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# Calibration Guidelines for Home Lawns

## Measuring Your Lawn:

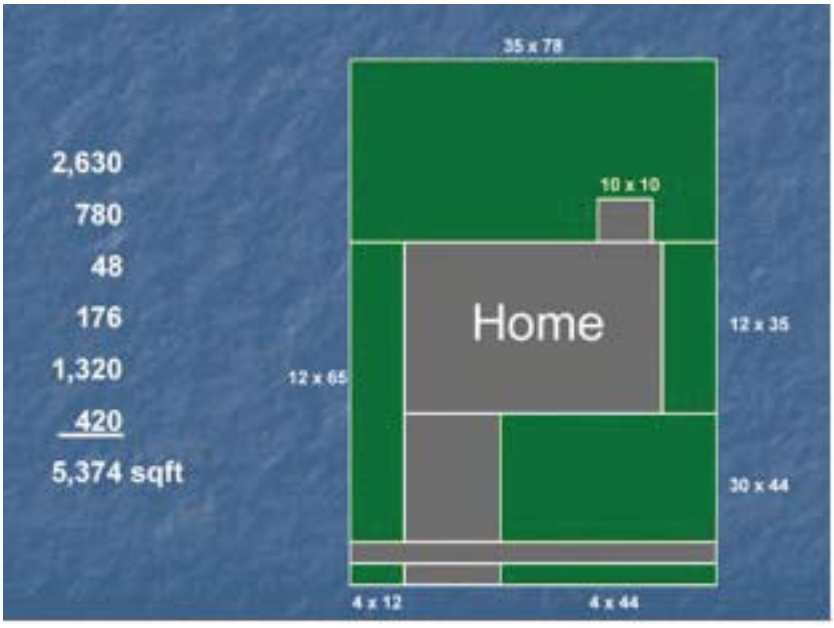
Area measurements and mapping a lawn should be the first step in any home lawn care program. It is essential to know the square footage of your lawn in order to make accurate applications of fertilizers and other lawn care products. The most commonly used area measurements are square feet (sqft) and acres (ac). Most home lawns can be measured up in units of 1,000 sqft.

Calculating area can be accomplished using several methods; dividing a lawn into geometric figures (rectangles, trapezoids, triangles, circles and ovals) and using the offset method (for irregular shaped areas).

### *Geometric figures*

- Rectangle Area = length x width
- Trapezoid Area = (A+B/2)(height); A& B are lengths of parallel sides
- Triangle Area = (length of base x height) /2
- Circle Area = $3.14(\text{radius})^2$
- Oval Area = (length of oval x height of oval) (0.8)

***Example:***




## Applying Products Correctly:

Proper use of fertilizers and other lawn care products, whether of synthetic or natural origin, contributes to healthy plant growth. Applying too much of a synthetic fertilizer may cause foliar burns or injury to the plant. Using too little may result in inadequate pest control or nutrient deficiencies.

The only way to know just how much fertilizer or pest control product is being applied to your lawn is to calibrate your application equipment. Calibrating simply begins with knowing the total square footage of your lawn and making sure you apply the correct amount of material for that square footage according to the manufacturer's recommendation. Always read and follow the product label.

## In This Issue

# Plants That Can Harm

**Disclaimer:** ***The following article was written for educational purposes only. Please contact a physician or the nationwide Poison Information Center (800-222-1222) if you suspect someone has eaten a poisonous plant.***

The third week of March each year is designated as National Poison Prevention Week and serves as an opportunity to educate the public about the danger of poisonings and how to prevent them. Although plants are an integral part of our life and critical to our well-being, there are a number of plant species that can be harmful because of their toxicity. It has been estimated that more than 700 species of plants growing in North America have caused illness or death in humans and that more than three percent of all poisonings are plant-related. Some poisonous plants have become such an integral part of our lives that many of us have lost track of the fact they are potentially harmful.

A poisonous plant can be defined as "any plant possessing a property injurious to man or animals". The term "injurious" can imply allergic reactions caused by spores or pollen, skin rashes caused by dermal contact with plants, and internal poisonings cause by ingestion of plant material. It is the latter type of poisoning that causes the greatest concern relative to human safety. Many poisonous plants are of significant medicinal value in that the toxic compound, when administered in small, controlled dosages, has valuable healing properties (e.g. digitalis or belladonna). In other cases the toxic agents in poisonous plants has been isolated and used as an effective insecticides (e.g. pyrethrum).

The substances that cause plants to be poisonous are biologically active chemicals that are formed through many different pathways within plants. Most are considered to be secondary metabolites (by-products) resulting from essential functions of the plant that provide it with valuable side-effects because of their toxicity. For example, a toxic secondary metabolite produced by a plant can increase its chances of survival by deterring animals and insects from using it as a food source. The diversity of toxic compounds in plants is remarkable. Although varied in nature, these toxic compounds can be classified into one of eight different groups all having one thing in common–they interfere with the metabolism of other living organisms, which makes them toxic. For example, the alkaloids represent a large group of toxic compounds contained by many plants (e.g. members of the Solanaceae [Nightshade] family) and are cholinesterase inhibitors that act on the nervous system. Other compounds such as the cardioactive glycosides are steroidal in nature and act as heart stimulant; ingestion of large amounts can lead to heart failure in humans. For a more thorough discussion of the nature of these toxic compounds a comprehensive reference such as *A Colour Atlas of Poisonous Plants* (D. Frohne and H. Pfander; Wolfe Publishing Ltd.; London, Eng.) should be consulted.

