

# HEALTHY LAWN CARE PROGRAM FOR HOMEOWNERS

2011-2012  
PROGRAM UPDATE



*Prepared for distribution  
in the Red Run Subwatershed, Clinton River Watershed,  
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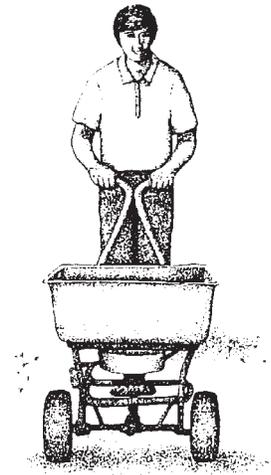
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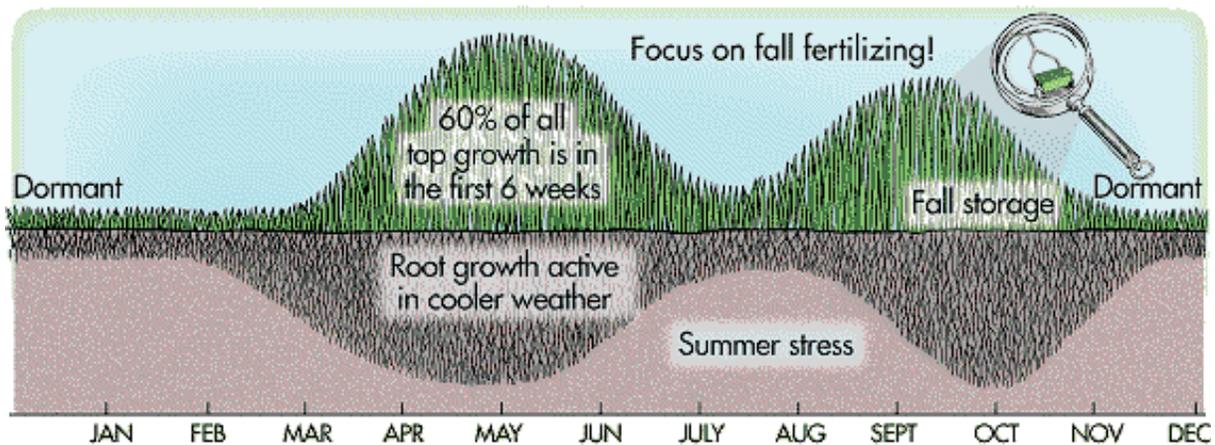
## A. What Is a Healthy Lawn?

A healthy lawn is thick, green and tall. The tall grass shades out weed seeds and the thick root system holds soil in place. Nourished by slow-release fertilizer or compost, the grass grows “naturally” – not in “spurts.” Some weeds may be present, but not enough to look messy. Homeowners take pride in their healthy lawns – since they are attractive and also protect water quality.

In a healthy lawn, plants and soils are alive and growing with vigor. In contrast, a weak lawn is often a thin, weed-infested mat of grass and thatch resting on infertile subsoil. A healthy lawn approach usually saves time and money for the homeowner – and reduces the potential of runoff or leaching of fertilizer and pesticides into rivers, streams, lakes or groundwater.

## B. How Grass Grows in Southeast Michigan

Grass grows in a manner different from other types of plants. The recommended mowing practices and other healthy lawn tips reflect basic horticulture and science. When citizens understand how grass grows, they are better able to "take charge" of their own lawn care program and understand when variations are needed or when questions need to be asked.



*Illustration above: prepared by Wayne Co. MSU Extension.*

Grass grows from the ***crown*** of the plant, which lies just above the ground level. As the stem grows, the leaf blades unwrap and grow away from the stem, forming the foliage we consider “grass”. Because grass grows from the crown, grass blades can be cut without harming the plant. In contrast, many other types of plants grow from the tip of the plant and must be pruned or trimmed carefully.

Grass blades make their own food through the process of photosynthesis. If grass is cut too short, its ability to make its own food may be damaged. Fertilizer spread on the lawn does not “feed” the grass. Fertilizer is more like a vitamin – since it helps the grass convert moisture and raw material into food.

Below the crown is an underground system of *roots*. The roots absorb water and nutrients and also anchor the plant. Roots grow in the Fall and store nutrients during the winter months for use in the Spring. As a result, Fall is the most important time to fertilize the lawn.

*Tillers* are shoots of grass which grow from the crown beside the primary shoot -- making a lawn thick and full. Some grasses are bunch grasses that form clumps as they expand to fill a lawn. Creeping grasses, more typical for lawns in Southeast Michigan, spread via stems that extend from the parent plant. Creeping stems are known as *rhizomes* if they travel below the ground and *stolons* (or runners) if they travel above the ground. Both rhizomes and stolons produce new plants when they travel along or under the ground.

*Thatch* is an interwoven mass of stolons, stems, rhizomes, roots, leaf blades, and sheaths -- all sitting on top of the soil surface. Thatch which is thicker than 1/2 an inch creates problems because it absorbs water and fertilizers before they reach the soil and roots. Thatch also blocks out air and becomes a breeding ground for insects and disease. When thatch is too thick, roots grow up into the thatch rather than in the soil.

A healthy layer of thatch is actually beneficial to the lawn. The thatch layer provides nutrients, conserves moisture, and protects the crowns of grass plants. If the thatch layer on the lawn is healthy, there is no reason to remove it.

Trey Rogers, Michigan State University, suggests a method for determining if a lawn needs dethatching. Simply dig up a small piece of lawn with a shovel or trowel. Make sure the cross section includes the soil beneath the lawn. If the dead grass layer (the thatch layer) is more than one-half inch thick, dethatching or aeration is needed.

To minimize thatch buildup, it is important to maintain an environment with decomposer organisms which naturally break down excess organic matter such as clippings. Frequent watering is one key to the process of decomposition. Core aeration is another beneficial practice, since it removes cores of soil and allows water, oxygen, and fertilizer to more easily reach plant roots. Adding sifted compost to the lawn also helps maintain a healthy environment for microorganisms.

### **C. How to Mow**

Two basic mowing practices form the foundation for healthy lawn care:

- (1) Mulching lawn clippings back into the lawn; and
- (2) Mowing so that 3 inches or more of grass remain AFTER cutting.

The benefits of these practices are documented in scientific research.

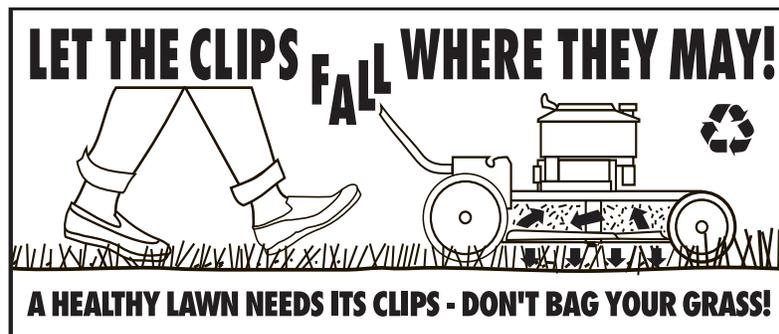
Consider the following list of recommended practices:

- **Set the mower blade at the highest setting**, leaving grass blades 3 inches tall, if possible. Tall grass encourages deep roots and also shades out crabgrass and low-growing weeds.
- **Remove no more than the top 1/3 of the grass blade.**
- **Let short grass clippings fall back onto the lawn.**
- **Use a sharp mower blade.** A dull blade will tear grass and provide an entry port for diseases. Sharpen the blade *at least* twice a year -- more if possible.
- **Mow when the grass is dry** in order to avoid a wet, sticky mess!
- **Keep the mower deck clean.** Wash the underside of the mower after each use. A clogged deck won't mulch or discharge properly.

If clippings are visible 5 or 6 days after mowing, mow more frequently. You may need to cut the lawn at intervals of 4 or 5 days during the rapid spring growing season.

Options for mowers include (1) using your existing mower by raising the mower blade and cutting frequently; (2) retrofitting your present mower with a mulching blade; and (3) using a new mulching mower which cuts and re-cuts grass. Mowers powered by battery, electricity or gasoline are available. Manual push mowers with easy-roll wheels are an option for small yards.

When using any mower, make sure that the design does not allow sticks and stones to be thrown up or out so as to endanger people and pets. Always keep children and pets away from the lawnmower.



#### **D. Grass Recycling Benefits**

Grass recycling, the process of letting short clippings fall on the lawn, is one of the basic practices for a healthy lawn. Clippings are composed of approximately 85% water. Short clippings quickly decompose, releasing valuable nutrients to the soil.

When clippings are returned to the lawn all season, they can contribute up to 25% of the lawn's seasonal fertilizer needs. Grass clippings are fairly balanced, containing about 3 - 4% nitrogen, 1/2% phosphorus (P), and 2% potassium (K). A season's worth of clippings

represents about 1/2 to 1 pound of nitrogen for every 1000 square feet of your lawn, allowing the lawn owner to reduce fertilizer applications by about 25% - 33%.

Grass clippings left on the lawn also help to maintain moisture in the soil -- a process that encourages natural biological activity and decomposition of organic materials.

Grass clippings left on the lawn do not cause thatch. Thatch is the layer of living and dead roots and stems at the soil surface. Troublesome thatch is typically caused by improper use of lawn chemicals, compacted soils, excessive watering, over-fertilization, and other factors. Grass selections that are very vigorous are particularly prone to thatch development.

### **E. Benefits of "Cutting High"**

Letting the grass remain 3" or more in height is a critical step in healthy lawn maintenance. To some, a "long grass look" appears messy. To those who have tried this approach and seen its benefits, it is a "natural, healthy look." In contrast, shorter grass appears scalped and stressed.

Benefits of tall grass include the following:

- Tall grass grows more slowly.
- Tall grass needs less water.
- Tall grass needs less fertilizer.
- Tall grass reduces weeds.
- Tall grass has fewer insect problems.

When grass is mowed tall, it grows more slowly and therefore needs less frequent cutting. Taller grass experiences less stress when it is cut because it still has ample foliage surface. When grass is mowed short, it responds with rapid growth to replace the lost foliage.

Tall grass does not need to be cut as frequently as shorter grass. Grass which starts at a three inch height can be allowed to grow to four inches before it needs to be cut. If grass is kept shorter, it may need to be cut after it grows only 1/2 inch or so. Always follow the "1/3 rule" and cut only the top 1/3 of the grass blade.

Tall grass encourages deep roots. More roots, in turn, help the grass store water and resist drought. Tall grass also shades the soil, reducing evaporation and cooling the crowns of the grass plants. In contrast, shorter grass means shorter roots that require more water and nutrients to compensate for what they can't obtain directly.

