



GUIDE TO YARD CARE

Do your part for the environment,
starting in your own yard

This guide will help you maintain a healthy yard, save money,
and take care of our state's varied landscapes.

TABLE OF CONTENTS

- 01 | Why Take Care of Texas?
- 02 | Landscape Design and Irrigation
- 07 | Composting
- 10 | Rainwater Harvesting with Rain Barrels
- 12 | Managing 10 Common Yard Pests
- 15 | Managing Lawn Problems in Texas

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
How is our customer service? tceq.texas.gov/customersurvey

TCEQ is an equal opportunity employer. The agency does not allow discrimination on the basis of race, color, religion, national origin, sex, disability, age, sexual orientation, or veteran status. In compliance with the Americans with Disabilities Act, this document may be requested in alternate formats by contacting TCEQ at 512-239-0010, 800-RELAY-TX (TDD), or by writing P.O. Box 13087, Austin, TX 78711-3087.

 Printed on recycled paper using vegetable-based ink.

Why Take Care of Texas?

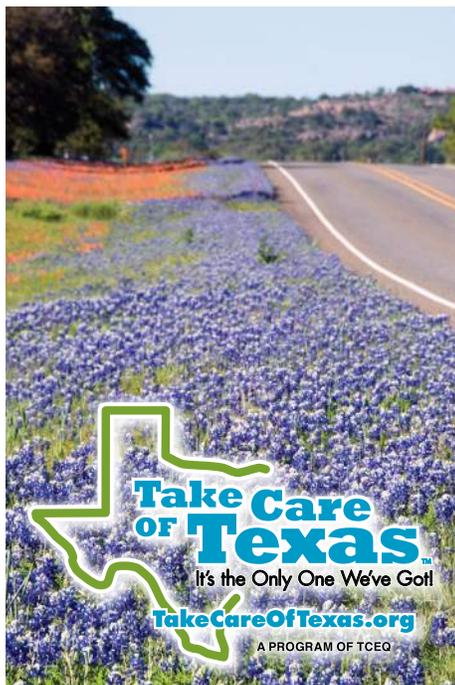
Texas is a scenic state rich in diverse resources. As Texans, it is our job to make sure our state remains a beautiful and healthy place to live. To accomplish this goal, we all need to do our part. The Take Care of Texas campaign is designed to involve all Texans in simple changes that will help keep our air and water clean, conserve water and energy, reduce waste, and save a little money in the process. For more information, please visit TakeCareOfTexas.org.

Water Conservation

Lawn and garden watering makes up 30–50% of total household water use. Finding ways to use less water will not only help conserve this precious resource, it will also save you money on your water bill.*

Some simple steps you can take are:

- water efficiently,
- don't overwater,
- collect rainwater,
- maintain your irrigation system, and
- use mulch.



Keep Our Water Clean

The quality of water is improving statewide, thanks to efforts by cities, industries, and individuals. However, we all need to do our part to help keep our lakes, rivers, and streams clean for their intended

uses—whether it's for swimming, fishing, or drinking.

You can make a difference by:

- using fewer fertilizers,
- choosing natural options,
- controlling pests with less pesticides,
- preventing erosion, and
- reducing runoff.

Keep Our Air Clean

Despite a quickly growing population, Texas' air quality has made huge strides in the past few decades.

We all need to continue to do our part to keep our air clean, and a great place to start is in your own yard.

Maintain Your Equipment

Follow the manufacturer's maintenance guidelines, including the following practices:

- Change the oil and clean or replace air filters regularly. Make sure you recycle your used oil at a collection center. To locate a center near you, go to www.tceq.texas.gov/p2/hhw/hhw.html.
- Use the proper mixture of fuel and oil in equipment with two-stroke engines.
- Get periodic tune-ups, maintain the mower's blades, and keep the underside of the mower's deck clean.
- Protect your equipment from the elements when not in use.



Avoid Spilling Gasoline

To prevent spills and overfills, try the following tips:

- Use a gasoline container you can handle easily and hold securely. When you pour, do it slowly and smoothly.
- Use a funnel or spout with an automatic stop device to prevent overfilling. Keep the cap or spout and the vent hole on gasoline containers closed tightly.
- Transport and store gasoline and power equipment out of direct sunlight in a cool, dry space.

Consider Cleaner Options

Some types of lawn and landscape equipment are more environmentally friendly than others. When selecting equipment, compare the air emissions, noise level, and energy consumption of different products.

Tools without motors are especially handy for small yards or small jobs; not only are they quiet, but they also generate no emissions.



Water-Efficient Landscape Design and Irrigation

To create a beautiful, healthy, and low-maintenance yard that benefits the environment, it's important to have:

- a thoughtfully designed landscape,
- native or well-adapted plants, and
- an efficient irrigation plan.

Landscape Design

Creating a healthy, low-maintenance landscape starts with a well-planned design that benefits both you and the environment. Sketch your yard with locations of existing structures, trees, shrubs, and grass areas. Then think through your landscaping requirements, limitations, and considerations regarding budget, appearance, function, maintenance, and irrigation.

Take note of slopes and consider including buffer zones of turf grass or other thick vegetation to absorb runoff from buildings and patios, and to reduce runoff into driveways and streams. Include lawn edging and hard surfaces between turf and other landscape features to

discourage weeds and reduce the need for trimming and herbicides.

Group together plants that have similar watering needs to prevent over-watering and excessive plant growth.

For more information on landscape design, visit earthkind.tamu.edu.

Plant Selection and Care

Using native and well-adapted plants is one of the easiest ways to create a beautiful, low-maintenance, and environmentally sound yard. Plants that are native or well adapted to your area will:

- use less water,
- reduce the need for soil modification,
- require little or no fertilizer,
- be less susceptible to pest problems, and
- be more tolerant of stressful environmental conditions, such as drought.

Incorporate a variety of plants to provide food and cover for a variety of living things. Diversity also minimizes damage from pests, because many of

them attack only one plant species. Dense plantings can provide shade that keeps out invading weeds.

Keep in mind that newly established landscaping will require more water than an established area. Adjust your watering schedule according to the needs of your plants.*

Avoid frequent or deep cultivation, which can damage plant roots, dry out the soil, disturb healthy soil organisms, and bring weed seeds to the surface where they can germinate. Cover all bare soil between plants with a solid mulch layer.

Consider planting deciduous trees on the south and west sides of your house and around your air conditioner. Because deciduous trees lose their leaves in the winter, they can save you energy by keeping your home shady and cool in the summer, yet allowing the sun to shine through windows to warm your home in the winter.



Choose Your Turf

In most landscape areas, turf grasses have the highest water demand and the highest maintenance requirements of all plants.

However, when properly maintained, turfgrass can have a positive impact on the environment. Turfgrass that is actively growing can be beneficial to your yard and the environment by helping to:

- stabilize soil,
- conserve water,
- filter air- and water-borne pollutants,
- suppress and control dust, glare, and noise, and
- dissipate heat.

Select grass carefully according to its intended use, planting location, and maintenance requirements, and make sure to choose turf that is compatible



with your region and environment.

When choosing what type of grass to use, keep in mind its tolerance to shade, drought, traffic, cold, salinity, and disease. Properly adapted turfgrass will require less maintenance and smaller amounts of fertilizer and supplemental water.