Poisoning by ingesting plants is much more common among children rather than adults. This partly stems from the fact that children are inquisitive by nature and might be tempted to sample a brightly colored berry or other interesting plant part, when adults would not. Secondly, most poisons are rated in toxicity according to the amount that must be ingested per unit of body weight to produce an effect (i.e. mg active ingredient/ kg body weight). Since children weigh less than adults it takes less of a toxic compound to produce visible symptoms of poisonings in children than in adults. Keeping poisonous plants out of the ready access by children is key to preventing poisoning. Plant poisoning in adults most often results from consuming unknown or incorrectly identified plant material rather than from experimentation. Education concerning which plants are poisonous is key to prevent poisoning. The following table is a **partial listing** of plants that are known to be poisonous. It was provided by the Missouri Poison Center located at Cardinal Glennon Children's Hospital in St. Louis (800-392-9111).

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| ***Common Name*** | ***Botanical Name*** |
|---|---|
| Apricot pits and leaves | Prunus armeniaca |
| Arrowhead vine | Syngonium podophyllum |
| Avocado peel and pid | Persea americana |
| Autumn crocus | Colchicum autumnale |
| Azalea | Rhododendron species |
| Bird of Paradise | Poinciana gilliesii |
| Bittersweet | Solanum dulcamera |
| Black nightshade | Solanum nigrum |
| Caladium | Caladium bicolor |
| Calla lily | Zantedeschia acthoipica |

## Plants That Can Harm continued from page 14

| *Common Name* | *Botanical Name* |
|---|---|
| Castor beans | Ricinus communis |
| Crabapple seeds | Malus species |
| Daphne | Daphne mezereum |
| Deadly nightshade | Altropa beladonna |
| Devil's ivy | Epipremnum aureum |
| Dumb cane | Dieffenbachia seguine |
| Elephant's ear | Alocasia macrorrhiza |
| Foxglove | Digitalis purpurea |
| Goldenchain tree | Laburnum anagyroides |
| Holly berries | Ilex species |
| Hyacinth | Hyacinthus orientalis |
| Hydrangea | Hydrangea species |
| Indian tobacco | Lobelia inflata |
| Iris leaves, roots, and rhizomes | Iris species |
| Jequirity bean (rosary pea) | Arbus precatorious |
| Jimsonweed | Datura species |
| Jack-in-the-pulpit | Arisaema triphyllum |
| Jerusalem cherry | Solanum psuedocapsicum |
| Larkspur | Delphinium species |
| Lily of the valley | Convalleria majalis |
| May apple (unripe fruit, root, and leaves) | Podophyllum peltatum |
| Mistletoe berries | Phoradendron villosum |
| Monkshood | Aconitnum columbianum |
| Moonseed berries | Menisperum canadense |
| Morning glory | Ipomea hederacea |
| Oleander | Nerium oleander |
| Peace lily | Spathiphyllum species |
| Pear seeds | Pyrus species |
| Periwinkle | Vinca species |
| Plum leaves, stem, bark, and pits | Prunus domestica |
| Heartleaf philodendron | Philodendron cordatum |
| Poison ivy | Toxicodendron rydbergii |
| Poison hemlock (resembles wild carrot) | Conium maculatum |
| Poison oak | Rhus diversiloba |
| Potato plant leaves | Solanum tuberosum |
| Privet | Ligustrum species |
| Raw cassava root | Manihot esculenta |
| Rhubarb leaves | Rheum rhabarbarum |
| Split-leaf philodendron | Monstera deliciosa |
| Tobacco | Nicotiana species |
| Tomato leaves | Lycopersicon lycopersicum |
| Virginia Creeper | Parthenocissus quinquefolia |
| Water Hemlock | Cicuta maculata |
| Wisteria seeds and pods | Wisteria Species |
| Yew | Taxus Species |

Always remember that prevention is the best cure for plant poisonings. The following are a few common sense suggestions that will help:

+ Become familiar with the plants in and around your home (common and scientific names) and know which ones are poisonous. Consult a reliable reference if necessary.
+ Instruct children to **never** put a plant or plant part in their mouths. Eliminate keep all known poisonous plants from your home or keep them well out of the reach of children.
+Never store non-food plants in your refrigerator.
+Never use flowers or other plant parts for food unless you are certain they are non-toxic and their production history is known. Pesticides used on ornamental plants are not necessarily labeled for food plants.
+Never experiment when it comes to consuming plants of unknown identity or toxicity.

If you think someone has eaten a poisonous plant, immediate action should be taken. While it is important to act quickly it is equally important not to panic. Remove any plant parts from the person's mouth and give the person a small amount of water to drink. Call the nationwide **Poison Information Center at (1-800-222-1222)**, your local hospital or your local police department **(911)**. Try to identify the plant that was eaten and collect a small sample of the plant, if possible. Give the sample to or identify the plant for the professionals who administer medical treatment to the victim.

