Module 5 - Fertilizer. This presentation provides an overview of fertilizer characteristics and selection, including their physical and chemical properties. It also explores how soil type, pH, temperature, and moisture influence fertilizer release rates. Additionally, the presentation covers the calculation of application rates to ensure proper usage, the selection of appropriate spreader types, and best practices for material storage and spill management.

At the end of this module you will be able to:

- Define fertilizer and terms associated with fertilizers
- Interpret and apply the information on a fertilizer label
- Calculate the amount of fertilizer to be applied according to the recommended rates
- Implement practices to avoid runoff and leaching of fertilizers
- Explain how to properly store fertilizer and clean up spills

FERTILIZER

Fertilization of plants can result in additional growth and production of leaves, stems, branches and roots. The appropriate fertilizer applied at the correct rate and time can help maintain a healthy Florida-Friendly landscape, which can prevent soil erosion and reduce nutrient runoff and leaching. Think of fertilizer as a tool for delivering nutrients to plants. As with any tool, it's important that you understand how to safely use it.

FERTILIZER GRADE

The fertilizer “grade” or “analysis” is the percent nitrogen, phosphorus and potassium guaranteed by the manufacturer to be in the fertilizer.
For historical reasons, nitrogen is expressed as N, available phosphorus as P_2O_5, and soluble potassium as K_2O.

The percent sign is not used, but instead the numbers are separated by dashes, and the order is always N, P_2O_5, and K_2O (for example, 15-0-15).
The elemental symbols: N, P and K, respectively, are used for nitrogen, phosphorus and potassium.

SLOW- OR CONTROLLED-RELEASE

Release mechanisms include:

- **Microbial action**
- **Hydrolysis**
- **Temperature**
- **Osmotic diffusion**

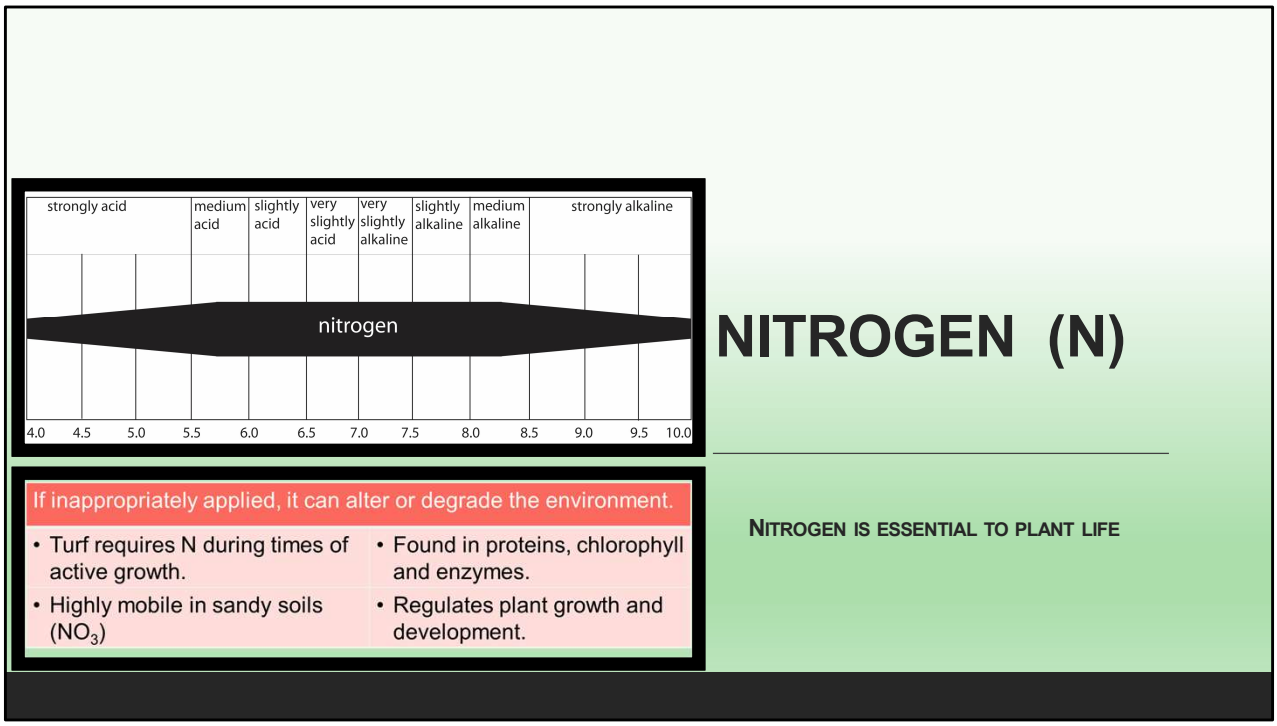
Fertilizers depend on microbial action, soil moisture, and/or a chemical reaction for the release of Nitrogen for use by turfgrass. It's important to know when to use a given slow-release Nitrogen source in order to obtain maximum effectiveness from the material. This is due to environmental influences on the Nitrogen release mechanisms of slow-release Nitrogen sources.

Slow-release fertilizers use methods such as coatings or insoluble polymers to control the availability of Nitrogen. The candy represents the "coating" that keeps the ingredient controlled. There are a variety of mechanisms that control the release of water-insoluble nitrogen

.

Fertilizer in the slow-release formulations is released by:

