Introduction to Organic Food Gardening

Presented by Grow Local,
a program of Sustainable Food Center

CONTENTS

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SUSTAINABLE FOOD CENTER

WHY GARDEN?

• Food security/ Food sovereignty - Food gardeners can ensure that they have access to fresh, healthy vegetables that are free of pesticides, preservatives and additives.

• Sustainability - Food gardeners can produce food in envrionmentally sustainable ways by conserving water, gardening organically and composting. By doing so, food growers can minimize their dependence on agrobusinesses that use unsustainable gardening practices.

• Preserves biodiversity - Agribusinesses are usually not interested in genetic diversity and plant only a few types of vegetables that transport well. By gardening, you ensure that a greater diversity of food plants are passed down to subsequent generations. You also protect and develop plant varieties that are particularly suited to Central Texas' unique soils and climate.

• Historical - Humans have been growing food for thousands of years. By gardening, we ensure that this agricultural knowledge is passed on to subsequent generations.

• Physical health - Gardening provides a good source of exercise.

• Educational - Adult and youth gardeners learn about soil, plants, compost, insects, weather patterns and a host of other environmental phenomena.

• Financial savings - Food growers save money on grocery bills, and expert gardeners can even make money by selling vegetables, flowers and herbs.

• Family friendly - Gardening is fun for children and offers families an enjoyable, meaningful activity to do together.

• Social outlet - Food growing brings people together at school and community gardens, educational events, seed swaps and harvest parties.

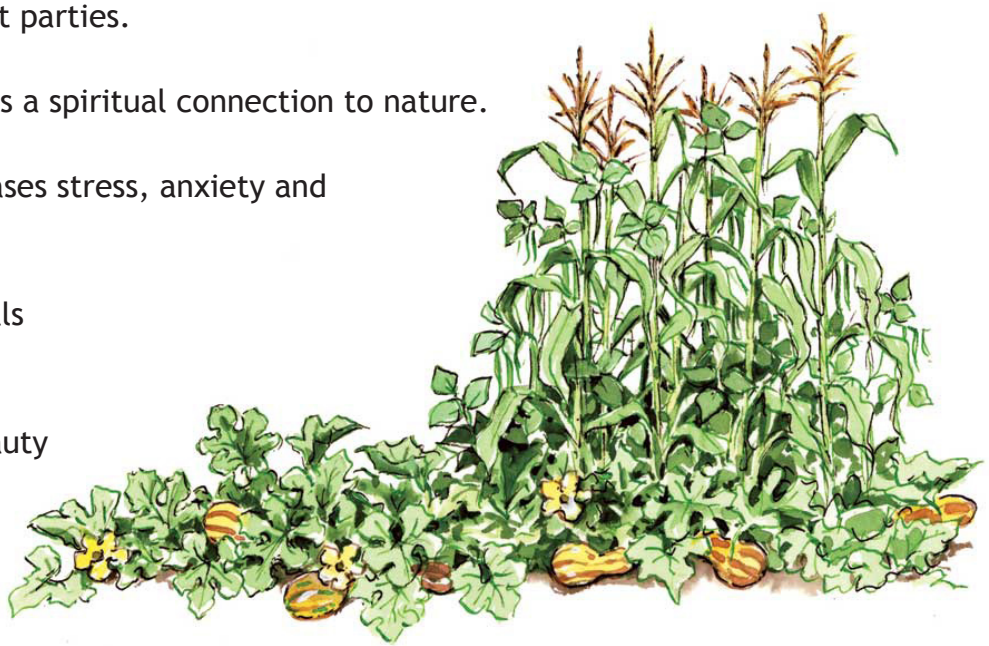
• Spiritual - Gardening provides a spiritual connection to nature.

• Mental health - Gardening eases stress, anxiety and depression and heals trauma.

• Gardening provides individuals with a creative outlet.

• Aesthetics - Gardens add beauty to urban spaces.

• **GARDENING IS FUN!**



WHY GARDEN ORGANICALLY?

In the context of gardening, “organic” refers to materials derived directly from plants, animals and minerals without the use fossil fuels or synthetic chemicals.

Sustainable Food Center promotes organic gardening because it is environmentally safe and sustainable and because vegetables and fruits grown organically taste better than their non-organic counterparts. They also contain more vitamins and minerals per bite, contributing to the health of individuals, families and communities.

There are two types of inorganic materials that gardeners frequently use: artificial fertilizers and artificial pesticides. Artificial fertilizers consist of alien molecules; thus, plants have a limited ability to absorb the nutrients they contain. Excess nutrients leech out of the soil and into nearby waterways, where they cause algae blooms, depriving other aquatic life of sunlight and oxygen. Artificial fertilizers also contain salts and if used regularly can build up salt in the soil, causing plants to wilt and die.