Poisonous plants have been a part of our daily lives for years. Their presence is not a cause for alarm as long as we know the dangers involved and are aware of the risk implied by their presence.

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# Home Lawn Basics

We have just had a major thaw after several weeks of cold weather and a few days of warmer weather is encouraging tree buds to swell and perennial bulbs to send up shoots. These are the signs that get most home gardeners anxious to start spring chores, one of which is home lawn care. Rather than lay out a punch list of items to do for the spring, it would be more advantageous to cover home lawn basics that apply to the entire season. These basic practices will offer a more complete approach to lawn care that will build a healthy lawn that is more environmentally friendly to Missouri's ground waters.

## How to Soil Test:

A routine soil fertility test (pH, neutralizable acidity, phosphorus, potassium, calcium, magnesium, organic matter, and cation exchange capacity) is recommended under the following circumstances:

- Before establishing a new lawn, whether from seed, sod, or sprigs.
- Every three years on established lawns (early spring or early fall).
- Annually when attempting to correct a nutrient deficiency or change the soil pH.

### *Taking a soil sample:*

- Your local MU Extension center has soil sample boxes available for use at no charge. One box (1.5 to 2 cups) is all the University lab needs for analyses.
- Using a small shovel or soil probe, sample to a 4 inch depth on established lawns or before seeding.
- Take 12 or more random cores from each area of the lawn to be tested and remove the thatch and live plant material before breaking up the cores and mixing thoroughly in a clean, dry plastic bucket. (Metal buckets contaminate the sample with micronutrients.) Take random samples from the lawn as a whole unless there is a need to sample problem areas separately.
- Obtain a Horticulture Soil Sample Information form, MP 555, from your local MU Extension center or from the Web (http://www.soilplantlab.missouri.edu/soil/). For additional information refer to MU Guide G6954 – Soil Testing for Lawns. Send the sample to the Soil and Plant Testing Laboratory at the following addresses or your local Extension office:

  23 Mumford Hall
  University of Missouri
  Columbia, MO 65211

## Measuring Your Lawn

Area measurements and mapping a lawn should be the first step in any home lawn care program. It is essential to know the square footage of your lawn in order to make accurate applications of fertilizers and other lawn care products. The most commonly used area measurements are square feet (sqft) and acres (ac). Most home lawns can be measured up in units of 1,000 sqft.

Calculating area can be accomplished using a simple method of dividing your lawn into geometric figures (rectangles, triangles, and circles). After taking several measurements, add each section for a total square footage. Another approach would involve taking a length and width measurement of your lot size, then subtract the square footage of your home, driveway, sidewalks, etc.

### *Geometric figures*

- Rectangle - Area = length x width
- Triangle - Area = (length of base x height) /2
- Circle - Area = $3.14(\text{radius})^2$

## Applying Products Correctly:

Proper applications of fertilizers and lawn care products are important to the health of your plants and quality of the environment. Applying too much of a synthetic fertilizer or pesticide to your lawn may cause foliar burns and injury or have negative environmental effects. While applying too much of a natural lawn care product is usually not injurious to your lawn, it can be economically infeasible. Applying too little of fertilizers or lawn care products can result in a low quality lawn, deficient in what it needs; making your lawn more prone to pest problems.

The only way to know just how much fertilizer or lawn care product is being applied to your lawn is to calibrate your application equipment. Calibrating simply begins with knowing the total square footage of your lawn and making sure you apply the correct amount of material for that square footage according to the manufacturer's recommendation. Always read and follow the product label.

### *Calibrating spreaders:*

Homeowners have a wide variety of spreaders to work with - some drop type, some rotary type, some listed on the product label for recommended settings, and many that are not. Rotary type spreaders are the best option in the application of lawn care products. They make applications easier, due to the fact that you do not need to worry about coming back precisely on your previous wheel marks. Rotary spreaders also require fewer passes to cover your lawn.

The best approach for homeowners does not necessarily involve the actual calibration of their spreader, but a more common sense approach to applying lawn care products. First, you need to accurately measure the square footage of your lawn and then purchase the correct amount of lawn care product. Second, evenly distribute that material over the total square footage. For example, you measured your lawn to be 10,000 square feet. The lawn care product you purchase states that, the contents of this bag covers 5,000 square feet. Therefore, you require 2 bags of this product to cover 10,000 square feet. You may ask now, what is the best technique to evenly distribute this product. Even distribution is usually assured with multiple passes in multiple directions over your lawn. Therefore, place your spreader on a light setting and continue to make passes over your lawn, changing directions with each pass until all the required material has

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been applied. This may require 3, 4, 5 or more trips over your lawn, but you can be certain that the distribution of the material is very good. In time, as you become familiar with your spreader and the products you use; you can fine tune your spreader to reduce the number of trip required.

Most fertilizers and lawn care products have tables on their bags with suggested settings for various brands of spreaders. If you are fortunate enough to own a spreader specified in the table, then; use that setting. Keep in mind that those settings are usually for one pass over the lawn. These application tables also assume a 3 mph walking speed. To give uniform applications, consider cutting the setting by 1/3 to ½, making two to three applications to avoid skips. This might be a way to decrease the number of trips you have to make with the above method.