- Microbial action
- Hydrolysis (moisture)
- Temperature
- Or Osmotic diffusion

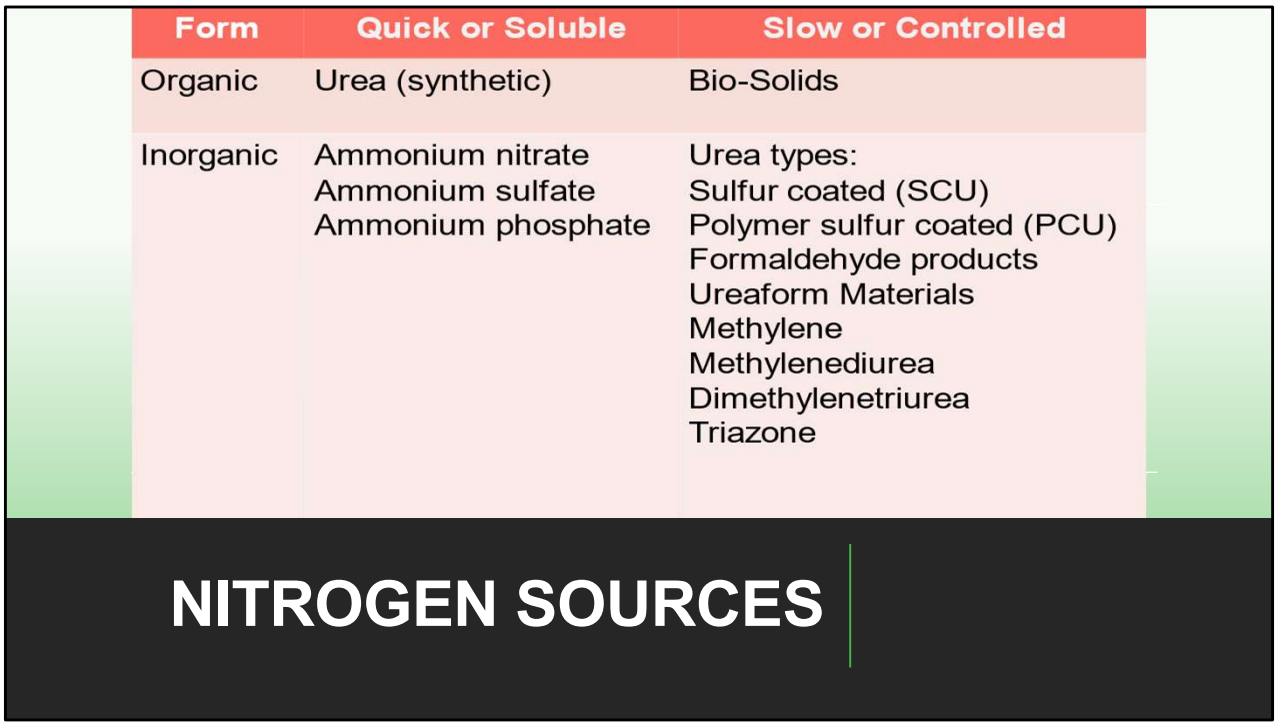


Nitrogen applied in excess can alter or degrade the environment – this can lead to disease, excess growth, and other problems with the turf.
It may also result in nonpoint source pollution of water bodies by nitrate leaching or runoff. Nitrogen is most available with a pH range of 5.5 to 8.5.

Nitrogen is the element needed in the greatest quantity by turfgrass. It contributes to growth and green up of the turf. The amount of Nitrogen required varies depending on turfgrass species, soil, time of year, traffic or other environmental conditions.

Nitrogen should be applied judiciously throughout the growing season and within the recommended amounts annually.

Care should be taken to check for local ordinances, which may prevent the application of Nitrogen during certain times of year.



Organic Forms

Organic fertilizers are another source of nitrogen that is slowly made available through microbial degradation. In this case, the release rates depend on the nature of the product and the prior treatment that it has received as well as temperature and moisture. Organic fertilizers,
including biosolids from wastewater treatment plants, generally have low N:P2O5 ratios, which means that it is difficult or impossible to meet the nitrogen needs of the turf without exceeding the annual maximum allowable P2O5, unless other nitrogen sources are added.

Quick Release Sources

One of the most common nitrogen fertilizers is urea (46 percent N), which is a water-soluble, synthetic organic nitrogen fertilizer with quick N-release characteristics. Urea can be applied as either liquid or granules, and is subject to volatilization, or loss of nitrogen to the atmosphere.
If urea is applied to a turfgrass surface and not incorporated through proper irrigation, significant quantities of N can be lost through volatilization.
Ammonium Nitrate (AN) and Ammonium Sulfate (AS) are two other soluble, quick-release N sources commonly used by professional lawn-care services.

These two materials are not as high in N as urea. AN (33.5 percent N) and AS (21 percent N), however, have a higher salt index and burn potential than urea on a per-pound-of-N basis. AS is also a very acidifying N source. For each pound of N applied as AS, 5.35 pounds of acidity are produced due to the ammonium-ion content. AS is often the preferred N source on high pH soils due to its acidifying properties.

Inorganic Forms
Forms that contains all of its N as Nitrate-N, Ammoniacal-N, and/or Water Soluble N is referred to as a soluble N fertilizer,
which has a high potential for leaching.
Slow Release Sources
Ureaform Fertilizer Materials (sparingly soluble) are reaction products of urea and formaldehyde which contain at least thirty-five percent (35%) nitrogen, largely in insoluble but slowly available form.
Urea-Formaldehyde Products (sparingly soluble) are reaction products of urea and formaldehyde which contain less than thirty-five percent (35%) nitrogen, largely in insoluble but slowly available form.
Sulfur Coated Urea (SCU) is a coated slow release fertilizer consisting of urea particles coated with sulfur.
Polymer Coated Urea (PCU) is a coated slow release fertilizer consisting of urea particles coated with a polymer (plastic) resin.
Methylenediurea (MDU) is a water soluble condensation product resulting from the reaction of one molecule of Formaldehyde, with two molecules of Urea, with the elimination of one molecule of water. It has a minimum total N content of 42% and is a source of slowly available N.

Refer to the GI-BMP manual on pages 42-45 for more information on N sources.

Quick or Soluble	Slow-Released
• Typically have about a 30-day response period.	• Release Nitrogen at a rate more consistent with plant's needs.
• Readily dissolvable in water and are often applied dissolved in water through a sprayer.	• Usually more expensive than soluble fertilizers.
• May also be applied in granular form.	• More efficient use of Nitrogen.
	• Extend availability.

NITROGEN SOURCES

There is much confusion over whether to use organic or inorganic fertilizers on turfgrasses. Both types have advantages and disadvantages; however, the type of fertilizer makes no difference to the turfgrass. Grasses absorb Nitrogen as nitrate- or ammoniacal-N.

Organic Nitrogen is not used directly by the plant but must be converted to one of the above chemical forms by soil microorganisms before being taken up by the plant. Nitrogen is available from many different sources. There are two main categories of Nitrogen sources: "quick release" and "slow release."

Quick-release fertilizers are sometimes referred to as water soluble or readily available.

- They typically have about a 30-day response period.
- They are readily dissolvable in water and are often applied dissolved in water through a sprayer.
- They may also be applied in a granular form.

