EARTH-KIND®

Landscaping for Beauty and Water Conservation – Part One

TEXAS A&M AGRILIFE EXTENSION

"Earth-Kind landscaping focuses on conserving and protecting natural resources through the use of ***environmentally friendly practices*** *to create* ***beautiful, easy-care*** *landscapes, as well as, vegetable gardens and fruit plantings."*

- **Blend of conventional and organic**
- **Based on decades of unbiased research**

TEXAS A&M AGRILIFE EXTENSION

Earth-Kind® Rose Cultivars

Please select a cultivar to see more information on that rose.

Dwarf Shrubs


Marie Daly


Souvenir de St. Anne's


The Fairy

Small Shrubs


Caldwell Pink


Cecile Brunner


Perle d'Or

Medium Shrubs


Belinda's Dream


Carefree Beauty


Ducher


Duchesse de Brabant


Else Poulsen


Georgetown Tea


Knock Out


La Marne


Madame Antoine Mari


Mutabilis


Spice

Mannerly Climbers

Earth-Kind® Roses Home

About Earth-Kind® Roses

How Cultivars Are Selected

Earth-Kind® Rose Cultivars

- Belinda's Dream
- Caldwell Pink
- Carefree Beauty ™
- Cecile Brunner
- Climbing Pinkie
- Ducher
- Duchesse de Brabant
- Else Poulsen
- Georgetown Tea
- Knock Out®
- La Marne
- Madame Antoine Mari
- Marie Daly
- Mutabilis
- New Dawn
- Perle d'Or
- Reve d'Or
- Sea Foam
- Souvenir de St. Anne's
- Spice
- The Fairy

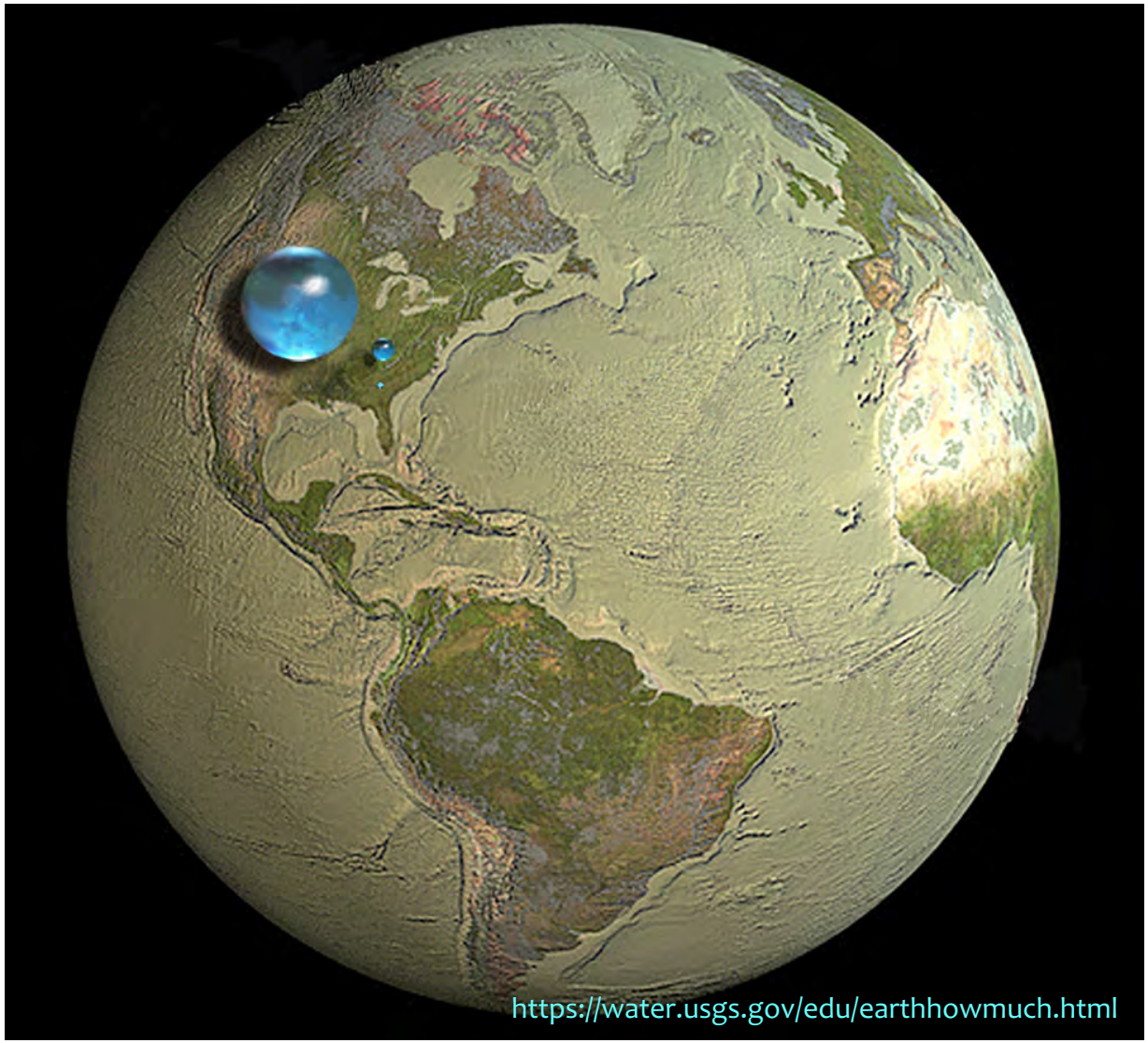
Earth-Kind® Rose Press Room

Growing Tips for Earth-Kind® Roses

Goals of Earth-Kind

1. **Conservation of water AND quality**
2. **Reduction of chemical and fertilizer use**
3. **Energy conservation**
4. **Reduction of solid waste**

Water: is there enough?



TEXAS A&M AGRILIFE EXTENSION

Water: what role do we play?

- By 2060, 46,000,000 people will need 22 Million acre-feet
  - Only 15 Million acre-feet expected to be available (TWDB)

- 30% (60%) of municipal water used in landscapes.

- 9 Billion gallons per day across the nation for landscaping (EPA)
  - As much as 50% wasted

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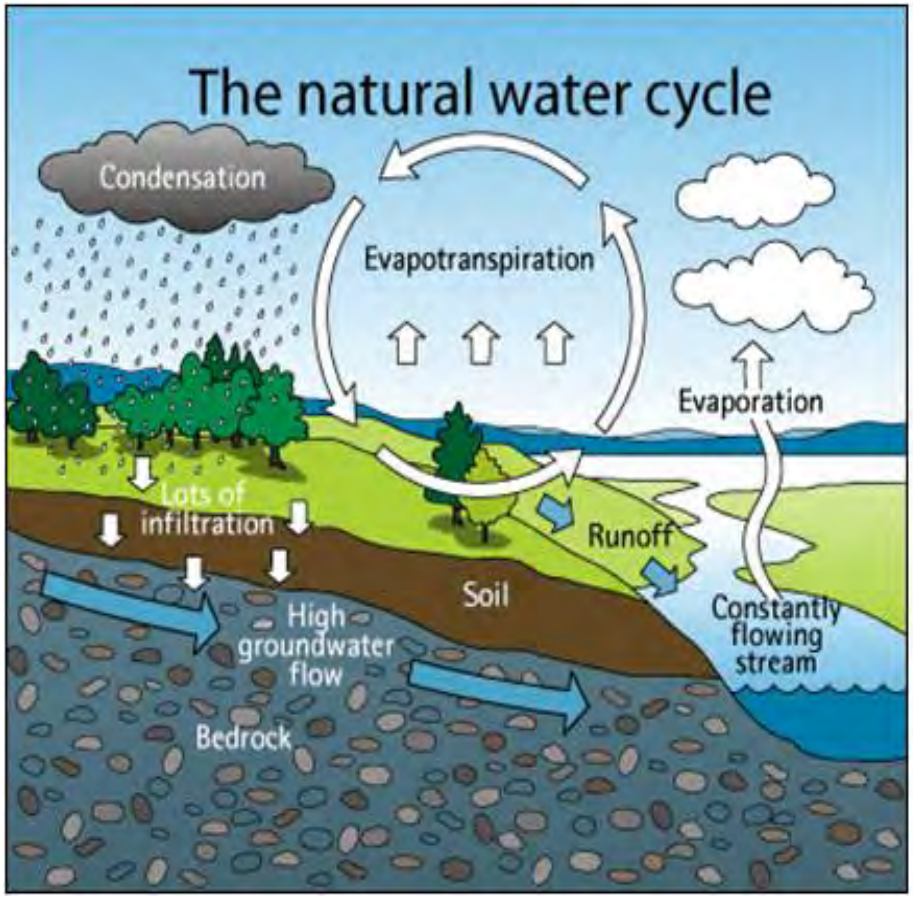
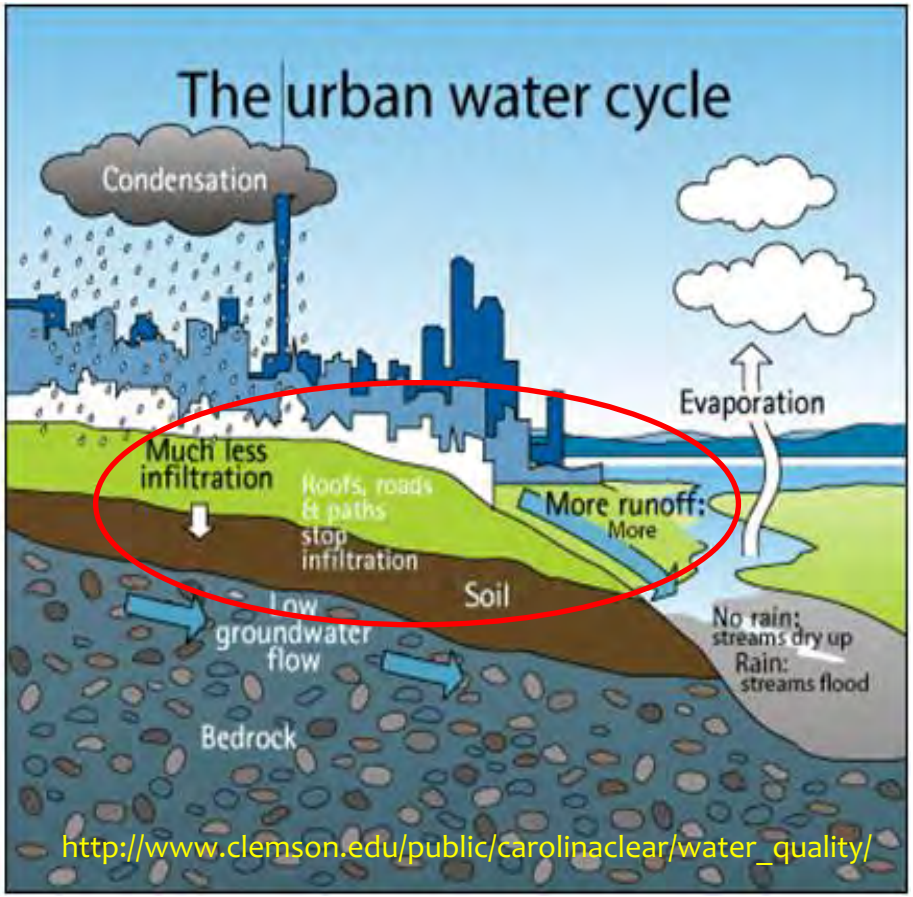
All water is shared





