Lawn Care
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LAWN CARE

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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, the lawn can be maintained in a high state of perfection as a show place. For others, the lawn functions to stabilize mud and dust problems, muffle noise, and provide a cool environment and playing surface for recreational activities.

A lawn may be maintained at different quality levels depending upon the turfgrass species selected, quality of lawn desired, interest of the owner, and time and money available. A satisfactory turf can be maintained if four vital principles of lawn care are followed: (1) select turfgrasses adapted to the specific environmental and soil conditions, (2) insure proper soil conditions, including adequate surface and internal drainage; (3) employ the proper mowing height and frequency; and (4) fertilize to meet the minimum nutritional requirements of the turf. When specific problems arise, additional cultural practices may be required to maintain or improve the lawn quality. Included are (a) irrigation to avoid drought, (b) cultivation to correct compaction, (c) de-thatching if a thatch problem develops, and (d) control of serious or objectionable turfgrass weeds, insects or diseases. The above turfgrass cultural practices will be discussed in the following sections.

Mowing

Mowing is one of the essential maintenance practices. Height and frequency of mowing are equally important in maintaining a quality turf.

Height

Height of cut should be adjusted to the turfgrass species. Excessively close mowing results in a shallow root system and a weakened turf which is prone to weed invasion. The preferred cutting height for most Kentucky bluegrass and red fescue varieties is 1.5 to 2.0 inches. In contrast, the low-growing bentgrasses should be mowed at a height of 0.3 to 0.8 inch, in order to minimize thatching. Height adjustments should be made by placing the mower on a hard, level surface and adjusting the bed knife (reel) or rotary blade edge to 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

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.

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 quality cut and a well groomed appearance.

Fertilization

Soil Testing

A vigorous, attractive turf requires adequate fertilization. A reliable soil test for pH, phosphorus and potassium every five years can be helpful in planning a program for fertilizing a lawn. You can obtain a representative soil sample by collecting 15 to 20 small samples with a narrow garden tool or soil probe from widely scattered areas in the lawn. These should be taken to a depth of about 3 inches with the grass and thatch discarded. Prevent contamination by using clean equipment. The soil should be mixed well, air-dried, and sent to a modern soil testing laboratory for analysis. Specify whether it represents 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, giving 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, one should consider soil test, kind of soil, turfgrass species and variety, time of year, clipping removal, watering 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 other nutrients are present. Table 1 provides suggestions for *annual* nitrogen requirements for adequate quality of the major turfgrasses in Michigan. A range for nitrogen is indicated for several turfgrass species because of variation in soil, climatic and cultural conditions. Higher quality turf can often be obtained with heavier nitrogen rates than suggested in Table 1, but increased mowing, increased leaching, and in some cases, increased disease susceptibility, may result.

Table 1. Annual Nitrogen Requirement for Turfgrasses in Michigan.

Species of turfgrass	Pounds nitrogen per 1000 sq. ft.
Merion bluegrass	5 to 7
Bentgrasses	5 to 7
Kentucky bluegrasses (Delta, Kenblue, Park)	2 to 4
Other Kentucky bluegrasses	3 to 5
Red fescue	1 to 3

Nitrogen needs may be reduced by 25 percent if clippings are returned; however, this may lead to increased thatch formation.

As a general rule, apply no more than 1.5 pounds of nitrogen per 1000 square feet to turf at one time.

Greater amounts may cause excessive growth, increase the danger of foliar burn, and impair root growth.

Kind of Fertilizer to Use

Basically, two factors should be considered 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 determined by its analysis; 20-5-10 and 16-8-8 are two common turfgrass analyses 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. Some specific examples are given in Table 2.

If watered-in, the soluble carriers (organic and inorganic), provide nitrogen to the plant soon after application, but they can cause burning of the grass. Lighter and more frequent applications will be needed to maintain optimum growth throughout the season.

The natural organics and urea-formaldehydes have a slower release rate which means that nitrogen availability is extended over a longer period of time. These carriers have minimal foliar burn potential, are somewhat more expensive, and require soil temperatures above 55-60° F for micro-organisms to breakdown the organic carrier and release the nitrogen. Certain natural organics have an odor problem associated with the decomposition period.

