Lawn Care
Michigan State University
Cooperative Extension Service
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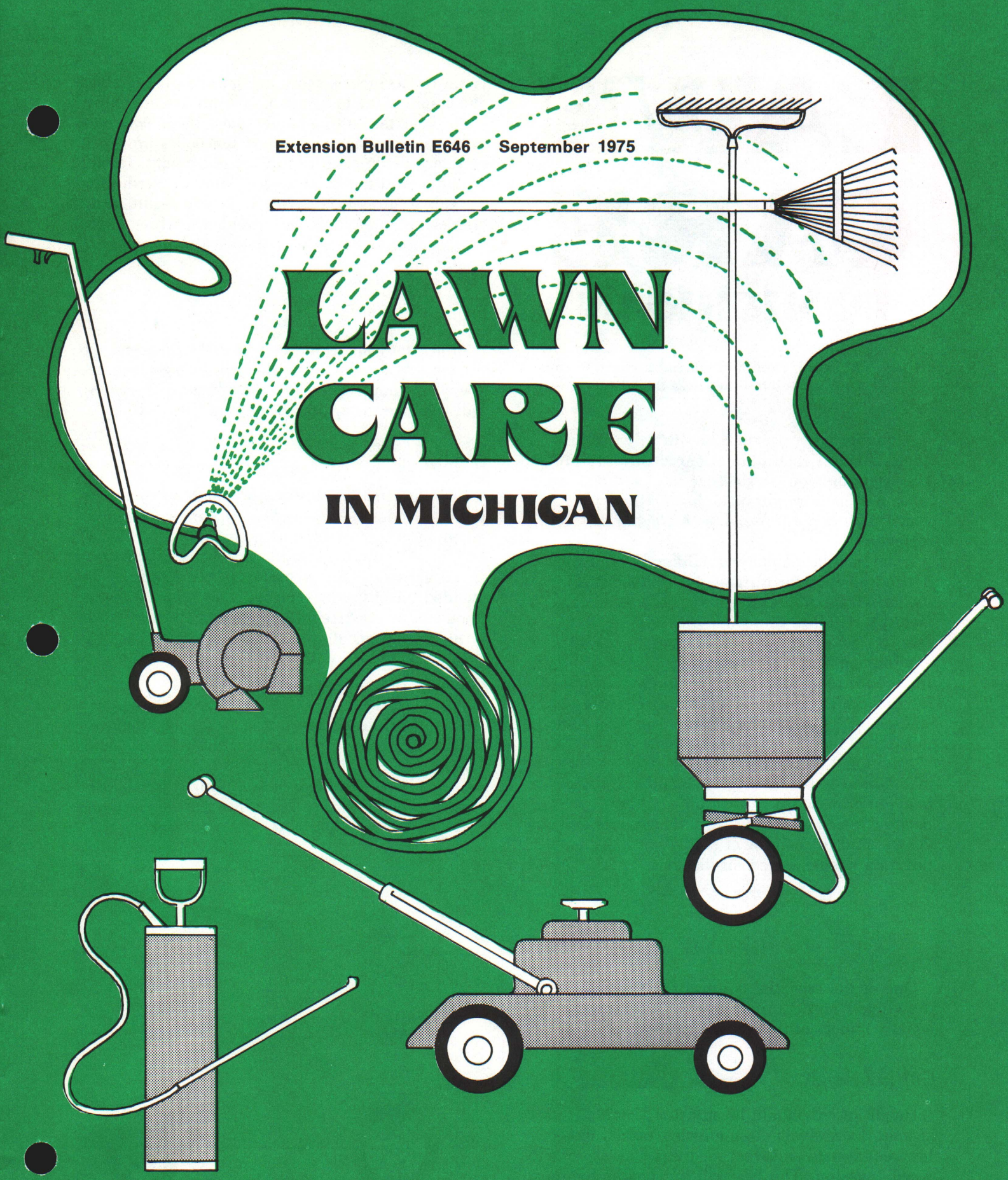

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LAWN CARE IN MICHIGAN

By James B. Beard, Paul E. Rieke and Richard B. Anda
Crop and Soil Sciences Dept.