TEXAS A&M AGRILIFE EXTENSION

Major Sources of Waste

- Irrigation
  - Runoff
  - Evaporation
  - Problems / improper management
- Plant Material
  - Inappropriate selection
  - Improper placement
- Other sources
  - Poor soil conditions
  - Ineffective / lack of mulch use

Runoff

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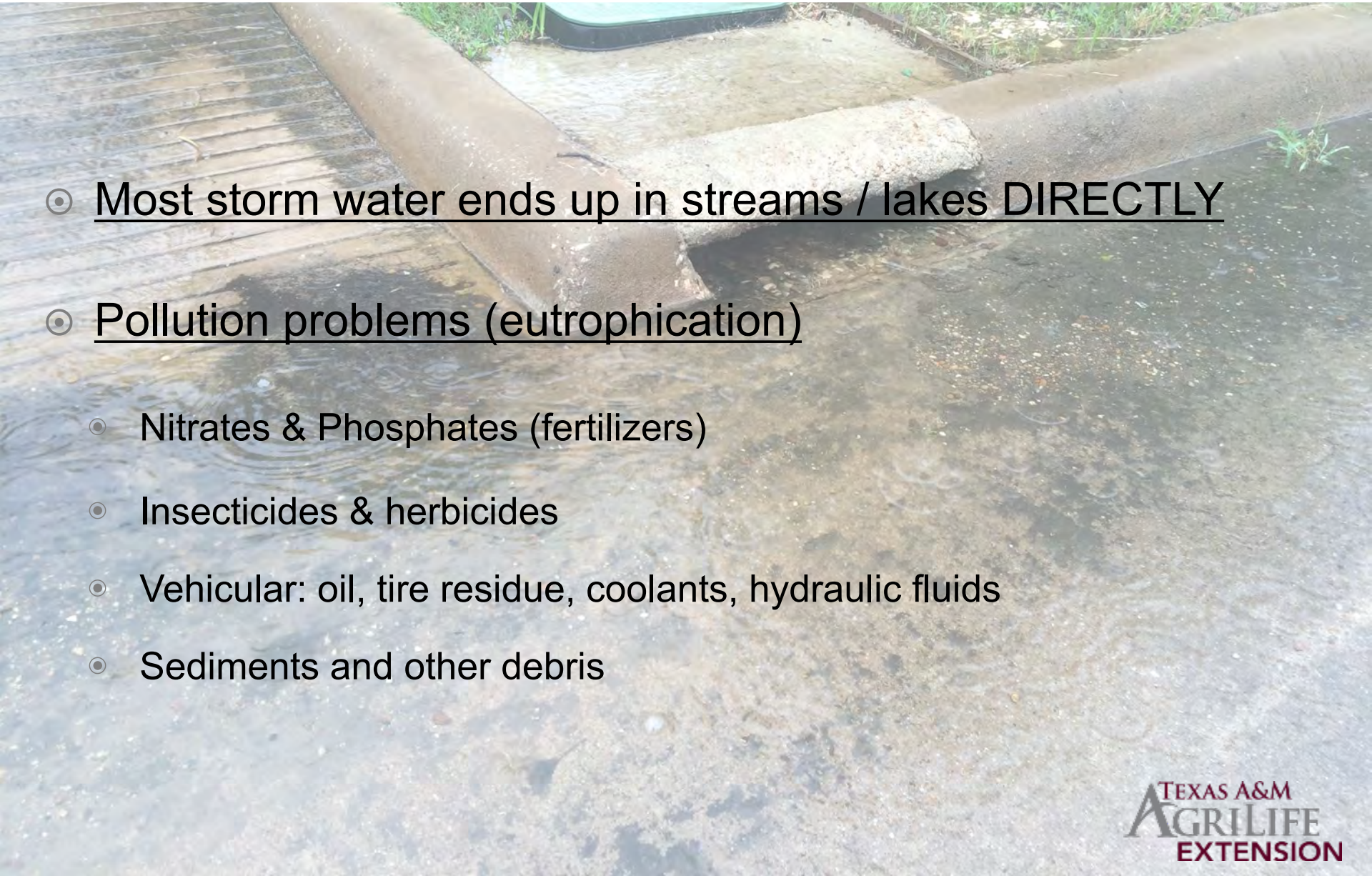
Improper Maintenance

Urban runoff issues



- Most storm water ends up in streams / lakes DIRECTLY
- Pollution problems (eutrophication)
  - Nitrates & Phosphates (fertilizers)
  - Insecticides & herbicides
  - Vehicular: oil, tire residue, coolants, hydraulic fluids
  - Sediments and other debris

Seven principles of Earth-Kind:

1) Planning and design
2) Soil analysis and preparation
3) Practical turf areas
4) Appropriate plant selection
5) Efficient irrigation and rainwater harvesting
6) Effective use of mulches
7) Appropriate maintenance

Earth-Kind®
Landscaping

http://earthkind.tamu.edu

Earth-Kind Landscaping uses research-proven techniques to provide maximum garden and landscape enjoyment while preserving and protecting the environment. The objective of Earth-Kind Landscaping is to combine the best of organic and traditional gardening and landscaping principles to create a horticultural system based on real world effectiveness and environmental responsibility. Earth-Kind Landscaping Encourages:

- Landscape Water conservation
- Reduction of fertilizer and pesticide use
- Landscaping for energy conservation
- Reduction of landscape wastes entering landfills

Individuals using Earth-Kind landscaping principles and practices can create beautiful, easy-care landscapes, while conserving and protecting natural resources and the environment.

Ask an Expert

Earth-Kind® Home

10 Ways to Make Your Landscape Earth-Kind®

Take the Earth-Kind® Challenge

Planning the Home Landscape – Earth-Kind® Edition

Earth-Kind® Plant Selector

Search the Earth-Kind® Plant Selector

Earth-Kind® Publications

Landscape Publications

Master Gardener On-Line Training

Additional Earth-Kind® Resources

Earth-Kind® Drought Preparedness

Earth-Kind® Landscaping

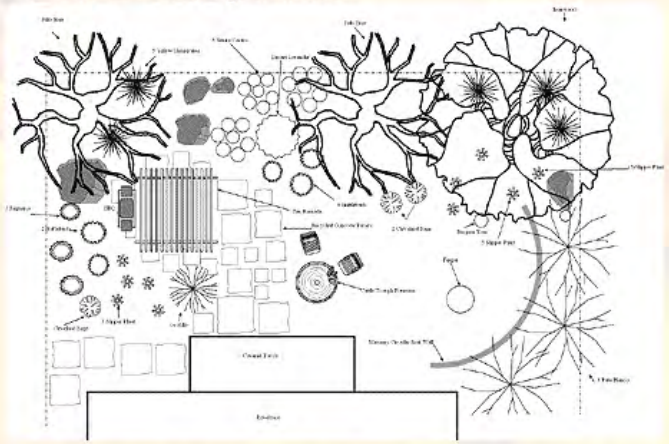
Planning the Home Landscape – Earth-Kind® Edition

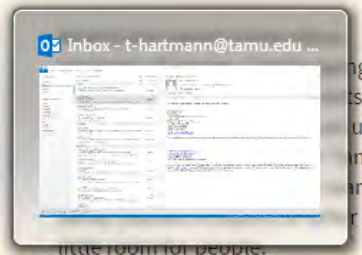
William C. Welch, Extension Landscape Horticulturist

Editors Note: Planning the Home Landscape is one of Aggie-Horticulture's most widely accessed educational resources. The Earth-Kind Edition of this resource highlights additional information *(shown in red and emphasized)* that can contribute to a healthy and sustainable environment while preserving and protecting our valuable natural resources.