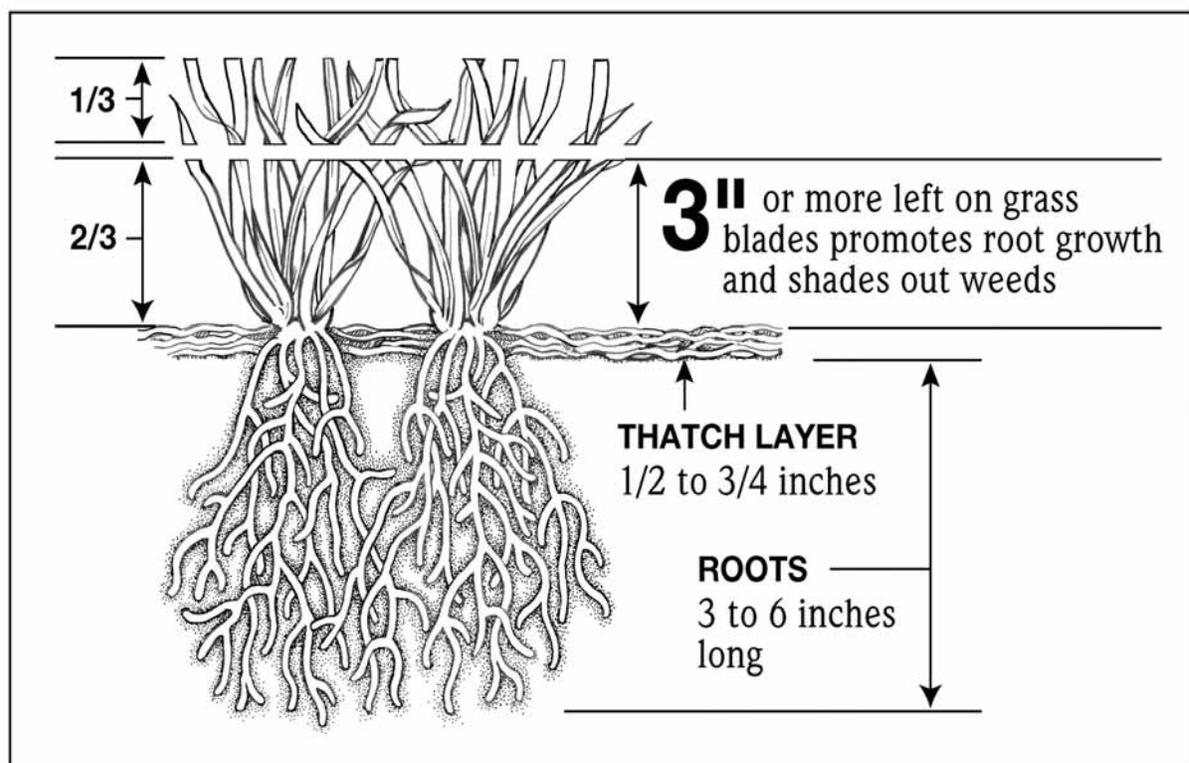
Small changes in mowing height make a big difference in lawn health and vigor. Increased grass length provides more area of leaf surface for photosynthesis. Increasing the height of the grass by 1/8 inch results in about 300 square feet more leaf surface for each 1000 square feet of lawn!

Tall grass has a greater resistance to disease and insects than short grass. Tall grass also provides habitat for a much higher population of beneficial insects that help control nuisance pests. Close mowing may encourage disease, since it greatly weakens the grass.

When northern turf grasses are cut at a height of 3 inches (as compared with two inches), substantial weed reduction usually occurs.

Some professionals vary the mowing height with the time of year. For example, some lawn care specialists recommend a close-cropped first spring mowing to remove excess dormant vegetation. This is not necessary, however, and may actually increase the presence of weeds.

Lower grass height for the last fall mowing is also sometimes suggested. The purpose of a low fall mowing is to remove the extra debris (i.e. the brown, dormant leaf blades). When snow melts in the spring, the grass then looks greener.



## F. Lawn Watering Recommendations from Michigan State University

### 1. Irrigation Basics

Water is essential for all living organisms, including turfgrass. Plants need water to move nutrients from the soil to their roots and then into the leaves. Water is also essential for photosynthesis (chemical conversion of sunlight into carbohydrates for the plant). Finally, water cools the grass plant as it evaporates through the leaves (this process is called transpiration).

Home lawns in Michigan require 0.5 to 1.5 inches of water per week. Rain and sprinklers are the two common sources of water. If rain occurs during the week, additional water may not be needed.

Adequate water -- but not too much water -- is a critical factor in maintaining a healthy lawn. Without adequate water, the grass will be stressed and will be more susceptible to pests, diseases, and weeds. With too much water, fertilizer materials and nutrients in the soil may leach out -- being lost to the roots and perhaps reaching groundwater or surface water. Clean water is a resource to be protected and should not be wasted. Since grass roots can be shallow, often less than 4" long, excess water permeates below the root system and is wasted. In addition, over-watering can seriously harm grass health.

The challenge is to provide the RIGHT amount of water often enough to meet the needs of the grass plants -- but not too much. In the end, the determining of watering amounts is a matter of practical judgment. Trey Rogers, Ph.D., Michigan State University professor and turfgrass specialist (author of *Lawn Geek*) notes that the following factors affect watering needs for turfgrass (page 132):

- The weather.
- Stress levels.
- Life span (Older lawns typically need less water).
- Core aeration. (Aeration on a regular basis reduces thatch).
- Amount of shade (shady lawns require less water).
- Soil texture. Grass on sandy soils must be watered more often and with smaller amounts of water each time, as compared with grass growing on clay or loamy soils.

It is also useful to know how deeply rooted the grass plants are -- and how deep moisture is traveling in your turf. In order to obtain this information for your lawn, you may measure the depth and moisture level of the root zone. To do this test, dig into the sod after you have watered the grass. Use a shovel and open the hole so you can see how far the water has penetrated. Ideally, you will see a well-spaced mass of roots growing vertically into the soil (three to six inches long). Watering should be done so that the soil is moistened to the bottom of the roots.

After the initial test, a screwdriver can be plunged into the grass after watering. Check the dampness and adjust watering accordingly.

## **2. Sensible Watering -- Light, Frequent Watering to Reach the Roots**

The recommendation for *light, frequent watering* reflects research by Dr. Joe Vargas, Michigan State University Turfgrass Pathologist, for over a decade. The recommendations are, however, different from traditional recommendations found in garden books and seminars throughout the United States which advocate infrequent, deep watering.

Light, frequent watering is a successful strategy because it cools the grass and reduces stress. When grass is watered every other day, for example, it typically will not be water-logged or prone to disease -- but will maintain an active biological system on the soil surface.

Because hand-held hoses and sprinklers are highly varied, it is difficult to identify an optimal length of time for watering. For a built-in irrigation system, however, it is possible to gauge the amount of water used over a particular period of time. A tuna can may be used to catch water and measure how long it takes to fill to the one-inch level.

If there is no rain, the lawn should be watered for 30 - 40 minutes every other day. (Note: This amount will really depend on soil type). The every-other-day watering regime also helps conserve water when the Detroit water system imposes watering restrictions. If time and water allow for a daily watering, only a 15 - 20 minute watering is needed.

Grass roots are short (often less than 4 inches long); excess water is lost to the system and is a waste. The length of the grass roots is determined by growing conditions and the season of the year and soil conditioning -- not just by the amount of water received.

The best time to water is between Noon and 4 pm -- e.g., the heat of the day -- when grass is under the most stress. Watering late in the day is not recommended because evening moisture may encourage disease. However, when water is needed, watering at anytime of day is better than not watering at all. The most important factor is to establish a routine of watering and follow it.

Watering lightly after fertilizing the lawn is also important. The water carries these nutrients to the root zone where they can be gradually used to support plant growth. When light watering follows fertilization, the fertilizer moves into the soil and does not typically run off into storm sewers, lakes, streams or groundwater. Note: Nitrogen moves into the soil; phosphorus and potassium do not.

### **3. Variations in Watering**

Light, daily watering is not practical for many citizens -- unless they have a built-in irrigation system. Fortunately, Michigan summers bring rain that helps the home lawn owner and gardener. The goal of a healthy lawn can be met, however, if lawn owners make a conscious decision to pay attention to their practices. Their attention to watering may save the investment made in their lawn.

As with all aspects of sensible horticulture, there is no single rule that applies to all situations. The goal is to water to the bottom of the plant roots -- and not to over-water. Keeping some moisture in the soil through frequent (daily if possible) watering strengthens the turf. From a practical standpoint, many lawn owners water every 2 to 3 days and still have a healthy, green lawn. This is very important, since the Detroit Water and Sewerage Department (as well as the Southeastern Oakland County Water Authority and local municipalities) sometimes restrict watering to every-other-day in order to conserve limited water supplies.

Practical aspects of lawn care must be balanced against the research. If it is not feasible to water during the middle of the day, a person will obviously water in the evening or morning.

Similarly, it may not be possible to water every one or two days while also handling community, work and family responsibilities.

When developing a watering plan, consideration should be given to other plants in the vicinity of the lawn. If there are trees with extensive root systems under the grass, additional water may be needed (trees need deep watering to sustain their deep roots).

Areas that dry out quickly, such as sandy areas, slopes, and areas near sidewalks, will need more watering than the average. Shady areas or depressions that hold water need less frequent watering.

Grasses with poorly developed root systems (caused by compacted soil, insect damage, or fungal disease) also need special attention to irrigation. These conditions result in shallow rooting which reduces the grass plant's access to soil moisture and nutrients. To compensate for these factors, daily watering is often helpful.

#### **4. Grass Dormancy**

During normal summers in Michigan, rainfall is usually not sufficient to keep a lawn green and growing. Grass becomes dormant and turns brown. The dormant lawn normally recovers when adequate moisture is available. A dormant lawn has both advantages and disadvantages:

##### ***Advantages:***

- Reduced mowing and fertilizing as growth slows or ceases.
- Minimal costs for water and irrigation equipment.

##### ***Disadvantages:***

- More weeds because of lack of competition.
- Slow recovery from additional stress, such as traffic, disease, or insect attack.
- Increased risk of serious damage by insects.
- Appearance -- since most citizens prefer a green lawn.

As summer approaches, citizens should determine whether watering will be practical. Plans usually need to be made in advance if the lawowner wishes to retain a dense, green lawn during periods of drought.

