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**MASTER GARDENER
WATER QUALITY
TRAINING MODULE #6**

FERTILIZER MANAGEMENT PRACTICES TO PROTECT WATER QUALITY IN URBANIZED ENVIRONMENTS

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Reasons to Fertilize

- ◆ Nutrient deficiencies
 - ◆ Slow Plant Growth
 - ◆ Chlorosis (yellowing)
 - ◆ Plant Death
- ◆ Nutrient Imbalances
- ◆ Promote Growth
 - ◆ Increase rate of plant establishment
 - ◆ Maintain winter color of warm season turfgrasses



Fertilizer Activities Contributing to Water Quality Issues



- ◆ Off-target application
 - ◆ Poor equipment
 - ◆ Poor technique
- ◆ Improper timing
 - ◆ Leaching/Runoff
- ◆ Excess application
 - ◆ Leaching/Runoff
 - ◆ Poor equipment calibration

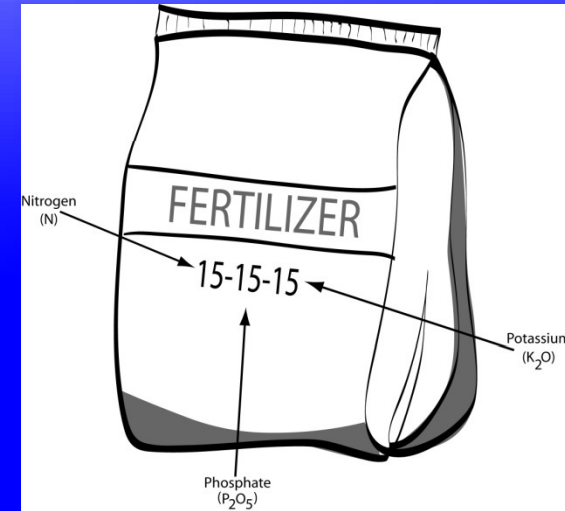
Nutrient Sources

- ◆ Organic
 - ◆ Compost, mulch, manure, etc..
 - ◆ Macro/Micronutrients
 - ◆ Not readily absorbed
- ◆ Inorganic
 - ◆ Synthetic fertilizers
 - ◆ Naturally occurring minerals
 - ◆ Almost entirely nitrogen, phosphorus, and potassium



Types of Fertilizers

- ◆ Single – nutrient
- ◆ Multi-nutrient
- ◆ Micronutrients
- ◆ Controlled release fertilizers (CRFs) or slow release
 - ◆ Organic sources
 - ◆ Nitrogen reaction types (ex. urea –formaldehyde)
 - ◆ Coated types (sulfur or polymer)
- ◆ Naturally organic



Factors Affecting the Release of Nutrients from CRFs

- ◆ Moisture
- ◆ Particle size
- ◆ Soil pH
- ◆ Bacteria
- ◆ Temperature



Timing of Fertilizer Applications

- ◆ Supply at time of active plant growth
 - ◆ Young tender growth is more susceptible to insect damage or frost damage.
 - ◆ Ex. Cool season vs. warm season turfgrass
- ◆ Ensure nutrients are available in soil reservoir prior to growth period.
 - ◆ Fertilize turfgrass in late winter or early spring.

Fertilizer Application Techniques

- ◆ Broadcasting
 - ◆ Hand applied, drop spreader, rotary spreader
- ◆ Banding
 - ◆ Pre-germination/transplanting
- ◆ Sidedressing
 - ◆ Post germination/transplanting
- ◆ Foliar
- ◆ Fertigation

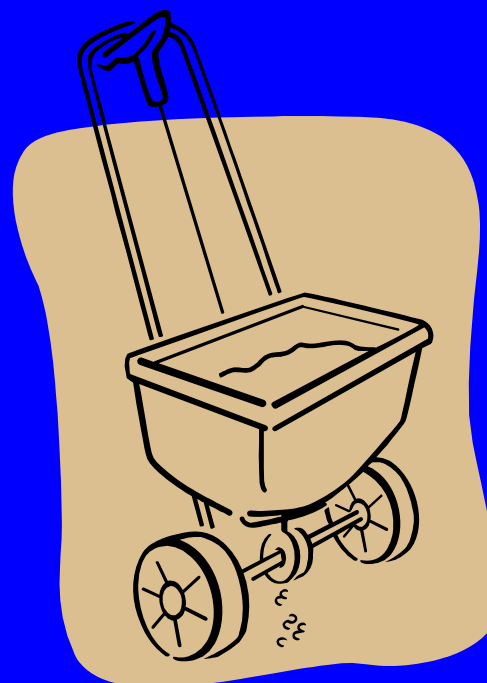
Fertilizer Application Equipment

- ◆ Hand
- ◆ Handheld Broadcast Spreader
 - ◆ Rotary
 - ◆ Shaker
- ◆ Drop Spreader
- ◆ Rotary Spreader