Artificial pesticides also pollute the earth. They easily become air or waterborne, traveling hundreds of miles from their point of application and contaminating distant waterways, or they may endure in the soil for decades. They do not distinguish between good and bad animals and instead harm all the organisms they come in contact with, from bees and birds to fish, amphibians and humans. Indeed, human exposure to pesticides in the field or on the fruits and vegetables that we eat can cause neurological problems, including memory loss, loss of coordination and reduced visual ability. Other negative health effects include asthma, allergies and skin disorders. Pesticide exposure is also linked with cancer, hormone disruption and problems with reproduction and fetal development.

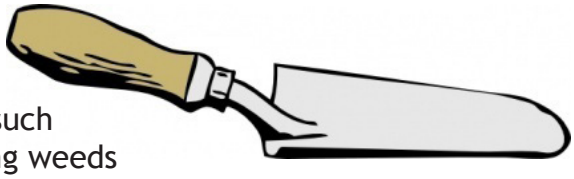
Equally important, inorganic fertilizers and pesticides harm the beneficial soil micrbobes, such as bacteria and fungi, which are responsible for building our soil and upon which plants depend to absorb nutrients and fight pests and diseases. Consequently, food growers who rely on inorganic gardening materials quickly find that their soil has degraded, their plants struggle to absorb nutrients and their crops suffer from regular outbreaks of pests and disease.

Fortunately, it is easy to garden organically. Some organic gardening practices, such as organic pest management, may be time consuming in the short term. In the long run, however, organic gardeners spend less money on and time in the garden, for they are able to create thriving soil ecologies that do much of their gardening work for them.

GARDENING TOOLS

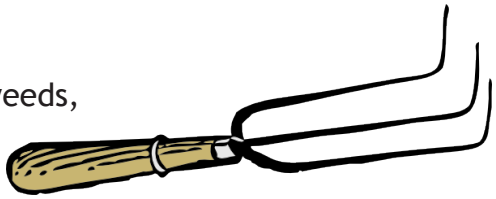
SHOVEL
A shovel is used for digging deep into the ground or moving materials. The longer the handle, the more leverage a shovel provides for difficult jobs. Pointy shovels are best for cutting through weeds and digging, while square-headed shovels are best for shoveling dirt and woodchips.

SPADING FORK
A spading fork is useful for breaking up, loosening, and turning soil and compost. It is also useful for shoveling woodchips. It typically has three or four metal prongs and a long wooden handle for leverage. Be careful of the prongs as they are sharp!



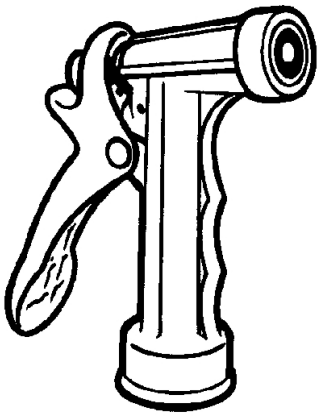
TROWEL
A trowel is a small shovel used for small jobs such as transplanting or removing weeds with shallow roots.

HAND CULTIVATOR
A hand cultivator is a small, pronged tool used to remove small weeds, turn the top layer of soil and dig rows for planting seeds.



HOE
Garden hoes are useful for breaking up and weeding compact soil.

GARDENING GLOVES
A sturdy pair of gardening gloves will keep your hands clean and protect them from ants and other biting insects as well as rocks, twigs and prickly plants.



HOSE NOZZLE
Hose nozzles control the intensity of the flow of water. By reducing the force of water from a hose, they prevent damage to plants and disturbance of soil.

WATERING CAN
Choose a light-weight, sturdy watering can so that you can water seeds and individual plants by hand. Watering cans are also useful if you want to apply liquid fertilizers to plants.

While it may be tempting to purchase cheap tools, remember that you get what you pay for. Inexpensive tools will often break quickly, requiring new purchases, so we recommend that you invest in solid, more expensive tools as this will save you money in the long run.