For those wishing to know specific calibration techniques of rotary spreaders, please refer to MU Guide Sheet WQ551 – Calibrating Home Garden Equipment @ http://extension.missouri.edu/explore/envqual/wq0551.htm.

## Proper Mowing is Key to Healthy Lawns

Turfgrass plants improperly mowed are under greater stress. Greater stress means a lawn can be more susceptible to weeds, diseases and insects. **Therefore, less stress from proper mowing practices equals fewer inputs ($) for a home owner or professional grounds manager.**

**Optimal cutting heights for cool-season grasses, such as blends of turf-type tall fescues, should range from 3.0 to 4.0 inches. Warm-season grasses, like zoysia, can range between 1.5 and 2.5 inches.**

Seasonal variation in mowing height was once thought to be highly beneficial and is still considered beneficial by some. We know that mowing cool-season grasses a little taller in the summer months can have benefits through summer stress periods (deeper roots, better cooling effect). **Taller grasses will also conserve moisture, giving some reduction in irrigation requirements.** We also know that cool-season grasses mowed a little taller in the spring and fall compete more successfully against weeds (up to 80 % control of annual weeds). Therefore, **select the tallest, acceptable mowing height for your species of grass and maintain that height during the entire season**. This provides benefits throughout the season -- competition against weeds as well as reduced summer stress.

**Clippings should be uniformly distributed rather than deposited in clumps.** Mowing the lawn when the **grass is dry** and using a properly sharpened mower blade will spread clippings evenly. If some areas produce excess clippings, simply mulch those in with a second passing of the mower.

Mowing creates wounds through which fungi can enter the plant and infect it. **Leaf cuts made by a sharp mower blade are cleaner and heal faster** than the tearing and shredding caused by a dull mower blade. A dull mower blade inflicts more and bigger wounds that increase potential for infection by turfgrass diseases. **Having a sharp, spare mower blade allows you to switch blades when needed and prevents delays in mowing when getting your mower blade sharpened.**

**Observe leaf tips or grass clippings collected on your mower deck immediately after a mowing to determine the quality of cut. Use this as an indicator of when to sharpen mower blades.**

**During hot summer months it is best to mow later in the day to minimize additional stresses on your grass.**

**It is also best to change directions of mowing each time you mow.**

**Frequency of cut should be determined by the "one-third rule" of mowing.** You should make sure that no more than one-third of the leaf growth is removed during a single mowing. During the spring and fall, cool-season grasses can be mowed every 5 to 6 days.

Many homeowners believe **grass clippings** need to be removed to have a healthy, vigorous lawn. By following the steps in the **"Don't Bag It" lawn care program,** you can have a beautiful lawn without collecting your grass clippings (MU Guide G6959 – "Don't Bag It" Lawn Care: How to Recycle Your Grass Clippings, Leaves and Branches). Returning grass clippings can return as much as 35 percent nitrogen and 50 percent potassium. Grass clippings also contribute to the organic matter levels of your soil improving the water and nutrient holding capacity of the soil.

**When is it OK to bag clippings?** 1) When delayed in mowing due to rain; 2) When you wish to make compost (Refer to: MU Guide G6956 – Making and Using Compost & G6958 – Grass Clippings, Compost and Mulch: Questions and Answers); and 3) When preparing for aeration and over-seeding in late summer to early fall. **Avoid using grass clippings in compost when chemically treated.**

**A word of caution about weed-eating:** Weed-eaters typically scalp turfgrasses when edging along sidewalks, curbs, and driveways. This promotes weeds! Best edging practices include a power edger or weed-eater (rotated) with a vertical blade preventing any scalping of turfgrasses.

## Fertilizer Schedules

Feed turfgrasses when they are actively growing (Synthetic Fertilizers - Table 1). Cool-season grasses should be fed primarily in the fall with some fertilizer applications made in spring. Many spring applications are in the form of fertilizer impregnated with preemergent herbicides for annual grassy weed control (crabgrass preventers – applied by April 15th). Warm-season grasses should be fed after initial green-up in the spring. They can be given N fertilizer during each month of active growth (May through August for nitrogen only; potassium applications in September).

Late-season nitrogen fertilization, sometimes referred to as late-fall fertilization, has been used by turf managers for years. This type of fertility program involves the application of much of the season's nitrogen during the late season months of August through October or November (dependent

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***Table 1. Nitrogen application scheduling***

| | SEPTEMBER | OCTOBER | NOVEMBER | MARCH to APRIL |
|---|---|---|---|---|
| Standard cool-season | 1.0[1] | 1.0 | 1.0 | 0.5-1.0[2] |
| Low-maintenance cool season | 1.0 | | 1.0 | 0.5-1.0 |
| | **MAY** | **JUNE** | **JULY** | **AUGUST** |
| Standard warm-season | 0.50 | 0.50 | 0.50 | 0.50 |
| Low-maintenance warm season | 0.50 | | 0.50 | |

***Notes:***

[1.] All rates are in pounds of nitrogen (N) per 1,000 square feet.