Fertilizer Calibration Steps

- ◆ Weigh out 1 lb of fertilizer material
- ◆ Set spreader at recommended setting on bag
- ◆ Apply material over a tarp or plastic sheet of known dimensions
- ◆ Weigh material applied to determine if spreader setting is correct



* Calibration needs to be done for each type of fertilizer used

Benefits of Organic Sources of Nutrients

- ◆ Compost and mulch supplies a wide array of macro- and micronutrients back to the soil reservoir.
- ◆ Increasing the depth of mulch layers increases the nutrient level of the soil underneath.
 - ◆ Apply 6" or more
 - ◆ If possible, use fresh material
 - ◆ Select coarser materials over finer materials
- ◆ Nitrogen is released through a slow process of mineralization and nitrification

Fertilization of Trees and Shrubs

- ◆ Increases growth of newly planted trees and shrubs.
- ◆ Not normally required for established plants.
- ◆ Poor growth is not always a result of nutrient deficiencies.



*See UC ANR Publication 8045 Fertilizing Landscape Trees

*See Clemson Extension Publication HGIC 1000 Fertilizing Trees and Shrubs

UC Guide to Healthy Lawns

<http://www.ipm.ucdavis.edu/TOOLS/TURF/>

Lawns

- ◆ Cool season species
 - ◆ Tall fescue (ex. Marathon)
 - ◆ Kentucky Bluegrass
 - ◆ Perennial Ryegrass
- ◆ Warm season species
 - ◆ Bermudagrass
 - ◆ St. Augustinegrass
 - ◆ Kikuyugrass
 - ◆ Zoysiagrass

Warm Season Turf Species

- ◆ Dormancy occurs when soil temperatures go below 55 degrees F.
 - ◆ New hybrids and proper fertilizer scheduling reduces winter dormancy (browning).
- ◆ Require less water than cool season.
- ◆ Less frequent mowing is required.
- ◆ Better adapted to our climate.
 - ◆ 80-95 degrees F

Zoysiagrass

Correct identification and fertilization practices are essential in maintaining a healthy lawn!



Identifying Tips

- Dark-green.
- Fine to medium textured.
- Thick turf - prickly to touch.
- Leaf blade is short, stiff and pointed at tip.
- Creeping growth habit.
- Warm-season grass.
- Best in full sun, but tolerates some shade.
- Heat tolerant.
- Dormant in winter, new UC varieties retain better color.
- Tolerant of heavy foot traffic.
- Thatch buildup may become a problem.



What you use in the garden affects our creeks, rivers, and ocean!

Maintenance

- Water infrequently – drought tolerant.
- Mow grass at $\frac{1}{2}$ –1 inches.



Fertilizing Tips

- Apply 2-4 lbs. of actual nitrogen per 1000 sq. ft. per year.
- Split the amount evenly among the months highlighted in green.
- Use the fertilizer calculator to determine the pounds of fertilizer to apply depending on the % of nitrogen listed on the bag.

Fertilize during the months highlighted in red!

Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec



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UC Guide for Healthy Lawns at:
www.ipm.ucdavis.edu/TOOLS/TURF/



Be sure to read product labels carefully and follow all instructions on proper use, storage, and disposal of fertilizers.



Seashore Paspalum

Correct identification and fertilization practices are essential in maintaining a healthy lawn!



Identifying Tips

- Light to medium green.
- Dense aggressive root system – creeping habit.
- Heat tolerant.
- Salt tolerant.
- Tolerates some shade.
- Warm-season grass.
- Dormant in winter.



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Maintenance

- Water infrequently and deep – moderately drought tolerant.
- Mow grass at $\frac{3}{4}$ – $1\frac{1}{2}$ inches.
- Fertilizing in fall as recommended maintains better winter color.



Fertilizing Tips

- Apply 2-3 lbs of actual nitrogen per 1000 sq. ft. per year.
- Split the amount evenly among the months highlighted in green.
- Use the fertilizer calculator to determine the pounds of fertilizer to apply depending on the % of nitrogen listed on the bag.

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Fertilize during the months highlighted in red!



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Bermudagrass

Correct identification and fertilization practices are essential for maintaining a healthy lawn!



Identifying Tips

- Gray-green.
- Medium to coarse textured.
- Leaf tips pointed.
- Hybrids finer textured and darker green.
- Creeping growth habit.
- Warm-season grass.
- Best in full sun.
- Tolerant of foot traffic.
- Dormant in winter.
- Salt-tolerant.