St. Augustine and Bermuda grasses are most often used for lawns in Texas. Zoysia, buffalo, and centipede grasses are used less often but are

also good options.

Planting the lowest-water-use turf grass adapted to your region is an effective way to reduce the need for landscape irrigation. Mowing grass at the height appropriate for its type helps conserve water and strengthen grass roots.

Avoid narrow strips or odd shapes of turf grass that will be difficult to irrigate without wasting time and water. Other forms of ground cover or alternative plant areas can also reduce

your ongoing expenditures of time, energy, water, and money.

For more information on selecting grasses, visit Aggie Turf at aggieturf.tamu.edu.

Fertilizer Use

More is not always better when applying synthetic fertilizers. There are less toxic, even natural, substitutes that are just as effective.

If you do choose to use fertilizers, however, it is very important to your health and the environment to always follow the manufacturer's directions, use only the recommended amount, and adjust your watering accordingly.

Be careful not to overfertilize, which can weaken turf and contribute to water pollution. Excess fertilizer can get washed away by overwatering or a rainstorm—wasting your money and contaminating nearby waterways with pollution.

Choose natural or organic fertilizers, such as compost, which typically slow-release their nutrients and can often be used in smaller amounts.

The best times to apply fertilizer, if it's needed, are at the beginning and end of the growing season, which will vary according to the temperature range in your region.

To prevent runoff pollution, do not over-water after applying fertilizer and avoid fertilizing just before a rainstorm.

Water Efficiently

One of the most important steps in maintaining a healthy landscape is effective irrigation. A properly watered lawn and garden is more resistant to pests and other lawn problems. However, much of the water used to maintain our landscapes is wasted through inefficient watering techniques. By developing a



Mulch

What Is Mulch?

Mulch is one of the best landscape substances for growing healthy plants and conserving water. The best mulch for your yard is one created from native sources and could include straw, newspaper, sawdust, bark, pine needles, leaves, grass clippings, and compost. It can benefit your lawn and garden by aiding in root development, preventing erosion, suppressing weeds, moderating soil temperature, and adding nutrients as they break down slowly. Mulching also helps conserve water by reducing water lost through evaporation.

How to Use Mulch

- Put a 4-inch layer of mulch around your trees and shrubs and a 2-inch layer around your garden plants. These should be the depths of the layers after settling. To prevent diseases and pest infestation, mulch should not be piled up against the stems or trunks of plants. For best results, use long-lasting mulches (wood chips, wood shavings, evergreen needles).
- Create a self-mulching lawn! Wait to mow until your grass is between 2 and 4 inches high. Then mow off only the top one-third of the grass, and don't bag the clippings. This way, the clippings will feed your soil and won't smother your grass.
- If you have too many clippings, rake them into mulch layers around trees and shrubbery.

Mulching Basics

- To control erosion in a lawn, cover bare areas with 2 to 4 inches of mulch.
- Mulch all areas that are not covered in grass or thick ground cover.
- When converting grassy areas to mulch, smother the grass with a thick layer of cardboard or newspaper rather than using chemicals. Some hardy grasses must be rooted out for successful removal.
- Blanket dormant perennials with several inches of shredded leaves or whole pine needles to protect them from the freezing weather.
- Spread mulches under annuals after they are well established.
- Water the ground thoroughly before and after applying a mulch cover.
- Do not put organic mulch where water flows rapidly or it may wash out.
- Rocks and other heavy, inert materials can be used in berms or buffers to slow the flow of water entering mulched areas, protecting them from wash-out.



water-efficient lawn and garden, you can maintain a healthy and beautiful yard that benefits the environment.

Watering Mistakes

Much of the water applied to lawns and gardens never gets absorbed by the plants. Common ways that water is wasted include:

- **Runoff.** Applying water too rapidly causes runoff, because grass and plants can only absorb so much water at a time. When runoff occurs, soil, fertilizers, and pesticides can be carried to nearby streams and lakes.
- **Evaporation.** Watering in the middle of the day causes much of the water you apply to be lost through evaporation. Plants don't have enough time to absorb the water before it is evaporated by the sun. Some water evaporates when it's applied to bare, unmulched soil. Also, a sprinkler head that has been set correctly sprays large drops of water instead of a fine mist, which is more susceptible to evaporation and wind drift.
- **Underwatering.** Watering too little is wasteful because it does little to alleviate any drought stress that the plants may have.
- **Overwatering.** Applying too much or too often causes the



greatest waste of water. In addition to overwatering the plant, excessive irrigation can leach nutrients deep into the soil away from plant roots, which increases the chance of runoff or groundwater pollution.

- **Adjustment.** Watering sidewalks or driveways wastes water and can be avoided by properly adjusting sprinkler heads.

Good Watering Techniques

Most lawns receive twice as much water as they require for a healthy appearance. The key to watering lawns is to apply water infrequently, yet thoroughly. This creates a deep, well-rooted lawn that efficiently uses the water that is stored in the soil. To

know when to water your lawn, simply observe the grass. Wilting and discoloration are signs of water stress. At the first sign of wilting, you have 24 to 48 hours before damage occurs.

Irrigate efficiently, wetting the soil to a depth of 4–6 inches, and allow the soil to dry out between watering.

A general rule is that most lawns need up to one inch of water a week. To water properly, apply 1 inch of water to the lawn as rapidly as possible without runoff.

An easy way to measure your application of water is to place a few empty, 6-ounce tuna cans around your lawn. When the cans each hold 1 inch of water, you have applied enough.

If you start to notice runoff before the cans contain 1 inch, turn off the water. Then, wait for approximately one hour to allow the grass to absorb the water before turning it on again.

Water early in the morning, before 10 a.m. Avoid watering from mid-morning to late afternoon, when you can lose one-third of your water to evaporation. Also avoid watering in the evening, because lawns and plants that are left wet overnight are more prone to disease.*



Irrigation Systems

Sprinkler systems offer an effective method for watering, if used properly. The goal of any irrigation system is to supplement rainfall. You can achieve your landscaping goals while conserving



water by using spray irrigation or drip irrigation. You may use permanent installations or temporary (hose-end) irrigation systems.

If you design and install your

own permanent landscape irrigation system, it must meet required state and local design standards and requirements. To review the irrigation rules for Texas, please visit

www.tceq.texas.gov/drinkingwater/irrigation. For your local rules, please contact your water utility.

If you do not install your own system, you should work with a licensed irrigator. A licensed irrigator can help evaluate your landscaping needs and develop plans that ensure the irrigation system works properly and conserves water. To locate a licensed irrigator in Texas, visit www2.tceq.texas.gov/lic_dpa/index.cfm.

All permanent irrigation systems are required to be connected using approved backflow prevention to ensure there is no cross-connection with the water supply.

Cross-Connection Control and Backflow Prevention

To maintain the quality of our drinking water, irrigation systems must be designed, installed, and operated to control possible cross-connections and prevent backflow into the water supply. Without proper backflow prevention, the stagnant water from the sprinkler system could be drawn into the drinkable water supply for your home. For more information on backflow, see *A Consumer's Guide to Backflow Prevention in Texas* (GI-411) at www.tceq.texas.gov/goto/gi-411.

What is a Cross-Connection?

A cross-connection is a physical connection between drinkable water and a liquid or gas that could make the water unsafe to drink.