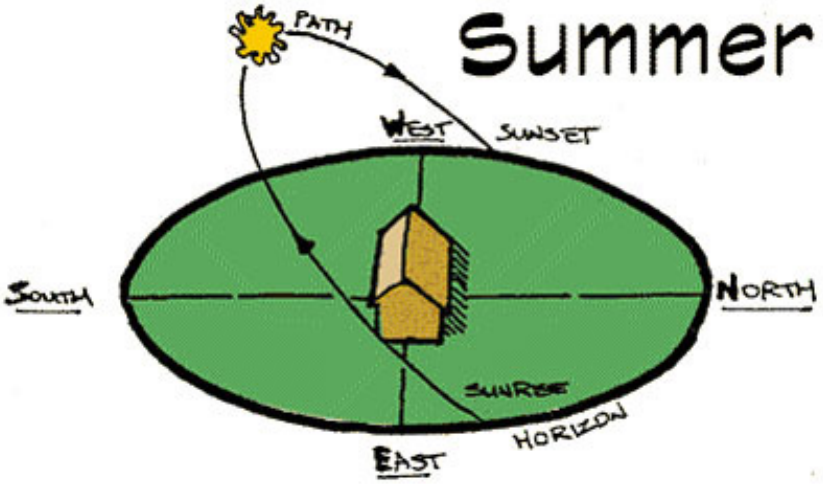
THE FOUR ELEMENTS

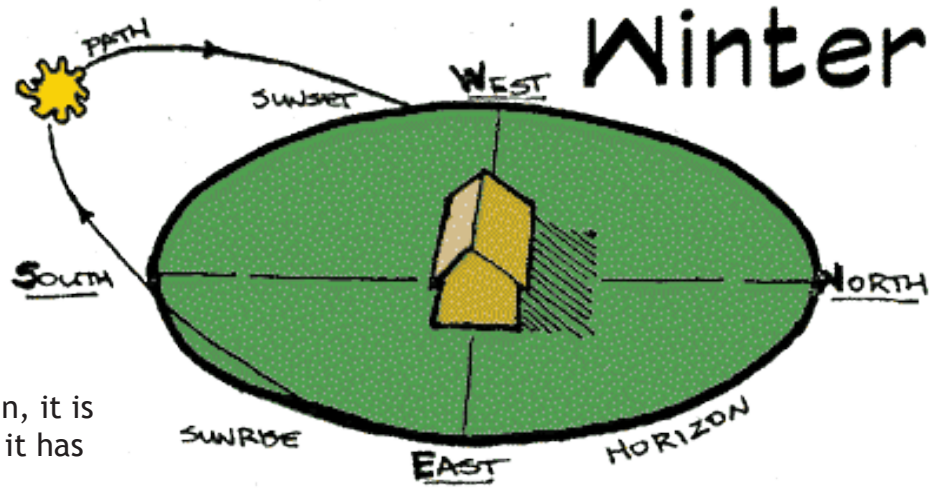
1) SUN

Sunlight is the primary source of food for almost all vegetation, and without enough of it, plants will not grow. Leafy vegetables such as lettuce, spinach and kale require a minimum of 6-8 hours of sunlight each day. Fruiting plants such as tomatoes, eggplant and cucumbers require at least 8-10 hours of sunlight each day. Stated otherwise, winter gardens require 6-8 hours of sunlight/day whereas summer gardens require 8-10 hours.

Where is South?

Because Central Texas is located in the northern hemisphere, the sun passes through the southern half of the sky. It is therefore important that vegetable gardens have good southern exposure. Shadows change throughout the day and year. They also change when trees drop and regrow their leaves. To ensure that your garden receives adequate sunlight, observe potential garden locations throughout the day and consider how shadows will change from season to season.