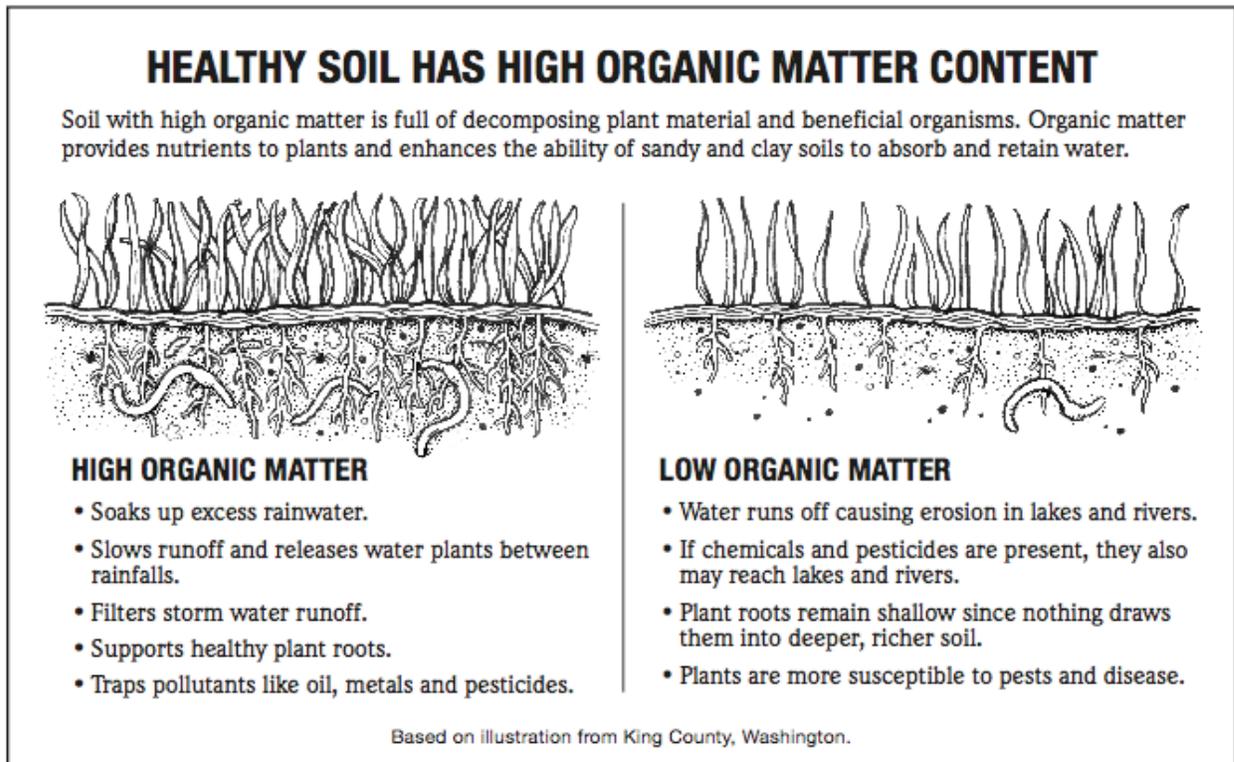
### **G. Healthy Soil – for a Healthy Lawn**

#### **1. What Is Healthy Soil?**

Grasses, like other living organisms, need food, water and a hospitable environment. The environment includes the soil in which roots find anchorage, air, water and minerals to support stem and leaf growth.

All soils are comprised of varying combinations of minerals (pulverized rock), organic matter (once-living material), air, and water. A healthy soil is comprised of 40 - 45% mineral particles, at least 5% organic matter (5% - 10% of the total volume), 25% air and 25% water.

The organic matter component of soil supports the biological life of the soil as it gradually decomposes and releases nutrients. Healthy soil has high organic matter content. The benefits of the organic matter are illustrated on the diagram below.



The most vigorous lawn growth occurs in loose, loamy soil teeming with beneficial microorganisms, insects, and worms. In a healthy soil, there is more life concentrated in the three inches below the soil surface than any place in the world above the soil! The beneficial organisms decompose grass trimmings and convert the organic matter into humus. They can also break down thatch, keeping it at "healthy" levels.

Organic matter increases soil aeration, water-holding capacity, and nutrient-exchange capacity of the soil. The interaction of soil organisms with the decomposing organic matter creates a moist, nutrient-rich habitat where plant roots can survive short-term drought, temporary lack of fertilizer, and other stressful conditions.

## 2. Soil Nutrient Testing: A Tool for Fertilizer Selection

The slogan "Don't Guess...Soil Test!" is correct. Without an actual soil nutrient test, fertilizer selection is pure guesswork. Jon Dahl, Michigan State University (MSU) Plant and Soil Test Laboratory, recommends soil testing in each garden area every three years – or at any site where the topsoil has been disturbed and landscape renovation is underway.

Since plants take up nutrients from the soil, nutrients need to be replenished from time-to-time. The only way to identify the particular nutrients needed at a site is to test the soil.

Soil nutrient tests help gardeners in the following ways:

- Determine available nutrients in the soil.
- Measure pH (degree of acidity or alkalinity) – a factor to consider with plant selection.
- Serve as a basis for fertilizer recommendations.
- Evaluate the probability of deficiencies, excesses or imbalances.



The MSU soil test provides laboratory readings for pH, phosphorus (P), potassium (K); calcium (Ca); and magnesium (Mg.). The soil nutrient test does not test for toxic materials in the soil (such as lead) or calcium chloride. (For information: [www.css.msu.edu/soil\\_testing](http://www.css.msu.edu/soil_testing).)

The Michigan State University standard soil nutrient test does not include a test of soil texture (that is, relative amounts of sand, silt and clay). Soil texture affects drainage, but is not a parameter related to soil health or plant growth.

Organic matter is included in the special “Don’t Guess...Soil Test!” program offered in cooperation with Oakland County retailers during the month of April. During other times of the year, the organic matter analysis is available from Michigan State University for an extra charge.

The organic matter content of soil is an important indicator of soil structure, soil fertility and soil health. To be considered healthy soil, organic matter should comprise 5% or more of the soil by weight (5% - 10% by volume.) An adequate level of organic matter also builds in natural resistance to pests and diseases. Because organic matter is continually used in a biologically active soil system, it needs to be replaced periodically.

The amount of organic matter in the soil directly affects the quantity of fertilizer needed. With high levels of organic matter, fertilizer quantities can be reduced. Because organic matter is continually “used” in a healthy soil system, organic matter needs to be replaced from time-to-time. Clippings left on the lawn or compost raked into the lawn are helpful practices.

Soil testing is worth the cost and effort! There is no such thing as a “free lunch” in nature. Plants may perform for years without needed additional fertilizer, but sooner or later, the free lunch ends. Hungry plants eventually will display stunted growth or off-color leaves. Because soil nutrients are “invisible” in the soil, a soil nutrient test is the only way to really learn about your soil.

The overuse of nitrogen fertilizers is a common mistake for home lawns. Excessive nitrogen creates lush, weak plants – and the surplus nitrogen may runoff the landscape or leach from the soil.

In addition to the Michigan State University soil and plant nutrient testing service, private laboratory services are also available. Sometimes garden centers offer soil testing as well, although rarely with equipment that allows for the accuracy of Michigan State University and specialty laboratories.

“Do-it-yourself” soil test kits are available from some garden centers and are useful for obtaining a quick, approximate reading of pH and nutrients. These “home-style” kits, however, do not provide precise laboratory results.

When collecting soil for a soil nutrient test, it is important to have a representative sample. The lawn owner should select the front or back yard, or special area of interest. Then take 10 sub-samples from within the area...randomly selected.



As shown in the illustration on the right, a vertical slice is taken to the root of the grass. For turfgrass, the sample should be selected to a depth of 3 – 4 inches. Additional instructions are provided with the soil test kit.

### 3. Ways to Build Soil Health

The conditions that allow microorganisms to thrive ... moisture, aeration, and nutrient supply....also help grass to grow. The following lawn care practices help build soil health:

- a. **Use a mulching mower and mow fall leaves** so that small pieces of leaf fall back into the grass. Leaves contribute many minerals and organic matter to the soil.

Leaves are rich in minerals, which benefit the lawn. For example, red maple leaves (pH 4.7) contain 1.29% calcium, 0.4% magnesium, 0.4% potassium, 0.09% phosphorus, and 0.52% nitrogen. The fibrous organic matter of leaves improves the aeration and structure of most soils.

- b. **Aerate compacted soil with a coring machine.** Soil is easily compacted (pressed together) in areas of frequent foot traffic. Clay soils are more likely to be compacted than loamy or sandy soils. Compaction prevents air, water and nutrients from reaching grass roots. The result can be a shallow root system and stress on the grass.

Coring machines can be rented or a contractor can be hired. Tools for coring by hand are also available for aerating small areas.

Holes should be 2 to 3 inches deep, and should be spaced at 4 to 5 inch intervals. With the coring machine, plugs are removed from the lawn and allowed to naturally decompose in the soil. In a few weeks, grass will fill in the holes. Tools for coring by hand are available for aerating small areas. Heavily trampled areas should be aerated each year -- and other areas, as needed.

The key to core aeration is the removal of the soil plug to allow air, water and nutrients to reach the grass roots. Golf shoes, spiking machines, or other devices that poke into the soil **do not provide this benefit.**

Sometimes companies aerate at a shallow depth, thinking that they will avoid damage to irrigation sprinkler heads. **Customers should request a full-depth aeration – with a minimum depth of 2 inches.** It is advisable to be present when your lawn is aerated by a private lawn service – and to specify your interest in a DEEP aeration BEFORE the job is begun.

**c. Top-dress the lawn with a 50/50 mixture of soil and sifted compost – or 100% compost.** The compost adds microorganisms, a wide range of nutrients (in small amounts), and organic matter, which benefits the soil system.

It is sometimes assumed that a natural organic fertilizer will add organic matter to the lawn. Although such fertilizers may contribute a small amount, they rarely have 40% organic matter content of a true compost.

Renewing soil with a top-dressing of organic matter is always advisable. Apply a thin layer (about 1/4 – 1/2 inch) – and do not cover more than 50% of the grass blade. (If you cover the grass blade, it cannot create its own food through photosynthesis. Sifted compost can also be broadcast by hand over the lawn. Do not cover the top of the grass blades with compost, or they cannot grow.