A well-designed landscape is a pleasure to the owner, enhances a community, adds to the property's resale value *and limits environmental impact.* Landscape design involves much more than placing trees, shrubs and other plants on the property. It is an art which deals with conscious arrangement or organization of outdoor space for human satisfaction and enjoyment. Some of its major goals include:

- Organizing and developing the site for maximum use and pleasure.
- Creating a visual relationship between the house and the site.
- Reducing landscape maintenance to a practical level.
- *Assists in conserving energy*
- *Reduces environmental inputs such as water, fertilizers and pesticides.*





ng"

s, parks, schools, etc. Much of this money is wasted, however, because of little understand how to landscape until they know why they landscape. There are ndscape": some think it improves the appearance of their place; others like to nt their place to look pretty. Too often these landscapes dominate rather than r materials in the landscape may take up a large portion of the space and leave little room for people.

TEXAS A&M AGRILIFE EXTENSION

EHT-083
02-15

10 Ways to Make Your Landscape EARTH-KIND®

Tim Hartmann, Extension Program Specialist, Horticultural Sciences
The Texas A&M University System

EARTH-KIND® focuses on using environmentally friendly management practices to produce landscapes that are beautiful, low-maintenance, and sustainable. The goals of an EARTH-KIND® landscape are to conserve water and energy, reduce pesticide and fertilizer use, and to recycle landscape wastes. Unfortunately, some EARTH-KIND® principles can be difficult to implement in an established landscape especially if the owner does not wish to make drastic changes to the existing design and plantings. The following, however, are ten

TEXAS A&M AGRILIFE EXTENSION

Earth-Kind® Challenge | Zimbra: Inbox (2425) | Blanco, TX Weather Forec

aggie-horticulture.tamu.edu/earthkind/challenge/

Earth-Kind®
Landscaping

Is your landscape contributing to a healthy and sustainable environment? There's one way to find out, take the Earth-Kind® Challenge. It's easy. Just answer this series of questions about the cultural principles and practices used in maintaining your landscape. You'll also find links to Earth-Kind® information along the way to assist in determining the most appropriate response.

If you need to, you can download a free PDF Reader.

After completing the questions, click on the SUBMIT button and you will automatically receive an Earth-Kind® score ranging from 0-100. The higher the score, the more you are doing to help preserve and protect the environment in which we live.

Remember - the value of this activity largely depends on how accurately the response to each question reflects your current maintenance principles and practices. *All questions should be answered.*

Landscape Design (10 points possible):

read more on landscape design...

Is there a plan or drawing of current and future landscape areas? Yes
How much turf area does the landscape include? 25% - 50%
Are plants with like water requirements grouped together in the landscape (hydrozoning)? Yes

Soil Preparation (10 points possible):

read more on soil improvement

How much organic matter has been incorporated in to landscape planting areas? 10% - 25%

Plant Selection (15 points possible):

read more on plant selection

What percent of landscape plants have an Earth-Kind® Index value of 8 or higher (use the Earth-Kind® Plant Selector to find values of many common landscape plants)? 25% - 50%

9:37 PM
2/15/2014

Earth-Kind® Challenge | Zimbra: Inbox (2425) | Blanco, TX Weather Forec

aggie-horticulture.tamu.edu/earthkind/challenge/return.php

Earth-Kind® Landscaping

Earth-Kind® Challenge Results

Thank you for participating in the Earth-Kind® Challenge.
Your score is 84

The following is a summary of your responses along with the best Earth-Kind® practices for creating a healthy and sustainable landscape environment. Responses are grouped into five categories (NEEDS IMPROVEMENT, FAIR, GOOD, EXCELLENT, OUTSTANDING) depending on the degree to which you adhere to Earth-Kind® practices in your landscape. NOTE: Your practices that are consistent with Earth-Kind® principles are marked with a green check; areas of potential improvement are denoted by a red X.

If you need to, you can download a free PDF Reader.

Since your score is between 80 - 89 your landscape management is **EXCELLENT!**

Landscape Design (10 points possible):

Is there a plan or drawing of current and future landscape areas?

You answered YES
Your response is consistent with good Earth-Kind® practices. Read more on landscape design...

How much turf area does the landscape include?

You answered more than 10%
The optimal Earth-Kind® landscape has less than 10% turf area.

When considering a landscape's water requirement, it is important to note that turfgrass requires more frequent watering and maintenance than most other landscape plants. Carefully select grass according to its intended use, planting location and maintenance requirements. For additional information, see our publication on Planning the Home Landscape.

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Practical Turf Areas

Texas A&M AgriLife Extension

Practical Turf

- Among the heaviest water users in TX landscapes
- Benefits:
  - Erosion control, water infiltration
  - Cooling through transpiration (30° F)
  - Effective design element
- Largely due to behavioral issues:
  - Quality expectations
  - Improper selection of turf
  - Inefficient management
  - Excessive use

Turf Coefficient Values (Tc)	
Warm Season	0.6
Cool Season	0.8

Quality Factor (Qf)	
No Stress	1.0
Low Stress	0.8
Normal Stress	0.6
High Stress	0.5
Very High Stress	0.4

http://texaset.tamu.edu/coefs.php

The Typical home landscape

- Majority of yard is turf by default
- Spray irrigation (excessive / improper usage)
- Poorly-adapted plant choices

http://imgkid.com/typical-suburban-house.shtml

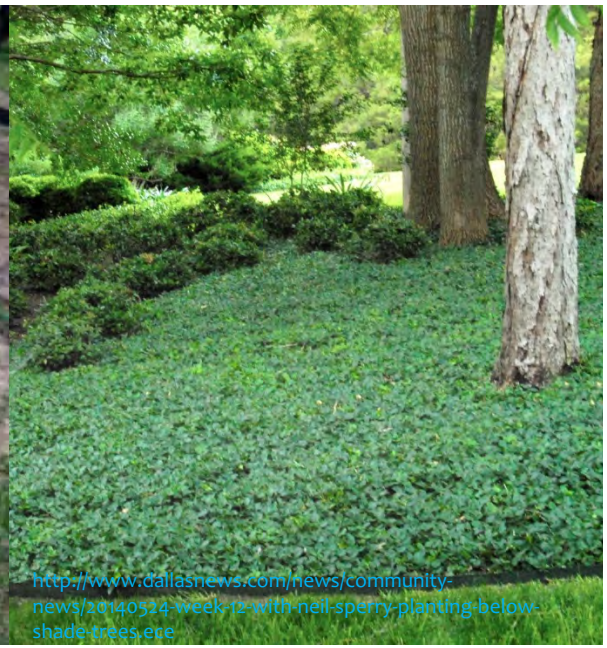
TX Senate Bill 198

- A BILL TO BE ENTITLED AN ACT relating to restrictive covenants **regulating drought-resistant landscaping or water-conserving turf**.

- BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF TEXAS: SECTIONA1.AASection 202.007(a), Property Code, is amended to read as follows: (a) property owners ' association may **not** include or enforce a provision in a dedicatory instrument that **prohibits or restricts** a property owner from:
  - (1) implementing measures **promoting solid-waste composting** of vegetation, including grass clippings, leaves, or brush, or **leaving grass clippings uncollected** on grass
  - (2) **installing rain barrels or a rainwater harvesting system**; [or]
  - (3) **implementing efficient irrigation systems**, including underground **drip or other drip systems** or
  - (4) **using drought-resistant landscaping or water-conserving turf**.

TEXAS A&M AGRILIFE EXTENSION

Placement of Turf



- Avoid long, narrow turf areas that are difficult to water
- Hardscapes, beds, and groundcovers under shade

“Growing” Problem Areas

https://www.reddit.com/r/DIY/comments/1ghgu2/my_wife_and_i_got_tired_of_trying_to_get_grass_to/

http://www.dallasnews.com/news/community-news/20140524-week-12-with-neil-sperry-planting-below-shade-trees.ece

Zoysiagrass

Casey Reynolds, PhD

Latin Name: *Zoysia* sp.

Growth Habit: Rhizomatous and Stoloniferous

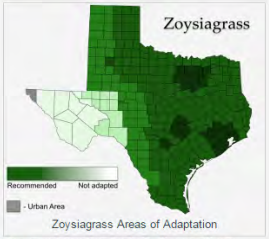
Vernation: Rolled

Leaf: Hairy on upper surface

Ligule: Fringe of hairs

Auricles: Absent

Inflorescence: Spike with 3-12 spikelets (*Z. pacifica*) or 10-50 spikelets (*Z. japonica* and *Z. matrella)*

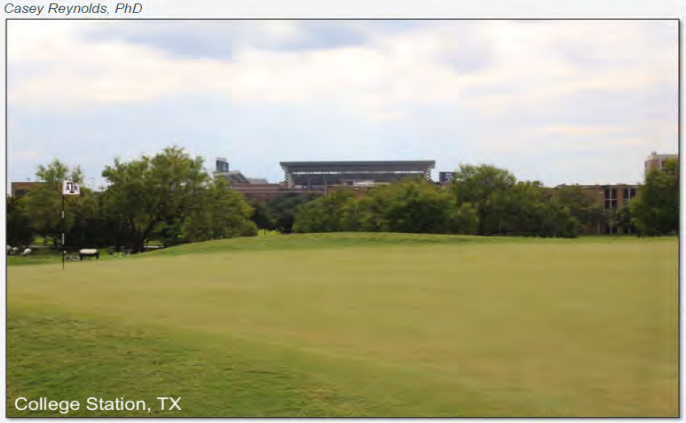


Zoysiagrass Areas of Adaptation

Description: Zoysiagrass is a warm-season turfgrass that spreads laterally by rhizomes and stolons, and is one of the most diverse turfgrasses available for use. This is primarily due to the fact that there are at least 11 species of zoysiagrass used as a turfgrass, with 2 species (*Z. japonica* and *Z. matrella*) being most predominate in the southern United States. Available varieties of *Z. japonica* typically possess coarser leaf texture and better cold tolerance relative to varieties of *Z. matrella*, while varieties of *Z. matrella* have improved shade tolerance

