rapid shoot growth.

CARE OF SHADED LAWNS

A portion of most lawn areas is subjected to partial shading. Shaded turfs are usually shallow rooted, lower in shoot density, less tolerant of traffic, and more prone to disease injury. The red or chewings fescues are the superior turfgrass species for shaded environments. Rough bluegrass is adapted to wet, shaded areas which receive little traffic. Seeding or sodding of turfs under deciduous trees should be done in the fall so that establishment can be achieved during a period when shading is minimal.

Modify turfgrass cultural practices whenever a shade condition exists. To enhance turfgrass growth under shade, raise the cutting height to between 2 and 2.5 inches. A low nitrogen fertility level and deep, infrequent irrigation will help to avoid excessive disease problems and favor growth of the fescues. This is particularly important since the fine leaved fescues do not tolerate high nitrogen levels or wet soil conditions.

Turfgrass quality can also be enhanced by improving the environment under the tree canopy. Pruning lower limbs and selectively pruning limbs in the upper crown will increase light penetration and air movement through the tree canopy. Also, pruning of the shallow tree roots by trenching will reduce competition for water and nutrients. When fertilizing trees, do it deeply to discourage shallow rooting. Tree leaves should be raked and removed regularly during the fall

period to avoid injury or weakening of the turf by restricting sunlight.

Under extremely low-light conditions, use of a ground cover such as periwinkle, Baltic ivy, Japanese pachysandra, etc. should be considered as an alternative to turf.

LAWN RENOVATION

Renovation is the procedure by which a thin, poor quality turf with a high weed population is transformed into a dense, weed-free lawn. This is accomplished without complete tillage and generally involves chemical kill of the shoot vegetation, followed by overseeding with desirable turfgrass species.

Listed below are some criteria to use when deciding whether to renovate a deteriorating lawn.

- Weed infestation is too great for satisfactory results from selective weed control.
- The lawn does not contain perennial weedy grasses that cannot be selectively controlled (e.g., quackgrass, nutsedge, tall fescue, or creeping bentgrass).
- At least 40 percent of the lawn is composed of desirable perennial turfgrasses such as Kentucky bluegrass and red fescue.
- Soil conditions are favorable so that the addition of topsoil or other soil amendments is not essential.

Assuming that these criteria are met, the procedure for lawn renovation is:

1. Determine and correct the original cause of lawn deterioration. The soil should be tested for pH, phosphorus, and potassium levels. De-thatching and cultivation by coring or slicing may be required.
2. Mow the lawn at a height of approximately 0.5 inch and remove the clippings.
3. Kill all vegetation using a contact herbicide that leaves no residual effect in the soil (i.e., cacodylic acid, paraquat, etc.)
4. After several days, remove the dead vegetation with a vertical renovating machine, setting the vertical blades deep enough to bring some soil to the surface.
5. Distribute the turfgrass seed uniformly.
6. Drag a heavy steel mat over the area to establish good seed and soil contact.
7. Irrigate the area daily. The initial irrigation should involve a thorough wetting to a six-inch soil depth.

LAWN RE-ESTABLISHMENT

When a lawn is severely infested with quackgrass, tall fescue, or similar difficult-to-control perennial weeds, chemical burn-off with a contact herbicide only kills the shoot growth. Eradiction cannot be obtained since new growth will arise from the underground plant parts. Use of a non-selective herbicide or soil fumigant is required to kill the weedy perennial grasses (i.e., dalapon, amitrole, methyl bromide, or metham). Complete re-establishment is necessary under these conditions. Re-establishment must be delayed for 4 to 5 weeks after treatment with amitrole or metham and 6 to 8 weeks after treatment with dalapon. Cultivation during this period will enhance soil aeration and breakdown of the toxic herbicide. Final soil preparation is then accomplished followed by seeding or sodding as outlined in Extension Bulletin, E-673, "Lawn Establishment."

Re-establishment is a more time consuming and expensive procedure than renovation. Certain perennial weedy grasses, such as tall fescue, grow in clumps or isolated patches so that spot treatment can be substituted for re-establishment. Spot treatment can be used with reasonable success, if the number of patches is not excessive. It involves treating the isolated weed patches with one of the non-selective herbicides listed above. After the appropriate waiting period, the soil should be loosened and the area seeded or sodded.

Another alternative is to dig out the weedy grass patches. Be sure all underground plant parts are removed, especially at the outer edges of the patch, in order to prevent re-infestation. Additional information is available in Extension Bulletin E-653, "Lawn Weed Control."

Issued in furtherance of cooperative extension work in agriculture and home economics, acts of May 8, and June 30, 1914, in cooperation with the U. S. Department of Agriculture. George S. McIntyre, Director, Cooperative Extension Service, Michigan State University, East Lansing, Michigan.

1P-1R-5:72—25M-MP