Urea-formaldehyde is a synthetic organic which possesses slow release properties. Turf fertilizers contain varying percentages of water-insoluble nitrogen (W.I.N.), which are listed on the fertilizer bag. Many specialty turfgrass fertilizers contain both water-soluble and water-insoluble nitrogen forms to provide both quick response and slow release characteristics, respectively. Do not confuse urea-formaldehyde (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 urea-formaldehyde can also be applied in liquid form.

Based on Soil Test

When soil test results are available, a 1-1-1 ratio fertilizer (such as 12-12-12) is suggested, when phosphorus (P) and potassium (K) levels are both 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 ratio fertilizer (such as 24-6-6), or a fertilizer containing nitrogen only.

Without a Soil Test

If a soil test is not available for an established lawn, selection of a fertilizer high in nitrogen, but containing some phosphorus and potassium is suggested at least once a year. Subsequent fertilization may be with the same fertilizer or nitrogen only. Rates of nitrogen application should be determined from Tables 1 and 2.

If the grass remains a yellowish or brownish color, even after fertilizing it with nitrogen and other nutrients, a deficiency of iron may exist. This is especially true if soil pH is 7.5, or higher. Spray at 2-week intervals with 4 ounces of iron sulfate dissolved in 5 gallons of water per 1000 square feet of lawn. Do not get the iron sulfate on clothes, concrete walls, or buildings since it will discolor them. You can also use chelated iron compounds in the place of iron sulfate. Follow the manufacturer's directions for application rates.

Table 2. Some Nitrogen Sources for Turf.

Type of fertilizer	Common names	Nitrogen content	Lbs. needed to equal 1 lb. of N.	Remarks
1. Soluble, inorganic	Ammonium nitrate	33%	3	Most effective for rapid green-up and growth when soil temperature is below 55–60 F. (before May 15). Strongly acidifying on soil. Will cause burning quite readily.
	Ammonium sulfate	20%	5	
2. Soluble, organic	Urea	45%	2¼	Slightly less available than soluble, inorganic forms when soil temperatures are below 55–60° F., but other characteristics are similar. Will cause burning quite readily.
3. Insoluble, natural organic	Processed sewage sludge	5–6%	20–17	Also contain some phosphorus. Release to available nitrogen forms most rapid when soil temperatures are above 55–60° F. Minimum danger of burning grass.
	Tankage	5–10%	20–10	
	Seed Meals	5%	20	
4. Insoluble, synthetic organic	Urea-formaldehydes	38%	3	Slow release until soil temperature is above 55–60° F. Normally mixed with soluble, readily available forms. Minimum danger of burning grass when used alone.

When to Fertilize

Soluble nitrogen fertilizers applied in early spring (April) will cause rapid growth and necessitate frequent mowing. During this period of rapid growth, the grass will fill in small open areas so that there is less opportunity for weed invasion. If the turf is of adequate density and has not suffered winter injury, spring fertilization rates can be reduced slightly and delayed until early May.

Late summer fertilization (late August) is important to thicken turf which may have been thinned due to disease, high-temperature stress, or drought.

A minimum of two applications of fertilizer per year should be made — in spring (April-May), and late summer (late August). When three applications are desired, late-April, early-June, and late-August dates are suggested. A light application of nitrogen in early July may be needed on lawns which did not receive enough nitrogen in the spring to maintain vigor and color through the summer. For Merion bluegrass or bentgrass, when rates as high as 7 to 8 pounds of nitrogen per 1000 square feet are used, four or more applications are suggested, especially when soluble carriers are used.

Fall fertilization should be completed before September 10. Later applications may prevent hardening-off of the turf before winter and make it more susceptible to winter injury.

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).

Rotary, broadcast-type fertilizer spreaders usually distribute the material more uniformly than drill or drop-type spreaders. The latter are safer if herbicide-fertilizer mixtures are applied around susceptible shrubs and trees. Hand application is tedious and must be done with care to avoid burning the turf.

Recommendations on the fertilizer bag or the chart supplied with the spreader should be used to determine proper spreader setting for the rate of application desired. When a lower or higher rate of application is needed, adjust the spreader accordingly.

Fertilizer-Pesticide Mixtures

Combinations of fertilizers with herbicides and/or fungicides are commercially available. These can be used efficiently and conveniently for pest control and fertilization when used at the proper rate and time. These materials should be applied **only when needed** for weed or disease control. Carefully follow 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 5.5, or below). Regular watering 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. When a soil test shows that a lawn needs lime, finely ground limestone may be broadcast at the rate of 25 to 50 pounds per 1000 square feet. Lime should not be applied unless a soil test indicates it is needed.