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Maintenance

- Water infrequently and deep to promote deep roots and drought tolerance.
- Mow seeded types at 1–1 ½ inches.
- Mow hybrid types at ½–¾ inches.
- Fertilizing in fall as recommended maintains better winter color on some hybrids.



Fertilizing Tips

- Apply 4 lbs of actual nitrogen per 1000 sq. ft. per year for seeded.
- Apply 4-6 lbs of actual nitrogen per 1000 sq. ft. per year for hybrids.
- Split the amount evenly among the months highlighted in green.
- Use the fertilizer calculator to determine the pounds of fertilizer to apply depending on the % of nitrogen listed on the bag.

Fertilize during the months highlighted in red!

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Be sure to read product labels carefully and follow all instructions on proper use, storage, and disposal of fertilizers.

St. Augustinegrass

Correct identification and fertilization practices are essential in maintaining a healthy lawn!



Identifying Tips

- Broad leaf blade with rounded leaf tip.
- Creeping above ground growth habit.
- Warm-season grass.
- Best in full sun, but also shade tolerant.
- Heat tolerant.
- Drought tolerant.
- Dormant in winter.
- Moderate tolerance to foot traffic.
- Salt tolerant.
- Low cold tolerance.
- Thatch buildup may become a problem.



What you use in the garden affects our creeks, rivers, and ocean!

Maintenance

- Water infrequently and deep – every 3-6 days to encourage deep root system.
- Mow grass at 1–3 inches.



Fertilizing Tips

- Apply 4 lbs. of actual nitrogen per 1000 sq. ft. per year.
- Split the amount evenly among the months highlighted in green.
- Use the fertilizer calculator to determine the pounds of fertilizer to apply depending on the % of nitrogen listed on the bag.
- Iron applications are often required as a supplement.

Fertilize during the months highlighted in red!

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Kikuyugrass

Correct identification and fertilization practices are essential in maintaining a healthy lawn!



Identifying Tips

- Light green.
- Coarse texture.
- Leaf blade hairy at base.
- Creeping roots above and below soil.
- Often mistaken for St. Augustinegrass.
- Commonly found in established lawns.
- Warm-season grass.
- Heat tolerant.
- Low cold tolerance.
- Tolerant of moderate shade.
- Dormant in winter.
- Recovers quickly from cold or traffic injury.



What you use in your garden affects our creeks, rivers, and ocean!

Maintenance

- Water infrequently and deep – drought tolerant.
- Mow grass at 1–1½ inches.



Fertilizing Tips

- Apply 2 lbs of actual nitrogen per 1000 sq. ft. per year.
- Split the amount evenly among the months highlighted in green.
- Use the fertilizer calculator to determine the pounds of fertilizer to apply depending on the % of nitrogen listed on the bag.

Fertilize during the months highlighted in red!

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Be sure to read product labels carefully and follow all instructions on proper use, storage, and disposal of fertilizers.

Cool Season Turf Species

- ◆ Keep green color in winter unless temperatures go below 32 degrees F for extended period.
- ◆ Require more water than warm season.
- ◆ Ideal growing temperature is 60-75 degrees F.
- ◆ Spring and Fall most active growing period.

Kentucky Bluegrass

Correct identification and fertilization practices are essential in maintaining a healthy lawn!



Identifying Tips

- Dark-green.
- Medium textured.
- Leaf blades have boat-shaped tip.
- Creeping underground root growth habit.
- Cool-season grass.
- Best in full sun.
- Tolerates some shade.
- Low heat tolerance – poor summer appearance.
- Susceptible to disease and weed invasion under stressful conditions.
- Moderate foot traffic.



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Maintenance

- Water frequently – every 1–3 days in summer.
- Mow grass at 1½–2½ inches, mow at highest during summer months.



Fertilizing Tips

- Apply 4-6 lbs of actual nitrogen per 1000 sq. ft. per year.
- Split the amount evenly among the months highlighted in green.
- Use the fertilizer calculator to determine the pounds of fertilizer to apply depending on the % of nitrogen listed on the bag.

Fertilize during the months highlighted in red!



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Tall Fescue

Correct identification and fertilization practices are essential in maintaining a healthy lawn!



Identifying Tips

- Dark-green.
- Moderate to coarse texture.
- Bunch-type grass with extensive root system.
- Most common lawn grass sold in California.
- Cool-season grass.
- Stays green in cool weather.
- Heat tolerant.
- Slight drought tolerance.
- Tolerates moderate foot traffic.
- Semi-dormant in hot summer months.