A quality lawn provides an attractive setting for home, business, institutional, or industrial buildings. 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: (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 turfgrass weeds, insects, or diseases.

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 that is prone to weed invasion. The best cutting height for most Kentucky bluegrass and fine leaved fescue cultivars is 1.5 to 2.0 inches. Mow low-growing bentgrasses at a height of 0.3 to 0.8 inch, to minimize thatching.

To check the cutting height, place the mower on a hard, level surface and adjust the bed knife (reel) or rotary blade edge to the desired height. 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

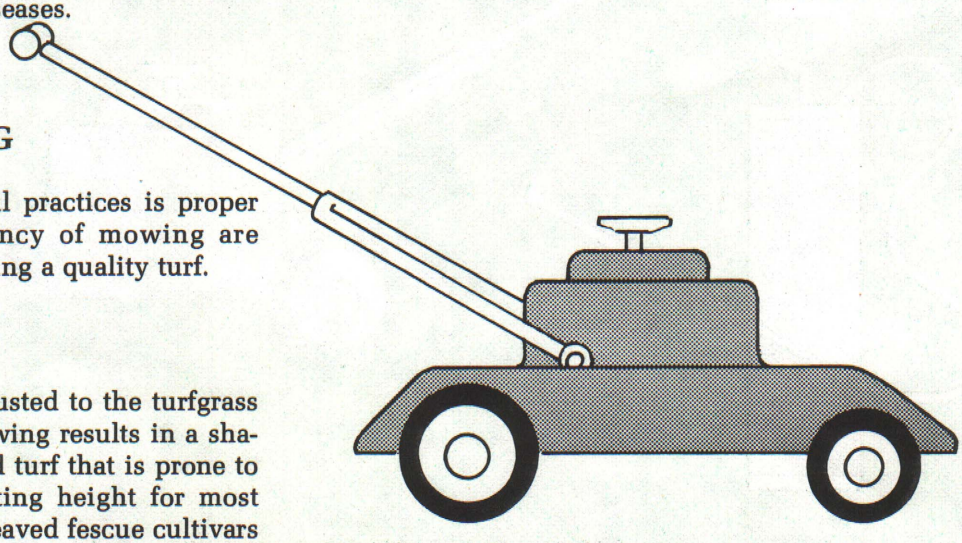
Adjust mowing to the growth rate of the turf. Do not remove more than one-third of the total leaf area at any one mowing. Varying the direction of mowing will improve the appearance of the turf.

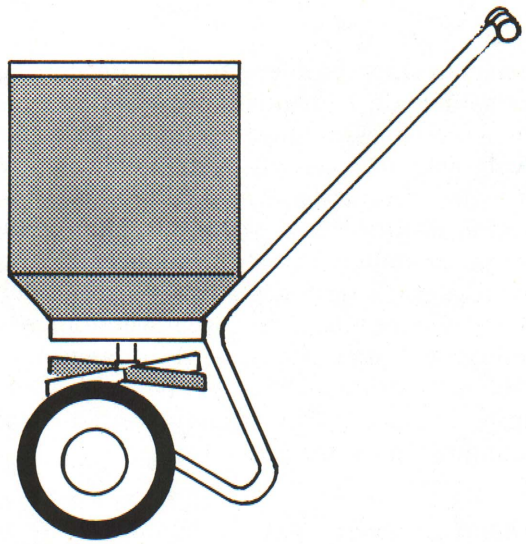
Clippings

By returning leaf clippings, plant nutrients are recycled, reducing fertilizer needs. Remove clippings when an excessive amount 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. Research has shown that returning clippings does not increase thatch buildup.

Mowing Equipment

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





FERTILIZATION

Soil Testing

A vigorous, attractive turf requires adequate fertilization. A reliable soil test for pH, phosphorus, and potassium every five years can help in planning a lawn fertilization program. For a representative soil sample, collect 15 to 20 small samples from widely scattered areas in the lawn using a narrow garden tool or soil probe. Samples should be taken from the top 2 inches of soil (excluding thatch layer). Avoid contamination by using clean equipment.

Mix the soil well, air dry, and send 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 to the Michigan State University Soil Testing Laboratory.