Sun-Related Tips

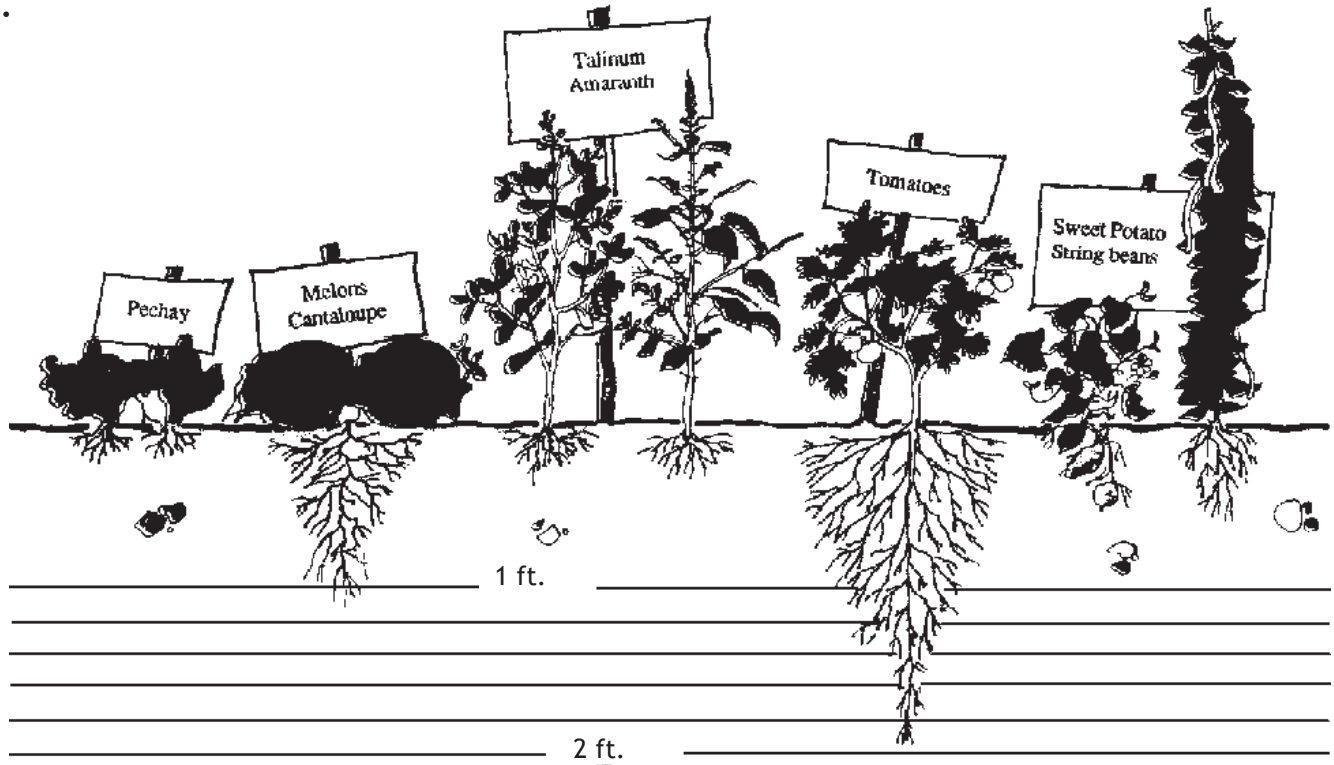
- Because plants prefer morning sun, it is best to situate your garden so that it has eastern exposure
- During Central Texas summers, plants often receive too much sun and heat, causing them to yellow and wither despite frequent watering. You can protect your garden from the summer sun by providing it with dappled western shade. Sources of shade include trees and trellises that support heat-tolerant vines, such as Trumpet or Passion vines or hyacinth beans. You can also plant a row of sunflowers on the west side of your garden.
- You can also use shade cloth to protect your plants from the summer sun. Shade cloth is available at most gardening stores.

2) SOIL

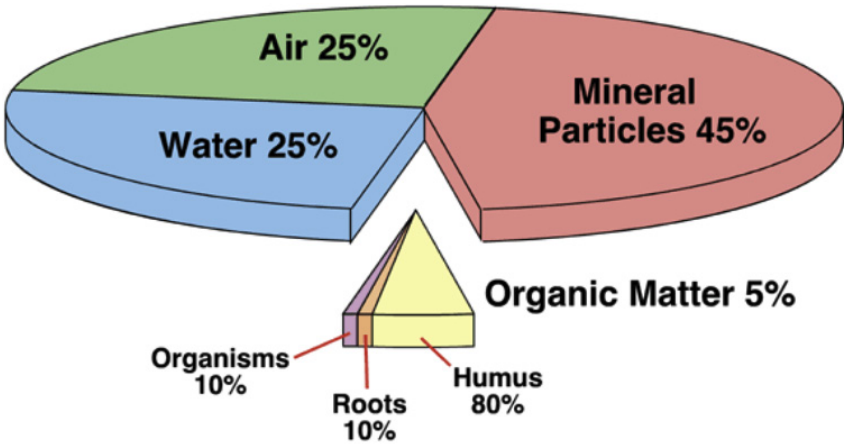
Soil Functions

Soil provides plants with habitat in which to grow and reproduce, and it stores the water, air and nutrients necessary for plant growth and health. Soil also provides habitat for millions of organisms upon which plants depend to access nutrients and fight diseases.

Vegetable gardens require <u>at least 12 inches of soil</u> and, ideally, will have two or more feet of soil.