Bermudagrass

Casey Reynolds, PhD



Latin Name: *Cynodon dactylon* L. Pers and *Cynodon dactylon* (L.) Pers x *Cynodon transvaalensis* Burtt Davy

Growth Habit: Rhizomatous and Stoloniferous

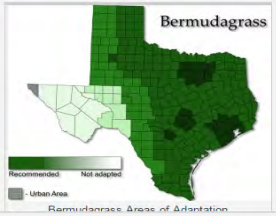
Vernation: Folded

Leaf: Smooth or hairy on both surfaces

Ligule: Fringe of hairs

Auricles: Absent

Inflorescence: Panicle with 2-9 spicate branches arranged in a digitate manner at the apex of the culm



Bermudagrass Areas of Adaptation

Description: Bermudagrass is a warm-season, fine-textured

St. Augustinegrass

Casey Reynolds, PhD

Latin Name: *Stenotaphrum secundatum* (Walt.) Kuntze

Growth Habit: Stoloniferous

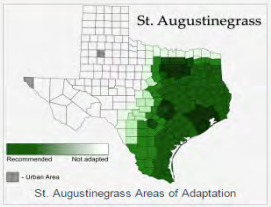
Vernation: Folded

Leaf: Flat, smooth on both surfaces, with a blunt tip

Ligule: Fringe of hairs

Auricles: Absent

Inflorescence: Spicate, with spikelets partially embedded in the rachis



St. Augustinegrass Areas of Adaptation

Description: St. Augustinegrass is a warm-season turfgrass that spreads laterally by stolons and is one of the most widely planted turfgrass species in Texas, particularly in urban environments. This is due to its superior shade tolerance relative to other warm-season grasses as well as its deep rooting potential and drought tolerance. It also performs well when mowed with a rotary mower at higher mowing heights, relative to other warm-season species, which makes it a popular choice for use in home lawns

https://aggieturf.tamu.edu/texas-turfgrasses/

Buffalograss

Casey Reynolds, PhD

Latin Name: (*Bouteloua dactyloides* (Nutt.) J.T. Columbus)

Growth Habit: Stoloniferous

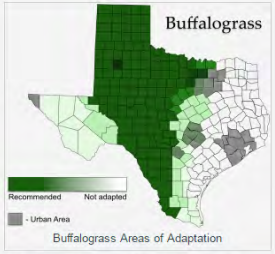
Vernation: Rolled

Leaf: Hairs on both surfaces; Ridges on upper surface

Ligule: Fringe of hairs

Auricles: Absent

Inflorescence: Staminate and pistillate spikelets in separate inflorescences; usually on different plants. Staminate spikelets in 1-4 spicate inflorescences; Pistillate spikelets in 2-4 burlike clusters.



Buffalograss Areas of Adaptation

Description: Buffalograss is a warm-season, native turfgrass that spreads laterally by stolons and is best suited as a low-input, low-use turfgrass. It is unique from other turfgrasses in

Turf Selection Matters

Consider using species such as Zoysia and Buffalograss that are capable of going dormant during drought and can easily recover.

Specific varieties within the same species are require considerably less water than do others (new San Augustine cultivars).

Buffalograss (lower right) requires 25% less water to remain green than do most turf species. It can also go survive long periods without water when dormant.

TEXAS A&M AGRILIFE EXTENSION

Practical turf solutions

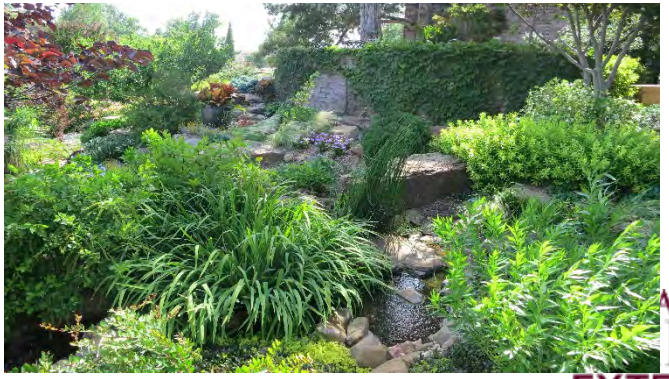
- ✓ Correct proportion (user-dependent)
- ✓ Appropriate selection (species/cultivar)
- ✓ Proper placement in landscape
- ✓ Sound management practices
  - Mulching of lawn clippings
  - Mowing at a taller height
- ✓ Aeration and addition of compost to compacted areas

TEXAS A&M AGRILIFE EXTENSION

Planning and Design

Designing for longevity and efficient management

- Proper spacing of plants
- Positioning and grouping
- Plant diversity



Final Plant Spacing

- Final Height / Width
- Air movement
- Watering
- Pests / Disease

Proper Plant Placement

- North side: shade & heavy water-users
- East side: part shade / heavy water users
- West / Southwest: arid / heat-tolerant
- South side: tropical / tender plants

Why do we have to mix it up?

Thinking outside the box…..

Areas of native vegetation support wildlife such as birds and beneficial insects, require no irrigation or maintenance, and serve as privacy screens

Wildflower meadows offer natural beauty with minimal care and water, attract butterflies, and can easily be incorporated in as small patches or larger expanses

TEXAS A&M AGRILIFE EXTENSION

Thinking outside the box…

Areas of enclosed turf surrounded by beds of groundcovers or perennials can slow and absorb runoff that would end up in streets

Mulched areas and hardscapes (pervious) can be used as alternatives to turf in areas under shade and in service areas for water conservation

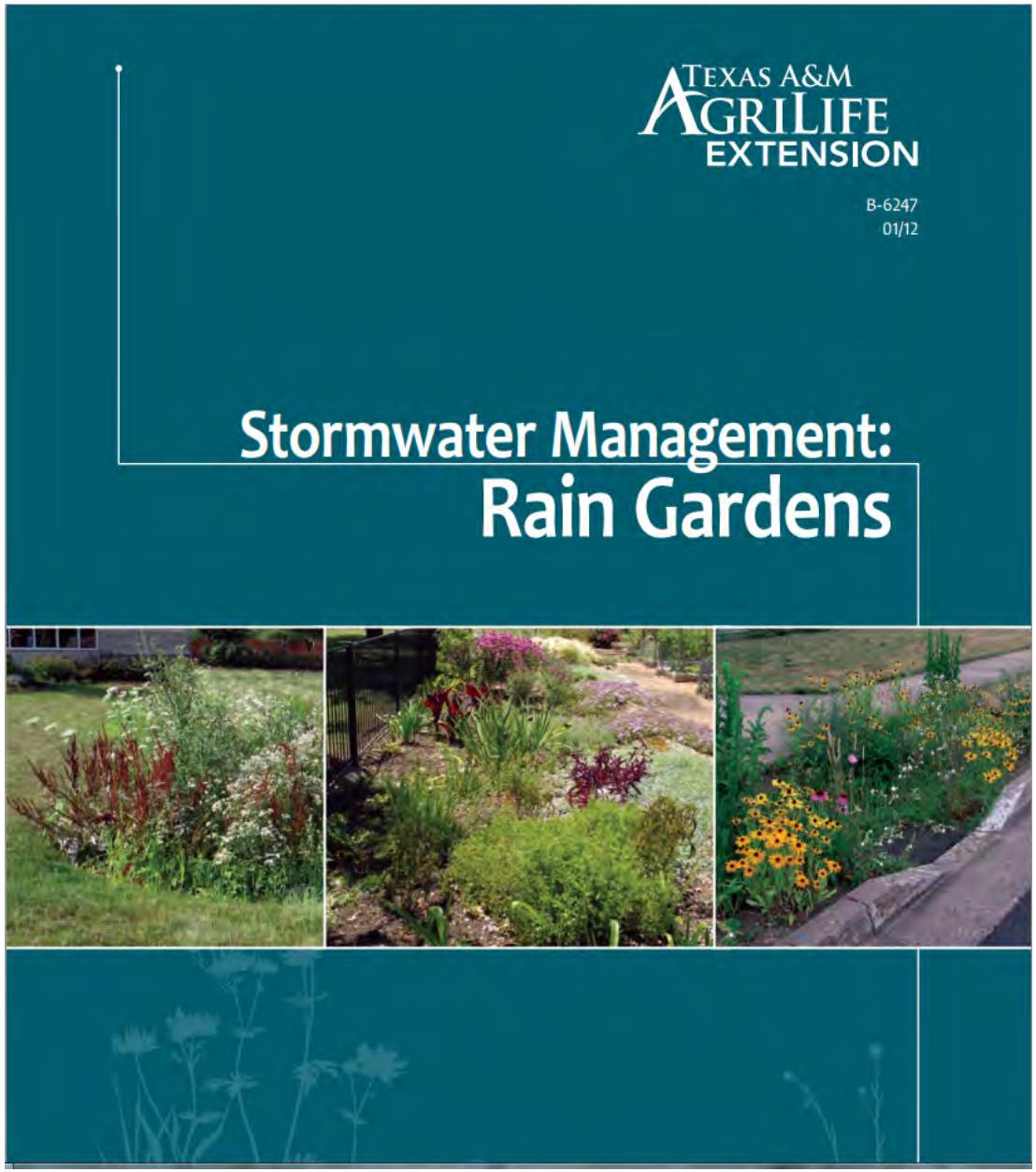
TEXAS A&M AGRILIFE EXTENSION

Thinking outside the box…

Rain gardens

Raingardens are shallow depressions that collect and store storm water for a short time, allowing filtration and infiltration