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Maintenance

- Water infrequently and deep to promote deep roots and drought tolerance.
- Regular deep watering is required in summer months.
- Mow grass at 1 ½–3 inches.



Fertilizing Tips

- Apply 3-6 lbs of actual nitrogen per 1000 sq. ft. per year.
- Split the amount evenly among the months highlighted in green.
- Use the fertilizer calculator to determine the pounds of fertilizer to apply depending on the % of nitrogen listed on the bag.

Fertilize during the months highlighted in red!



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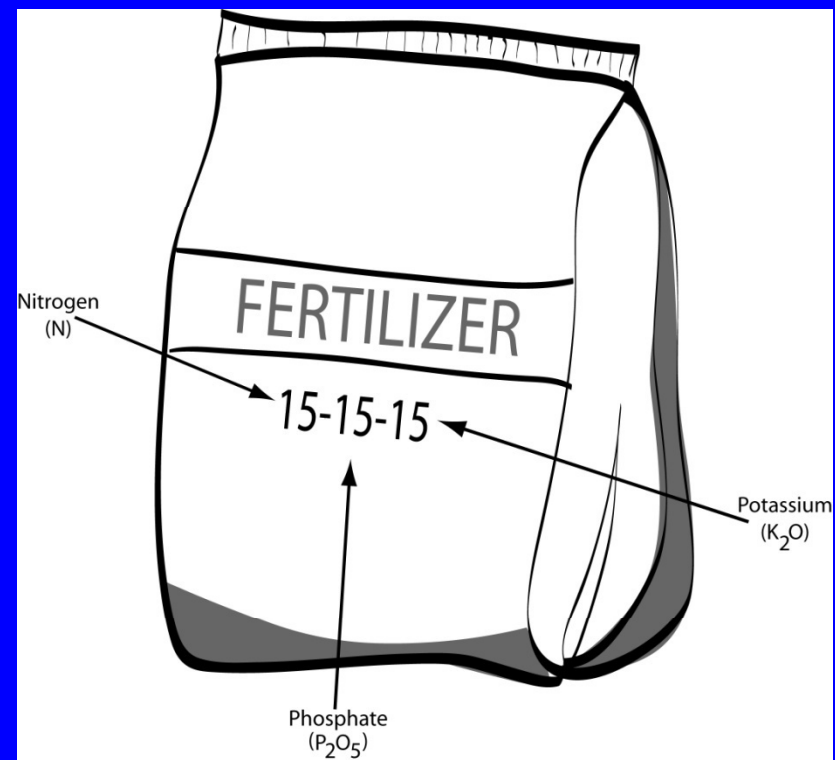


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Fertilizer Basics

- ◆ Locate fertilizer analysis on bag
- ◆ N-P-K
- ◆ Complete vs. Incomplete



Fertilizer Facts

Prevent Fertilizer From Polluting Creeks, Rivers and the Ocean!

- Only apply fertilizer to planted areas where it can move into the soil and be taken up by plant roots.
- Be careful to apply the appropriate amount of fertilizer at a time when plants are actively growing.
- Sweep or blow fertilizer off of sidewalks, walkways, and driveways back onto lawns - not into the street gutter and storm drains.
- Water fertilizer into lawn in a controlled manner - avoid overirrigation and the running of fertilizer and irrigation off of lawns into gutters or below the root zone.
- Only use rotary spreaders in large turf areas - drop spreaders should be used along the edge or in narrow parkways to avoid off target application.
- Avoid the use of fertilizer/pesticide combinations unless the presence of the pest coincides with a scheduled fertilization.

Be sure to read product labels carefully and follow all instructions on proper use, storage, and disposal of fertilizers.



Types of Fertilizers

Fast Release (Soluble Nitrogen)

- Least costly.
- Quick greening response.
- Used up quickly by plants
 - more frequent applications required.
- Excess application can "burn" lawn.
- Overirrigation/rain moves fertilizer below plant roots or washes away.
- Usually last about 4-6 weeks.

Examples: ammonium nitrate, ammonium sulfate, calcium nitrate, and urea.

Slow-Release

- Releases nutrients slowly over time.
- Does not readily burn turfgrass.
- Apply less frequently.
- Does not move as easily below plant roots under excessive irrigation.
- Can last up to 8 weeks or longer depending on formulation.

Examples: sulfur-coated urea, urea formaldehyde, IBDU, and organic fertilizers

Natural Organic Materials

- Releases nutrients slowly over time.
- Usually bulky.
- Does not readily burn turfgrass.
- More expensive than soluble fertilizers per pound of actual nitrogen.
- May have unpleasant odor, contain weed seeds or salts.