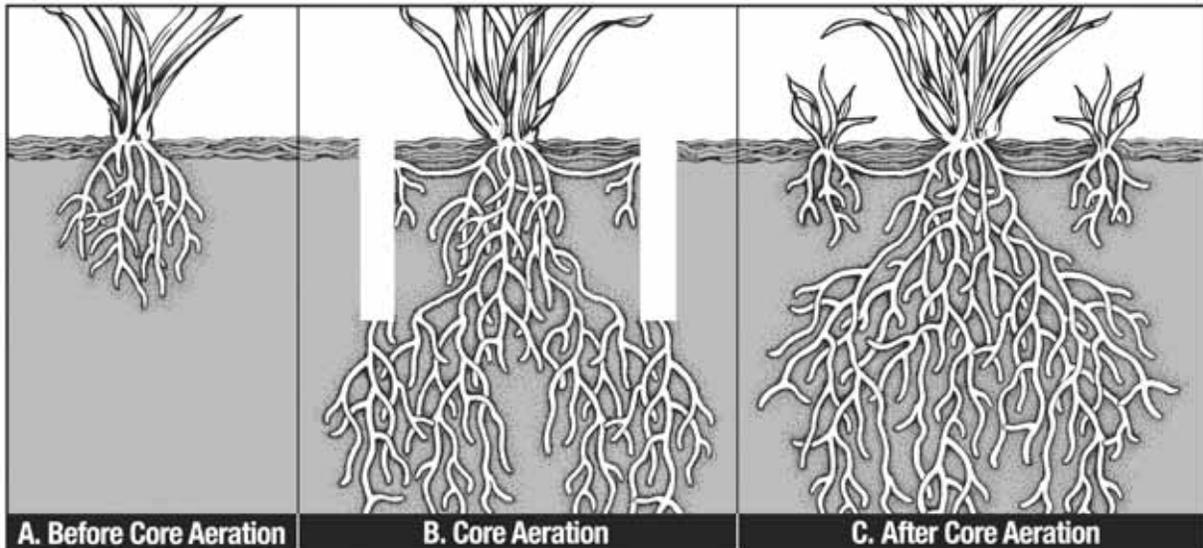
Suitable materials include compost (as weed-free as possible), dried or composted manure, sewage sludge, soil/compost mix, or other materials. Organic matter, when added in substantial amounts, has been shown by the U.S. Department of Agriculture to decrease soil compaction and increase the water-holding capacity and air exchange capacity of the soil.

Top-dressing with compost is a very effective methods for reducing lawn thatch, including dead and dying roots and stems. Compost may be applied once or twice a year, depending on your other fertilizers and the condition of the soil.

Two choices are available for spreading compost on a home lawn: (1) bring in several yards of compost and rake it over the lawn; or (2) purchase a compost spreader. A spreader is like a fertilizer spreader without teeth. (Note: some citizens have successfully used old fertilizer spreaders with the teeth removed).

**As your lawn soils improve, check for earthworms from time-to-time. Ten worms per square foot is one indicator of healthy soil!**

## BENEFITS OF CORE AERATION



**A.** Turfgrass in compacted soil. Grass is thin and lacks vigor.

**B.** Through core aeration, small cores of soil are removed and deposited on the ground. Air, water, and nutrients can easily reach the roots.

**C.** Healthy turfgrass with thick roots naturally resists stress.

Graphic design prepared by SOCWA, Southeastern Oakland County Water Authority

The diagram above shows that core aeration leads to thicker root growth. The benefits of core aeration develop gradually, as air, water and nutrients reach the roots.

Diagram C (after core aeration) shows thicker roots...and additional tillers. The roots are from the aeration, and the tillers are the combined result of all healthy lawn care practices (cutting high, watering, earth-friendly fertilizers, etc.)

An extra benefit to core aeration is spreading compost over the lawn.

Core aeration may be carried out before or after slow-release, earth-friendly fertilizer or compost is applied.

## H. Fertilizer Selection and Application

### 1. Basic Fertilizer Selection

Fertilizer is important to the health and vigor of turfgrass. The type of fertilizer selected by the lawn owner, however, is a matter of choice. Many good fertilizers and choices are available at local hardware stores, garden centers, and builder supply stores.

A *fertilizer*, by definition, is any material or mixture used to supply one or more of the essential plant nutrient elements. Sixteen nutrients are essential for plant growth and

development. Of the major nutrients, nitrogen, phosphorus, and potassium are required in relatively large amounts. Calcium, magnesium, and sulfur are also required in relatively large amounts, but are less likely to be deficient in the soil system. Micronutrients (such as iron, chlorine, manganese, boron, etc.) are essential to plants in relatively small amounts.

**Nitrogen (N)** is important because it promotes vigorous plant growth, increases top growth, and is a building block for protein. **Phosphorus (P)** promotes cell division and stimulates healthy root growth and is essential for seed germination. **Potassium (K)**, also labeled as "potash", is an essential nutrient for photosynthesis, which also promotes fruit formation and imparts disease resistance and winter hardiness.

The purpose of fertilization is to provide nutrients (minerals) to the grass roots. With these nutrients present, grass blades can manufacture their own food. Some fertilizers, however, have important benefits for the soil system -- especially if they contain organic matter, which helps build soil life and better soil structure.

All fertilizers are labeled with 3 numbers (i.e., 12-3-9 or 10-10-10), giving the percentage by weight of nitrogen (N), phosphate (P), and potash (K). These numbers are called the "guaranteed analysis".

A **complete fertilizer** provides some quantity of all three of these nutrients. An **incomplete fertilizer** is missing one or two of these nutrients.

For lawns, nitrogen is the nutrient used in the largest quantity. The specific amount of nitrogen needed is determined, in part, by the type of grass, soil health, site conditions, maintenance practices of the lawn owner, and appearance desired by the owner.

The standard fertilizer application rate listed on the bag is one pound for every 1000 square feet of lawn – for each application. The amount of fertilizer applied over the course of the year – not the total amount applied at each application – is usually the focus.

The Healthy Lawn Care Program recommends 2, 3, or 4 pounds of nitrogen per year, spread out over 2, 3, or 4 applications during the growing season. The most important recommendation for nitrogen, however, is to select a fertilizer with slow-release nitrogen. As described below, slow-release fertilizers provide for steady growth and water quality protection – a winning combination.

To determine the amount of phosphorus (P) and potassium (K) needed by your lawn, a soil nutrient test will be needed. If it is not initially convenient to obtain a soil nutrient test, simply purchasing a fertilizer with some phosphorus (P) and some potassium (K) will be sufficient. To minimize over-application, however, and to obtain information about other nutrients, a soil nutrient test for your lawn is recommended.

The nitrogen content in the soil is very difficult to measure because it does not stay in the soil long enough to be effectively tested. As a result, neither Michigan State University nor private soil testing laboratories normally test home soils for nitrogen content. When a soil nutrient test is purchased, however, an estimate and recommendation for nitrogen is included

in the soil test report. Nitrogen fertilizer recommendations are based upon the general conditions of the soil and the plants being grown.

Despite the attention given to N-P-K ratios in fertilizers, the key fertilizer characteristics for healthy lawn care and water quality protection are:

- Low or no phosphorus
- Slow-release nitrogen
- Free of pesticides (no weed-and-feed products)

Criteria for earth-friendly fertilizers are reviewed each year by the Healthy Lawns and Gardens Technical Advisory Committee for Oakland, Wayne, and Macomb Counties.

## **2. Organic vs. Synthetic Fertilizers**

The choice of organic vs. synthetic (man-made) fertilizers is an individual one. There are excellent organic fertilizers and excellent synthetic fertilizers. The nutrients are the same after they are released into the soil system. In addition, both organic and synthetic fertilizer products may be part of a natural or earth-friendly lawn care program.

As used in this report, the term “organic fertilizer” means “natural organic fertilizer.” A natural organic fertilizer contains nutrients which are derived from the remains of (or are a by-product of) once-living organisms. Examples of organic fertilizers include cottonseed meal, blood meal, composted manure, and bone meal. (Note: Urea is sometimes organic and sometimes synthetic in form.)

In general, organic fertilizers release their nutrients slowly over a fairly long time. (Note: synthetic fertilizer can also be made to release nutrients over a long period of time.) Organic nutrients depend on microbial organisms in the soil to break down the material and make it available to plant roots.

Organic fertilizers benefit the soil system by increasing the organic matter content of the soil and improving physical structure. (Note: In order to significantly improve the organic matter content of the soil, other methods, such as mowing leaves and adding compost to the lawn, are recommended.)

On the other hand, organic fertilizers may not have nutrients immediately available to plants when they are planted. Also, organic products may be more expensive than synthetic products. In general, a large quantity of organic fertilizer is needed to provide a given level of nutrients -- at least when compared with formulated bags of synthetic fertilizers.

A number of fertilizers formulated with a combination of organic and synthetic materials are available for purchase. These products attempt to combine the advantages of both types.

## **3. Earth-Friendly Fertilizers: Recommendations for Southeast Michigan**

An earth-friendly fertilizer, as defined by the Healthy Lawns and Gardens Technical Advisory Committee, meets the following three criteria:

**Slow-release nitrogen:**

- Natural organic fertilizer; or
- Synthetic fertilizer with 40% or more W.I.N. or controlled-release component or stabilized nitrogen fertilizer with equivalent performance capacity.

**Low-phosphorus or no-phosphorus:**

- Ratio of nitrogen-to-phosphate is 5:1 or greater

**Free of all pesticides (including herbicides); no weed-and-feed.**

The Healthy Lawns and Gardens Technical Advisory Committee includes representatives from the Michigan Green Industry Association, private lawn and landscape firms, MSU Extension (Oakland, Wayne and Macomb Counties), Wayne County Department of Environment, Oakland County Drain Commissioner's Office, municipalities, citizen organizations and other interested parties. SOCWA (the Southeastern Oakland County Water Authority) has received federal and state funding to coordinate the project, serving as facilitator. Michigan State University researchers serve as project advisors.

Annually, the Technical Advisory Committee reviews the criteria in light of both research (which is somewhat limited) and practical experience (which is extensive). The earth-friendly fertilizer criteria are set to meet the dual goal of yard waste reduction and water quality protection.

Fertilizer products available at local retailers are reviewed and compared with the criteria set by the committee. Hardware stores and garden centers that carry products meeting the criteria are given 'bright green' earth-friendly fertilizer stickers to affix to the bags.

Retailers in Oakland, Wayne, and Macomb Counties are participating. In Wayne County, stickers are delivered to retailers by the Wayne County Department of Environment. In Southern and Southeast Oakland County, the program is administered by SOCWA, the Southeastern Oakland County Water Authority. In Macomb County, a teacher at South Lake High School in St. Clair Shores administers the program. The Clinton River Watershed Council is assisting in the Macomb County portion of the Red Run Subwatershed. (Stickers are provided by the Macomb County Board of Commissioners). Other counties and communities are invited to use the same criteria, print their stickers, and help engage the public in "rethinking" their approach to lawn care.