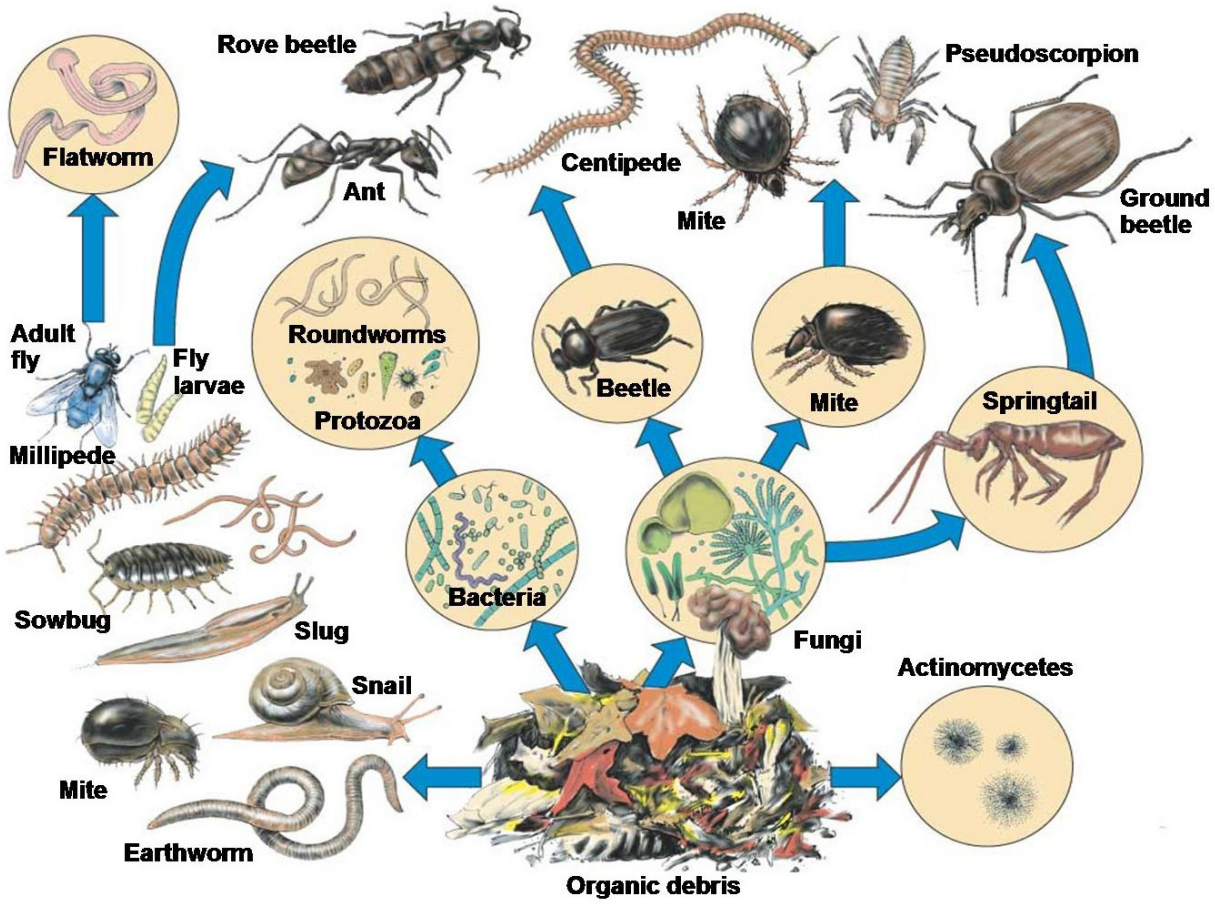
Soil Components



Soil is made up of water, air, mineral particles and organic matter. Common **<u>mineral particles</u>** include gravel, sand, silt and clay. **<u>Organic matter</u>** refers to anything that is alive or was once living, including roots, branches, twigs and humus. **<u>Humus</u>** refers to decomposed organic matter, also called compost. **<u>Organisms</u>** refer to the bacteria, fungi and animals, such as ants, beetles and earthworms, that live in the soil.

Soil is Alive

Healthy soil is teeming with millions of creatures, from microscopic bacteria to earthworms. These organisms build soil by digesting organic matter into compost and by binding compost and mineral particles together. Over time, this digestive work creates a unique soil structure that stores and cycles water, air and nutrients, providing an ideal growing medium for plants.



Functions of Soil Organisms

• **Composters** - Soil organisms consume wood, leaves and other organic materials and turn these materials into nutrient-rich compost.
• **Nutrient absorption** - Many nutrients found in organic matter exist in forms not accessible to plants. As microbes consume organic materials, they change the chemical makeup of nutrients into forms that plants can absorb.
• **Water retention** - Bacteria exude goo and fungi form webs. Together, these bind compost and mineral particles, creating a crumbly structure with pockets that absorb, store and cycle water.
• **Aeration** - Soil's unique structure also stores and cycles air. In addition, when larger organisms such as ants and earthworms move through the soil, they aerate it. This is called biological (as opposed to mechanical) tillage.
• **Nutrient retention** - Soil organisms lock up nutrients in their bodies, ensuring that nutrients do not wash away when it rains.
• **Pest and disease prevention** - Healthy soils contain a diverse range of organisms that suppress pests and diseases by outcompeting them.
• **Purification** - Soil organisms break down many pollutants.