Irrigation

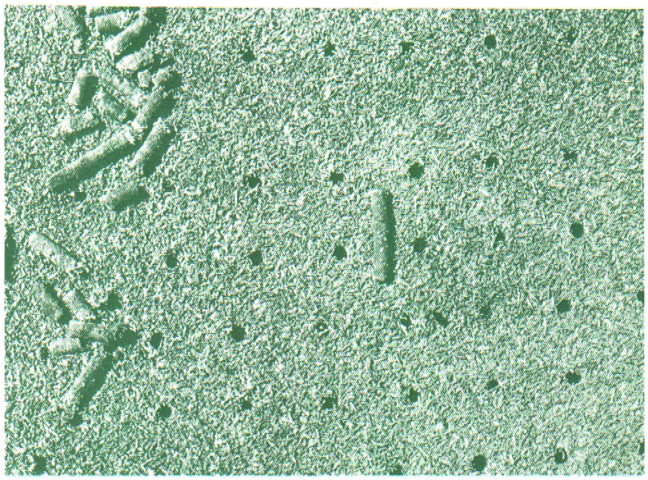
Adequate water is essential for optimum growth, density and color of turf. When water needs are greater than the soil can provide, leaves will wilt. To maintain growth, watering should be done before wilt appears. Consideration should be given to weather, soil, depth of rooting, and turfgrass quality desired. Water often enough to keep the grass from wilting. Thoroughly wet the soil to a depth of 6 to 8 inches. This may require watering in one area for several hours depending on the equipment and water pressure. Shallow, frequent, watering may result in shallow rooting and increased incidence of disease.

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

Water should be applied only as fast as the soil can absorb it. Irrigate as uniformly as possible, but consider that some areas may require more water than others because of slope, exposure to wind, competition with trees, or soil variability.

Cultivation

Soil compaction is most common on fine-textured, poorly drained soils and on areas of concentrated traffic. A compacted soil condition results in restricted water and air movement, causing a shallow root system and reduced turfgrass vigor and 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. The



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

practice of coring involves removal of a soil core from the turf. Slicing and spiking employ solid knives which 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 accomplished with hand tools on small areas or through the use of powered cultivators. Frequency of cultivation will depend upon the intensity of traffic and the resulting severity of compaction. Cultivation should be practiced during periods of active turfgrass growth, such as the spring or fall. A minimum of one cultivation per year is desirable on intensively used turfs grown on fine-textured soils.

De-Thatching

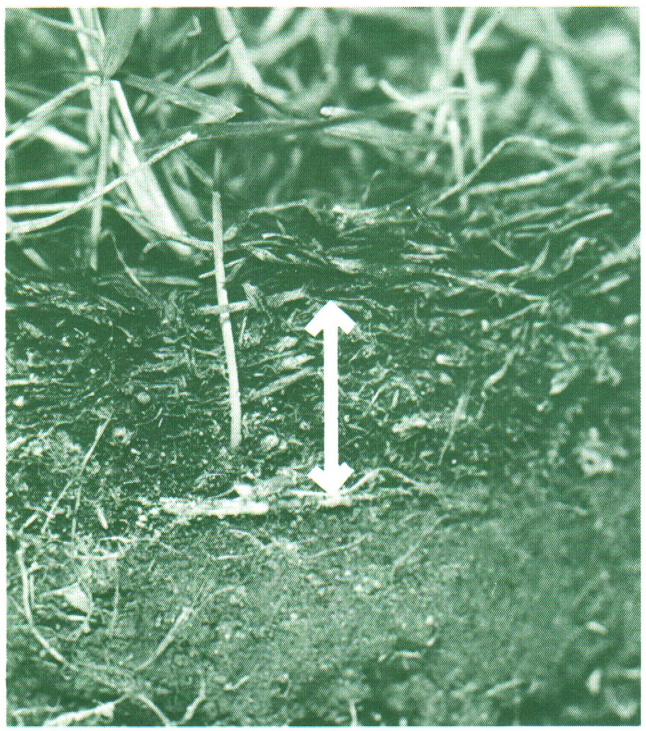
Thatch consists of a tightly intermingled layer of living and dead stems, leaves and roots of the turfgrass plant which develop between the green vegetation and the soil surface. Thatch is primarily a problem on intensively maintained turfs characterized by high rates of nitrogen fertilization, vigorous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