#### **4. Slow-Release Fertilizer for Steady Growth and Water Quality Protection**

Slow-release fertilizers are recommended for all varieties of lawn grasses. A slow-release fertilizer will promote steady, uniform growth and help protect water quality -- while providing the nitrogen (and other nutrients) necessary for healthy grass growth.

Many professionals -- on golf courses and home lawns, use slow release fertilizers. Citizens participating in the Healthy Lawn Demonstration Program (1996 to the present) have found slow-release fertilizers to be useful for creating a low-maintenance, attractive green lawn. An additional practical reason is that there is less 'quick' top growth during spring months.

University specialists recommend slow-release fertilizers for the following reasons:

- (a) To protect lakes, streams, and groundwater, reducing high-nitrogen runoff or leaching
- (b) To promote steady, natural uniform grass growth, avoiding "spurts" of growth.
- (c) To provide nitrogen, a building block for protein in the grass blades and stems.
- (d) To reduce the danger of over-fertilization, including salt buildup or burning of lawn.
- (e) To save time and money in the long run. Slow-release fertilizers typically last more than 2 - 3 months. These products may appear to be more expensive, but actually be less expensive, since fewer applications are needed.
- (f) To protect soil microbial life.

Slow-release fertilizers may be either natural organic or synthetic in their chemical formulation.

Slow-release sources discharge nitrogen over an extended period of time. The major advantages of slow-release products include:

- low burn potential;
- lower risk of loss of nitrogen from the site;
- less frequent applications; and
- more uniform response.

Disadvantages of slow-release include:

- slower initial plant response,
- higher cost (usually) and
- the need to apply product in a granular formulation due to a lack of solubility.

Slow release fertilizers include:

- Organic fertilizers (nitrogen released through microbial action); and
- Fertilizers with 40% or more of their nitrogen in a water insoluble form (W.I.N.) or the equivalent.)

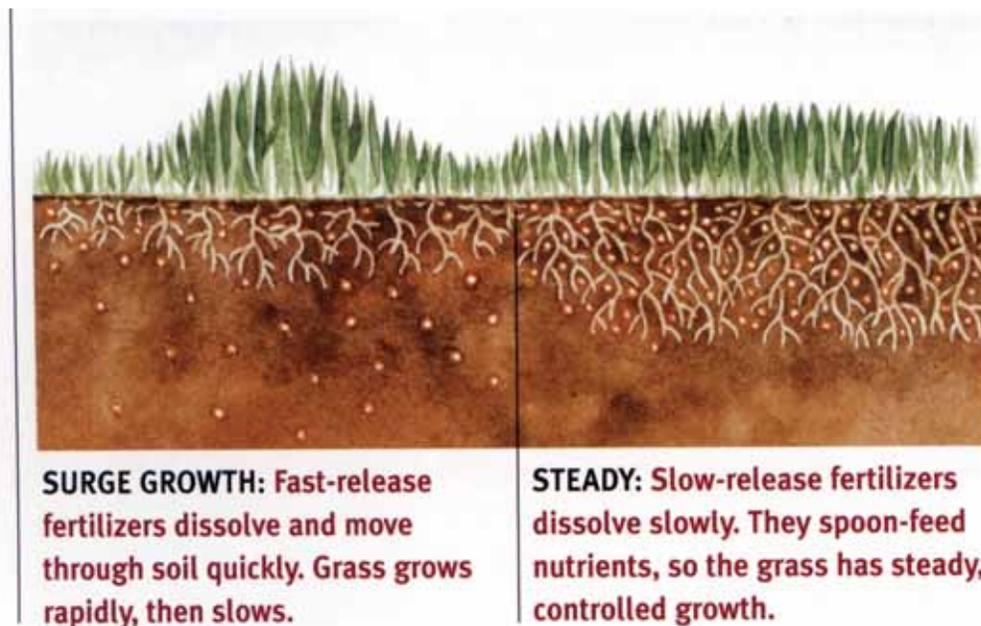
Slowly-available nitrogen materials release a major portion of their nitrogen over relatively long periods of time. The standard of 40% or more slowly-available nitrogen is recommended by Healthy Lawn and Garden Technical Advisory Committee. Two important reasons support this standard: (1) this type of slow-release fertilizer is available to landscape companies and to citizens; and (2) it protects water quality. Some Eastern states (especially in the Chesapeake Bay region) use 50% W.I.N. as their standard for slow-release nitrogen.

The activity of soil microorganisms is dependent on soil moisture, pH, and temperature. Microbial breakdown is accelerated by high temperatures and moisture. Materials dependent on physical processes (such as hydrolysis) for nitrogen release are relatively unaffected by temperature but are very dependent on soil moisture.

Natural organic materials and some synthetic organic materials depend on microbial decomposition alone. Other synthetic organic materials and coated nitrogen products depend on physical and/or chemical processes in combination with microbial activity.

Natural organic fertilizers are derived from remains or by-products of living organisms. Many organic fertilizers are the wastes and by-products of plant and animal processing industries, such as bone meal, blood meal, cottonseed meal, fish emulsion, manures, and processed sewage sludge. Natural organic fertilizers require a greater volume of material because of their low N-P-K analysis and are usually slow-release.

Not all slow-release fertilizers have the low-phosphorus characteristics needed for a high level of water quality protection. Fertilizers that are both slow-release nitrogen and low-phosphorus are recommended (see the section which follows).



## 5. Low-Phosphorus or No-Phosphorus Fertilizers

Phosphorus is a concern for surface water quality. Excessive phosphorus that is not needed by plants may run off the ground and contribute to lake or stream pollution. Phosphorus is not generally considered a concern for groundwater protection in Michigan.

Soil tests for Southeast Oakland County (and much of Southeast Michigan) show high levels of phosphorus in the soil. For many lawns in these areas, no additional phosphorus is needed for plant growth – unless natural soils have been seriously disrupted or unless a new lawn is being established.

For a very high level of water quality protection, residents are encouraged to select a zero-phosphorus or low-phosphorus fertilizer. Because substantial quantities of phosphorus occur naturally in most Oakland and Wayne County soils, it is not necessary to completely exclude phosphorus from fertilizer. The small amount of additional phosphorus is unlikely to contribute to polluted stormwater runoff. In fact, phosphorus naturally binds to soil, whereas nitrogen is more likely to leach through soil or be dissolved in rainwater and runoff into storm drains, lakes, and rivers.

As determined by the Healthy Lawn and Garden Technical Advisory Committee, a very small amount of phosphorus will not change the background level or affect the runoff of phosphorus. The recommended technical standard is to select fertilizers where the relative ratio of nitrogen to phosphorus is equal to or greater than 5:1. For example, a fertilizer with an analysis of 20-4-2 has a nitrogen-to-phosphorus ratio of 20:4 (equal to 5:1). Such a fertilizer could be called a “low-phosphorus” fertilizer, which would provide extra water quality protection.

The standard of 5:1 (or greater) for low-phosphorus fertilizers is useful because it allows for broader consumer choice – while also protecting water quality. Very few (if any) natural organic products have zero phosphorus, although some products do meet the low-phosphorus content standard.

Increasingly, garden centers and hardware stores in Oakland County and Wayne County are stocking slow-release, low-phosphorus fertilizers to help their customers protect water quality. For a list of stores participating in the slow-release fertilizer bag sticker program, contact SOCWA (248-288-5150) or the Wayne County Department of the Environment (734-326-3936). Websites include: [www.socwa.org](http://www.socwa.org) and [www.HealthyLandscapes.com](http://www.HealthyLandscapes.com).

## 6. Avoid Weed-and-Feed Combination Products

**Weed-and-feed products are not recommended** because they typically lead to excessive quantities of pesticides applied in the wrong place on the lawn. In addition, it is easy to put down the wrong pesticide for the weed of concern – at the wrong time of year.

Spot treating for specific weeds, following an IPM, Integrated Pest Management, decision-making process is a useful alternative.

Hand-weeding is used by many, after they have established a healthy lawn that naturally resists crabgrass and other weeds.

Additional information about weed management is included at the end of this report.

## **7. How to Determine Fertilizer Quantities**

The application rate listed on the fertilizer bag is correct for most lawns: one pound of N for each 1000 square feet of lawn, for each application. It is the number of applications, not the amount of nitrogen per application that should be varied according to the type of lawn, condition of soil, lawn maintenance practices, etc. The Healthy Lawn Program recommends 2, 3, or 4 fertilizer applications over the course of the growing season. This number of applications translates into a total of 2 pounds, 3 pounds, or 4 pounds of nitrogen per thousand square feet of lawn – for the entire year.

Lawn owners are encouraged to “take charge” of their own lawn and determine the number of fertilizer applications (and the total amount of fertilizer) needed. The following guidelines are useful in making the determination:

1. If clippings are left on the lawn after mowing, fertilizer quantity can be reduced by 25% or more.
2. If the lawn is in partial shade, fertilizer applications can be reduced by 25% or more. (Note: It is difficult to grow healthy grass in dense shade. Natural organic mulches are a better choice).
3. Different types of grasses need different amounts of nitrogen to keep them healthy. Of the grasses common in Southeast Michigan, Kentucky bluegrass typically requires the most nitrogen (4 or more pounds of nitrogen per thousand square feet). Fescues (tall fescue, red fescue, mixed fescue, etc.) and ryegrasses (annual; perennial, etc.), and grass mixtures, require less nitrogen fertilizer.
4. Older lawns (vs. newly-established lawns) typically require less nitrogen fertilizer.
5. Soils with a “healthy” amount of organic matter (more than 5% by volume) may need less nitrogen fertilizer. Organic matter contributes some nitrogen to the soil system as it decomposes.

Time and money may also influence lawn owner decisions.

If residents are extremely concerned about the potential for fertilizer leaching or runoff, the fertilizer application rate can be reduced in half – and the number of applications doubled.

Finally, it should be remembered that it is fine to apply no fertilizer at all to the lawn. The only consequence of not applying fertilizer at all is the potential for thin grass, weeds, and a stressed lawn that is prone to disease. Although the first year of a “no fertilizer” lawn may be fine, the second and third year may lead to an unsightly appearance which drives the lawn owner to apply herbicides and insecticides – adding to environmental impacts rather than reducing them.