How to Build Healthy, Living Soil

1) GARDEN ORGANICALLY: Avoid inorganic pesticides and fertilizers as they harm microbes.

2) ADD COMPOST: Fresh compost contains nutrients as well as millions of soil organisms. (Bagged compost is nutrient-rich, but because it has been sitting around for weeks or even months, it often contains few microbes.) Start gardening with soil that contains 1/3 part compost. Before each planting season, amend your soil by covering your beds with a three-inch layer of compost. Gently turn the compost into the garden, taking care to minimize disturbance of existing soil organisms.

3) MULCH: When soil is exposed to the air, it dries out, causing organisms to die. Nutrients also evaporate into the atmosphere. To protect organisms and conserve water and nutrients, mulch your soil with organic matter, such as leaves or straw. As the mulch breaks down, it will add organic matter to the soil. (It is best to avoid using coarse wood chips as mulch.)

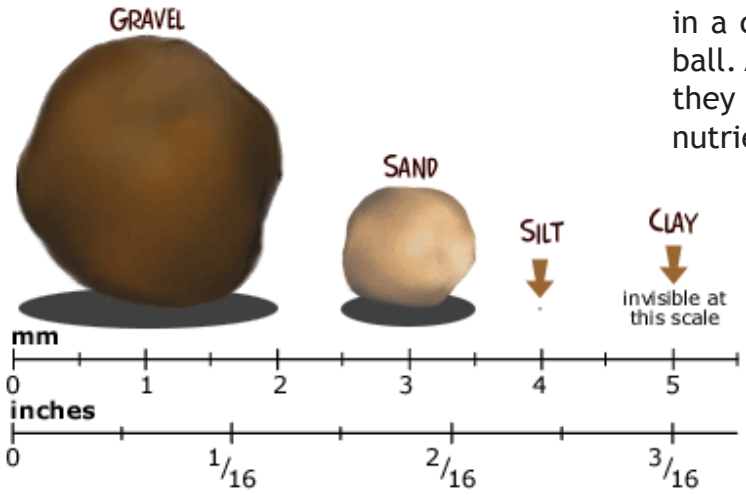
4) AVOID CHLORINATED WATER: Municipal water systems are chlorinated to prevent water-borne diseases; however, chlorine also harms beneficial soil bacteria, the foundation of a diverse soil web. So does chloramine, another chemical found in city water. Avoid using tap water by storing rainwater. You can also purchase a shower filter for your garden tap. Chlorine evaporates when exposed to air, so you can leave water in an uncovered container for 24 hours before using it in your garden. To encourage chloramines to evaporate, throw a handful of soil into the water, as chloramines turn into chlorine when they interact with organic matter.

5) **MINIMIZE MECHANICAL TILLAGE:** While mechanical tilling aerates soil, it harms soil organisms. If done frequently and over long periods of time, it degrades the soil. Fortunately, gardens that are tended regularly do not need to be mechanically tilled as larger soil organisms till the soil for us.

Because new gardens do not have an established soil biology, their plants often experience inconsistent growth and low yields. Generally, it takes three to five years to establish your soil's biology. If you are working with a new garden, be patient and keep building your soil!

Mineral Particles

Minerals have different qualities that affect the ability of soil to absorb, retain and release nutrients, water and air. Mineral particles most commonly found in garden soil include sand, silt and clay.



Sand particles are like plastic balls. When placed in a container, there is a lot of space between each ball. As a result, sandy soils tend not to compact, and they have good drainage; however, they do not store nutrients or water well.

Clay particles are like poker chips. When stacked together, there is little space between them. As a result, clay soils have a tendency to compact, causing poor drainage; however, clay soils store water and nutrients. That said, clay also tends to "lock up" nutrients, requiring a thriving soil biology to make them accessable to plants.