[2.] The spring application may be made with a combination crabgrass preventer.

upon location). It is important that late-season fertilization not be confused with dormant or winter fertilization. The latter method implies that fertilizer applications are made after the turf has lost most of its color during late fall or winter and is not actively growing. This differs notably from the late season concept, which requires that nitrogen be applied before the turf loses its green color in the fall. Late-season fertilization has become popular because of many agronomic and aesthetic advantages, which include: better fall and winter color, earlier spring green-up, increased shoot density, improved fall, winter and spring root growth, and enhanced storage of energy reserves (carbohydrates) within the plant.

It is important to remember that the nitrogen source used for fall application be a type that is not heavily dependent on microbial activity to cause the nitrogen to release. This means that fertilizers containing urea, sulfur-coated urea (SCU), IBDU, shorter-chain methylene ureas and ammonium sulfate are ideal N sources for the late-season applications. Although SCU and IBDU are referred to as controlled-release fertilizers, the rate at which nitrogen is released from these fertilizers mainly depends on soil moisture and not on the degree of microbial activity. The use of microbe-dependent N sources for late-season applications may not elicit the desired fall/winter color response because they do not provide enough available nitrogen for plant uptake when temperatures are low. However, these slow-release N sources would be ideal for spring and summer use. Examples of these would be natural organic nitrogen sources and fertilizers consisting mostly of longer-chain methylene-ureas (low in cold-water soluble N). Research has shown at several universities that natural organic fertilizers, such as Bradfield, Milorganite, Sustane, Ringer, Nature's and Organica, perform well in home lawn fertilization programs (See Table 2 and 3 for organic fertilizer schedules). A product like Organica, a corn gluten-based fertilizer, can also provide some preemergent activity for annual grass and broadleaf weed control.

### *Calculating How Much Fertilizer to Apply*

The first of the three numbers on a fertilizer bag is the percent nitrogen (by weight), the second is percent P2O5 (not actual P), and the third number is percent K2O (not actual K). Percent nitrogen refers to the concentration of nitrogen in the fertilizer source. Natural organic sources are typically low in nitrogen concentration, while synthetic nitrogen sources are higher. Knowledge of this number allows one to calculate how much fertilizer to apply based on specific rates of nitrogen being applied per 1,000 square feet. If you want to apply 1 pound of nitrogen per 1,000 square feet of lawn area, you must apply Ringers organic fertilizer (9 percent N) at a rate of 11 pounds of fertilizer per 1,000 square feet. Knowing this simple calculation allows you to apply proper amount of nitrogen per 1,000 square feet regardless of the type of fertilizer or nitrogen type.

***Table 2. Application Schedule for Organic Fertilizers Cool-season Grasses*** **(Rates are expressed in pounds of nitrogen per 1,000 sqft)**

| | | | |
|---|---|---|---|
| **Cool-season Grass No Fall Seeding** | **Early April:** Corn Gluten* Product 0.8-1.2 | **Late June:** Corn Gluten or other Organic Product 0.4-0.8 | **Mid Sept.:** Corn Gluten or other Organic Product 0.8 |
| **Cool-season Grass Fall Seeding** | Corn Gluten Product 0.8-1.2 | Corn Gluten or other Organic Product 0.4-0.8 | Do not use Corn Gluten, use another Organic 0.3-0.8 |

** Corn gluten based organic products offer some pre-emergence weed control for annual weeds and can affect turfgrass seed germination. Be sure to purchase corn gluten products that are in a granular formulation. They are much easier to spread.*

***Table 3. Application Schedule for Organic Fertilizers Warm-season Grasses*** **(Rates are expressed in pounds of nitrogen per 1,000 sqft)**

| | | | |
|---|---|---|---|
| **Warm season Grass** | **Mid April:** Corn Gluten* Product 0.8-1.2 | **Late June:** Corn Gluten or other Organic Product 0.4-0.8 | **Mid August:** Corn Gluten or other Organic Product 0.8 |

** Corn gluten based organic products offer some pre-emergence weed control for annual weeds and can affect turfgrass seed germination. Be sure to purchase corn gluten products that are in a granular formulation. They are much easier to spread.*

## Proper Watering Methods

Nearly all diseases require water for their development. Some disease problems such as pythium blight, brown patch, and dollar spot are accentuated by extended periods of free moisture. Extended periods of free moisture in turfgrasses can be caused by dew, guttation fluids, and frequent irrigation or rainfall. Guttation is the formation of water droplets at the tips of grass leaves that contain exudates of sugars and proteins. These exudates serve as an excellent food source for diseases. Remove dew and guttation fluids from

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**Calculating how much fertilizer to apply**

The first of the three numbers on a fertilizer bag is the percent nitrogen (by weight), the second is percent P2O5 (not actual P), and the third number is percent K2O (not actual K).

Percent nitrogen refers to the concentration of nitrogen in the fertilizer source. Natural organic sources are typically low in nitrogen concentration, while synthetic nitrogen sources are higher. Knowledge of this number allows one to calculate how much fertilizer to apply based on specific rates of nitrogen being applied per 1,000 square feet. If you want to apply 1 pound of nitrogen per 1,000 square feet. Knowing this simple calculation allows you to apply percent N) at a rate of 11 pounds of fertilizer per 1,000 square feet regardless of the type of fertilizer or nitrogen type.