## 8. Timing of Fertilizer Applications – Spring, Summer, and Fall

A little bit of nitrogen goes a long way to make grass green and healthy. When “too much” fertilizer is applied, grass grows fast and the potential for disease is increased. The fertilizer application selected by the homeowner should match the type of grass, the soil, lawn care style, and other personal choice factors.

In all cases, fertilizing during hot, dry weeks should be avoided. At such times the lawn requires water – not fertilizer.

Turfgrass specialists can tell when lawn needs fertilizer by its “look and feel.” A yellowish or dull green blade, or non-vigorous growth, often indicates the need for fertilizer. However, stress from compacted soil (not the lack of fertilizer) may also be the problem. Always consider the total picture – including soil health and drainage – before fertilizing. Core aeration, for example, may help improve drainage and the ability of nutrients to be absorbed by roots. In order to avoid over-application, measure the actual area of the lawn to be fertilized – excluding paved areas and gardens.

The recommendations on lawn fertilizer bags help customers apply the desired amount – namely, one pound of nitrogen per 1000 square feet of lawn. For example, if a bag of fertilizer lists that it will cover 5000 square feet of lawn, it will deliver approximately 5 pounds of nitrogen to that area. The type of grass, condition of the grass, soil conditions, and goals of the lawnmower are factors to be considered. Options for the timing of fertilizer applications are outlined below.

### ***Option #1 – One fertilizer application***

- One pound of nitrogen for every 1000 sq. ft. of lawn **in early fall (September)**

### ***Option #2 - Two fertilizer applications***

*(or one application with clippings left on the lawn)*

- One pound of nitrogen for every 1000 sq. ft. of lawn in **late spring (May)**
- One pound of nitrogen for every 1000 sq. ft. of lawn in the **mid-fall (Oct.-Nov.)**

### ***Option #3 – Three fertilizer applications***

*(especially for lawns with sod where the clippings are left on the lawn):*

- One pound of nitrogen for every 1000 sq. ft. of lawn in the **late spring** (Memorial Day)
- One pound of nitrogen for every 1000 sq. ft. of lawn in the **early fall** (Labor Day.)
- One pound of nitrogen fertilizer for every 1000 sq. ft. of lawn in **mid-fall** (October).

### ***Option #4 -- Four fertilizer applications***

*(Especially irrigated lawns with new sod when the clippings are removed)*

- One pound of nitrogen for every 1000 sq. ft. of lawn in the **late spring** (Memorial Day).
- One pound of nitrogen for every 1000 sq. ft. of lawn in **early summer** (4th of July).
- One pound of nitrogen for every 1000 sq. ft. of lawn in the **early fall** (Labor Day.)
- One pound of nitrogen for every 1000 sq. ft. of lawn in **late fall** (Thanksgiving).

*Note: Evaluate summer fertilizer applications based on current weather conditions. If late June/early July weather is dry and hot, fertilizer should not be applied.*

Early spring fertilization is NOT needed if some fertilizer has been applied the previous fall. Sometimes pre-emergent herbicide is combined with fertilizer and applied in the early spring. This type of mixed application is not cost-effective and can lead to unnecessary runoff of fertilizer and pesticide product.

**Fall is the most important time to fertilize.** Fall fertilization promotes root growth rather than top growth. Strong roots store food produced in the grass blades for use in the early spring. Some lawn care programs in Michigan and the Midwest recommend applying 70% or more of the total nitrogen fertilizer for the year during the fall ... spread out over 2 or 3 applications.

For further information about lawn care, “Turf Tips” fact sheets from Michigan State University are very useful (see [www.turf.msu.edu](http://www.turf.msu.edu)). Additional references and websites are listed at the end of this report.

## **9. How to Apply Fertilizer**

Measure the square foot area of the home lawn area and determine the amount of fertilizer to be applied. Be sure to measure the actual area of lawn – not the total size of the yard with gardens and pavement. Read labels on fertilizer bag to determine total amount of fertilizer needed for the square footage of your lawn.

Determine the quantity of fertilizer needed for the lawn area (usually for one application, although some residents buy enough fertilizer for the entire year and store it in the garage).

The rate recommended by most fertilizer labels is approximately one pound of nitrogen per 1000 square feet of lawn -- the same rate recommended by the SOCWA Healthy Lawn Program.

Either use the settings on the fertilizer spreader (after it has been calibrated), or simply check the amount of fertilizer dropped by your spreader.

The amount of fertilizer applied is determined primarily by the size of the openings in the spreader. Try a small area of your lawn to see how quickly the fertilizer is dispersed. Adjust the openings, as needed, to evenly spread the correct amount of fertilizer over your lawn.

Another approach for obtaining a uniform application is to calibrate the spreader to deliver 1/2 the desired rate of nitrogen. Then cover the lawn twice. Make the first application in one direction and a second application at a right angle.

## **10. Compost as a Top-Dressing**

Compost, whether made at home, picked up from a municipal source, or purchased at a garden center is an important material for lawn and garden care.

Compost is an excellent soil conditioner. When added to sandy soil, compost helps retain and hold water. When mixed with clay soils, compost loosens the soil particles and improves drainage. In addition, compost improves soil structure, encourages root growth, aerates soil, releases nutrients slowly, and suppresses some soil-borne diseases. There is some evidence that fertilizer use can be reduced when compost is liberally applied to the lawn (1/2 – 1 inch thick.)

Most importantly for thatch management in a lawn, compost contributes microorganisms which help maintain a steady, natural decomposition of organic matter such as clippings.

In Southeast Michigan, excellent yard waste compost is available for homeowner use. Communities which are members of SOCRRA (Southeastern Oakland County Resource Recovery Authority) receive SOCRRA compost for pickup by residents at no cost. Compost may also be purchased in bags from garden centers or purchased in bulk from landscape supply yards.

Compost applications through private landscape services may also be available. Compost spreaders which evenly distribute the product are available for homeowners and landscape services.

## **11. Fertilizer Application Setbacks from Lakes, Rivers and Streams**

Fertilizer should never be applied directly adjacent to rivers, lakes and streams. Fertilizer, even slow-release natural organic fertilizer, may be carried by rainwater and snowmelt over the lawn to paved surfaces. Fertilizer can easily reach storm drains, rivers and lakes when pellets and particles are left on sidewalks, driveways, and streets.

When fertilizer reaches water bodies, it increases nutrient loadings which lead to algae growth and other problems. Algae and pollutants may alter river ecology, including the balance of micro-organisms and macro-organisms. Sediment washed into storm drains, lakes and streams can smother fish eggs as well.

A simple, effective approach for water quality protection is to establish a “no fertilizer” zone – or a fertilizer application setback from all lakes, rivers and streams. The recommended setback varies with the slope of the land. Many professionals in Southeast Michigan recommend a setback of 20 – 30 feet – or more.

Lawnowners who use private lawn care services should always remind the applicator of the importance of the “no fertilizer” zone. It may need to be delineated on the ground...and included as a specification in a contractors agreement.

A useful additional buffer to minimize fertilizer runoff is to plant native grasses, flowers, and/or shrubs at the edge of the water body. A vegetated buffer zone starts with aquatic plants and extends landward, helping to trap soil, fertilizer, and other materials that may be washed off the land.

## **I. Reduce Weed-and-Feed and Pre-Emergent Herbicides**

Herbicides kill weeds – and are a type of pesticide. Reducing pesticides in the home landscape is an important goal for both personal health and water quality. Recommended practices include:

- (1) Avoid “weed-and-feed” combination products; and
- (2) Minimize pre-emergent herbicide, such as crabgrass preventor.

These practices are briefly described below.

### **1. Avoid Weed-and-Feed Combination Products**

A healthy lawn program minimizes pesticides – that is, herbicides, fungicides, and insecticides – to the maximum possible extent. The best defense against many insects, diseases, and weeds is a healthy lawn. Proper mowing, watering and fertilizing help prevent problems because they encourage healthy, vigorous growth.

Weed-and-feed products combine fertilizer with herbicide. Weed-and-feed products should be avoided for the following reasons:

- The proper time to apply herbicide is often different than the proper time for fertilizer. In addition, the proper time for herbicide application varies with the target weed.

### **2. Minimize Pre-Emergent Herbicides**

A pre-emergent herbicide is a weed control product that does not allow weed or grass seeds to germinate.

There are several issues of concern related to the use of pre-emergent products. First, pre-emergent herbicides, like other weed control products, are often applied annually without a clear identification of whether a product exists. A second concern relates to the weather. Pre-emergent products must be applied early in the spring to be effective – and sometimes applications are made (incorrectly) with the soil is frozen.

If healthy lawn care practices are followed, pre-emergent herbicide use can be greatly reduced – since a thick, healthy lawn naturally resists crabgrass. If crabgrass is identified as a problem, it can be removed through herbicide use for one year only.

Corn gluten meal is a nitrogen fertilizer and as a crabgrass preventer. While it takes some time to be effective in a lawn with a large crabgrass population, corn gluten meal offers a major advantage: it is a non-toxic, natural organic product. In fact, corn gluten meal meets the criteria for an “earth-friendly fertilizer” under the Healthy Lawn Care Program.

Corn gluten meal inhibits seed germination of all types, and therefore cannot be used within six weeks of overseeding a lawn. It is also not effective against previously established perennial weeds or annual weeds that are already growing.

## J. Using Integrated Pest Management (IPM) as a Guide for Making Decisions

### 1. A Healthy Lawn Is the Best Defense

The best defense against most insects, diseases and weeds that plague urban lawns is healthy lawn care. In addition to recommended mowing, irrigation, and fertilization, periodic core aeration, top-dressing with sifted compost, and mowing leaves back into the lawn can be useful for building healthy soil and a healthy lawn.

### 2. What Is Integrated Pest Management?

Integrated Pest Management, or IPM, is an environmentally sensitive approach to managing pests (including insects, weeds, and diseases). IPM combines cultural, mechanical, biological, and selective chemical control techniques to suppress pests with the least disruption to the environment and maximum attention to human safety. IPM has been successfully used in agriculture for nearly thirty years and should become an important tool for the home gardener.