Slow-release fertilizers are also called water insoluble or controlled release

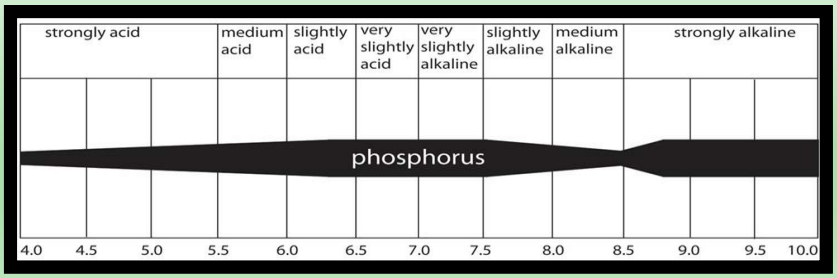
- They release Nitrogen at a rate more consistent with plants' needs
- They extend availability for a longer time
- They are a more efficient use of Nitrogen
- They are more expensive than soluble fertilizers
- They may be derived from "organic" sources such as Milorganite

Many fertilizers now have a mixture of both slow- and quick-release sources of Nitrogen.

- The Florida-Friendly Landscaping™ Program recommends at least 30% slow release.
- Some counties and cities require at least 50% slow release.

Fertilization of Grasses and Ornamentals:

• Should be applied based on soil and/or tissue test.	• Established turf and ornamental needs are low.
• If inappropriately applied, it can alter or degrade the environment.	• Often ample in plant-available form in central and south Florida.



PHOSPHORUS (P)

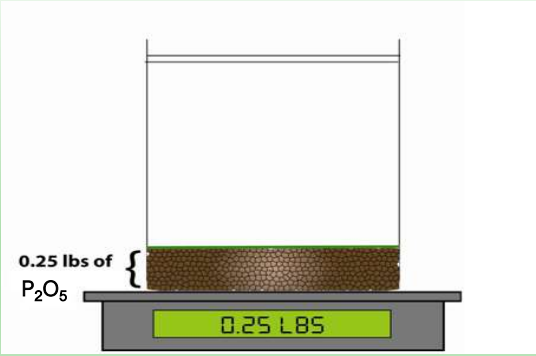
Often, plant-available Phosphorus is ample in central and south Florida. Phosphorus needs may increase under traffic or other stresses. The need for Phosphorus is usually low for established turf and ornamental plants.

A soil and/or tissue test for plant-available Phosphorus should be done before applying a fertilizer with Phosphorus.

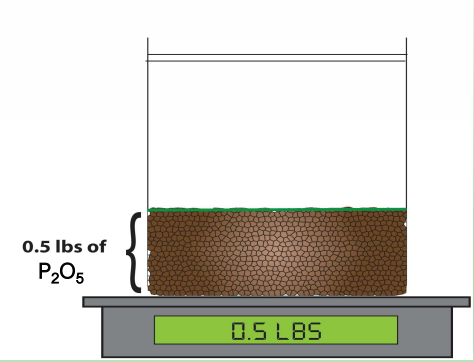
FDACS PHOSPHORUS RULE

FDACS Fertilizer Rule limits use:

0.25 LB 1,000 FT² PER APPLICATION



0.5 LB 1,000 FT² ANNUALLY

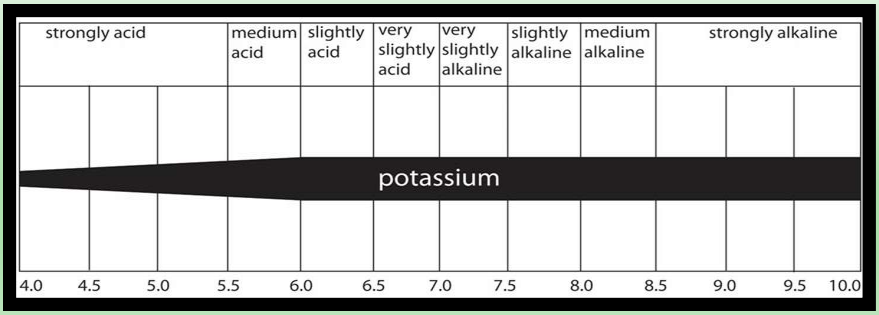


By rule, application of P is limited to 0.25 pounds of P_2O_5 per 1,000 square feet for any single application and no more than 0.50 pounds of P_2O_5 per 1,000 square feet annually. This means that you may see "no-phosphate" or "low-phosphate" fertilizers.

Florida soils often contain high amounts of phosphorus. Since this is an element of concern for potential pollution, it is wise to limit the phosphorus.

Potassium is similar to a “multi-vitamin” for turf/ornamental plants

- Improve drought/cold tolerances and disease resistance.
- Aids in producing a deep root system and plant resiliency.
- Mobile in sandy soils, but not a pollutant.
- N:K ratios: 2:1 or 1:1



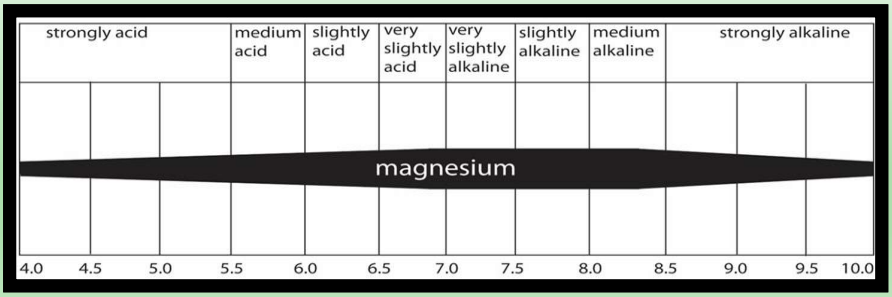
POTASSIUM (K)

Of the three primary nutrients (N, P, and K), K Potassium is second only to N in utilization by turfgrasses. Large responses in turfgrass growth are not typically observed in response to Potassium fertilization, but Potassium has been linked to reduced disease incidence, drought and cold tolerance, and enhanced root growth. The potassium fertilization rate is often tied to the N fertilization level, generally in a 2:1 or 1:1 ratio.

Ideally, turfgrass potassium fertilization should be based on soil test recommendations. Because of high mobility in sandy soils, potassium fertilization should be made as soon after soil testing as possible.

However, potassium is often applied without a prior soil test, based on the requirements of the turfgrass. Fortunately, potassium is not considered a pollutant, but prudence in potassium fertilization is essential for economic and resource conservation reasons.
Excessive potassium fertilization can contribute to high soil electroconductivity (EC) levels that may limit root growth and turfgrass tolerance to drought.