What's in the Bag?

To select the right turfgrass fertilizer, you must know how to read the label on the bag. State law requires that each fertilizer bag be labelled with the percentages of nitrogen (N), available phosphoric acid (P_2O_5) and water soluble potash (K_2O), respectively. Thus:

A 20-5-10 analysis contains:	
Nitrogen	20%
Available phosphoric acid	5%
Water soluble potash	10%

A 20 pound bag of a 20-5-10 fertilizer contains 4 pounds N, 1 pound P_2O_5, and 2 pounds K_2O.

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

When deciding what fertilizer, how much, and when to apply, consider soil test results, kind of soil, kind of grass, time of year, clipping removal or return, irrigation practices, type and cost of fertilizer, and the quality of turf desired. Remember, a well fertilized, attractive lawn will require more frequent mowing and more intensive care.

Applying Nitrogen

Turfgrasses are most responsive to nitrogen, provided adequate levels of other nutrients are present. Suggested annual nitrogen requirements for major turfgrasses used in Michigan are given in Table 1. A range for nitrogen is shown 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 25 to 40 percent if clippings are returned.

As a general rule, apply no more than 1.5 pounds of actual nitrogen (when a water soluble form) per 1,000 square feet at one time. Reduce this to 1.0 pound nitrogen during the summer. Greater amounts can cause excessive growth, increase the danger of foliar burn, and impair root growth.

Fertilizing Near Lakes and Streams

Take special care when selecting the type of grass and fertilization program for turfgrass areas near lakes or streams. Use a low maintenance turfgrass, such as red fescue, and lower nitrogen rates. Irrigate

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 fescues, sunny areas	2 to 4
Red and chewings fescues, shaded areas	1 to 2*

**Additional fertilization of trees should be practiced by deep root feeding (See Extension Bulletin E-786, "Fertilizing Shade and Ornamental Trees")*

judiciously, especially on sandy soils, to reduce the possibility of leaching nitrogen. 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 nutrients in a fertilizer can be figured from 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 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) and IBDU are are synthetic organics which possess slow nitrogen 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. Do not confuse ureaformaldehyde (slow-acting) with urea (fast-acting) nitrogen.

Liquid fertilizers can also be used effectively, if properly applied. They usually contian soluble, fast-acting nitrogen materials.

Based on Soil Test

Use 1-1-1 ratio fertilizer (such as 12-12-12) 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

Table 2. Common 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 growing 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 growing turf, if not watered-in immediately.
3. Water Insoluble, Natural Organic	Processed Sewage sludge	5 to 6%	20-17	Moderately slow	Also contain some phosphorus. Release to available nitrogen forms most rapid when soil temperature is above 55-60°F. Minimum danger of burning turf.
	Tankage	5 to 10%	20-10		
4. Water Insoluble, Synthetic Organic	a) 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.
	b) IBDU	31%	3.2	Slow	Faster nitrogen release with higher soil moisture. Larger IBDU particles give slow nitrogen release. Not greatly affected by temperature. Minimum danger of burning turf when used alone.

yellow-green color after fertilizing with nitrogen. This is especially true if the soil pH is 7.5 or higher. An iron deficiency can be corrected by spraying at 2-week intervals with 1 to 2 ounces of iron sulfate dissolved in 5 gallons of water, per 1000 square feet of lawn. Do not allow the iron sulfate to get 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.

In Absence of a Soil Test

Fertilize with a 4-1-1 or 4-1-2 ratio. In many cases, fertilizers containing only nitrogen (or nitrogen and potassium) are acceptable. The rate of 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 summer (early September). Fertilize in late-April, early-June, and early-September dates 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 nitrogen is 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 is important to thicken turfs which may have been thinned by damage from diseases, insects, heat stress, or drought. This should generally be completed before September 15.

Apply fertilizers only when the turf can use the available nutrients soon after application.

How to Apply

Apply fertilizer materials with care. Always apply fertilizer uniformly over the area when the grass is dry, unless otherwise stated on the fertilizer bag. If fertilizer is spilled, remove it immediately (a vacuum sweeper works well). Water-in fertilizers, especially soluble materials, if the turf is actively growing (May 1 to September 15).