TEXAS A&M AGRILIFE EXTENSION



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Plants for a rain garden

Table 4. List and characteristics of rain garden plants

Botanical Name	Common Name	Height/Width	S/SH	W/D
Perennials				
Achillea millefolium	Yarrow	1 ft/1 ft	S	D
Acorus calamus	Sweet flag	4 ft/2 ft	S	W
Alstroemeria pulchella	Peruvian	3 ft/2 ft	S/PSH	W/D
Aquilegia hinckleyana	Texas columbine	12 in./12 in.	S	W/D
Asclepias tuberosa	Butterfly weed	3 ft/6 in.	S	D
Aspidistra elatior	Cast iron plant	24 in./24 in.	SH	W/D
Amorpha fruticiosa *	False indigo	5 ft to 10 ft/8 in.	S/PSH	W
Baptisia australis	Blue false indigo	3 ft to 6 ft/24 in.	S	W
Calyptocarpus vialis	Horseherb	4 in./18 in.	SH	W/D
Canna generalis	Canna	2 ft to 6 ft/2 ft to 6 ft	S	W
Coreopsis verticillata 'Moonbeam'	Moonbean coreopsis	1 ft/1 ft	S/PSH	W/D
Dichondra argentea 'Silver Falls'	Silver falls	2 in./4 in.	S/PSH	D
Echinacea purpurea	Purple cone flower	2 ft/2 ft	S	W/D
Eupatorium coelestinum	Blue mistflower	8 in./16 in.	S	W/D
Eupatorium purpureum	Joe-Pye weed	4 in. to 4 ft/2 ft	S/SH	W
Heliopsis helianthoides	Ox-eyed sunflower	3 in. to 5 in./30 in.	S	W
Hibiscus coccineus	TX Star hibiscus-red	6 ft/4 ft	S	W/WD
Hibiscus coccineus 'Lone Star'	TX Star hibiscus-white	6 ft/4 ft	S	W/WD
Hibiscus moscheutos	Swamp rose mallow	3 ft to 4 ft	S	W/D
Hymenocallis liriosme	Spider lily	2 ft/1 ft	S	W/D
Ipomopsis rubra	Standing cypress	2 ft to 6 ft/6 in. to 12 in.	S	W
Iris spp. bearded and hybrids	Iris	12 in./6 in.	S	D
Iris brevicaulis Louisiana species and hybrids	Louisiana iris	Up to 40 in./6 in.	S/PSH	W
Kosteletzkya virginica	Marsh mallow	6 ft/6 ft	S	W
Liatris spicata	Gayfeather	2 in./18 in.	S	W
Lobelia cardinalis	Cardinal flower	2 ft to 4 ft/2 ft	S/PSH	W
Lythrum salicaria	Loosestrife	3 ft/3 ft	S	W/D
Monarda fistulosa	Bee balm	2 ft/2 ft	S	W/D
Rudbeckia hirta	Black-eyed Susan	1 ft to 2 ft/1 ft	S	W/D
Rudbeckia fulgida 'Goldstrum'	Black-eyed Susan	2 ft/2 ft	S	W/D
Rudbeckia maxima	Giant coneflower	4 ft to 6 ft/2 ft to 3 ft	S	W
Ruellia brittoniana 'Katie's'	Ruella Katie	6 in./12 in.	S	W/D
Salvia coccinea	Scarlet sage	3 ft to 5 ft/1 ft to 2 ft	S/SH	W/D
Setcreasea pallida	PurpleHeart	12 in./24 in.	S/PSH	W/D
Sisyrinchium angustifolium	Blue-eyed grass	6 in. to 12 in./12 in.	S	W/D
Solidago altissima	Goldenrod	2 ft to 4 ft/3 ft to 5 ft	S	W/D

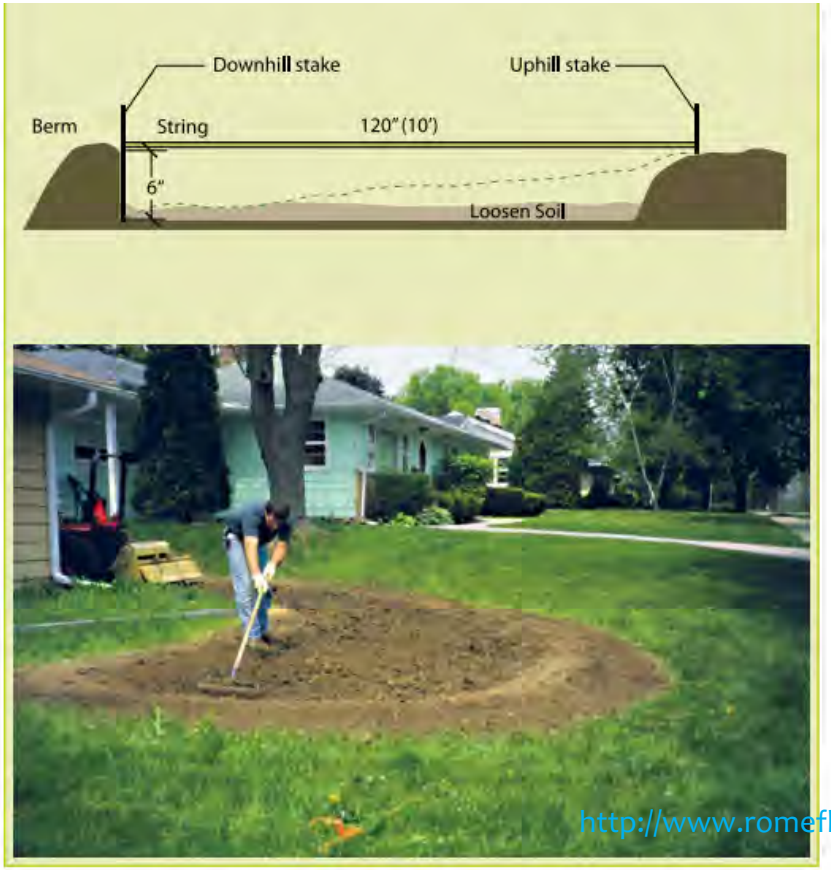
continued on next page

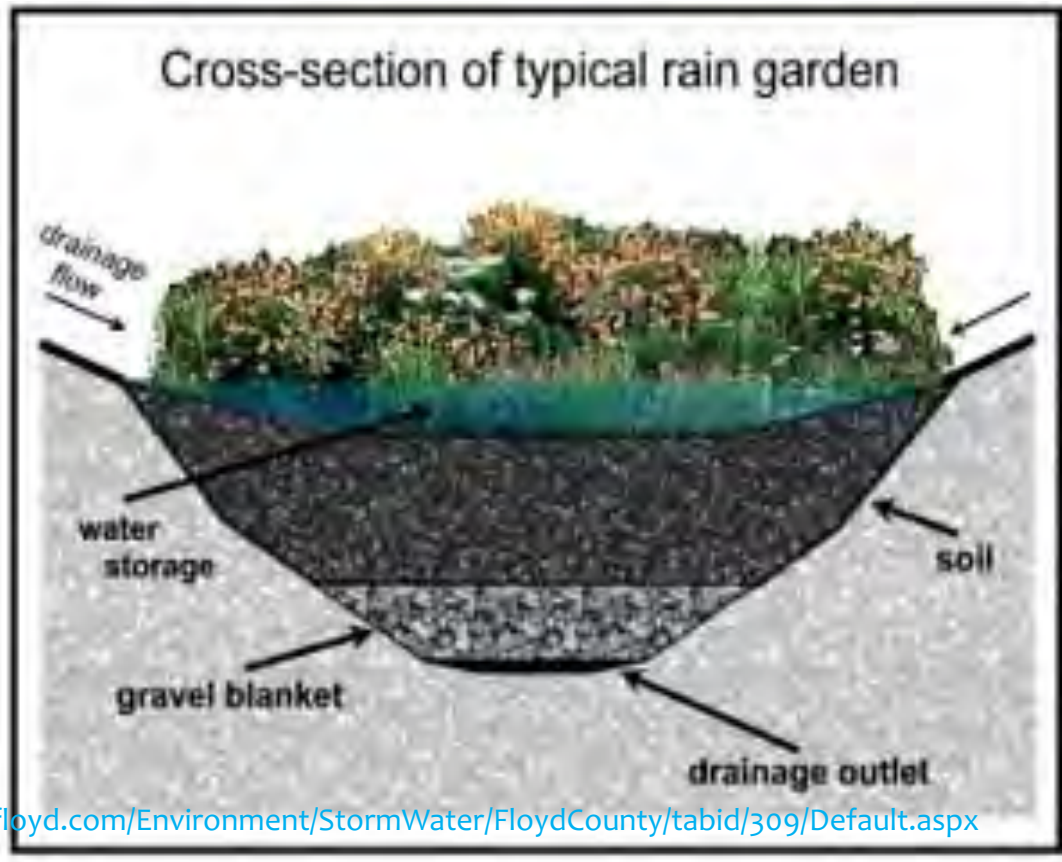
Table 4 continued.