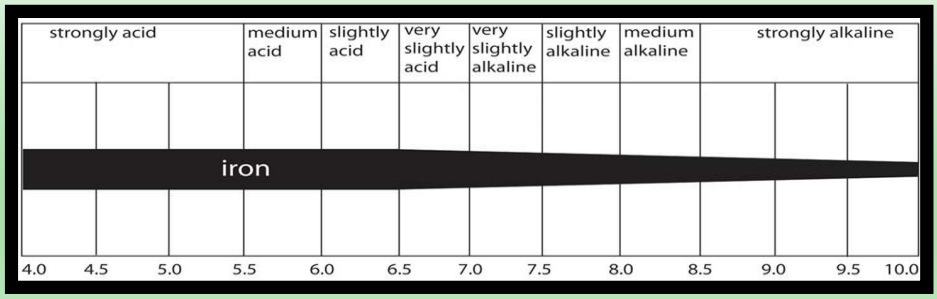
• A magnesium deficiency may be found in many parts of the state.	• May affect landscape plants and palms.
• Helps activate many plant enzymes needed for growth.	• Soil application treatment to deficient palms provides effective, long-term results.



MAGNESIUM (Mg)

There are certain locations in the state where landscape plants show symptoms of Magnesium deficiency. To take care of this problem, up to 2.5 pounds of a granular form Magnesium may be applied per 1000 square feet per year . This deficiency is usually in landscape plants and palms, not turf. Foliar applications will provide an initial response; however, soil applications of Magnesium will provide longer lasting results. Note that results will vary depending on soil characteristic, for example, pH.

• Greening response using Fe and/or Mn most likely on soils having a pH above 7.	• Essential for chlorophyll, but not a substitute for nitrogen.
• Limited pH availability.	• In high pH soils, apply as chelated or sulfate source as a foliar treatment.



IRON (Fe)

Iron is a micronutrient required for healthy turfgrass growth and maintenance. Micronutrients are essential to plant growth, but are needed in much smaller quantities than macronutrients.
While Iron cannot substitute for the other required nutrients, it can be an important component of a fertilization regime, particularly in areas where the pH is high (greater than 7.0). This is because certain plants, including turfgrasses, can have difficulty taking up Iron from soils that have a high pH soils.

A soil test will indicate the pH. In soils with high pH, a foliar application with iron may be needed to keep the grass green and healthy; however, this does not substitute for the other nutrients. Granular iron sources are oxidized in Florida soils rapidly (within 1 hour).

In high quality pH soils, apply as chelated or sulfate source as a foliar treatment.

Iron can make your lawn green because it is involved in chlorophyll biosynthesis, but it does not provide the proteins and amino acids that nitrogen

does. It is important to note that iron is not a substitute for nitrogen.

This section contains the necessary calculations and practices to ensure appropriate rates and application regimes are followed. Knowing the exact square footage of the area where the fertilizer is being applied is essential in order to deliver the correct amount.

This saves time, money and prevents adverse impacts on the environment.

To get the square footage of the application area, use the calculation for a rectangle: multiply the length times the width.

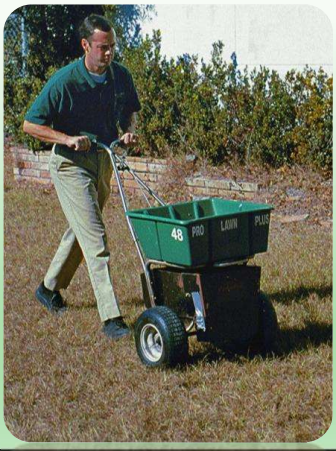
In this example, the area equals 600 square feet. Of course, not all properties are exact rectangles, but try to get as close as possible to the correct square footage. You can also break the area into more than

one rectangle and add the results together.

Today, there are many electronic tools to help you determine the square footage of the area to be fertilized. Some of these may use satellite technology and apps on your mobile device.

FEQUENTLY CALIBRATE EQUIPMENT

DELIVER THE CORRECT AMOUNT OF FERTILIZER



Frequently Calibrate Equipment: Deliver the correct amount to the area. Make sure the spreader/application equipment is properly calibrated and set to deliver the correct amount of fertilizer to the area.

Inspect equipment to ensure it is in safe, in good condition, and working correctly. Be sure to check the gate, agitator, pressure and flow and the deflector shield.

DETERMINE NITROGEN SOURCE/RATE

GRANULE OR LIQUID FORMS OF NITROGEN (N)

Quick or Soluble	Slow or Controlled
Nitrate - N	Sulfur Coated Urea (SCU)
Ammoniacal - N	Urea - Formaldehyde
Urea-N	Ureaform
Other water-soluble N	Polymer Coated Urea (PCU) Biosolids (Note N:P ratio)
Soluble: 0.5 lb N / 1000 ft2	Slow Release: 1 lb N / 1000 ft2
Where it is permissible by ordinance, the following rates for soluble N and slow-released N may be applied.*	
Soluble 0.7 N / 1000 ft2	Slow Release 2 lb N / 1000 ft2
*FDACS Rule 5E-1.003(2) Labeling Requirements for Urban Turf Fertilizers	

Quick- and slow-release forms of nitrogen are applied at two different rates. A fertilizer that contains all of its nitrogen as nitrate-N, Ammoniacal-N, and/or Water Soluble nitrogen is referred to as a soluble nitrogen fertilizer, which has a high potential for leaching and should not be applied at rates greater than 0.5 lb N/1000 square feet.
Slow-release products may be applied up to 1 lb N/1000 square ft.
Slow- or controlled-release fertilizer is defined as a fertilizer containing a plant nutrient in a form that delays its availability for plant uptake and use after application, or that extends its availability to the plant significantly longer than a reference quick or soluble such as ammonium nitrate, urea or other water soluble sources of nitrogen.

If you live in an area where fertilization is prohibited from June through September, new controlled release fertilizers have been developed that may be effectively used to prevent nutrient deficiencies during this period of maximum growth. For those south of Ocala, apply a 0.7 - 1 pound per 1,000 square feet nitrogen application in late March or early April, and again in early October. In addition, in mid-to late May (look for a dry spell in the forecast) you may apply up to 2 pounds per 1,000 square feet of nitrogen if the label permits it, using a special slow-release fertilizer of 65% or

more slow-release nitrogen (unless prohibited by local ordinance). North of Ocala you can also apply the 2 pound rate prior to the ban period. For a detailed fertilization guide for Florida turfgrasses, see IFAS Publication SL-21, General Recommendations for Fertilization of Turfgrasses on Florida Soils, at http://edis.ifas.ufl.edu/LH014.