**Example:**

Apply 1 pound of nitrogen (N) per 1,000 square feet with 24-4-12 fertilizer. Take 1 pound of N divided by the percent N in the product, which will equal the pounds of fertilizer to apply per 1,000 square feet.

$$\frac{\text{1 lb. of nitrogen needed}}{\text{0.24 (\%)}}$$

**= 4.16 lb. of fertilizer per 1,000 sq. ft.**

Fertilizer applications can also be made based on the amount of phosphorus (P) or potassium (K) needed per 1,000 square feet. Divide the number of pounds you need per 1,000 square feet by the percent of P or K (decimal form) to equal pounds of fertilizer required per 1,000 square feet.

grass leaves by dragging a hose across the surface, using a whipping pole, or briefly irrigating only long enough to wash the dew from the surface. Following these methods will spread the concentrated dew or guttation over a larger surface area causing the turf canopy to dry faster.

Improper irrigation alone may create a disease problem that could have been prevented. Avoid frequent irrigation that results in extended periods of free moisture. Avoid late evening watering that extends free moisture period throughout the night. Cool-season grasses can be allowed to have drying periods (near wilting) to disrupt the growth cycle of fungi favoring free moisture.

Irrigation in the early morning not only limits extended periods of dew and guttation, but irrigation is also being applied at a time of the day when temperatures are low (reduced evaporation) and winds are calm (better distribution of water). A general rule of thumb is to avoid puddles and runoff during irrigation, put the water where it is needed, and irrigate only what your particular soil type can absorb in one cycle. Lawns need 1 to 1 ½ inches of water a week either from rain or irrigation.

### Benefits of Timing of Aeration:

Aeration is a practice of pulling soil plugs to open the soil surface for better air, water and nutrient movement. It is a practice that also helps to reduce compaction and thatch by spreading soil plugs on the surface. Soil plugs are crumbled and fall freely into aeration holes as well as spreading some soil into the thatch layer where soil microbes can feed on thatch debris. Aeration is a practice that can be done in both spring and fall.

Aeration is the very best way to begin a fall fertilization program. Applications of fertilizer after aeration will move nutrients immediately into the root-zone of your lawn. This practice has shown excellent results in the density and color of cool-season turfgrasses on their way to recovery from summer stresses.

Aeration is also an excellent practice prior to fall over-seeding. If lawns show some thinning from a stressful summer, over-seeding is recommended to maintain the density desired for a quality lawn. Aeration prior to seeding will help ensure better seed/soil contact for improved germination.

Aeration equipment can be found at local rental stores or garden centers as well. A machine that pulls a ½" diameter plug three to four inches deep on four inch centers will do an excellent job. Machines that force hollow tines into the soil are better than pull-type drums with tines. Not all machines will meet these specifications; however any amount of aeration is better than no aeration to kick-off fall fertilization and over-seeding.

### Why We Over-seed:

A thick lawn mowed tall (3 ½ to 4 inches) is your best natural weed control. Over-seeding of cool-season grasses should occur in September to maintain the density required for competition against weeds. Lawns showing some thinning from summer stress can be over-seeded with half the amount of seed used in a normal establishment or renovation. Normal seeding rates for turf-type tall fescue blends range from 7 to 9 pounds/1,000 square feet. Mixtures of tall fescue with Kentucky bluegrass in a 95/5 ratio should be seeded at the same rate for a normal seeding. Therefore, over-seeding rates for these grasses should range between 3.5 to 4.5 pounds/1,000 square feet. As with fertilizers and other lawn products, we recommend applying seed at a half rate in two directions to provide better distribution of the seed.

Keep in mind that it is always important to have good seed/soil contact for better seed germination. Covering seed with light amounts (1/4") of good quality compost is another means to help germination and improve the soil. When seeding small bare areas avoid using straw since straw contains some weed seed. Some good commercial mulch, such as PennMulch or Straw Net, can be used and do not contain any weed seed.

Keep soil moist for several weeks until seed germinates. Frequent, light waterings may be needed to keep soil surface from drying out and affecting seed germination.

Begin mowing just as soon as grass reaches desired height to promote tillering and improve density. Mowing grass frequently in the fall will also mulch down fallen leaves.

### Managing Common Turfgrass Pests: Weeds, Diseases, Insects and Moles:

Whatever pest problem you are having, there are five basic steps to pest management:

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# A Short History of Container Nursery Stock Production

The advent of modern nursery stock production can be traced to a number of significant factors such as the mechanization of production systems and a vastly improved transportation network. In addition, the introduction of synthetic materials such as plastics for containers and irrigation systems, the development of soilless plant growth media, and the development of selective chemicals for weed control and pesticides and fertilizers have contributed greatly to the production of nursery stock materials as well as the reduction in labor and production costs.

Plants have been grown in containers ever since man learned to turn clay into pots. Tomb paintings in ancient Egypt dating from 1500 BCE reveal potted incense trees being carried aboard ships of Queen Hatshepsut. Although growing plants in containers has been practiced for centuries, the commercial production of container nursery stock is a relatively modern practice. Early producers of container stock used tin cans, standard clay pots, containers made of tarpaper and/or whatever else was available to grow plants in. Growing media consisted of whatever field soil was available. This proved to be inadequate in containers because it failed to support good plant growth. It was not until after World War II with the advent of modern plastics and the creation of a transcontinental highway system that container nursery stock production became practical and marketable.