What is backflow?

Backflow is water flowing against its intended direction, which can contaminate the water supply. Backflow can be caused by either a loss of pressure in the supply lines or an increase in pressure on the customer's side.

There are several ways that you can prevent backflow in your irrigation system:

- Make sure that the end of your garden hose is never submerged in water not suitable for drinking.
- Install a hose bib vacuum reaker on each of your outside faucets. These inexpensive devices are available in most hardware stores and are designed to allow water to flow in only one direction.
- Schedule a licensed backflow prevention assembly tester to perform a test to confirm that your backflow prevention assembly is operating properly. Keep in mind that you must have the licensed tester examine all backflow prevention assemblies upon installation. Check with your water provider about more stringent regulations that may apply and the required frequency for testing of your backflow prevention assembly.

For More Information

If you are thinking about installing your own irrigation system or would like to know more about the requirements for irrigation systems and licensed landscape irrigators, the rules explaining those requirements can be found in Title 30, Texas Administrative Code, Chapter 344.

The TCEQ Landscape Irrigation program can provide valuable information on landscape irrigation in Texas. You may contact the program by email at Install@tceq.texas.gov or visit their webpage at www.tceq.texas.gov/drinkingwater/irrigation.

To locate a licensed irrigator or licensed backflow prevention assembly tester, please visit www2.tceq.texas.gov/lic_dpa/index.cfm. It is important to always check the licensing credentials of anyone you may potentially do business with.

The *Environmental Protection Agency's Cross-Connection Control Manual* offers information on cross-connection controls and methods of backflow prevention. Go to www.epa.gov/nscep and search for "cross connection". Always contact your local water supplier before planning or installing an irrigation system to ensure that you comply with any requirements.

Spray Irrigation

Spray systems can be part of a permanent irrigation system or a temporary system that consists of "hose-end" sprinklers that you can set up and move around.

Your area may have specific requirements for permanent irrigation systems, including obtaining a permit for the system and installing the appropriate backflow prevention assembly. You should contact your local water supplier before planning or installing an irrigation system to ensure that you comply with any requirements.

When used properly, permanent sprinkler systems can save time and money. Many underground irrigation systems use timed controllers that turn off the system when a measured amount of water is used. Rain and moisture sensors help prevent watering in the rain and are now required in most areas in Texas. Check with your local water supplier to make sure your irrigation system meets the requirements that are in place for your area.

Permanent sprinkler systems require maintenance and adjustments. This can be done by you, a licensed irrigator, or licensed master plumber.

- Check your settings at least quarterly to make sure that water is being applied properly and make adjustments as needed. It is important to ensure you are



providing adequate water but are not overwatering. Depending on where you live, you may need to winterize your system in the late fall to prevent freezing of system components.

- Check your sprinkler heads regularly. Remove any dirt or debris that may be clogging the nozzle and make sure that water is flowing at the proper pressure.
- Check for leaks and repair them promptly. Sprinkler head repair can be done by you, a licensed irrigator, or a licensed master plumber.

Different areas of your yard may have different watering requirements. Some plants and trees may require less water than grass does. You can reduce the sprinkler run time for these areas. A licensed irrigator can advise you on irrigation application rates for your geographic area, topography, soil conditions, and other factors.

For “hose-end” sprinklers, make sure the sprinkler heads are adjusted to avoid watering sidewalks and driveways or other hard surfaces. A hose-end sprinkler head should spray large droplets of water instead of a fog of fine mist, which may be affected by wind drift. Set a timer so that you remember to turn off the hose-end sprinkler.

For more information on irrigation systems, see *Landscape Irrigation: A Consumer’s Guide to Landscape Irrigation in Texas* (GI-390) at www.tceq.texas.gov/goto/gi-390.



Drip Irrigation

Drip irrigation can offer a more efficient method of watering than spray irrigation, particularly in small areas. Drip irrigation applies water to the soil slowly and under low pressure through emitters, bubblers, or spray heads placed at intervals. Because drip irrigation systems distribute water slowly, the run time may be significantly longer than for a traditional sprinkler system. However, there will be less evaporation and loss due to runoff.

Drip irrigation installation can be inexpensive and, with maintenance, can last as long as other irrigation systems. You can install drip irrigation systems on or below the ground’s surface. Consult a licensed irrigator to determine the appropriate type of drip irrigation system for your needs.

Drip irrigation can be used for watering vegetables, ornamental and fruit trees, shrubs, vines, and container-grown plants outdoors. Drip irrigation is not well suited for solid plantings of shallow-rooted plants such as grass and some ground covers.

Some of the benefits of drip irrigation are:

- Drip irrigation can reduce water loss by 60% or more, compared to spray irrigation. Because drip irrigation applies water just where it is needed, there is little chance of waste through evaporation or runoff.



- The soil moisture remains relatively constant.
- Water contact with the leaves, stems, and fruit of plants is minimized, preventing disease.
- Rows between plants remain dry, which reduces weed growth.
- Once installed, little labor is required to operate or maintain a drip irrigation system.

Operating a drip system involves deciding how often to turn it on and how long to leave it on. The object is to maintain adequate soil conditions without wasting water by overwatering.

- For newly seeded gardens, the system should run only a short time every day for a few days, to keep the surface soil from drying out.
- Plants loaded with fruit will need an inch of water every other day.*

Soaker Hoses

Soaker hoses require less equipment and can be easier and less expensive to install than drip irrigation.

A soaker hose is a porous hose that you can connect to an outside faucet, garden hose, or rain barrel and lay out along the base of plants. The hose allows water to seep out along its length. This system works well with plants that are close together, like ornamental beds with clumped flowers or ground covers.

However, you should not use a soaker hose to irrigate plants, trees, or shrubs that are spaced far apart, because the area between the plants will be excessively watered, which wastes water and could lead to weaker plants.



Composting

What Is Compost?

Composting is the controlled, accelerated decomposition of organic material such as yard trimmings, kitchen scraps, wood shavings, cardboard, and paper. Compost is a material rich in humus and nutrients, and can also make good mulch.

How to Use Compost

- You can use it as a mulch or topdressing or mix it into the soil. Compost makes good mulch because it is generally free of weeds and is inexpensive. It helps the soil absorb and retain nutrients and moisture and protects plants from diseases and pests.
- To plant a lawn or garden, mix 1 to 2 inches of compost into the top 6 to 8 inches of soil.
- To add nutrients to established ornamental plants, apply a 1/2- to 1-inch layer of compost on the soil or directly beneath mulches.
- You can add compost to established lawn areas. Verticutting or aerating will

Why Compost?

Save Money

- Lower your water bill.
- Buy less fertilizer.
- Stop buying lawn and leaf bags.

Save Time and Effort

- Stop bagging grass and leaves.
- Spend less time watering.
- Spend less time fertilizing.

Help Your Community

- Save landfill space.
- Conserve water resources.
- Reduce water pollution.

improve the infiltration of compost to the root area. Use a rake to distribute compost into the crevices. Mulching your lawn in the spring (and fall, if needed) with compost is also a great soil-building strategy.

- To add nutrients and control fungus in gardens or planters, use compost as one-third of a potting soil mix (with equal parts topsoil and sand).
- Avoid backfilling planting holes with compost as it will discourage plant roots from growing outward.