Centrifugal type fertilizer spreaders distribute materials rapidly with minimal overlapping problems.

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

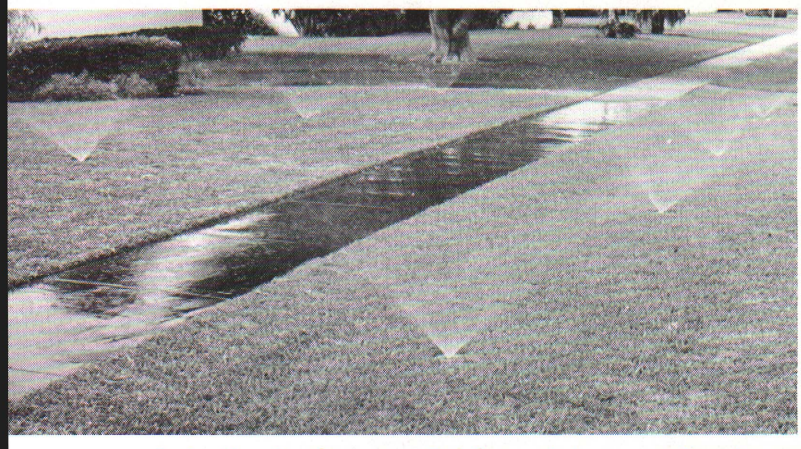
Follow recommendations on the fertilizer bag or the chart supplied with the spreader for the proper spreader setting for the application rate desired.

Fertilizer-Pesticide Combinations

Combinations of fertilizers with pesticides can be used efficiently and conveniently when applied at the proper rate and time. Apply these materials 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.

LIMING

Lawn soils should not be limed unless they are strongly acidic (pH 5.7 or below) as indicated by a soil test. Regular irrigation from most water sources in Michigan supplies enough lime. Thus, it is seldom necessary to apply lime to an established lawn which has been irrigated with such water. To correct an acidic soil condition, broadcast finely ground limestone, at any time, at the rate of 25 to 50 pounds per 1,000 square feet.



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

IRRIGATION

Adequate water is essential for best 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 irrigation can result in shallow rooting and increased disease problems. *Note:* When lawns are infected with *Fusarium* blight disease, frequent watering will be needed to reduce injury to the turf.

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.

Apply water 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 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.

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 reduced 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. The cores are broken apart and distributed by raking or dragging. In slicing and spiking, solid knives punch openings in the soil. Spiking is more superficial and short-term than coring or slicing, which penetrate to a depth of 2 to 4 inches. Cultivation can be done 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 in the spring or early fall. A minimum of one cultivation per year is desirable on intensively trafficked turfs growing on fine-textured (clay) soils.