Botanical Name	Common Name	Height/Width	S/SH	W/D
Perennials continued				
Stachys byzantina	Lamb's ear	6 in./12 in.	S	D
Tradescantia occidentalis	Spiderwort	2 ft/1 ft	SH/PSH	W/D
Vernonia fasciculata	Ironweed	4 ft to 6 ft	S	W
Zephyranthes spp.	Rain lily	6 in. to 10 in.	S	W
Grasses				
Carex spp.	Sedge	Varies	Varies	W/D
Chasmanthium latifolium	Inland seaoats	2 ft to 4 ft	SH	W
Muhlenbergia reverchonii	Seep muhly	2 ft to 4 ft	S	W
Panicum virgatum	Switch grass	3 ft to 4 ft	S	W/D
Shrubs				
Aesculus pavia	Scarlet buckeye	10 ft to 15 ft/6 ft to 10 ft	PSH/SH	W/D
Callicarpa Americana	American beauty berry	4 ft to 6 ft/5 ft to 8 ft	S/SH	W/D
Cephalanthus occidentalis *	Buttonbush	5 ft to 15 ft/6 ft to 8 ft	S/PSH	W
Clethra alnifolia	Summersweet clethra	3 ft to 10 ft/5 ft	S/PSH	W/W/D
Ilex decidua	Possumhaw holly	20 ft/15 ft	S/SH	W/D
Ilex vomitoria	Yaupon	20 ft/20 ft	S/SH	W/D
Itea virginica	Virgina sweetspire	3 ft to 5 ft/3 ft	PSH	W/D
Leucothoe recemosa *	Leucothoe, Sweetbell	3 ft to 10 ft/6 ft	S/PSH	W/W/D
Myrica cerifera	Southern wax myrtle	15 ft/10 ft	S/SH	W/D
Sabal minor	Dwarf palmetto	4 ft/5 ft	SH	W/D
Symphoricarpos orbiculatus	Coralberry	1 ft to 6 ft/1 ft to 2 ft	PSH/SH	D
Spirea x bumalda 'Anthony Waterer'	Anthony water spirea	2 ft to 3 ft/3 ft	S	D
Trees				
Acer rubrunm var. *drummondii*	Southern swamp maple	70 ft/30 ft	S	W/D
Betula nigra	River birch	30 ft to 50 ft/20 ft to 30 ft	S/PSH	W/D
Cyrilla racemiflora *	Leatherwood (Titi)	15 ft/10 ft to 15 ft		W/D
Magnolia virginiana	Sweet bay magnolia	2 ft to 30 ft/20 ft	S/PSH	W/W/D
Sophora affinis	Eve's necklace	30 ft/20 ft	S	W/D
Taxodium distichum	Bald cypress	70 ft/30 ft	S	W/D

S – Sun SH – Shade PSH – Part Shade W – Wet D – Dry
* Suitable for Texas Gulf Coast

Building a rain garden





http://www.romefloyd.com/Environment/StormWater/FloydCounty/tabid/309/Default.aspx

TEXAS A&M AGRILIFE EXTENSION

Terraced beds for runoff control

TEXAS A&M AGRILIFE EXTENSION

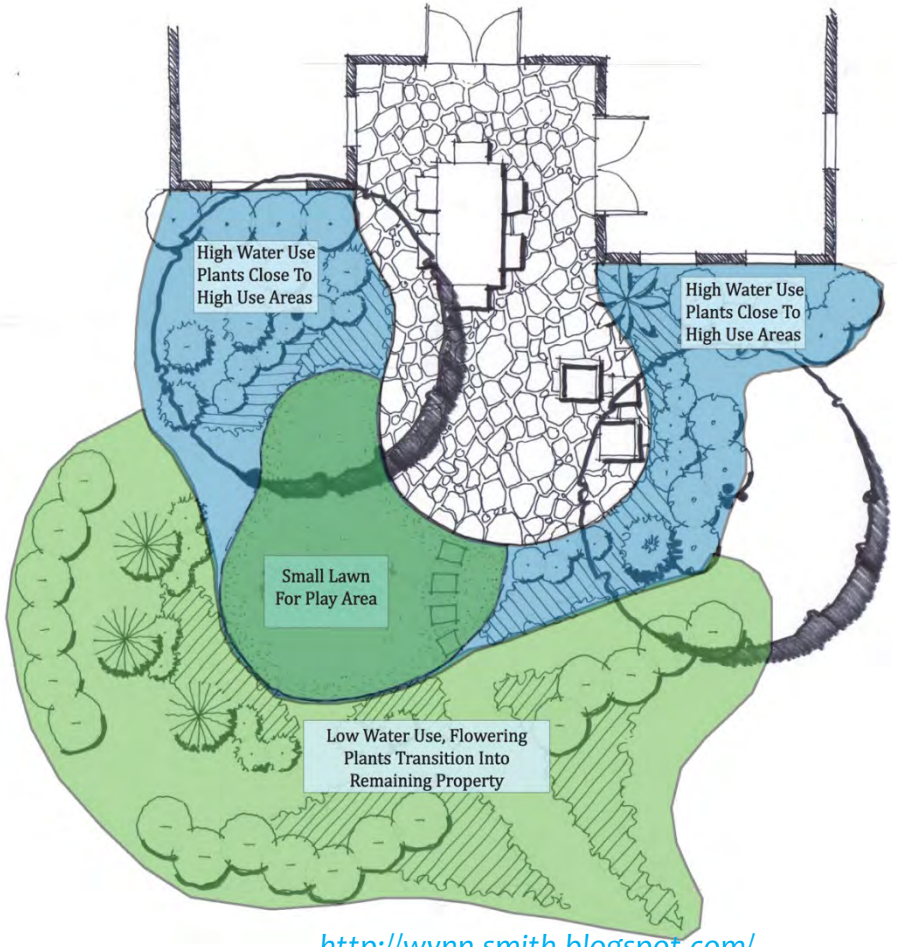
Hydrozoning: saving water and plants!

Hydrozoning: three main groups

1.) Regular (high) water use
- 1x or 2x **per week**
- Turf & most annuals

2.) Occasional (medium) use
- 1x to 2x **per month**
- Most perennials / groundcovers

3.) Natural rainfall (low) use
- Occasionally, during severe drought
- Native & adapted trees / shrubs



http://wynn-smith.blogspot.com/

TEXAS A&M AGRILIFE EXTENSION

Regular water use plants

- Most turf grasses
- Vegetables
- Wax leaf begonia
- Dianthus
- Sweet William
- Coleus
- Impatiens
- Caladium
- Gerbera daisy
- Geranium
- Pentas

Nasturtium
Banana
Zinnia
Snapdragon
Pansy
Elephant ear
Croton
Hosta
Day lily
Gingers

Medium water use plants

- Lantana
- Verbena
- Firebush
- Most ornamental grasses
- Esparanza
- Bird of Paradise (*Caesalpinia*)
- Artemeisa
- Hibiscus
- Most Iris
- Perennial herbs
- Turk's cap
- Perennial phlox
- Crinum lily
- Amaryllis
- Liriope

Cast Iron Plant
Asparagus fern
Mealy sage
Echinacea
Autumn sage
Mexican bush sage
Mexican mint marigold
Gomphrena
Purslane and moss rose
Wandering Jew
Vinca
Rock rose
Society garlic
Holly fern

Low water use plants

- Asiatic jasmine
- Yaupon holly
- Possumhaw
- Crepe myrtle
- Oleander
- Primrose jasmine
- Flowering quince
- Red yucca
- Elaeagnus
- Natal plum
- Cotoneaster
- Pitosporum

Earth-kind roses
Crimson barberry
Desert willow
Chinese pistache
Cedar elm
Bald cypress
Yuccas
Agaves
Texas redbud
Mexican plum
Monterrey and Chinkqpin oak
Live oak

Dealing with service alleys

http://www.santacruz.watersavingplants.com/Garden-Resources/Swales.php

TEXAS A&M AGRILIFE EXTENSION

Wildflower Meadows

Photo credit: Vikram Baliga

Soil Analysis and Preparation

Texas A&M AgriLife Extension

Ideal soil type???

Meanwhile in Burleson / Milam Counties….

http://www.organicfarmingblog.com/ally-fertile-soil/

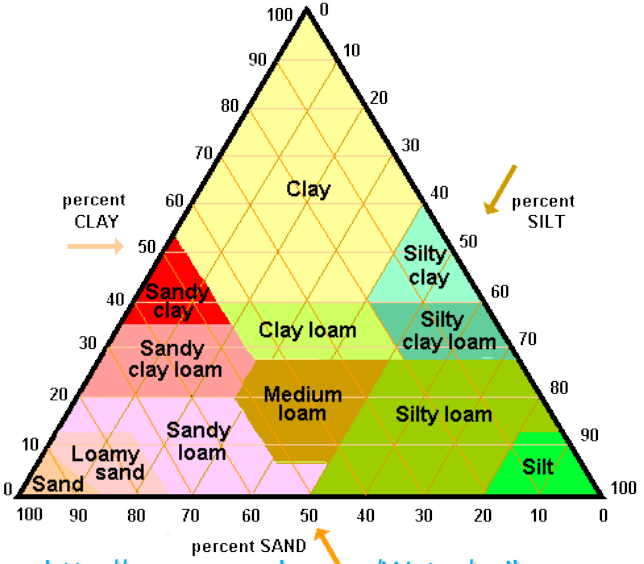
http://www.gtk.fi/tutkimus/tutkimusohjelmat/yhdyskuntarakentaminen/sulfaattimaat.html