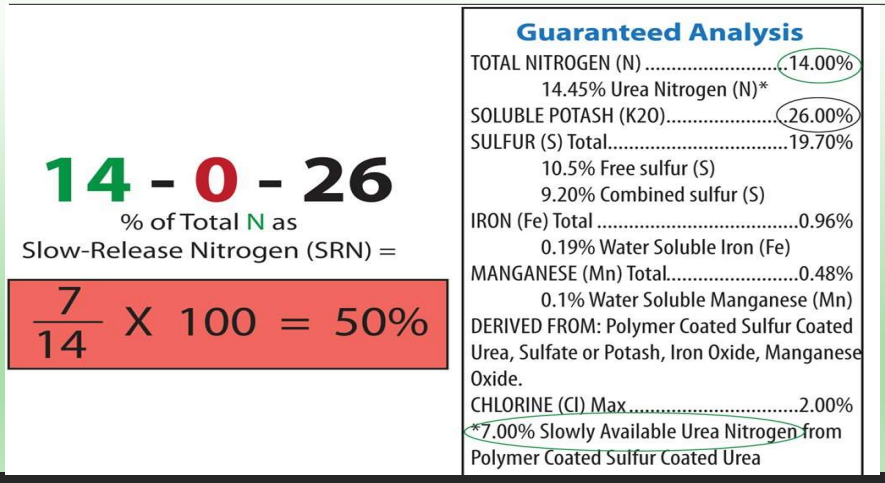
WHAT IS THE SLOW-RELEASED NITROGEN PERCENTAGE?

Calculating SRN from the Fertilizer label

14 - 0 - 26

% of Total N as
Slow-Release Nitrogen (SRN) =

$$\frac{7}{14} \times 100 = 50\%$$



Guaranteed Analysis

TOTAL NITROGEN (N) 14.00%
14.45% Urea Nitrogen (N)*
SOLUBLE POTASH (K2O).....26.00%
SULFUR (S) Total.....19.70%
10.5% Free sulfur (S)
9.20% Combined sulfur (S)
IRON (Fe) Total 0.96%
0.19% Water Soluble Iron (Fe)
MANGANESE (Mn) Total.....0.48%
0.1% Water Soluble Manganese (Mn)
DERIVED FROM: Polymer Coated Sulfur Coated Urea, Sulfate or Potash, Iron Oxide, Manganese Oxide.
CHLORINE (Cl) Max.....2.00%
*7.00% Slowly Available Urea Nitrogen from Polymer Coated Sulfur Coated Urea

By Florida law, the label must provide:

- The brand and grade
- The manufacturer's name and address
- The guaranteed analysis
- Sources from which the guaranteed primary and secondary nutrients are derived
- And the net weight

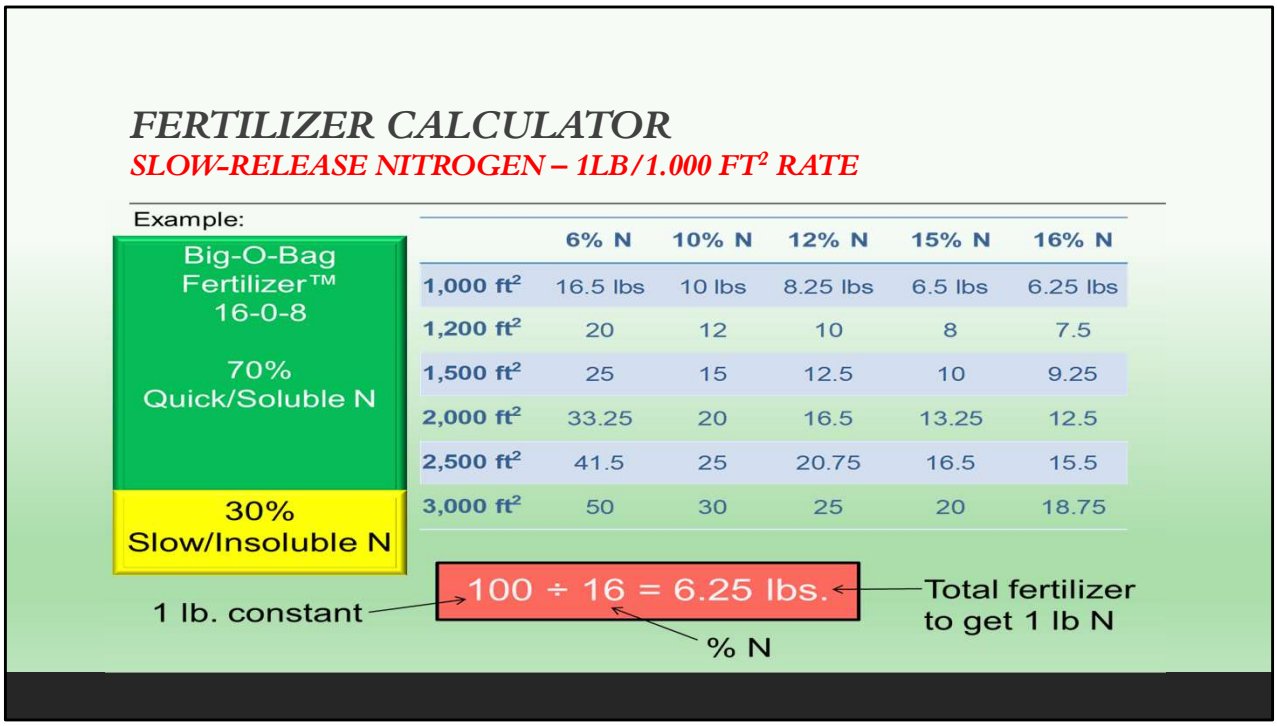
The label also identifies the breakdown of Total Nitrogen as either Nitrate-N, Ammoniacal-N, Water Soluble or Urea-N, and Water Insoluble-N.

On this label,

- Total Nitrogen is 14%,
- Slowly available is 7% as a polymer-coated urea
- So, this fertilizer is 50% slow release Nitrogen

It is important to note that the state of Florida defines a slow release nitrogen product to contain 15 percent or more slow-release net content.

The University of Florida IFAS, Florida-Friendly Landscaping™ Program defines a slow release nitrogen product to contain 30% or more slow release net content.