Container nursery stock production systems offer consumers the flexibility of year-round planting. With the advent of plastic pots and new and improved soilless growing media, growing containerized nursery stock became profitable. Container stock provides a convenient package that can be easily displayed and handled. Consumers can conveniently purchase and transport a small potted tree or shrub in the back seat or trunk of a car.

Growers realized early on that field soils created cultural problems when placed in containers. In their natural state, field soils contain a balance of beneficial and pathogenic microorganisms. When placed in containers under greenhouse or nursery conditions with high fertilizer and high-moisture regimes, they quickly fall out of balance in favor of pathogenic organisms. Because mineral soils placed in containers suffer from compaction and poor aeration, growers began experimenting with other materials that would prove more suitable for container culture.

The primary function of soilless growing media in container-grown stock is to provide an optimum environment for plant root growth. Most soilless media used in the production of nursery crops contain various percentages of pine bark, peat moss, vermiculite, perlite, sand and essential nutrients. Growing media containing these components control the water-holding capacity, aeration, and available nutrients that provide a suitable root environment for the aerial portion of the plant to achieve optimum growth

Research began in England in the 1930s at the John Innes Horticulture Institute to develop a standardized growing medium containing loam-based compost, peat moss, sand and nutrients. The first truly synthetic growing media was created at the University of California-Los Angeles in the early 1950s. Its principal components consisted of various proportions of fine sand, peat moss, and supplemental nutrients. Work done at Cornell University in the 1960s is considered the predecessor of the modern soilless growing media. The Cornell Peat-Lite Mixes consisted of various combinations of peat moss, vermiculite and perlite. In 1968 at the University of Florida-Jacksonville, Whitcomb began experimenting with aged ground pine bark as a component with various mixtures of peat, and sand. Subsequent studies have found that with the addition of nutrients, aged pine bark works well as a component in container-growing media because it is slow to break down.

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## Calibration Guidelines for Home Lawns continued from page 13

### *Calibrating Spreaders*

Homeowners have a wide variety of spreaders to work with - some drop type, some rotary type, some listed on the product label for recommended settings, and many that are not.

The best approach for homeowners does not necessarily involve the actual calibration of their spreader, but a more common sense approach to applying fertilizer and lawn care products. If you accurately measure the square footage of your lawn and then purchase the correct amount of fertilizer or lawn care product, then the task at hand is to evenly distribute that material over the total square footage. For example, you measured your lawn to be 10,000 square feet. The lawn care product you purchase states that, the contents of this bag covers 5,000 square feet. Therefore, you require 2 bags of this product to cover 10,000 square feet. You may ask now, what is the best technique to evenly distribute this product. Even distribution is usually assured with multiple passes in multiple directions over your lawn. Therefore, place your spreader on a light setting and

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## Calibration Guidelines for Home Lawns continued from page 20

continue to make passes over your lawn, changing directions with each pass until all the required material has been applied. This may require 3, 4, 5 or more trips over your lawn, but you can be certain that the distribution of the material is very good. Think of it as good exercise.

For those wishing to know specific calibration techniques of drop and rotary spreaders, please refer to MU Guide Sheet WQ551 – Calibrating Home Garden Equipment @

http://extension.missouri.edu/explore/envqual/wq0551.htm.

***Granular Calibration Tips***

- The application rate for granular spreaders depends on the granule size, the spreader setting and the speed at which the operator walks.
- Drop spreaders are more precise and there is little chance of product application to non-target areas. However, steering and overlap errors can easily lead to missed or double-covered strips. Also, drop spreaders may clog in tall, wet grass.
- Rotary spreaders are faster than drop spreaders but are more difficult to calibrate. Product distribution is less uniform with single applications, and wind may blow the product off the intended area.
- Use a header strip in areas where the spreader must be turned around. A header strip is a swath of the spreader applied at right angles to the main direction of spreading. This allows the applicator to maintain constant speed up to the header strip.
- Shut the spreader off while turning around on the header strip.
- Wash the spreader out after each use. Allow to dry before storing. Lubricate according to manufacturer's instructions.

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## Home Lawn Basics continued from page 19

1. Properly Identify the key pest and the damage it may cause,
2. Monitor pest populations regularly,
3. Determine the potential for economic loss from the pest,
4. Select the proper pest control tactic, such as cultural, biological or chemical,
5. Evaluate the control measure used.

***Weeds:***

A weed is simply a plant out of place. Any plant that is disrupting the desired aesthetic quality, performance or functionality of a turf area is a weed. Weeds are opportunistic and can become a problem under several situations: improper management (mowing height and frequency, fertilization, irrigation), soil disturbance, thinned areas due to traffic, diseases, insects and poor establishment. A turfgrass weed control program involves any practice that will prevent weed development in a turf, or shift factors favoring weed development to the point that turf growth and health are favored instead. The primary step in any pest management program is proper identification. Proper weed identification is necessary before a decision can be made about control. It is possible that a simple change in a cultural practice could prevent a weed problem or at least decrease population levels below economic or aesthetically disruptive levels. However, in some situations, the use of chemical pesticides may still be needed.