Composting Basics

- Composting works best when you combine equal amounts (by weight) of “green” and “brown” materials in the mixture.
- The compost pile should remain moist throughout, like a wrung-out sponge, but not soaked. “Brown” composting materials include dead leaves, dry hay, wood shavings, and shredded paper. Vegetable and fruit scraps, green grass clippings and shrub prunings, and manure are examples of “green” composting materials.
- Compost breaks down faster in a pile at least 3 feet high and 3 feet in diameter, with all the materials broken into small pieces and well mixed.
- Composting occurs most rapidly when green and brown materials are reduced to small pieces and thoroughly mixed together. That way, every part of the pile gives decomposing organisms access to needed carbon, nitrogen, oxygen, and water. A pile of large chunks of material will have too much air space, and the surfaces will dry out rapidly. On the other hand, a pile of very fine materials may have too little oxygen and require frequent turning.
- Twigs and leaves can be run over with a lawn mower or run through a leaf shredder.
- Garden plants or fleshy prunings can be chopped with a machete or pruning shears.

- Food scraps can be cut up in the kitchen or chopped up in a bucket with a square-point shovel.
- You can tell a pile is quickly and actively composting when it gets at least as hot as the hot water in your house. Temperatures this high (135 degrees Fahrenheit or higher) can kill most weed seeds and germs that cause disease. Help your pile stay hot by putting it in a bin or covering it with a tarp. You can use a special compost thermometer to monitor its temperature.
- Watch our video of “[How to Start Composting in Your Own Backyard](https://www.youtube.com/c/TakeCare-ofTexas/videos),” featuring Travis County Master Gardener Patricia Mokry, who explains simple ways to begin and maintain various types of compost <https://www.youtube.com/c/TakeCare-ofTexas/videos>.

Good Choices for Composting

- ✓ Yard waste such as leaves, grass clippings, pine needles, weeds, small prunings, and spent garden plants.
- ✓ Food waste such as vegetable and fruit scraps, coffee grounds and filters, and used tea bags.

Avoid These Materials

- ✗ Meat, bones, fish, dairy products, grease, and oil—they cause odors and attract pets and pests.
- ✗ Pet droppings—they can harbor diseases.
- ✗ Noxious weeds with seeds or runners—you could wind up spreading them with your compost.
- ✗ Diseased and insect-infected plants—the diseases and pests could survive in your compost and spread.
- ✗ Shavings and sawdust from treated wood, and other materials containing strong preservatives or other toxins.
- ✗ Ashes—they slow the composting process.



When Is Compost Ready?

Using compost before it is ready can damage plants. Undecayed “brown” materials in the soil can temporarily reduce plant-available nitrogen. Undecayed “green” materials can harbor pests and diseases. Immature compost can also introduce weed seeds and root-damaging organic acids. Compost is ready when:



- it smells earthy—not sour, putrid, or like ammonia;
- it no longer heats up after it is turned or dampened;
- it has a crumbly texture and it looks like dark soil; and
- it has a pH near neutral.

Turning the Pile

Turning optimizes conditions for composting bacteria and helps to:

- add more oxygen,
- distribute moisture evenly,
- break up clumps and compacted material,
- blend green and brown



materials better, and

- increase the temperature enough to kill weed seeds.

In the summer, you should turn the pile weekly. In the winter, once a month will suffice. You can use a hayfork or a compost turner to break up clumps and move drier material from the outer edges to the center.

Harvesting Compost

Compost can be shoveled out of a pile or bin and used just as it is, especially for mulch. Remove undecayed objects by sifting them through a screen.

- If you are using compost to prepare soil for planting or sodding, sift it through a 1-inch mesh screen. Compost used in potting mixes or as topdressing on lawns is commonly sifted through a 3/8- or 1/2-inch mesh screen.
- Make a simple screen by mounting hardware cloth or other durable wire mesh in a sturdy wooden frame that will fit neatly onto the wheelbarrow or other container into which you will sift the compost.
- Spread compost onto the screen in a thin layer and shake it. You can work the material through

the screen with a paddle if it is fine but clumpy.

- Add the “oversized” material that remains on top of the screen to a new pile to help the new pile start composting faster.

Compost Variations

Compost Containers

You can store compost in a pile or in a bin; however, bins can help keep your yard tidy, discourage pests, and make the compost easier to turn. You can make your own container with lumber, pallets, concrete blocks, wire fencing, or other materials.

When selecting a compost container, keep the following tips in mind:



- **Capacity.** The best composting temperature is reached in a pile or bin of at least 1 cubic yard (3-foot length, width, and height).
- **Access.** Select a bin design that allows easy access for adding material, for watering, and for turning.
- **Ease of assembly and relocation.** These features allow you to easily move your bin for turning and refilling.
- **Security.** A well-managed compost pile should not attract harmful bugs, and pet and vermin access should be restricted.
- **Moisture and heat retention.** Enclosed bins work better for smaller amounts of material.

Troubleshooting

Symptom	Problem	Solution
Bad odor.	Too wet or too much green material.	Turn the pile or add more brown material. Cover the pile with a layer of mulch if the odor continues to persist for more than one day.
Material is not breaking down and the pile is dry.	Not enough water.	Turn the pile and add water until the whole pile is moist.
Pile is damp and sweet-smelling, but will not heat up.	Not enough nitrogen.	Add higher-nitrogen materials like green grass clippings, food scraps, coffee grounds, blood meal, or manure.
The pile is not warm enough or is only warm in the center.	The pile is too small.	Add more materials to increase volume or consider using a container for the compost.
The pile has flies, roaches, ants, or maggots.	Too wet or food is exposed.	Ensure that the pile stays damp, but not soaking wet. Bury food items under a layer of leaves.

- **Flexible size and adjustable shape.** These features will accommodate changes in compost volume.
- **Aesthetics.** This is a personal consideration for both you and your neighbors.

Composting in the Ground

Burying Problem Materials

Mix smelly food scraps and insect-infested garden plants with soil and bury the mixture at least 8 inches deep in unused garden space. If the material stays moist, it will compost in a year without producing an odor or spreading diseases or pests.

Sheet Composting

When tilling in the fall, add a few inches of leaves in unplanted garden space to enrich the soil for spring planting. Avoid using this method, called sheet composting, just before planting. Much of the soil's plant-available nitrogen will become temporarily unavailable as composting microbes consume it along with the brown leaves. A few

months after sheet composting, there will be more plant-available nitrogen in the soil than before.

Walkway Composting

Spread a thick layer of leaves, chipped branches, and grass clippings into shallow ditches or rows between garden beds to

form walkways. Add more material later as it compacts. In a few months, most of this material will decompose enough to be incorporated into the garden soil when the soil is reworked for planting.

An Easy Compost Recipe

1. Select an area that measures 4 by 8 feet, where water does not puddle when it rains.
2. Place the bin or pile on half of this space, mixing brown and green materials in equal parts by weight, or about three-to-one (brown to green) by volume. Chop or shred woody materials for the pile. Water the pile as you build it to keep it thoroughly moist like a wrung-out sponge.
3. Build the pile to a height of 3 feet to speed up the composting process.
4. Mix greens and browns as you add to the pile. When adding kitchen scraps, bury them 10 inches or so into the pile to avoid attracting pests.
5. Turn the pile, adding water as needed.
6. You can sift and use finished compost when the materials break down and it smells like rich soil.