	6% N	10% N	12% N	15% N	16% N
1,000 ft²	16.5 lbs	10 lbs	8.25 lbs	6.5 lbs	6.25 lbs
1,200 ft²	20	12	10	8	7.5
1,500 ft²	25	15	12.5	10	9.25
2,000 ft²	33.25	20	16.5	13.25	12.5
2,500 ft²	41.5	25	20.75	16.5	15.5
3,000 ft²	50	30	25	20	18.75

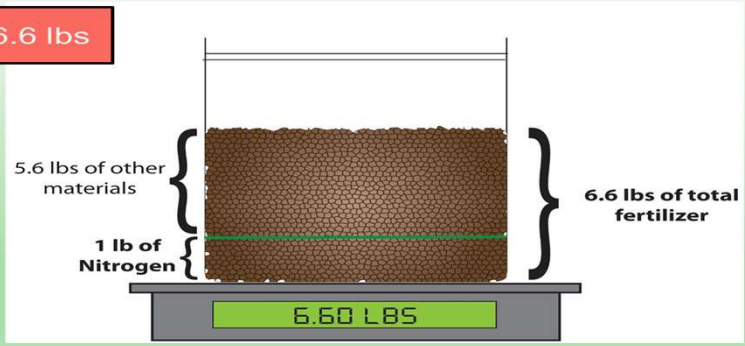
For turfgrass fertilizers containing 30% or more slow-release nitrogen, the recommended application rate to Florida lawns is 1 pound per 1000 sq ft. In the table, match the size of the lawn to the percentage of nitrogen in your fertilizer to find the amount of fertilizer you need to apply. Remember, the most that can be applied is 1 lb. Nitrogen per 1000 square feet.

HOW MUCH FERTILIZER PER 1,000 ft^2

SLOW-RELEASE NITROGEN – 1LB/1.000 FT² RATE

Example: 15-0-15

100 ÷ 15 = 6.6 lbs



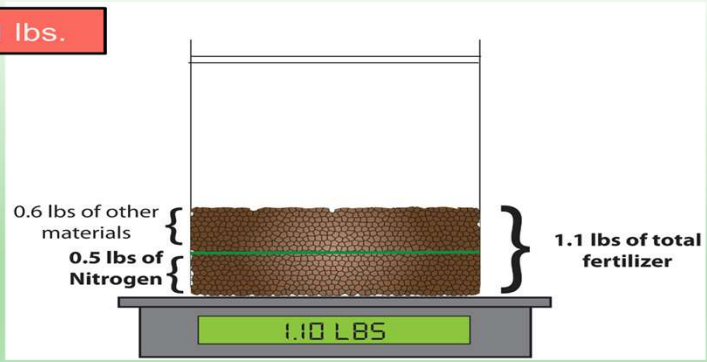
Calculate the rate of application by determining how much fertilizer you need to get 1 pound of actual Nitrogen.
See the calculation for more guidance; divide 100 by the percentage of Nitrogen in the fertilizer.
Next, how much N do we want to apply per 1,000 square feet with this product? How much fertilizer should be applied to achieve the 1 pound per 1000 sq ft rate? The answer is 6.6 pounds.

HOW MUCH FERTILIZER PER 1,000 FT²

QUICK RELEASE NITROGEN-NO MORE THAN 0.5 LB/1,000 FT²

Example: 46-0-0

50 ÷ 46 = 1.1 lbs.



One of the most common nitrogen fertilizers is urea containing 46 percent nitrogen, which is a water-soluble, synthetic organic nitrogen fertilizer with quick Nitrogen release characteristics.

Urea can be applied as either liquid or granules, and is subject to volatilization, or loss of nitrogen to the atmosphere.

If urea is applied to a turfgrass surface and not incorporated through proper irrigation, significant quantities of Nitrogen can be lost through volatilization.

Therefore, it's imperative that the proper quantity of water be applied following the application of urea fertilizer, unless rainfall is anticipated within 8 to 12 hours.
Application of 1/4 inch of water should be sufficient to solubilize most of the urea and move it into the turfgrass root zone.

For those who can apply soluble forms of nitrogen such as urea, only apply at the recommended 1/2 lb rate per 1000 square feet.
How much Nitrogen do we want to apply per 1,000 square feet with this

product?

Short pause
The answer is 1.1 lbs. of fertilizer

CJ Suggestion for para 2 and 3: The answer is 1.1. lbs of fertilizer. And remember, after applying urea fertilizer it's important to apply 1/4" of water to avoid volitilization.

RECOMMENDED FERTILIZER RATES

Matching the fertilizer source and rate with the growth phase of the turfgrass and landscape plants is one of the keys to nutrient management. For turfgrass, you may shift from 1 lb total N of 15-0-15 slow release product to a 1/2 lb N of 5-0-20 for a fall fertilization as dormancy approaches.

Leaching losses of nitrogen can be minimized by using controlled-release nitrogen sources, making frequent, low-rate applications of soluble fertilizers, or applying a combination of the two fertilizer materials. Low-rate applications are usually made using soluble fertilizers, whether applied as a liquid or granular product.

The ultimate goal in helping protect our Florida environment is to reduce the amount of nitrogen applied while still maintaining a healthy landscape.

Determining Fertilization Rates for Florida

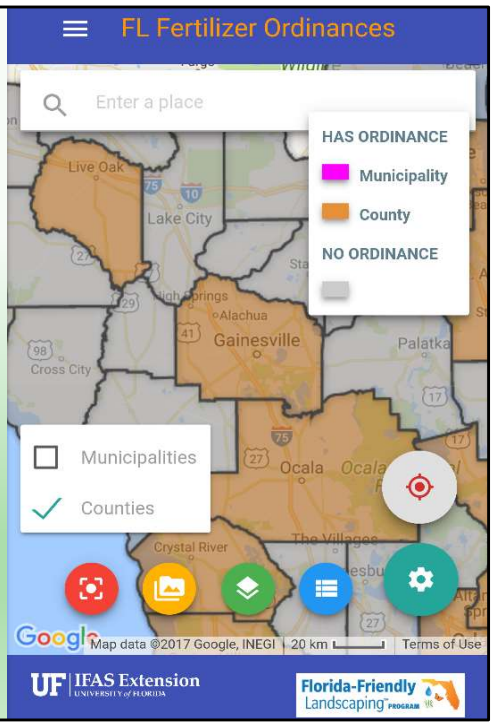
UF/IFAS Florida Zones

UF/IFAS fertilization recommendations provide a range of rates for each grass at each location. For example, a homeowner taking care of his own yard would most likely be at the low end of the range, while a lawn care service would typically be at the higher end. Acceptable quality grass can be maintained within this range of rates.