***Diseases:***

Selecting disease resistant varieties of turfgrass species is the foremost best step to reduce potential disease problems. Using good turfgrass management practices that lead to a healthy plant is the second. Managing plant growth and carefully selecting the appropriate varieties for your conditions come next. Knowing some information about what diseases favor —especially any that have historically been at that site— can give the homeowner a heads-up on prevention of turfgrass diseases. A couple of examples include: Dollar spot is a disease that favors lower fertility, primarily infects bluegrass and ryegrass, and likes 80-degree days with moderate humidity and nighttime temperatures in the 60s that produce heavy morning dews. Brown patch favors high nitrogen in turfgrasses, primarily infects fescues, ryegrass and bentgrass, and likes 90-degree days with high humidity and nighttime temperatures above 70 degrees. This information would help you decide how to change management/cultural practices to favor your lawn and not the disease.

***Insects:***

While insects are one of the most populous forms of animal life on earth, only a small number of insects may, at some time in their life cycle, become a potential threat to turfgrass. Turfgrass insects can be somewhat cyclical, and population levels depend on a number of factors, including weather, suitable food sources, desirable habitat and predators. Turfgrass damage is usually not observed until the numbers of an insect species reach a threshold level. Insects may always be present, but not always at damaging levels. For example, a homeowner would not need to treat if only one or two white grubs are found while doing yard work. However, if the homeowner peels back dead sod and finds more than five annual white grubs per square foot, then treatment is called for. Turfgrass pests cannot be controlled over long periods of time solely through the use of pesticides. To have a healthy and vigorous turfgrass, it is necessary to use pesticides in combination with sound cultural practices.

A healthy, growing plant is the best defense against turfgrass pests. Many plants become more susceptible to pests if they are stressed. Following good turf management practices with mowing, proper watering, fertility, aeration, thatch control and overall sanitation (leaf litter, mulches and other debris) produces good, healthy, dense turf that is pest-resistant.

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# April Gardening Calendar

## Ornamentals

- **Weeks 1–4:** When buying bedding plants, choose compact, bushy plants that have not begun to flower.
- **Weeks 1–3:** Fertilize established roses once new growth is 2 inches long. Use a balanced formulation. Begin spraying to control black spot disease.
- **Weeks 1–2:** Examine shrubs for winter injury. Prune all dead and weakened wood.
- **Week 1:** Winter mulches should be removed from roses. Complete pruning promptly. Remove only dead wood from climbers at this time. Cultivate lightly, working in some compost or other organic matter.
- **Weeks 2–4:** Look for flowering dogwoods in bloom.
- **Week 3–4:** Evergreen and deciduous hedges may be sheared. Prune the top narrower than the base so sunlight will reach the lower limbs.
- **Week 3–4:** Easter lilies past blooming can be planted outdoors. Set the bulbs 2 to 3 inches deeper than they grew in the pot. Mulch well if frost occurs.

## Lawns

- **Weeks 1–4:** Start mowing cool season grasses at recommended heights. For complete details, refer to University Extension Guide #6705, Cool Season Grasses.
- **Weeks 1–2:** Aerate turf if thatch is heavy or if soil is compacted.

## Vegetables

- **Weeks 1–2:** Finish transplanting broccoli, Brussels sprouts, cabbage, and cauliflower plants into the garden. High phosphorous fertilizers help get transplants off to a quick start.
- **Weeks 1–2:** Finish sowing seeds of all cool–season vegetables not yet planted.
- **Weeks 1–2:** Start cucumber, cantaloupe, summer squash, and watermelon seeds indoors in peat pots.
- **Weeks 1–2:** Plastic films can be used to pre–heat the soil where warm season vegetables are to be grown.
- **Weeks 2–3:** Make succession sowings of cool season crops.
- **Weeks 3–4:** Begin setting out transplants of tomatoes, eggplants, peppers and sweet potatoes.

## Fruits

- **Weeks 1–4:** Blemish–free fruits unmarred by insect or disease injury can rarely be produced without relying on regular applications of insecticides and fungicides For special information, consult University Extension Guide Sheet #G6010, Home Fruit Spray Schedule.
- **Weeks 1–2:** Leaf rollers are active on apple trees. Control as needed.
- **Weeks 1:** Plant bare–root or potted fruits as soon as the soil can be worked.
- **Weeks 2–4:** Protect bees and other pollinating insects. Do not spray insecticides on fruit trees that are blooming.
- **Weeks 3–4:** Begin sprays for fire–blight susceptible apples and pears using an agricultural streptomycin.
- **Week 4:** Spider mites and codling moths become active on apples.

## Miscellaneous

- **Weeks 1–2:** Termites begin swarming. Termites can be distinguished from ants by their thick waists and straight antennae. Ants have slender waists and elbowed antennae.
- **Weeks 1–2:** Look for morel mushrooms when lilacs bloom and the forest floor turns green.
- **Week 1:** Mount a rain gauge on a post near the garden to keep track of precipitation so you can tell when to water. Most gardens need about 1 inch of rain per week between April and September.
- **Week 4:** Soaker hoses and drip irrigation systems help you save water and money.
- **Week 4:** Hummingbirds return from their winter home in Central America.
- **Week 4:** Wasp and hornet queens begin nesting.