Worm Composting

Worm composting uses worms to turn food scraps, newspapers, and cardboard into rich compost that you can add to potted plants, lawns, or gardens. It is convenient, and you can do it both indoors (even in an apartment) and outdoors. Worm composting is also the best way to compost paper.

The Worms

Brown-nose worms or red worms work best in containers; do not use night crawlers or other large, soil-burrowing worms. Composting worms are available from various stores and catalogs that sell garden soils and supplies.

The Material

- **Paper.** Paper serves as "bedding" for the worms to live in. The worms consume it along with the other materials. You can use any kind of paper, but worms will consume newspaper, cardboard, paper towels, and other coarse paper faster than fine printing and writing paper.
- **Food scraps.** Almost any fruit, grain, or vegetable material other than oil is good for worm composting. Egg

shells, coffee grounds, and tea bags are also fine.

- **Other materials.** Add a little soil or fine sand to provide grit. Leaves and other yard trimmings can also be used as part of the bedding. Livestock manure is excellent food for worms in outdoor containers.

The Container

You can use wooden boxes, plastic bins, or holes in the ground. A 1-by-2-by-3-foot box or four 10-gallon containers are big enough to compost the food scraps from a medium-sized family. Punch a few 1/8-inch holes in the upper sides for ventilation. Tight-fitting lids help keep pests out of outdoor wooden boxes, but don't use a lid with a plastic container unless the container is well ventilated. A poorly ventilated, sealed plastic container can quickly suffocate the worms.

How to Compost with Worms

- Tear newspaper or cardboard into strips. Dip the strips into water and let them drain.
- Add this paper bedding to a bin until it is one-third full. Mix in a little soil

or fine sand. Start with a pound of worms for each pound of food scraps that you plan to compost each week. Unless you start composting more food scraps, you should never need to add more worms.

- Add a 1/2-inch or thinner layer of food scraps on top, mix it lightly into the top 2 inches of bedding, and cover everything with at least 1 inch of shredded paper. Don't leave any food scraps at the surface. Wait two days or longer, and then repeat these steps as materials are available.
- When a worm bin is full, scoop out any undigested food scraps and the material that contains the most worms—usually the top 3 to 4 inches of the material. Use the rest as compost. Put the worm-rich material back in the bin, mix it with an equal amount of fresh bedding, and cover it with 1 inch of shredded paper.



Rainwater Harvesting with Rain Barrels

What Is Rainwater Harvesting?

Rainwater harvesting is the collection and storage of rainwater, offering an effective way to conserve water in your yard. You can collect rainwater from a roof, which is the most common method, and store it in catchment tanks, such as rain barrels. Systems for harvesting rainwater can be as simple as placing a barrel beneath a gutter downspout to collect a small amount of water for use on gardens and plants. Rain barrels are simple to install and can be made easily at home.

A Brief History of Rainwater Harvesting

Before there were public water utilities, many American households harvested rainwater. With the development of large, reliable water treatment and distribution systems, the appeal of rainwater harvesting diminished.

However, as the environmental and economic costs of providing centralized water escalate, a new interest in rainwater harvesting has emerged.



The easiest way to begin harvesting rainwater for your home is to use a rain barrel to collect water for your container plants, landscape, and garden.

Reasons for Harvesting Rainwater

Benefits

By collecting rainwater and using it on your lawn, plants, flowers, trees, and shrubs, you can save water and money. In fact, by collecting rainwater from just 10% of the residential roof area in Texas, we could conserve over 31 billion gallons of water annually. Using collected rainwater has three major advantages:

- it reduces runoff pollution,
- it can reduce your utility bills (the water is free!), and
- it is healthier for plants than treated water.

Other Incentives

Texas Tax Code 151.355 exempts rainwater-harvesting equipment from sales tax. To download the Texas Sales and Use Tax Exemption Certificate, visit www.comptroller.texas.gov/forms/01-339.pdf.

Some cities and counties offer rebates or reduced costs for rain barrels. Check with your local government or water utility to find out if incentives are available in your area.

Maintaining Your Rain Barrel

Like most things around your home, your rain barrel needs a little regular attention to keep working smoothly. To keep it in the best shape:

- Use all the water in the barrel regularly.
- Clean your gutters at least twice a year to reduce debris.
- Once a year, during a dry spell, tip the barrel over and rinse it out with a hose.

Any standing water will begin to smell after a while, especially if it



contains organic matter, such as leaves. Smelly water won't hurt your plants, but it can be a nuisance. To avoid it, use all the water in the barrel within a month of collecting it.

Safety Considerations

Remember: the water collected in a rain barrel as described in this publication is intended to be used for outside purposes only, such as watering your container plants, landscape, and garden. Also, it's important to safeguard the quality of your drinking water by never submerging a water hose in a rain barrel.

Prevent your rain barrel from serving as a mosquito breeding ground. A well-sealed screen will help keep mosquitoes from getting into your rain barrel. However, mosquito larvae may still wash in from your gutters. You can keep mosquitoes at bay by emptying the barrel regularly. You can also add mosquito dunks to the water. These dunks contain a nontoxic bacterium that kills mosquito larvae. It's safe for your plants, and it will not harm pets or people. You can find this product at most garden-supply stores.



Harvest More Rainwater

If you decide that you want to store even more rainwater, you can connect two or more rain barrels. You can also consider installing a large system using cisterns, which can collect thousands of gallons of water. For information on constructing a larger rainwater-harvesting system, see *Rainwater Harvesting* (GI-404, reprinted courtesy of the Texas A&M AgriLife Extension Service) at TakeCareofTexas.org/resources/rainwater-harvesting.

Texas A&M's AgriLife website discusses rainwater harvesting and lists publications, training programs, and suppliers of rainwater-harvesting equipment.** Visit "Rainwater Harvesting" at rainwaterharvesting.tamu.edu.



Contact the Texas Comptroller's office at 800-252-5555 for questions about the exemption of rainwater harvesting equipment from state sales tax.

***The listing of suppliers is provided by Texas A&M AgriLife Extension solely to inform the reader of the different types of equipment and products that are available for harvesting rainwater. Neither Texas A&M AgriLife Extension nor the TCEQ endorses any particular vendor, manufacturer, or product.*

How to Construct a Rain Barrel

Materials

- 55-gallon polyethylene plastic barrel
- 3/4-inch hose spigot
- 3/4-inch PVC closed nipple
- window screen
- Teflon cement
- water hose (optional)
- bricks or concrete blocks (optional)

Tools

- drill with a 1-inch paddle bit
- utility knife or jig saw

Instructions

- **Inflow.** Use the utility knife or jig saw to cut a hole in the top of the barrel approximately the same diameter as your gutter downspout.
- **Spigot.** Measure 3 to 4 inches from the bottom of the barrel and drill a 1-inch hole. Screw the spigot halfway into the barrel, apply some Teflon cement to the exposed threads, and continue to twist until tight. In addition, you can use a rubber washer, metal washer, and

a lock nut to more firmly secure the spigot to the barrel from the interior.

- **Overflow.** Measure 3 to 4 inches from the top of the barrel and drill a 1-inch hole. Twist in the 3/4-inch PVC closed nipple about one-quarter of the way, apply Teflon cement to the exposed threads in the middle portion of the coupling, and continue to screw it in, leaving 1 inch of thread exposed.