TEXAS A&M AGRILIFE EXTENSION

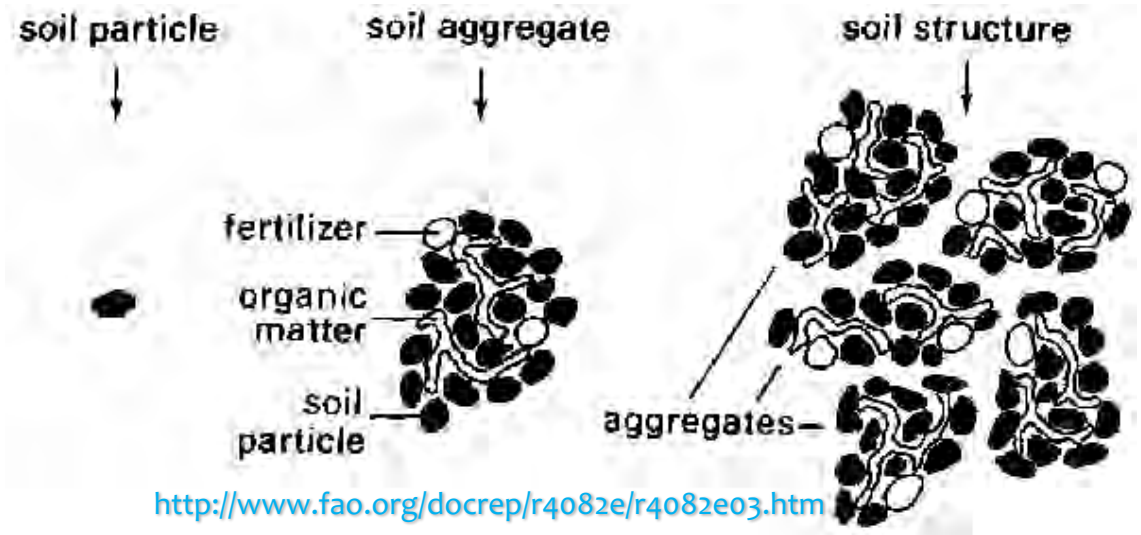
Soil texture vs. structure

https://wgnhs.uwex.edu/wisconsin-geology/frac-sand-mining/

http://forums.gardenweb.com/forums/load/soil/msg0423104817361.html



http://www.oneplan.org/Water/soil-triangle.asp



http://www.fao.org/docrep/r4082e/r4082e03.htm

TEXAS A&M AGRILIFE EXTENSION

Soil Preparation

- One-time incorporation of compost
  - Fully-finished (avoid nitrogen sink)
  - 3 inches, fully incorporated
- Top-dressing with layer of organic mulch
  - 3” maintained year-round
  - Continuous nutrient and organic matter source
- Raised beds in poorly-drained sites
  - ≥12 inches and crowned in center
  - Facilitation of drainage and greater rooting depth

TEXAS A&M AGRILIFE EXTENSION

Composts: choose wisely

http://mea.com.au/soil-plants-climate/soil-moisture-monitoring/learning-centre/what-is-soil-structure

http://www.cranfordinc.com/

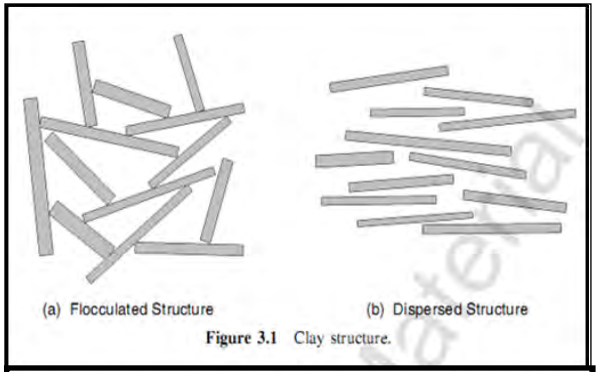
TEXAS A&M AGRILIFE EXTENSION

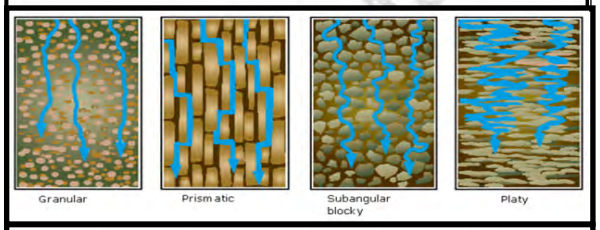
Raised beds: simple, but extremely effective

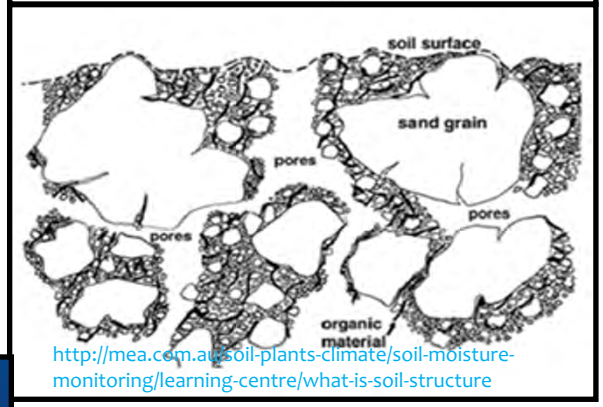
Texas A&M AgriLife Extension

Benefits of a Healthy Soil

- ✓ Drainage in clay soils through structure
- ✓ Water- and nutrient-retention in sands
- ✓ Slow release of nutrients by organic matter
- ✓ Greater diversity in soil microbes
- ✓ More expansive root system







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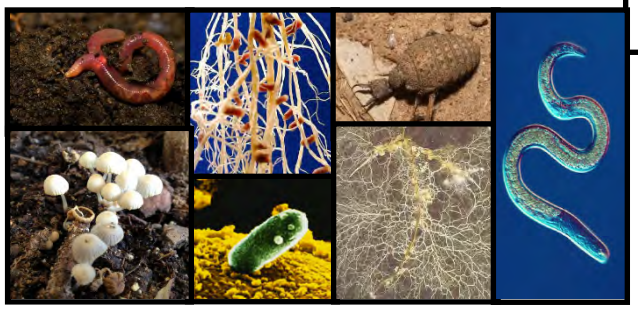
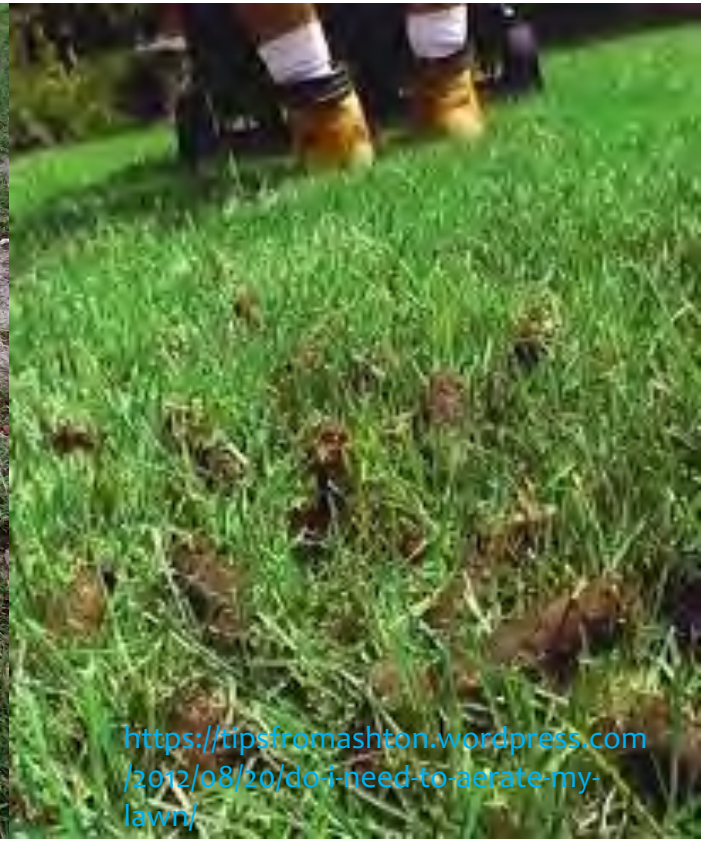


TEXAS A&M AGRILIFE EXTENSION

Soil Improvement for Turf



https://tipsfromashton.wordpress.com/2012/08/20/do-i-need-to-aerate-my-lawn/

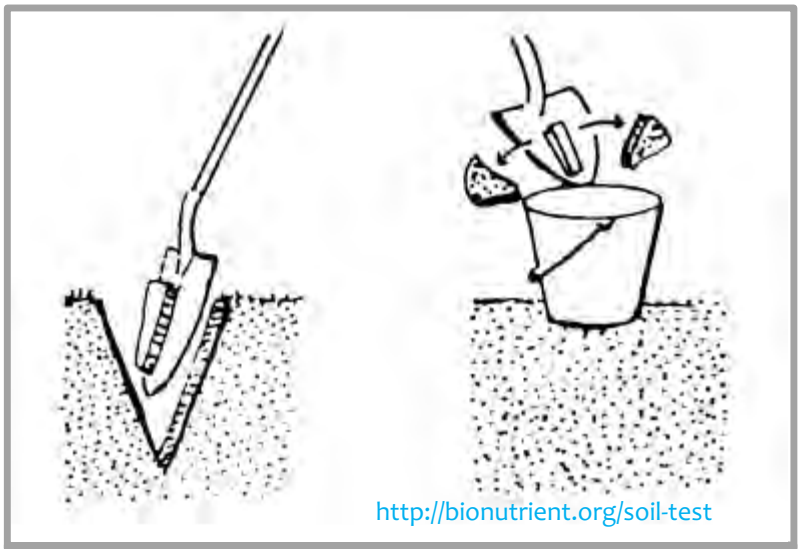
TEXAS A&M AGRILIFE EXTENSION

Soil analysis

TEXAS A&M AGRILIFE EXTENSION

Your results are only as good as your sampling!