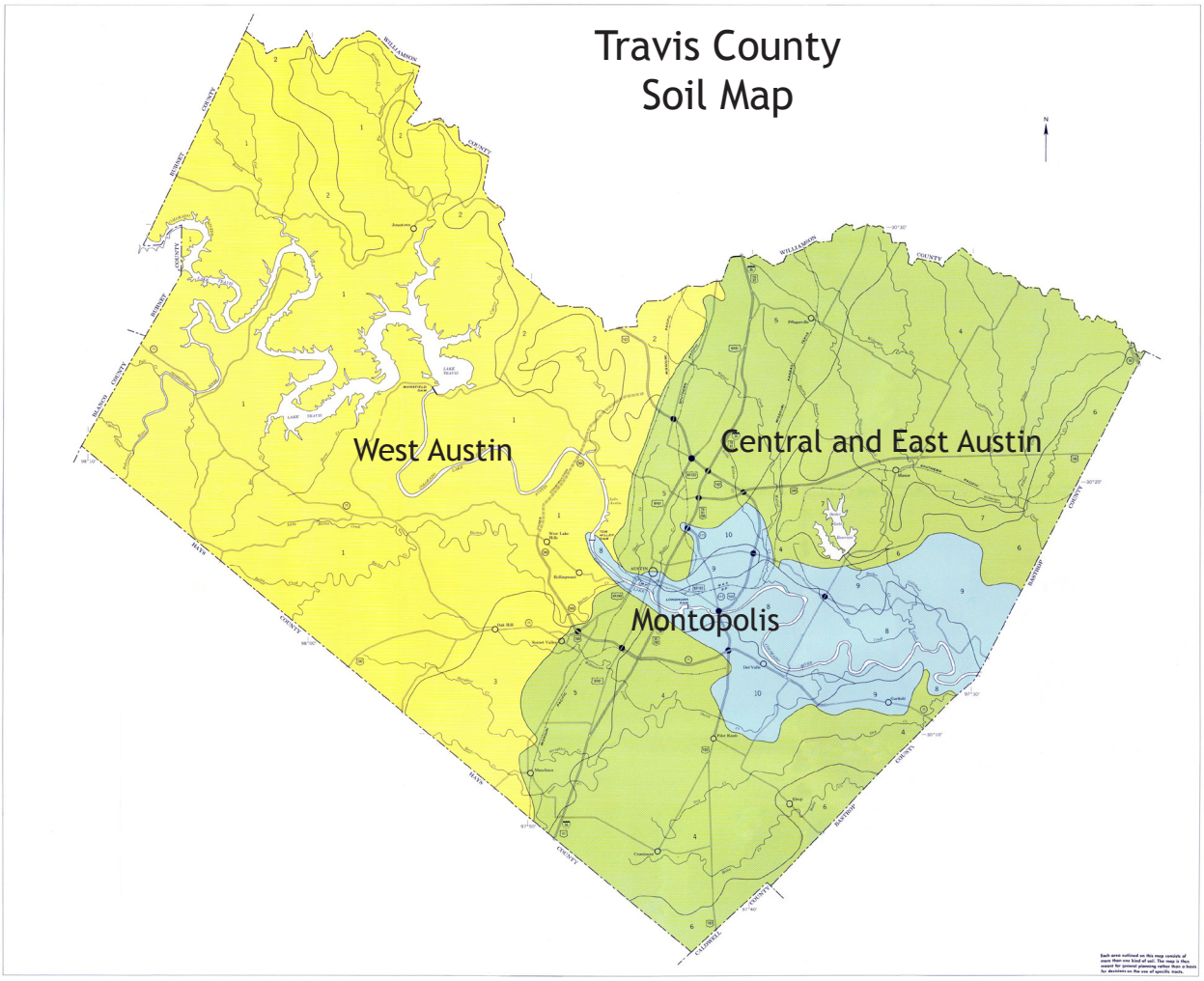
Silt particles are found in rivers and creeks. They are larger than clay but smaller than sand and therefore share qualities of both.

Mineral Component	Benefits	Drawbacks
Clay	Good nutrient and water retention	Poor drainage; locks up nutrients; compacts easily
Silt	Good nutrient and water retention	Compacts easily
Sand	Good drainage	Poor nutrient retention; dries out quickly

Ideal gardening soil consists of equal parts clay, sand and silt. It is referred to as **loam**. (Avoid purchasing "sandy loam" in stores as the product is nutrient-poor and high in clay content.)

Different parts of Austin have different soil profiles. East of Mopac Expressway, in the Blackland Prairies, the soil is generally deep and has a high clay content. West of Mopac, along the Edwards Plateau, the soil is shallow and contains more limestone. In those parts of Montopolis that sit in the historic floodplains of the Colorado River, the soil is silty. Due to urban development, much of the city's native soils have been removed and/or replaced.

To find out what kind of soil you have, dig into it. No matter what your soil profile, in order to improve your soil, amend your garden beds with organic matter, including compost and mulch.



3) WATER

How close is your water source?

Because Central Texas has a hot, semi-arid climate, vegetable gardens require frequent watering. Save time and energy by locating your beds near a water source. Gardeners can water with municipal water, rainwater or well water.