The key steps in the IPM process are as follows:

- **Select resistant plants:** Choose pest resistant plant varieties. In addition, use native plants or well-adapted varieties.
- **Use good gardening (cultural) practices:** These practices include maintaining healthy soil, providing adequate drainage and good air circulation, providing proper moisture, and choosing the right plant for the right place. A healthy, vigorous plant is less likely to be affected by diseases and insects.
- **Establish threshold levels:** Decide what level of weed, insect, or disease presence or damage that is acceptable.
- **Monitor pests:** Inspect plants regularly to determine the level and type of pest problems and to determine if and when treatment is needed (e.g., pest level exceeds the threshold). Be aware of beneficial insects as well as pests. When deciding on a treatment, the goal is not to eliminate the pest, but to keep pests and their damage to acceptable levels with the least disruption to beneficial insects and the environment.
- **Identify the problem:** Always identify the insect, weed, or disease causing the problem before initiating treatment. When a pest is accurately identified in damaging numbers (about the threshold), select a control which is targeted to the specific pest, if possible. Beneficial organisms may be impacted by the control, so proceed with caution. Start with the least toxic method. Advance to a more toxic method only if the first approach does not work. Be aware that many biological and chemical controls are effective only during a certain stage of a pest's life cycle.
- **Evaluate the effectiveness and benefits of the selected pest management strategy:** Observation and revisions of pest management methods are an integral part of Integrated Pest Management.

Home lawn owners often overlook the key step of observation and monitoring the lawn. The lawn is actually a "turf grass system" where grass, beneficial organisms, harmful organisms, soil, and air interact in a complex fashion. Sometimes pesticides are quickly applied before the type and scope of the problem is properly diagnosed.

For questions about insect and disease control, please refer to the MSU Extension Oakland County Plant & Pest Hotline, a consumer service (telephone 248/858-0902 or toll-free: 888-350-0900, ext. 80902). In addition to free telephone consultation, samples of grass and pests can be submitted for inspection for a nominal fee. Similar services are available in Wayne and Macomb Counties.

### **3. Grub Management with IPM in Mind**

*(information provided by Charlene Molnar, Oakland County MSU Extension)*

The following outline of grub management reflects Integrated Pest Management. This system of inquiry and decision-making should always be followed before applying insecticides. A problem (such as grubs) on a neighbors lawn does not mean that it will occur soon on your lawn. Always make sure you have a problem...and then consider all options before taking steps.

#### ***What Are Grubs?***

In Michigan, the most destructive white grubs found in lawns and gardens are the larvae of Japanese Beetles and European Chafers. White grubs have C-shaped bodies with brown heads and grow to a length of  $\frac{3}{4}$  inch – 1  $\frac{1}{2}$  inches. They live in the soil and feed on grass roots. Feeding damage from a few grubs has little effect on turf, but when more than half of the grass roots are consumed, the turf may begin to wilt or turn brown in patches.

#### ***Symptoms***

Small, dried out and dying patches of grass, which may peel back like a carpet, indicate a possible grub problem. Skunks or raccoons digging in a lawn usually indicate that grubs are present. Mole damage can be a sign of grubs, but moles also eat other soil organisms such as earthworms.

#### ***Simple Test***

The ideal time to look for grubs is March to mid-May, and from labor Day to Thanksgiving. Cut through three sides of a 1-square foot flat of sod at the edge of the dying grass. Roll the flap back to look underneath. Loosen soil to a depth of 2 to 4 inches. Count the grubs. Return the flap to position and water well for 1 – 2 weeks to allow grass to re-root. Repeat this test in several locations.

If you only occasionally water your lawn, five or more grubs per square foot indicates a grub problem. Ten to twenty or more grubs per square foot in a well-watered lawn may be a serious problem.

### ***Grub Control Options – Prevention***

The best defense against grubs is to maintain a healthy lawn. Frequent watering, proper fertilization and high mowing height promote grass growth and counteracts root damage by grubs. The objective for managing grubs is NOT to maintain a grub-free lawn, but to maintain a healthy lawn that can tolerate a reasonable population of grubs.

### ***Grub Control through Biological Controls***

Beneficial nematodes are soil-dwelling, microscopic worms that burrow inside grubs and can kill them. The *Heterorhabditidae* species of nematodes can reduce grub populations below destructive levels, but work best on irrigated turf. Beneficial nematodes will not harm beneficial insects or earthworms.

### ***Grub Control through Chemical Controls***

If you decide to use a chemical treatment, consider the life cycle of the pest in determining the proper timing of the application. The preventative insecticides may be effective when applied in late-June or July, but they should not be applied unless THERE IS A REASON TO BELIEVE that a problem will exist in the future.

Other chemical pesticides may be used to cure the grub problem in late August, September, October, March or April. For more information, call the Oakland County MSU Extension Plant and Pest Hotline (248) 858-0902.

## **4. Herbicide Use to "Clean Up" Weedy Areas**

If you decide to remove existing lawn weeds with herbicides, it is wise to carefully identify the weed and then investigate all options. Learn the difference between a pre-emergent herbicide and a post-emergent herbicide. A pre-emergent herbicide kills weed seeds before they have a chance to germinate. A post-emergent herbicide kills a weed after it has emerged and is growing.

Make sure that you have properly identified the weed you are fighting and have identified where it is in its life cycle. Also, make sure that there is no practical option to removing the weeds -- such as hand pulling.

Removing weeds with hand tools when the soil is damp is not difficult if weeds have not "taken over" the entire yard. A little persistence and consistency pays off. Perhaps the neighborhood children could be hired to remove dandelions in the spring.

If all other options have been eliminated, herbicides may be considered. Be sure to pay close attention to safety. Follow the label instructions exactly. Weed-killing compounds (herbicides) all present some hazards in use -- to the person applying them as well as to the turf. Professional landscapers who apply herbicides are certified by the State of Michigan. The same chemicals used by professionals are often available to citizens who have no training or certification.

Purchase only what you need and use up the entire container. Recycle empty spray cans. Leftover, spent, or unusable pesticide should be carefully transported to a household hazardous waste collection center.

## 5. Consumer Information About Pesticide Impacts

To identify the health and environmental impact of individual herbicides (and other pesticides), contact the EPA-sponsored National Pesticide Information Center (NPIC). Call toll-free: 1-800-858-7378.; 6:30 am – 4:30 pm, Pacific Time, 7 days a week. Alternatively, the staff will respond to e-mail at: [npic@ace.orst.edu](mailto:npic@ace.orst.edu).

NPIC provides objective, science-based information about pesticides. Information includes chemical impacts and health and the environment.

## K. Managing Weeds Without Herbicides

### 1. What Is a Weed?

A weed is a plant in the wrong place. The lawn owner's perception determines what is a weed and what is not.

Annual weeds reproduce only by seed and live just one season. Perennial weeds reproduce by both seed and roots, and live for two or more years. Many weeds reproduce seed prolifically (up to 30,000 seeds in a single season for some species.)

Weeds are often strong competitors for nutrients, water, sunlight and space. Most noxious weeds are better adapted to compete and succeed than other plants desired by citizens. Weeds detract from the appearance of the lawn and can also be a link in the perpetuation of insect and disease problems.

When weedy places are examined, it is often found that the soil has been subjected to a disturbance at some point. The disturbance may have been the form of cultivation to prepare the ground for planting, grading in connection with road maintenance, excessive trampling, close mowing of the lawn.

Stiff competition from desired grasses is **nature's method** for controlling the undesired weeds. A healthy lawn care program will fight many weeds naturally by improving the vigor and density of the turf grass.

A healthy low-maintenance lawn will inevitable have some weeds. Proper maintenance, however, keeps the grass growing vigorously enough to out-compete many weeds. By growing a thick, healthy lawn and by pulling some weeds by hand, a lawn without herbicides can be successfully maintained to meet the goals of the lawn owner. The lawn owner can then be assured that chemicals which can harm people and pets – as well as chemicals that may harm water quality -- are avoided.

## 2. Practical Tips for Natural Weed Control

Learn about the life cycles of individual weeds. Weeds are easiest to control when they are very young. Is the weed an annual, perennial, or biennial. Purchase a good weed guide from a local bookstore or check the library.

**Annual** weeds include chickweed, lamb's quarters, purslane, pigweed, and others. If you keep them from setting seed, you've eliminated next year's weed crop. **Perennial** weeds include bindweed, dandelions, thistles, dock, and others. They reproduce both by seed and by roots. Wandering roots which can easily resprout from tiny pieces are a concern.

Weed control should consist of preventing weed seeds from reaching the lawn -- and fighting young weeds that begin to grow.

Practical tips for natural weed control include:

- Eliminate sources of weed seed. Prevent weeds from forming seed heads.
- Rototilling the lawn is not a solution for weed elimination. Weed seeds may be dormant in the soil for several years and then grow with vigor when brought to the soil surface.
- Modify the habitat in which weeds grow in order to minimize the conditions that produce more weeds than you are willing to tolerate.
- Mow leaves into the lawn to discourage dandelions. According to Michigan State University student research, sugar maple leaves are particularly effective.

Use of chemical herbicides for weed control is not a permanent solution. Unless proper practices are followed for maintaining healthy soils, the weeds will simply grow back.

The simplest, natural control of weeds is a healthy, dense lawn, which shades the millions of weed seeds in the soil. Without sunlight, the seeds will not germinate. Keep the soil aerated so that grass roots grow deeply to produce thick grass that will naturally fight the weeds.

Remember that weeds thrive in compacted, infertile soil. Measures that reduce soil compaction also fight the weeds.

## Appendix #1:

### “Low Mow” Lawn Options - Upper Midwest Region

#### NATIVE GRASSES

Although there are 1400 native species of grasses indigenous to the United States, only two are considered by the Lawn Institute to be suitable for turf. In general, native grasses require less water and much less fertilizer than non-native species. They are, however, unusual and considered by some to be experimental. Typical lawn grasses, including Kentucky bluegrass and others, are not native to the United States.

**Buffalo grass** (*Buchloe dactyloides*) is one native grass being used to create lawns in the Midwest. It is native to the Great Plains, is fine-textured, low-growing, and grayish-green in color. Buffalo grass is drought-tolerant once established and becomes even more so if mowed infrequently and high. Buffalo grass thrives in heat and sun. It tolerates dry, compacted clay soils – but it does NOT do well in dense shade or sandy, poorly drained soils. It goes brown with the first frost and is slow to green up in the Spring. **HOWEVER, ACCORDING TO MSU RESEARCHERS, BUFFALO GRASS IS NOT VERY SUITED TO THE CLIMATE AND SITE CONDITIONS OF SOUTHEAST MICHIGAN.**

#### NO MOW GRASS SEED MIXES

“No mow” grass seed mixes are available from Prairie Nursery in Westfield, Wisconsin (800-476-9453 or [www.prairienursery.com](http://www.prairienursery.com)) among other locations. The Prairie Nursery product is a blend of six low-growing Fine Fescue turf grasses which will:

- Grow to form a dense turf
- Thrive in full sun or partial shade
- Require little water or fertilizer
- Require mowing only once or twice a year, thereby reducing maintenance dramatically.