http://www.sbreb.org/brochures/soilsampling/figure6.jpg



http://bionutrient.org/soil-test

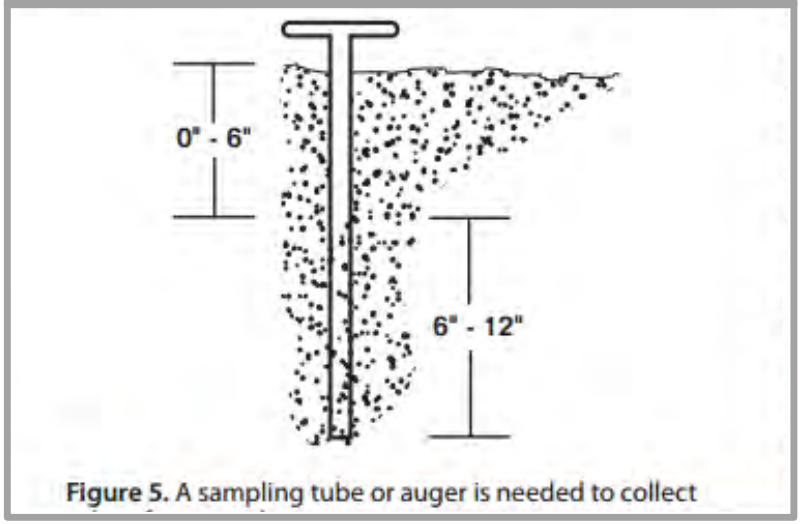


Figure 5. A sampling tube or auger is needed to collect

http://soiltesting.tamu.edu/publications/E-534.pdf

TEXAS A&M AGRILIFE EXTENSION

AGRILIFE EXTENSION

Soil, Water and Forage Testing Laboratory
Department of Soil and Crop Sciences
Texas AgriLife Extension Service

SU 15

Urban and Homeowner Soil Sample Information Form

Please submit this completed form and payment with samples. Mark each sample bag with your sample identification and ensure that it corresponds with the sample identification written on this form. *See sampling and mailing instructions on the back of this form.
(PLEASE DO NOT SEND CASH)

SUBMITTAL AND INVOICE INFORMATION: This information will be used for all official invoicing and communication.

Name _____ County where sampled _____

Address _____ Phone _____

City _____ State_____ Zip _____

CLIENT NAME: Client name will only be included with information above on result reports.

Name _____

Lab Use only

Payment (DO NOT SEND CASH)
- ☐ Check
- ☐ Money Order (keep your M.O. receipt)
- ☐ Credit Card*

Amount Paid $_____
Make Checks Payable to: **Soil Testing Laboratory**
*Additional Credit card payment forms can be downloaded at http://soiltesting.tamu.edu

SAMPLE INFORMATION (Required)

(see options listed below)

Laboratory # For Lab Use)	My Sample ID	Square feet of sampled area	Last Time Fertilized	I previously used fertilizers/organics	I am growing (see below*)	Requested Analyses
Example	Front Yard	2000	5/30/14	5 lbs 21-0-5 per 1000 sqft	F	☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10 ☐11 ☐12
						☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10 ☐11 ☐12
						☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10 ☐11 ☐12

Annual, Flowers and Gardens
A. Azaleas and Camellias
B. Roses
C. Annuals
D. Vegetable Garden
E. Other

Turfgrass
F. Common Bermudagrass
G. Hybrid Bermudagrass
H. St. Augustinegrass
I. Centipedegrass
J. Buffalograss
K. Tall Fescue
L. Kentucky Bluegrass

Trees and Woody Ornamentals
M. Pecan trees
N. Fruit trees
O. Shrubs and Ornamentals
P. Shade trees
Q. Other trees

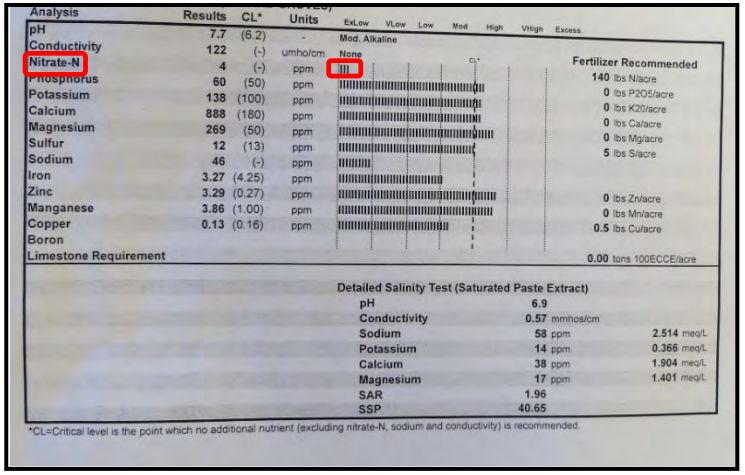
Describe any problems you have observed and want to correct:

1. Routine Analysis (R) (pH, NO_3-N, P, K, Ca, Mg, Na, S and Conductivity) (This test is a base test for basic fertilizer recommendations.)	$10 per sample
2. R + Micronutrients (Micro) (Adds Zn, Fe, Cu, and Mn to test 1.)	$17 per sample
3. R + Micro + Boron (B) (Includes Test 2 plus boron) (Recommended for individuals applying compost and manures.)	$24 per sample
4. R + Detailed Salinity (Includes Test 1 plus detailed salinity analysis) (Recommended for individuals using lower quality irrigation water.)	$30 per sample
8. R + Micro + B + Organic Matter (Includes Test 3 plus organic matter analysis)	$44 per sample
9. R + Texture (determines % sand, silt, and clay) (Includes Test 1 plus textural analysis)	$30 per sample
10. R + Micro + Texture (Includes Test 2 plus textural analysis)	$37 per sample
11. R + Micro + B + Organic Matter + Detailed Salinity (Includes Test 8 plus detailed salinity)	$84 per sample
12. R + Micro + B + Org. Matter + Detailed Sal. + Texture (Includes Test 8 plus textural analysis and detailed salinity and provides the most comprehensive	$84 per sample

TEXAS A&M AGRILIFE EXTENSION

Soil Analysis and Nutrient Monitoring

- Soil fertility test following soil preparation
  - Periodic routine analyses afterward
- Basis for all subsequent nutrient applications
- Little to no applications required
  - Typically only nitrogen (<1 pound actual N)



Analysis	Results	CL*	Units	ExLow VLow Low Mod High VHigh Excess.	Fertilizer Recommended
pH	7.7	(6.2)	-	Mod. Alkaline	
Conductivity	122	(-)	umho/cm	None	
Nitrate-N	4	(-)	ppm	III	140 lbs N/acre
Phosphorus	60	(50)	ppm		0 lbs P2O5/acre
Potassium	138	(100)	ppm		0 lbs K2O/acre
Calcium	888	(180)	ppm		0 lbs Ca/acre
Magnesium	269	(50)	ppm		0 lbs Mg/acre
Sulfur	12	(13)	ppm		5 lbs S/acre
Sodium	46	(-)	ppm		
Iron	3.27	(4.25)	ppm		
Zinc	3.29	(0.27)	ppm		0 lbs Zn/acre
Manganese	3.86	(1.00)	ppm		0 lbs Mn/acre
Copper	0.13	(0.16)	ppm		0.5 lbs Cu/acre
Boron					
Limestone Requirement					0.00 tons 100ECCE/acre

Detailed Salinity Test (Saturated Paste Extract)		
pH	6.9	
Conductivity	0.57 mmhos/cm	
Sodium	58 ppm	2.514 meq/L
Potassium	14 ppm	0.366 meq/L
Calcium	38 ppm	1.904 meq/L
Magnesium	17 ppm	1.401 meq/L
SAR	1.96	
SSP	40.65	

*CL=Critical level is the point which no additional nutrient (excluding nitrate-N, sodium and conductivity) is recommended.

TEXAS A&M AGRILIFE EXTENSION

Houston, TX 77015

Sample received on: 2/22/2016
Printed on: 3/3/2016
Area Represented: not provided

Harris County
Laboratory Number: 454166
Customer Sample ID: #1 Back Yard
Crop Grown: GARDEN

Analysis	Results	CL*	Units	ExLow	VLow	Low	Mod	High	VHigh	Excess.	Fertilizer Recommended
pH	7.7	(6.5)	-	Mod. Alkaline							
Conductivity	338	(-)	umho/cm	None				CL*			
Nitrate-N	0	(-)	ppm**								1.4 lbs N/1000sqft
Phosphorus	72	(50)	ppm								0 lbs P2O5/1000sqft
Potassium	494	(175)	ppm								0 lbs K20/1000sqft
Calcium	5,294	(180)	ppm								0 lbs Ca/1000sqft
Magnesium	327	(50)	ppm								0 lbs Mg/1000sgft
Sulfur	35	(13)	ppm								0 lbs S/1000sqft
Sodium	39	(-)	ppm								
Iron	24.38	(4.25)	ppm								
Zinc	7.86	(0.27)	ppm								
Manganese	13.72	(1.00)	ppm								
Copper	1.38	(0.16)	ppm								
Boron	2.41	(0.60)	ppm								
Limestone Requirement											0.00 lbs/1000sqft

*CL=Critical level is the point which no additional nutrient (excluding nitrate-N, sodium and conductivity) is recommended. **ppm=mg/kg

http://soiltesting.tamu.edu/

Nitrogen: Apply an additional 1 lb N/1000 sqft every 4-6 weeks, as needed, to maintain vegetative growth.