North Florida is north of Ocala. Central Florida is defined as south of Ocala to a line extending from Vero Beach to Tampa. South Florida includes the remaining southern portion of the state.

FERTILIZER ORDINANCE APP

https://ffl.ifas.ufl.edu/fertilizer/



The Florida Fertilizer Ordinances mobile web application provides a quick and convenient reference to the state's many local fertilizer ordinances.

Features:

- Search maps to find ordinance details for specific address, city, county or current location.
- View a summary of key restrictions and requirements.
- Customize map display.
- Link to the full ordinance text.
- Uses Google maps features with full detail for street view or satellite view.
- Use on any device with browser and internet access.

This free web app is designed for mobile devices but can be used on a computer too.
Nothing to download.
Internet connection is required.

Nitrogen recommendations (lbs. N / 1,000 ft² / year)*			
TURFGRASS	**NORTH**	**CENTRAL**	**SOUTH**
Bahiagrass	1-2	1-2	1-2
Bermudagrass	3-5	4-6	5-7
Centipedegrass	0.4-2	0.4-3	0.4-3
St. Augustinegrass	2-4	2-5	4-6
Zoysiagrass	2-3	2-4	2.5-4.5
***Suggested rates based on years of nitrate leaching and turf health research**			

RECOMMENDED RATES FOR FLORIDA

Rate and timing of N fertilization depends on the turfgrass species, season of the year, level of maintenance desired, source of N applied, and location in the state.

The rate of nutrient application, particularly Nitrogen, depends on a number of factors: turfgrass species, turfgrass maintenance level goals, the location in the state where the turfgrass is being grown, time of year, and type of fertilizer source being used (soluble or slow release). Thus, a single rate of application cannot be recommended. The frequency of fertilization also depends on all the factors listed above for Nitrogen.

Maintenance Level	Lbs. N / 1,000 ft² / yr
Basic	0-2
Moderate	2-4

ANNUAL FERTILIZER RECOMMENDATIONS FOR ESTABLISHED LANDSCAPE PLANTS

When fertilization is indicated, most established landscape plants should be fertilized at the rates you see here. The rate used will depend on species growth requirements as well as the maintenance level desired by the client.

Most established landscape plants may not require regular fertilization.

PALMS HAVE SPECIAL NEEDS

- Use an 8-2-12-4 palm-special fertilizer
- Fertilization of field-grown and landscape palms in Florida, http://edis.ifas.ufl.edu/EP261
- Nutrient deficiencies of landscape and field-grown palms in Florida, http://edis.ifas.ufl.edu/EP273

In general a complete fertilizer for palms should contain Magnesium as well as the N-P-K found in most fertilizers. Ideally, 100 percent of the N, K, and Mg nutrients should be in slow release form to prevent the palms from developing deficiency symptoms.

Palms appear to have higher needs for micronutrients than other landscape plants. For more information see related EDIS publications found on the EDIS website or at your county Extension office.

VIDEO SCRIPT

Fertilization is one of the key management practices in establishing and maintaining healthy, actively growing turf and landscape plants. In order to prevent potential leaching and runoff of fertilizer and pesticides, applicators need to consider weather conditions, application rates, calibration of equipment, soil properties and proximity to ground and surface waters. Rainfall that exceeds the soil's ability to retain moisture in the root zone may lead to nutrient runoff into surface waters or leaching down through the soil to ground water. Do not apply fertilizer when the National Weather Service has issued a flood, tropical storm, or hurricane watch or warning, or if heavy rains are likely.

There is no significant difference between liquid or dry applications. In terms of BMPs for environmental protection, the proper application of fertilizer is more important than the type of product. The rate and timing of N fertilization depends on the plant species, season of the year, level of maintenance desired, source of N applied and location in the state. After determining the square footage and appropriate amount of fertilizer to be applied, make sure your fertilizer spreader or applicator is properly calibrated and on the correct setting to deliver the desired

amount of fertilizer for the area being treated.

Areas where tree, shrub, and turf fertilization zones overlap should receive one, not two, fertilizations. It is important to use the right type of spreader and spreading technique. Do not use a drop-type spreader for applying sulfur-coated fertilizers because it can damage the fragile nitrogen prill coating, reducing product longevity. Most urban landscapes are surrounded by impervious surfaces such as sidewalks, driveways and streets. It is important to ensure that fertilizers and other lawn chemicals stay on target by using a deflector shield. A deflector shield only allows fertilizer to be distributed on one side. This half-circle application allows for a more accurate fertilizer application.

If any materials do get onto these impervious surfaces, sweep or blow them into the vegetated landscape; otherwise clean and remove them up. Applications of liquid or granular fertilizers should be immediately irrigate with a ¼ inch of water to avoid the loss of nitrogen and increase uptake efficiency. If water restrictions apply, you may irrigate as you are allowed, but more than a ½ inch may cause some nitrogen to be leached past the root zone. Establish buffers in sensitive areas are intended to absorb pollutants from storm water flowing across the land. These areas usually do not require fertilization, or need it only during an initial establishment period. Some communities may require larger treatment buffers to ensure no prills or droplets enter the water.

The applicator should understand and respect the nature of these areas and put into practice the “ring of responsibility”. The “Ring of Responsibility” pertains to the application of liquid and granular fertilizers. It is a preventative buffer area, which protects against accidental direct contamination when fertilizing, and is the responsibility of the applicator. The Ring of Responsibility Best Management Practice establishes a 3’ set back from water bodies when using a deflector shield.

If you are broadcasting fertilizer without a deflector shield, the Ring of Responsibility should extend at least 10 feet from the edge of the water, since the prills may be thrown up to 7 feet. Except when adjacent to a protective seawall, always leave a “Ring of Responsibility” buffer around or along the shoreline of canals, lakes, or waterways, so that you do not get fertilizer into a body of water. Many counties and cities have fertilizer ordinances that require greater distances from water’s edge as well as use of a deflector shield. Become familiar with all local ordinance requirements! It is everyone’s responsibility to follow these practices and avoid potential runoff situations where we might get leaching of fertilizers or chemicals into ground or surface waters.

Fertilizer must be handled properly during transportation, storage, mixing and loading of product into the tank or hopper. Ideally, fertilizer should be stored in a concrete

building with a metal or other flame-resistant roof. Take care when storing fertilizer to prevent the contamination of nearby ground water and surface water. Storing dry bulk materials on a concrete or asphalt pad may be acceptable if the pad is adequately protected from rainfall and from water flowing across the pad. Always store nitrate-based fertilizers separately from solvents, fuels, and pesticides, since nitrate fertilizers are oxidants and can accelerate a fire. Store all fertilizer in an area that is protected from rainfall.