The “no mow” fescue blend is more drought resistant than a bluegrass lawn because of the deeper root system and is suitable for the cooler, medium rainfall areas of the Upper Midwest and Canada. Seeding in late August or September is recommended, allowing the turf to become established before spring weed seeds have time to germinate. Seeding in the spring can create challenges, because weeds often grow faster than this slow-growing seed mix.

The “no mow” lawn is a soft, four-to-six inch tall “flowing carpet of grass.” The nutrients from mulched grass are usually sufficient fertilizer. For a more “cropped lawn look”, occasional mowing (perhaps once per month) to a height of three to four inches is workable (same height recommended for all species of grass). One use for the “no mow” blend is as a transition between a “regular lawn and home” and a wooded area or prairie.

## Appendix #2

### FACT SHEET: COMPOST FROM SOCRRA

**What is SOCRRA?** The Southeastern Oakland County Resource Recovery Authority (SOCRRA) is an intergovernmental organization providing waste management, yard waste management, and recycling services to member communities including: Berkley, Beverly Hills, Birmingham, Clawson, Ferndale, Hazel Park, Huntington Woods, Lathrup Village, Oak Park, Pleasant Ridge, Royal Oak, and Troy. Office address: 3910 W. Webster, Royal Oak; [www.socrra.org](http://www.socrra.org).

**Location of the SOCRRA Compost Site:** 1741 School Road, Rochester Hills. (Located north of M-59; just west of Dequindre Rd.)

**Availability of screened compost:** SOCRRA compost is returned to SOCRRA member communities for distribution to residents and for community gardening projects. Compost may also be picked up for free at the compost site at certain times (usually Saturday mornings). *For information on times, call the office at 248-288-5150 or [www.socrra.org](http://www.socrra.org) (go to “HOURS”).*

**Materials used to make SOCRRA compost:** Leaves, grass clippings, and other yard waste material collected from SOCRRA communities); plus woodchips.

**Process at the compost site:** Once at the compost site, yard waste is mixed and shredded, achieving a 2:1 ratio of leaves to grass clippings. The mix is placed in windrows (long piles) and turned periodically to allow aeration and natural moisture addition. After decomposition, the compost is screened to remove sticks, stones and other debris. The screened compost is then stockpiled for curing.

**Characteristics of SOCRRA compost,** as analyzed by Woods End Laboratories, Inc.:

**pH:** 7.63 (alkaline, like many soils in Southeast Michigan)]

**Total nitrogen:** 1.410%

**Phosphorus (P):** 0.178%

**Potassium (K):** 0.616%

**Pesticide residue:** Extremely low

**Recommendation for use:** Mix SOCRRA compost with native soil on a 50-50 basis. SOCRRA compost is an excellent amendment and top-dressing for all gardens and lawns, and has been extensively used by local gardeners and some landscapers in Southeast Michigan.

**Benefits of compost for healthy soils and water quality:**

- Increases water-holding capacity of sandy soils.
- Enhances the permeability of clay soils.
- Slowly releases nutrients to plant roots.
- Improves soil structure and tilth.
- Restores microbial populations.
- Suppresses certain soil-borne diseases.
- Prevents soil erosion.
- Degrades oils, pesticides, and other soil contaminants.
- Binds heavy metals carried by storm water runoff.

## Appendix #3

### OVERSEEDING and RESEEDING Tip Sheet Written by Barbara Johnson, Advanced Master Composter

#### OVERSEEDING:

When your lawn looks 'tired', thinning, worn out,' it may need overseeding. I usually overseed every three or four years (or when I feel up to it). The process is easy and inexpensive. I am able to complete the job by myself in a couple of hours – front yard OR back yard – but this does depend upon the size of the lawn. It is best done during the first two weeks of September.

BEFORE YOU START: measure to learn the square footage of your lawn; have on hand enough good quality seed to cover the whole lawn generously, and also have on hand enough compost to cover the area. Don't attempt to grow grass underneath big trees. Create an island made of mulch and just place large containers of flowers that can take shade. Call your local DPW and see if they have free compost. I load up containers that fit into my van, drive to the DPW, back up to the pile of compost, and shovel into the containers.

1. Mow the lawn as short as you can. (I know, this is against all the rules for mowing, but it's okay for this process only).
2. Rake as hard as you can. (Again, I know raking is not usually approved of, but...) You should be able to put all the raked material into your compost bins. The soil must be exposed so the seeds can make contact and germinate.
3. Spread good seed generously. I found it easier to spread just along one strip, (you choose the width – e.g. 3 feet) then I follow by spreading compost about 1/16" thick on top of the seeds.
4. I repeat for another strip: seed followed by compost. This way means I don't have to walk on the completed strips and disturb the seeds or compost.

In decades past, after reseeding or overseeding, I would spread straw over the lawn to protect the seeds from the birds, but now I decided to use compost as I had learned how it would improve the soil – didn't remember right away that compost can hold more than its weight in water: **100 lbs of compost can hold 130 lbs of water!** This meant that when I watered the lawn each morning, the soil would remain damp. I didn't have to water again until the next morning and the seeds didn't dry out. I saw green tips by the third or fourth day, and usually by the tenth day I could mow!

## RESEEDING (with Grass Seed and Compost)

When your lawn is really thin – almost all weeds and dead grass, you probably need to start over. This is called reseeding and is best done in early Spring or during the first two weeks of September. You need to choose between buying sod or spreading seed.

Reseeding is cheaper because you can do it yourself. Measure your lawn to learn the size in square feet. Buy good seed: perennial rye and tall fescue look like bluegrass, and tall fescue is shade tolerant. Mixtures of grass seed are best as they are more disease resistant.

Don't even try to keep grass growing underneath large shade trees. Use your hose to outline an attractive area: large and curving, going beyond the drip line. (by the way, do you know that tree roots grow far out beyond the drip line – the ends of branches?)

Have compost on hand to spread over the seeds as they must be kept from drying out.

Rake strongly and spread seed generously. If you spread the seed in a strip about 3 feet wide, you can cover the seeds with about 1/16" compost to protect them from the birds. You can then add another strip of seeds plus compost, and you won't be walking over all you've done and messing it up.

Repeat until the whole lawn area has been covered with seeds and compost. Now you must moisten the lawn – don't water so much that everything washes away. If you have a sprinkler system, you will remember to water the whole area each morning – each area getting about 10 minutes worth. The compost will keep the seeds moist so you won't have to water again until the next morning. If you don't have a sprinkler system, you will need to move your hoses around.. Of course, if rain is forecast you can leave this chore to Mother Nature.

The best hint regarding mowing is to mow high. During hot weather, the minimum is three inches.

#### Appendix #4:

### BOOKS & PRINTED REFERENCES

Brooklyn Botanic Garden, *Easy Lawns: Low Maintenance Native Grasses for Gardeners Everywhere*, Stevie Daniels, Guest Editor, Brooklyn, New York, 1999, paperback.

Chicago Horticultural Society, *Plant Facts - General Lawn Care*, No. 37, Chicago, Illinois.

Christians, Nick with Ashton Ritchie, "*Scotts' Lawns – Your Guide to a Beautiful Lawn*", Meredith Books, 2002, paperback.

Danneberger, T. Karl, *Turfgrass Ecology & Management*, Franzak & Foster, 1993 (hardcover).

Doppel, Tim, et al. *The Healthy Landscape: Landscape Care for A New Century*, Metropolitan Detroit Landscape Association, 1996.

Ellis, Barbara, editor. *Safe & Easy Lawn Care -- The Complete Guide to Organic, Low-Maintenance Lawns*, Houghton Mifflin Company, Boston, 1997 (paperback).

Franklin, Stuart, *Building a Healthy Lawn: A Safe and Natural Approach*, Storey Communications, Inc., 1988 (paperback).

Kessler, G.M., J.L. Taylor and D.D. Warncke. *Fertilizing Garden & Landscape Plants & Lawns*, North Central Regional Extension Publication No. 356, reprinted February 1996, available through county MSU Extension offices, 15 pp.

Olkowski, William and Sheila Daar, *Common-Sense Pest Control*, Taunton Books, 1994.

Patchan, Gregory M., "Lawn Establishment, Care and Maintenance", chapter from Michigan Master Gardener Notebook, 1995.

Raymond, Dick, *Natural Lawn Care*, Storey Communications, 1993, paperback.

Rogers, Trey; *Lawn Geek – Tips and Tricks for the Ultimate Turf from the Guru of Grass*, New American Library, 2007, paperback.

Tukey, Paul, *The Organic Lawn Care Manual*, A Natural, LOW-Maintenance System for a Beautiful, Safe Lawn, Storey Publishing, 2007, paperback.

Walheim, Lance and the Editors of the National Gardening Association, *Lawn Care for Dummies*, IDG Books Worldwide, Inc., Foster City, California, 1998, paperback.

## Appendix #5

### WEBSITES FOR LAWN AND SOIL INFORMATION

Recommended by

Members of the Healthy Lawns and Gardens Technical Advisory Committee

MSU Turfgrass Science – Home Lawns

<http://www.turf.msu.edu>

MSU Turf Weeds

<http://www.msuturfweeds.net>

MSU Soil Ecology and Management

<http://www.safs.msu.edu/soilecology/index.htm>

MSU Extension Soil Web Pages for Consumers

<http://web1.msue.msu.edu/monroe/soilweb2/index.htm>

Brooklyn Botanic Garden Sustainable Techniques

<http://www.bbg.org/gar2/topics/sustainable/>

NRCS Soils Website

<http://soils.usda.gov/>

NRCS Soil Biology website

[http://soils.usda.gov/sqi/concepts/soil\\_biology/biology.html](http://soils.usda.gov/sqi/concepts/soil_biology/biology.html)

Sustainable Turf Care/National Sustainable Ag Information Service

<http://attra.ncat.org/soils.html>

University of Minnesota Extension

<http://www.extension.umn.edu/gardeninfo/components/info.lawns.html>

<http://www.extension.umn.edu/distribution/horticulture>

University of Illinois Extension

<http://www.urbanext.uiuc.edu/lawntalk/>

University of Minnesota Sustainable Urban Landscape Information Series

<http://www.sustland.umn.edu/index.html>

Soils & Compost National Sustainable Ag Information Service

<http://attra.ncat.org/soils.html>

Virginia Cooperative Extension Publications

[www.vt.ext.edu](http://www.vt.ext.edu)

Virginia Turf Weeds

<http://www.ppws.vt.edu/~saskew/tufweeds/>

“The Yardener” – Jeff Ball, Garden Writer

[www.yardener.com/BasicLawnCareTechniques.html](http://www.yardener.com/BasicLawnCareTechniques.html)