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

Thatch Control

Vigorous hand raking with a stiff garden rake can be effective in thatch removal on small areas. Mechanical removal by a vertical de-thatching machine is a very effective method of thatch removal. These machines have vertical knives or tines mounted on a power driven reel which remove the thatch by a cutting or pulling action. Rental machines are relatively light in weight and have a small power unit so that they can be easily transported. It may be necessary to go over a turfgrass area several times in order to remove a heavy thatch, particularly when light weight de-thatching machines are used. De-thatching should be accomplished when growing conditions are favorable for recovery. Preferred periods for de-thatching are September or early spring during the initiation of growth. De-thatching should be practiced annually on intensely maintained turfs. After de-thatching, thatch debris should be removed by raking or sweeping.

Certain cultural practices can be utilized to increase the rate of thatch decomposition. Cultivation should be practiced on fine-textured, poorly drained, com-



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

pacted 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.

Spring Care

Proper spring lawn care is important in establishing an actively growing turf of adequate quality for the upcoming growing season. The lawn should be raked prior to active spring growth and the first mowing to remove dead grass, leaves, twigs and other debris. It is particularly important to remove stones, wire and similar objects which can damage mowing equipment and be potentially injurious to people if thrown by a rotary mower. By adjusting the cutting unit down to one inch for the initial mowing only, much of the dead leaf and stem debris will be cut off and can be removed. This close mowing stimulates earlier spring greenup, but must be done prior to the initiation of spring growth in order to avoid injury to the new shoot growth.

Rolling is a practice which is sometimes required on lawns to smooth uneven areas caused by the heaving action of winter freezing and thawing, insects, earthworms, or traffic. Since basically a compaction action, rolling should be practiced only when necessary. The preferred 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 control and fertilization. If de-thatching is necessary, it should also be accomplished in early spring.

Shade Grass Care

A portion of most lawn areas is subjected to partial shading. Shaded turfs are shallow rooted, lower in shoot density, less tolerant of traffic and more prone to disease injury. Red fescue is 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.

Turfgrass cultural practices should be modified whenever a shade condition exists. Cultural practices which enhance turfgrass growth under shaded conditions include elevating the height of cut to between 2 and 2.5 inches. A low level of fertility, and deep, infrequent watering should be practiced to avoid excessive disease problems and favor growth of the red fescue. This is particularly important since red fescue does not tolerate high nitrogen levels or wet soil conditions.

Turfgrass quality can 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 shallow tree roots will reduce competition for water and nutrients. If the tree is fertilized, it should be through deep-root feeding to avoid excessive surface fertilization and resultant injury to the red fescue. Fallen leaves should be raked and removed regularly during the fall to

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

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 proportion of weeds is transformed into a dense, weed-free lawn. This is accomplished without complete tillage and generally involves chemical kill of all the shoot vegetation, and subsequent overseeding with desirable turfgrass species.

Listed below are some criteria to be used when deciding whether to renovate:

- Weed infestation is too great to allow 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 grasses 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 a small quantity of soil to the surface.
5. Distribute the turfgrass seed uniformly.
6. Drag a heavy steel mat over the area to establish contact between the seed and soil.
7. Water the area daily. 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 other difficult-to-control perennial weeds, chemical burn-off with a contact herbicide will only kill the shoot growth. Effective weed control will not be obtained since new growth can 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, metham or dazomet). Complete re-establishment is necessary under these conditions. Re-establishment must be delayed for 4 to 5 weeks after treatment with amitrole, metham or dazomet and 6 to 8 weeks after treatment with dalapon. Cultivation during this period will enhance aeration and breakdown of the toxic herbicide. The final soil preparation is then accomplished followed by seeding or sodding as outlined in Extension Bulletin, E-673, "Lawn Establishment".

Obviously, re-establishment is a more time consuming and expensive procedure than renovation. Often, perennial weedy grasses like tall fescue, grow in clumps or isolated patches so *spot treatment* may be substituted for re-establishment. If the number of patches is not excessive, the spot treatment method may be used with reasonable success. This involves treating the isolated weed patches with one of the non-selective herbicides, 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, or re-infestation will occur. Additional information is available in Extension Bulletin E-653, "Lawn Weed Control."

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