Load fertilizer into application equipment away from wells or surface water bodies. A concrete or asphalt pad with rainfall protection is ideal, as it permits the easy recovery of spilled material. If this is not feasible, loading at random locations in the field can prevent a buildup of nutrients in one location. Clean up spilled fertilizer materials immediately. Collected granules may be applied as a fertilizer. At fixed sites, the area can be cleaned by sweeping, vacuuming, or with a shovel or loader, if a large spill.

Liquid fertilizers may be collected by washing down the loading area to a containment basin specifically designed to permit the recovery and reuse of the wash water.

If not handled properly, fertilizers can alter or degrade the environment. Nutrients such as Nitrogen and Phosphorus in fertilizers can lead to the excessive growth of algae and noxious plants in estuaries, lakes, and streams, and may pose a human health risk.

The importance of proper fertilization cannot be overemphasized. Prevent potential leaching and runoff of fertilizer by leaving a “Ring of Responsibility”!

REVIEW TRAINING OBJECTIVES

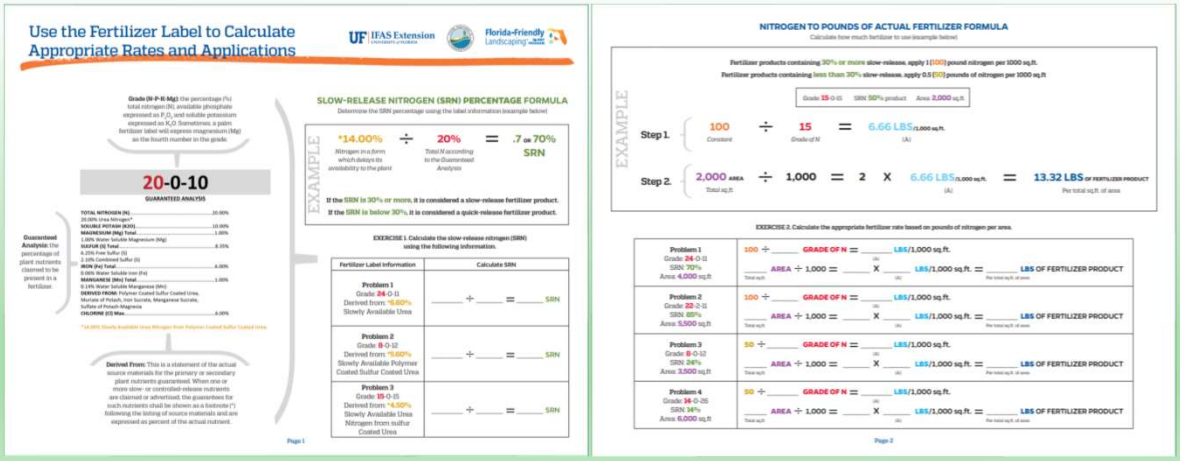
1. **Define fertilizer and terms associated with fertilizers.**
2. **Interpret and apply the information on a fertilizer label.**
3. **Calculate the amount of fertilizer to be applied according to the recommended rates.**
4. **Apply recommended rates.**
5. **Implement practices to avoid runoff and leaching of fertilizers.**

Now that you have reviewed the fertilizer module, you will be able to:

- Define fertilizer and terms associated with fertilizers.
- Interpret and apply the information on a fertilizer label.
- Calculate the amount of fertilizer to be applied according to the recommended rates.
- Apply recommended rates.
- Implement practices to avoid runoff and leaching of fertilizers.

Thank you, this concludes the Fertilizer module.

Fertilizer Worksheet



Use the Fertilizer Label to Calculate Appropriate Rates and Applications

UF IFAS Extension | Florida-friendly Landscaping

20-0-10

GUARANTEED ANALYSIS

SLOW-RELEASE NITROGEN (SRN) PERCENTAGE FORMULA

EXAMPLE

*14.00% ÷ 20% = .7 or 70% SRN

If the SRN is 30% or more, it is considered a slow-release fertilizer product.

If the SRN is below 30%, it is considered a quick-release fertilizer product.

Fertilizer Label Information	Calculate SRN
Problem 1 Grade: 24-0-11 Derived from: *5.60% Slowly Available Urea	____ ÷ ____ = ____ SRN
Problem 2 Grade: 8-0-12 Derived from: *5.60% Slowly Available Polymer Coated Sulfur Coated Urea	____ ÷ ____ = ____ SRN
Problem 3 Grade: 15-0-15 Derived from: *4.50% Slowly Available Urea Nitrogen from sulfur Coated Urea	____ ÷ ____ = ____ SRN

NITROGEN TO POUNDS OF ACTUAL FERTILIZER FORMULA

EXAMPLE

Step 1. 100 ÷ 15 = 6.66 LBS/1,000 sq.ft.

Step 2. 2,000 AREA ÷ 1,000 = 2 X 6.66 LBS/1,000 sq.ft. = 13.32 LBS OF FERTILIZER PRODUCT

Problem 1 Grade: 24-0-11 SRN: 70% Area: 4,000 sq.ft	100 ÷ ____ GRADE OF N = ____ LBS/1,000 sq.ft. ____ AREA ÷ 1,000 = ____ X ____ LBS/1,000 sq.ft. = ____ LBS OF FERTILIZER PRODUCT
Problem 2 Grade: 22-2-11 SRN: 68% Area: 5,500 sq.ft	100 ÷ ____ GRADE OF N = ____ LBS/1,000 sq.ft. ____ AREA ÷ 1,000 = ____ X ____ LBS/1,000 sq.ft. = ____ LBS OF FERTILIZER PRODUCT
Problem 3 Grade: 8-0-12 SRN: 24% Area: 3,500 sq.ft	50 ÷ ____ GRADE OF N = ____ LBS/1,000 sq.ft. ____ AREA ÷ 1,000 = ____ X ____ LBS/1,000 sq.ft. = ____ LBS OF FERTILIZER PRODUCT
Problem 4 Grade: 34-0-05 SRN: 14% Area: 6,000 sq.ft	50 ÷ ____ GRADE OF N = ____ LBS/1,000 sq.ft. ____ AREA ÷ 1,000 = ____ X ____ LBS/1,000 sq.ft. = ____ LBS OF FERTILIZER PRODUCT

Complete Fertilizer Worksheet.