Connect the hose to the pipe coupling overflow spigot at the top of the barrel. You can run this hose into another barrel or to a soaker hose (which will evenly distribute excess water and help avoid flooding).

- **Downspout.** Place the barrel directly below the downspout. You will need to reconfigure the downspout to flow into the hole. If you like, place the barrel on concrete blocks or bricks. Raising the barrel will allow you to get a bucket under the spigot, and will facilitate leveling the area where your barrel will sit.



Cover the hole on the top of the barrel with the window screen to prevent sticks, rocks, or dirt from getting into it. Screens also keep mosquitoes out. Secure the screen with a few bricks or rocks to keep it in place.



Managing 10 Common Texas Yard Pests

Gardening and yard care can give you satisfying results, such as beautiful landscapes and abundant wildlife. However, yard pests can be discouraging, even for the most committed gardener. Learn smart ways to get rid of these 10 common Texas yard pests so that you can better enjoy your landscape, and Take Care of Texas in your yard.

1. Grubs

Grubs are small (1/2 to 1" long), C-shaped, and creamy white, with three pairs of legs. Grubs are the larva stage of the June beetle, or June bug.



Quick Tips to Avoid Pests

- Irrigate efficiently. Water infrequently, but thoroughly (generally 1 inch, once a week), and do so in the mornings.*
- Use native and adapted plants, which are better suited to the local environment and are more resistant to pests.
- Mow properly, taking off no more than one-third of the grass blade with each mowing.
- Choose natural or organic fertilizers, avoid overusing fertilizers, and encourage natural predators such as worms, ladybugs, certain beetles and mites, and birds.
- Monitor for pests often to catch infestations early and determine if control is needed; many times, natural predators may make treatment unnecessary.

Infestation and Attack

Grubs attack St. Augustine, Bermuda, zoysia, and buffalo grasses. They feed on roots and other underground parts, and are most prevalent during the summer and fall months.

Prevention or Solutions

- Only treat when more than 5–10 grubs per square foot are found.
- Apply beneficial nematodes (small, round worms) to the affected areas.
- Choose the most effective time for treatment: mid-June to late July.

2. Chinch Bugs

Adult chinch bugs are small and slender (1/6 to 1/5" long). They have black bodies and whitish wings with black "bases" on their forewings. Recently hatched nymphs are wingless and pinkish-red, with a light-colored band across their backs.



Infestation and Attack

Chinch bugs primarily attack St. Augustine grass, but may feed on zoysia or Bermuda grass as well. They cause expanding, irregular patches of dead or stunted grass surrounded by a halo of yellowing, dying grass.

Prevention or Solutions

- Make your yard a haven for birds and beneficial predator insects, such as big-eyed bugs, by avoiding the wide use of lawn chemicals.
- Check for chinch bug infestation on the grass blades at the edges of affected areas. To test, cut the bottom out of a coffee can, push the can one inch into your turf near the edge of a dead patch, and fill the can with water. If chinch bugs are present, they will float to the surface.
- If there are signs of damage, spot-treat only the infected areas with insecticidal soaps.

3. Fire Ants

Fire ant colonies include a queen (or queens), winged males and females, workers, and brood. Colonies can create mounds up to 18 inches tall.



Infestation and Attack

Fire ants prefer open, sunny areas such as lawns, pastures, and parks. They are most prevalent in spring and fall. Fire ants do not injure turf grass, but their mounds can become unsightly. They are aggressive and cause painful stings.

Prevention or Solutions

- Carefully pour a large pot (about 3 gallons) of boiling water on each mound. This method will kill a mound about 60% of the time and works best after a rain.
- Introduce beneficial nematodes, applying them to moist soil at dusk.
- Choose baits over contact products. Baits are safer to use because they are ant-specific and formulated with very small percentages of the active ingredients. Make sure to use fresh bait, and to apply it when the ants are foraging.
- Organize your neighbors to treat fire ants at the same time, to avoid driving the ants from yard to yard.

4. Aphids

Aphids are tiny (1/16 to 1/8") insects with a soft body, long legs, and antennae. Most aphids are host-plant specific and usually do not move to other species.



Infestation and Attack

Aphids attack new growth or the underside of leaves. They suck sap from plants and excrete clear, sticky "honeydew" onto leaves. This honeydew

often causes a black, sooty fungus that blocks sunlight from leaves. Typically, aphids attack bedding plants, crepe myrtle, hibiscus, oaks, oleanders, pecan trees, roses, and vegetables.

Prevention or Solutions

- After you identify an infestation, introduce ladybugs, lacewings, and other beneficial insects to your landscape. For best results, follow release instructions carefully and release in an enclosed area.
- Use sticky barriers to prevent ants from tending the aphids and protecting them from natural predators.
- For minor infestations, spray host plants with water at high pressure to dislodge the aphids.
- Use insecticidal soaps and horticultural oils to help control the aphids.
- When appropriate, use row covers, which will physically keep the aphids off vegetable crops while still allowing air, light, and water exchange.

5. Caterpillars

Pest caterpillars include the tomato hornworm, the tent caterpillar, the genista caterpillar, and the spring cankerworm.

Caterpillars are the larval stage of butterflies, so butterfly-gardening enthusiasts should expect some caterpillar damage.

Infestation and Attack

Caterpillars can be found year-round but are most prevalent in spring and fall.

Prevention or Solutions

- Do not treat native trees; caterpillar infestations are natural and rarely threaten the health of a tree unless it is already stressed or weakened.



TOMATO HORNWORM



TENT CATERPILLAR



GENISTA CATERPILLAR



SPRING CANKERWORM

- Monitor infestations of very young caterpillars to see if natural controls such as predators, parasitic wasps, or harsh weather will eliminate the infestation. Try releasing parasitic wasps when caterpillars first appear.
- Dislodge young (small) tent caterpillars with a broom or with high-pressure water sprays, to allow parasitic wasps easier access.
- You can remove by hand egg masses or groups of caterpillars found on trees or branches, or prune them out of the tree and destroy them. You can drop handpicked caterpillars into a bucket of soapy water.
- Use row covers as a barrier in vegetable gardens.
- Treat young caterpillars with *Bacillus thuringiensis*, but not near butterfly gardens.

6. Fleas

Fleas are tiny insects with hind legs adapted for jumping. They leave black droppings around pet sleeping areas and jump when disturbed.



Infestation and Attack

Fleas can attack pets and people. Flea bites mostly occur on the lower legs and can cause redness and itching. Most adult fleas live on the animal host, although flea eggs and larvae can be found in moist soil in the yard, as well as in bedding and carpet.

Prevention or Solutions

- Keep your house well-vacuumed, especially where your pet rests. Immediately dispose of vacuum bags after use to prevent fleas from escaping back into your home.
- Steam clean carpets to remove organic material, which is food for flea larvae.
- Wash your pet's bedding regularly in hot water. If pets sleep with you, wash your bedding frequently as well.
- Use a flea comb to remove fleas from your pet; drop the fleas in a bucket of soapy water.
- Shampoo your pet regularly with a gentle shampoo to remove fleas and flea eggs. Shampoos containing

Decrease Pesticide Waste in Your Home

To decrease the amount of leftover or unwanted pesticides in your home, use the following guidelines:

- Buy only what you need to do the job.
- Use alternative products that do not contain hazardous materials.
- Pass on your unexpired pesticides in good condition to friends, relatives, or neighbors who can use them.
- Use the product for its intended purpose.