Examples: steer and poultry manure

What you use on your garden affects our creeks, rivers, and ocean!



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Fertilizer Application

How to Fertilize Your Lawn

- Identify type of grass using lawn care reference cards.
- Locate on the reference card the pounds of nitrogen required for 1000 square feet of lawn per year.
- Divide the amount of nitrogen required for the year by the number of application months. Apply no more than 1 lb of nitrogen at each application to avoid burning.
- Use the fertilizer calculator to determine the pounds of material to remove from the bag to apply 1 lb. of actual nitrogen to 1000 square feet. If the area is larger, multiply by the appropriate factor (i.e. 2000 square feet multiply by 2).
- Calibrate spreader (directions on reverse).
- Deeply irrigate lawn a couple days before you apply fertilizer.
- Apply fertilizer and irrigate just enough to move the fertilizer from the leaves into the soil.

Be sure to read product labels carefully and follow all instructions on proper use, storage, and disposal of fertilizers.

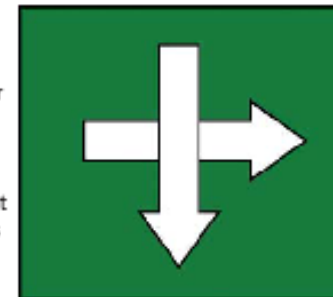


Calibration of Spreaders

- Fill spreader with fertilizer.
- Apply over a 100 square feet area (i.e. 50 feet x 2 feet) covered with a plastic tarp to collect fertilizer.
- Weigh the amount of fertilizer collected on the tarp.
- Multiply this amount by 10 to determine how much would be applied over 1000 square feet.
- The number should match the pounds of fertilizer determined by the fertilizer calculator.
- If the number is higher or lower, adjust the spreader setting accordingly.

Application of Dry Fertilizers

- Apply to edges first.
- Apply half the fertilizer in one direction.
- Apply the other half at right angles to the first.
- Overlap wheel marks to avoid striping.
- Return any unused fertilizer to bag.
- Do not wash out spreader on or near sidewalks or driveways.



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SIDE 1

Calculador Para La Proporción De Fertilizante

Calcula libras de fertilizante para aplicar 1 libra de nitrógeno actual por 1,000 pies cuadrados.

LBS. OF NITROGEN IN BAG	
0	100
7	100
8	100

14-3	
LBS. TO APPLY PER 1,000 SQ. FT.	

622	
LBS. TO APPLY PER ACRE	

INSTRUCTIONS: Use Nitrogen percentage on bag to read application pounds per acre and square feet.

Como encontrar el % Nitrógeno en un bolso del fertilizante



Lo que usted utiliza en su jardín puede afectar nuestros ríos y el océano!



SIDE 2

Fertilizer Rate Calculator

Calculate pounds of fertilizer to apply 1 pound of actual nitrogen per 1000 square feet

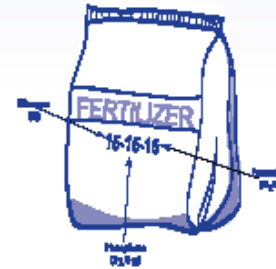
LBS. OF NITROGEN IN BAG	
0	100
7	100
8	100

14-3	
LBS. TO APPLY PER 1,000 SQ. FT.	

622	
LBS. TO APPLY PER ACRE	

INSTRUCTIONS: Use Nitrogen percentage on bag to read application pounds per acre and square feet.

Finding the % of Nitrogen on the Fertilizer Label



What you use in the garden affects our creeks, rivers and ocean!

For more information about fertilizing programs, contact your Orange County University of California Cooperative Extension Office at (714) 758-1994 or visiting the following websites: UC Field to Healthy Lanes at www.ucsouth.edu/field2land/ or UCCE Master Gardeners of Orange County at www.ocsocny.com



Funding for this project has been provided in full or in part through an agreement with the State Water Resources Control Board pursuant to the Clean Water Act of 1987 (Project #11)

Company: UC COOPERATIVE EXTENSION
Date: 01/12/08
Sales: CM Design JV
Style: 3.5 X 8 BU
Colors: 2
Sketch Output: PDF
Thick: 60 lbs



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Fertilizer Application Tips

- ◆ Set the spreader at half the recommended rate and make two passes at 90° of each other.
- ◆ Sweep up any off-target granules.
- ◆ Stick with the same brand and type of fertilizer if you are not willing to calibrate your spreader each time.
- ◆ Pay close attention to the amount of water used to “water-in” the fertilizer.
- ◆ Organic > Controlled Release > Inorganic