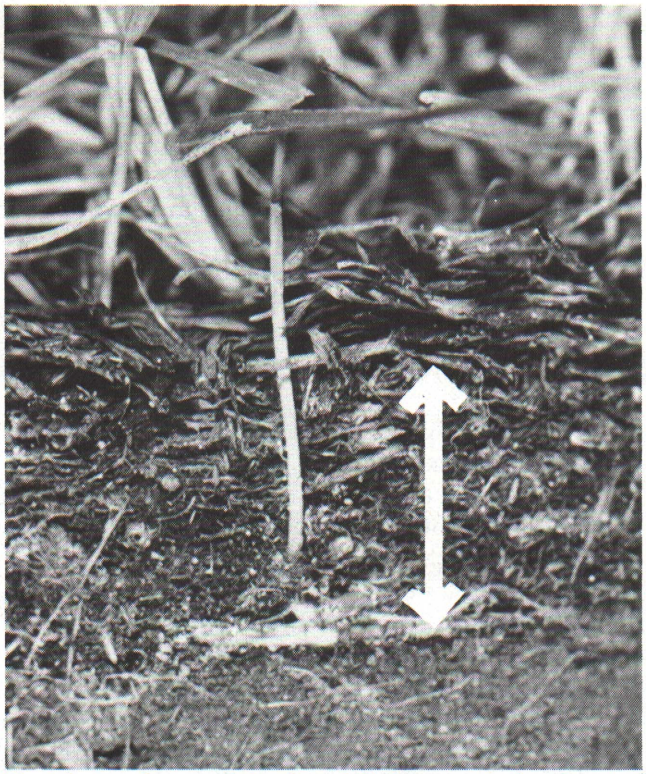
THATCH

Thatch consists of a tightly intermingled layer of living and dead stems and roots of the turfgrass plant that develops between the green vegatation and the soil surface. Returning clippings to the lawn does not increase thatch buildup. It is primarily a problem on intensively cultured turfs characterized by high nitrogen fertilization rates, vigorous growth, and irrigation. Vigorously growing, heavily fertilized turfgrasses, and acidic or poorly aerated soils contribute to a more rapid thatch accumulation rate.

Thatch is undesirable because it: (a) increases turfgrass disease problems, (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. If thatch accumulation exceeds one-half inch, thatch control should be initiated. Many lawns never need de-thatching.

Thatch Control

Vigorous hand raking with a stiff garden rake can be used for removal on small areas. Mechanical removal with a de-thatching machine is less work. 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.

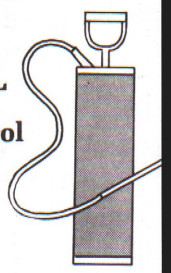


Thatch is a layer of dead and living vegetation located between the green grass and soil (arrow). Removal of a pie-shaped wedge from the lawn will reveal the depth of thatch.

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

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-thatch annually on intensely maintained turfs. Remove thatch debris immediately by raking or sweeping.

Certain cultural practices increase the rate of thatch decomposition. Cultivation can be practiced on fine-textured, poorly drained, compacted soils. A light application of ground limestone may stimulate thatch decomposition on acidic soils having a pH below 6.0.



WEED—DISEASE—INSECT CONTROL

(see Extension Bulletins E-653 Lawn Weed Control and E-903 Lawn Disease and Insect Control)

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 that can damage mowing equipment and cause injury 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 that 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.

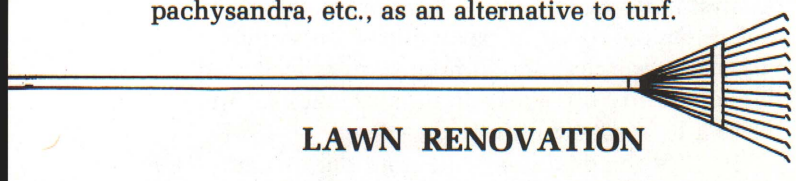
CARE OF SHADED LAWNS

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 and 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 turf 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 be enhanced by improving the environment under the tree canopy. Prune lower limbs and selectively prune limbs in the upper crown to increase light penetration and air movement through the tree canopy. Also, pruning of 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 extreme low-light conditions, consider a ground cover such as periwinkle, Baltic ivy, Japanese pachysandra, etc., 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 can be done without complete tillage and generally involves chemical kill of the shoot vegetation, followed by overseeding with desirable turfgrass species.

Renovate a deteriorating lawn if the following conditions exist.

- Weed infestation is too great for satisfactory results from selective weed control (weeds cannot be killed without injuring the desirable turfgrasses).
- The lawn is free of perennial weedy grasses that cannot be selectively controlled (e.g., quackgrass, nutsedge, tall fescue, 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 incorporation 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. Kill the aboveground, weedy vegetation using a contact herbicide that leaves no residual effect in the soil (i.e., paraquat, etc.)
3. After several days, remove the dead vegetation with a vertical renovating machine and rake or sweep the area clear.
4. Cultivate by coring or slicing to provide good seed-soil contact.
5. Select an adapted seed mixture of good quality. (See Extension Bulletin E-673, "Lawn Establishment")
6. Distribute the turfgrass seed uniformly over the area.
7. Drag a weighted mat over the area to establish good seed and soil contact.
8. Irrigate the area daily at midday, for three weeks. 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. Eradication 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 or amitrole). Complete re-establishment is necessary under these conditions. Re-establishment must be delayed for 4 to 5 weeks after treatment with amitrole 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 (according to the label) 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."

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