If you have leftover or unwanted pesticides that need to be disposed of, check TCEQ's list of household hazardous waste (HHW) facilities and collection events at www.tceq.texas.gov/p2/hhw/contacts.html. If an HHW service is not available in your area, it is acceptable for households to dispose of leftover or unwanted pesticides in the regular trash.



pesticides are not necessary, because any soapy water will kill fleas.

- If areas of your yard are heavily infested with fleas, treat these areas using a spray of beneficial nematodes. These organisms kill flea larvae but are not harmful to the environment.

7. Mosquitoes

Adult mosquitoes are small, long-legged flies with two scaly wings and long, segmented antennae.

Mosquitoes have long piercing and sucking mouthparts. They lay their eggs in still water.



Infestation and Attack

Mosquitoes are found in Texas year-round, but become more prevalent in spring and summer. They are most active between dusk and dawn.

Prevention or Solutions

- Eliminate breeding sites by reducing the amount of standing water in your yard. Use bacterial larvicide tablets to reduce mosquitoes in rain barrels or in permanent bodies of water.
- Light citronella candles to provide short-term relief on patios and other outside areas.
- Wear light-colored, loose-fitting clothing when outside. If you opt to use mosquito repellents, apply to clothing and exposed skin according to the instructions on the label. Once indoors, wash any treated skin with soap and water.
- Repair leaky faucets and outdoor pipes.
- For pets, use topical spot treatments to help repel mosquitoes. Since heartworms are transmitted by mosquitoes, use heartworm medication in conjunction with the repellants.

8. Spider Mites

Adults are tiny (1/150 to 1/50"), spiderlike mites with eight legs and no antennae. They vary in color.



Infestation and Attack

Spider mites lay eggs on the underside of leaves and on buds. They attack fruit trees, tomatoes, marigolds, strawberries, roses, junipers, rosemary, and many house plants.

Prevention or Solutions

- Take a white piece of paper and strike some affected leaves on it—you'll see the mites crawling on the paper.
- Encourage natural enemies like green lacewing larvae, ladybugs, and predatory mites.
- For minor infestations, spray the host plants weekly with high-pressure water, spraying upward from beneath the plant foliage.
- Apply insecticidal soaps or horticultural oils; spray upward from beneath the plant foliage.

9. Snails and Slugs

Snails and slugs have fleshy, soft, slimy, legless bodies (1/2 to 4" long).

They range in color from whitish-yellow to black. They are slow-moving and require moisture for survival. Snails have a hard, spiral shell on their backs that provides protection from predators and excessive heat and dryness.



Infestation and Attack

Snails and slugs attack the leaves, flowers, and stems of plants. They can completely devour young vegetable seedlings overnight.

Prevention or Solutions

- Handpick snails and slugs at night when they are active and drop them in a jar of soapy water.
- Attract snails overnight to a hollowed-out melon rind or a shallow container filled with beer or apple cider. Dispose of them in the early morning and replenish the bait often.
- Destroy snail and slug eggs, which look like crystal beads and are often found in large clusters under rocks and debris.

- Eliminate their hiding places, such as under flowerpots and landscape timbers. Place barriers of copper stripping around planters to prevent snails and slugs from reaching the plants.
- Use window-screen material or row covers to protect seedlings.
- Finally, and only if significant plant damage begins to appear, use snail and slug baits as a last resort.

10. Beetles

The two most common pest beetles are the flea beetle and the cucumber beetle.

There are several types of beneficial beetles which feed on caterpillars, aphids, and other pests. Helpful beetles include the ground beetle and the ladybird beetle, or ladybug.



Infestation and Attack

The flea beetle attacks many vegetables, including cucumbers, tomatoes, peppers, and eggplant. Their larvae feed underground on roots. Flea beetles create a "shotgun" pattern of feeding damage on leaves, and may also spread diseases such as potato blight and bacterial wilt.

The cucumber beetle attacks all members of the squash and cucumber family. They cause minimal feeding damage, but they spread diseases, such as bacterial wilt and squash mosaic virus, that can kill plants.

Prevention or Solutions

- Choose disease-resistant varieties of squash, such as "cougar," "sunglo," and "sunray," and irrigate efficiently.
- Use trellises to get your plants off the ground and mulch heavily around the plants.
- Remove dead plant materials and debris from your garden.
- Treat the soil with beneficial nematodes.



Managing Lawn Problems in Texas

Choose Your Landscape

When choosing a landscape for your yard, it is important to consider not only what you want your yard to look like, but the amount of resources and time necessary to maintain it.

In most landscape areas, turf grasses have the highest water demand and the highest maintenance requirements of all plants. Lawn alternatives, such as drought-tolerant native plants and other forms of ground cover, can save water and energy as well as time and money by requiring little maintenance. For more information on selecting a landscape, visit earthkind.tamu.edu.

If you decide to have a lawn, consider planting a less extensive grass landscape and choose a turf that is right for your region and environment. Planting the lowest-water-use turf grass adapted to your region is an effective way to reduce the need for landscape irrigation. Avoid narrow strips or odd shapes of turf grass that will be difficult to irrigate without wasting time and water.

Maintain Your Lawn

Maintaining a healthy turf will help you avoid many common lawn problems, as well as the need for many pesticides—including insecticides, herbicides, and fungicides.

Water Efficiently

A properly watered lawn is more resistant to pests and other lawn problems. However, much of the water used to maintain our landscapes is wasted through inefficient watering techniques. Irrigate efficiently, making sure to:

- water infrequently, yet thoroughly,
- water in the morning, before 10 a.m., and
- wet the soil to a depth of 4–6 inches, and allow the soil to dry out between watering.

For more in-depth watering tips, visit the Water-Efficient Landscapes section on pages 2-6 of this publication.

Mow Properly

Mowing grass too short causes stress, discourages deep root growth, and results in rapid loss of soil moisture.

Mow often enough so that each mowing removes no more than one-third of the grass blade. For example, if you set your cutting height at 2 inches, you should cut your grass before it's more than 3 inches tall.

Practice Grasscycling

Grasscycling refers to the practice of leaving grass clippings on the lawn to decompose into soil. Grasscycling will not only cut down on your watering needs, it will make your turf greener and tougher by preventing common turf diseases and reducing the need for lawn

fertilizer. The key to grasscycling is to mow at the proper height and disperse the grass clippings evenly, so that they can work their way down to the soil.

When the mowed grass clippings remain on the yard, they can act as a slow-release lawn fertilizer, while also helping to retain soil moisture. This reduces the need for watering and can eliminate the need for fertilizer. In turn, this helps to keep fertilizers out of storm drains and, as a result, out of rivers, lakes, and bays.



Cultivate Healthy Soil

Grass and other plants can be weak and unhealthy for a variety of reasons. In general, it's important to establish an adequate depth of healthy soil (at least 6 inches under your turf) and aerate your lawn once a year to improve drainage and reduce soil compaction.

If you do encounter a problem in your lawn, try solving it using natural, noninvasive methods. In most cases, compost is the best soil additive you can use. Compost contains micronutrients—such as iron and manganese—that are often absent in synthetic fertilizers. Compost also balances both acidic and alkaline soils, bringing pH levels into the optimum range for nutrient availability.

Don't Let Leaves Pile Up

A thick ground cover of leaves blocks sunlight, which is good for suppressing weed growth in planting beds; but on the lawn, it can also suppress the growth of grass. Mow fallen leaves to create good winter mulch for your lawn or add the leaves to your backyard compost pile.





TAKE-ALL PATCH



BROWN PATCH



Common Lawn Problems

Fungal Diseases

Take-All Patch

Take-all patch first appears as a yellowing of the grass and a darkening of the grass roots, followed by a thinning of the turf in irregular shapes. The darkening of the roots indicates rotting, and the roots can rot so extensively that the grass can be easily pulled up.



Infestation and Attack

Take-all patch most commonly affects St. Augustine, zoysia, and Bermuda grasses, and can rot roots so badly that it eventually kills the entire lawn. It spreads mainly during the fall, winter, and spring, when there is more moisture and cool or mild temperatures. However, the symptoms generally do not appear until the hot, stressful days of summer.

Prevention and Solutions

- Maintain good drainage in your lawn area.
- Avoid overfertilization of turf areas, as excessive nitrogen seems to promote take-all patch.
- Raise the mowing height on your mower to reduce stress to your turf.
- Avoid the use of broadleaf herbicides, which may weaken your turf.
- Avoid urea-based fertilizers.

Brown Patch

Brown patch first causes circular patterns of dead grass blades; in two to three weeks, new leaves may emerge



in the center of the circular patch, giving diseased areas a donut-shaped appearance. The affected grass turns brown and grass blades rot and break off from the runners.

Infestation and Attack

Brown patch most commonly attacks St. Augustine grass and can spread in an area of 1 to 50 square feet. It occurs in late fall through early spring and is promoted by wet weather or frequent irrigation.

Prevention and Solutions

- Avoid overfertilization or overwatering of your lawn.
- Aerate your lawn once a year.
- At the first sign of the disease, apply a fungicide to the affected area.

Lawn Stresses

Shade Stress

Turf grass that is affected by shade stress (lack of sunlight) thins and disappears, leaving bare patches of soil and/or areas of weeds.



Infestation and Attack

Buffalo and Bermuda grasses do not grow well in shaded areas—these grasses are the most susceptible to shade stress.

Prevention and Solutions

- For planting in shady areas, choose shade-tolerant groundcovers or shade-tolerant turf grasses (such as St. Augustine or zoysia).
- Thin out tree branches a bit to “brighten” shady areas.
- Raise the mowing height on your mower to allow more grass blade to capture sunlight.

Iron Chlorosis

Iron Chlorosis causes the blades of the grass to develop green and yellow stripes, or to turn completely yellow. It occurs in alkaline (high pH) soils with high phosphorus levels, and under cool and wet soil conditions.



Infestation and Attack

St. Augustine grass is most susceptible to Iron Chlorosis.

Prevention and Solutions

- Do not use fertilizers that are high in phosphorus.
- Topdress your turf with 1/4- to 1/3-inch of compost.
- Aerate your lawn once a year.
- For temporary relief, try adding iron supplements to your lawn.

Drought Stress

Grass affected by drought stress looks blue-green or silverish, and individual blades curl. Footprints remain in the lawn after you step on it, and the soil under the lawn is dry.



Tolerance to Drought

All turf can survive some drought stress, although some types of turf require less water than others.

- *St. Augustine*: drought tolerant in shade only
- *Bermuda, zoysia*: drought tolerant
- *Buffalo*: very drought tolerant

Prevention and Solutions

- Choose drought-tolerant turf grass.
- Irrigate efficiently.
- For sloped areas, consider alternatives to turf.



SHADE STRESS



IRON CHLOROSIS



DROUGHT STRESS

Weeds

The two most common types of weeds are:

- *Grassy.* Grassy weeds have jointed, hollow stems. Their leaf blades have veins parallel to the margins and are several times longer than they are wide. Their roots are fibrous and multi-branching, and their flowers are usually inconspicuous.
- *Broadleaf.* Broadleaf weeds often have showy flowers. Their leaves have a network of veins at diverse angles to one another. Their stems are often pithy and they usually have a taproot.

Infestation and Attack

Weeds are often the result of poor-quality turf, rather than being the cause of it. Weeds are aggressive and reproduce quickly, enabling them to invade areas of thin, weak turf.

Prevention and Solutions

- Keep plants healthy—this will help them outcompete weeds.
- Do not let weeds flower or go to seed—this will greatly increase their potential population.
- Do not bring soil with weed seeds or weed roots on-site.
- Use drip irrigation in beds so that you apply water only where you want it—remember, weeds also need water to grow.
- Monitor and remove weeds regularly, before they are established.
- Prevent weeds from growing by blocking light from them or by creating a physical barrier to impede their growth.
- Minimize foot traffic or pet activity in shady areas.



Getting to the Root of the Problem

The Texas A&M AgriLife Extension offers diagnostic labs and services to help you identify the cause of some lawn problems. Grass and other plants can be weak and unhealthy for a variety of reasons, including disease or misapplication of fertilizer.

The best (and only) sure way to know if the soil in your yard lacks sufficient nutrients is to get a soil test from a qualified soil lab. This will tell you exactly what your soil needs, and how much of it.

If you're having trouble identifying potential pathogens in your yard, you can also have diseased plants tested for pathogens. The Texas A&M AgriLife Extension can test field crops, trees, turfgrass, vegetables, fruits, flowers, shrubs, houseplants, or any other type of plant.

To find out more about these diagnostic labs and services, visit agrilifeextension.tamu.edu/browse/diagnostic-labs-services/.



Additional Resources

General Information

Take Care of Texas
[TakeCareOfTexas.org](https://www.TakeCareOfTexas.org)

Texas Water Development Board
twdb.texas.gov/conservation

Texas A&M AgriLife Extension Service
agrilifeextension.tamu.edu

Environmental Protection Agency
epa.gov/watersense/outdoor

Yard Care

Take Care of Texas

[TakeCareOfTexas.org/in-the-yard](https://www.TakeCareOfTexas.org/in-the-yard)

Texas A&M AgriLife Extension, EarthKind
earthkind.tamu.edu

Texas A&M AgriLife Extension Service Inte-
grated Pest Management
landscapeipm.tamu.edu

Lady Bird Johnson Wildflower Center Native
Plant Selector
wildflower.org/plants

Take the Pledge!

Visit [TakeCareOfTexas.org](https://www.TakeCareOfTexas.org)
to pledge to conserve
water and energy, and keep
our air and water clean.

[Pledge Now!](#)

Stay in the Know!

Take Care of Texas provides useful
information that can help you conserve
water and energy, keep our air and water
clean, and reduce waste. Subscribe to the
News You Can Use monthly e-newsletter
by entering your email address at the
bottom of our website

[TakeCareOfTexas.org](https://www.TakeCareOfTexas.org)

For More Information, Contact:

Take Care of Texas, MC 118
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, TX 78711-3087
512-239-0010
educate@tceq.texas.gov



[TakeCareOfTexas.org](https://www.TakeCareOfTexas.org)