	Benefits	**Drawbacks**
Municipal/Tap water	• Easy to access	• Contains chlorine and chloramines, which harm soil organisms • Strains water reservoirs
Rainwater	• Does not contain chlorine or chloramines • Reduces strain on aquifers • Free	• Can be costly to establish a catchment system *(See page 41 for more information about rainwater collection)*
Well water	• Does not contain chlorine or chloramine	• Costly to dig a well • Strains water reservoirs

How to Water (In-Ground Beds)

Appropriate watering is crucial to successful vegetable gardening. Most vegetables prefer damp soil, and if the soil is dry or wet for too long, they will wither or wilt and eventually die. New food growers often over water. Plants suffering from too much water wilt, much like plants suffering from dehydration. In turn, novice gardeners water even more, exacerbating the problem. If you are a new gardener and unsure if your garden needs watering, stick you finger in the soil at least three inches down. If the soil is dry, water. If it is wet or moist, wait a day or two.

As a general rule, unless it rains or the day is overcast and very humid, seeds should be watered lightly every 2-3 days during cold weather and every day during hot weather. To minimize disturbance of seeds and soil, when watering with a hose, use a nozzle, or use your thumb to break up the force of water. Once plants have formed their first true set of leaves, start watering less often but more deeply. (The first set of leaves on a plant, called cotyledon, are always undifferentiated, meaning they look the same on all plants. True leaves are unique to each plant and indicate that a plant has established a root structure.)

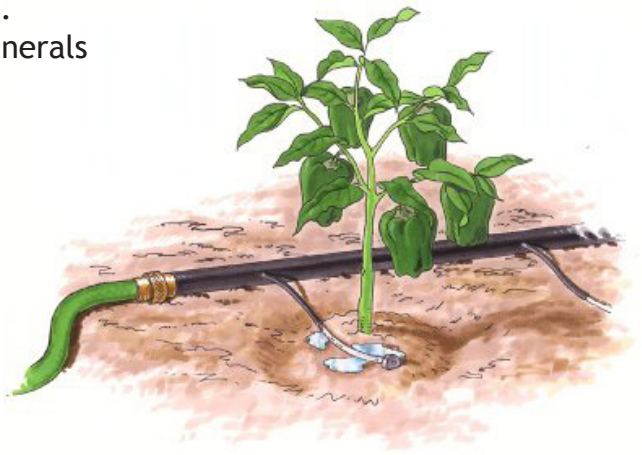
When transplating seedlings, if the weather is warm, it is recommended to water every day or two for at least a week. In cooler weather, you can water every three days. Once you see new growth, you know a plant is established, and you can treat it like other established plants in your garden. Fully grown plants should be watered less often but more deeply. This encourages roots to grow down where water is stored and where soil temperatures do not fluctuate.

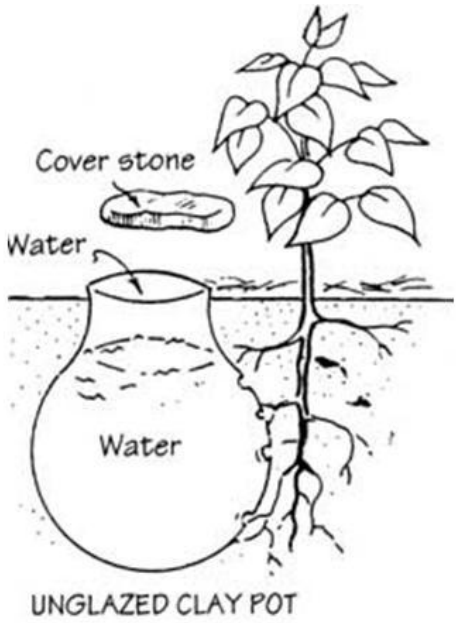
These are general rules because all plants have different water needs. Cabbage plants, for example, require regular watering, even in cool weather, while okra needs watering no more than once a week, even in the middle of the summer. Additionally, different soils hold different amounts of water. As your gardening skills develop, you will get a natural feel for when plants need to be watered. In the meantime, do not hesitate to poke your fingers into the soil. Just make sure not to disturb plant roots.

Irrigation options

Hand watering with a hose or watering can is, technologically speaking, the simplest way to water a garden. It also maximizes control over which plants you water and how. In the summer and during dry spells, it can be time consuming.

Drip irrigation involves placing soaker or drip hoses directly on the soil, reducing evaporation. If installed properly, drip irrigation systems can save time.
They have a tendency to clog with built-up salts and minerals and therefore require cleaning at regular intervals.





Ceramic pots (ollas) are permeable clay pots that slowly release water underground, reducing evaporation. They are a useful way to irrigate established plants, but they should not be relied upon to water seeds. They generally cost between $25 and $40, depending on their size. It this is beyond your price range, you can substitute them with glass or plastic bottles. Simply poke or drill small holes in the bottom of the bottles and bury them in the ground.

Water Conservation

Sustainable water use is a crucial part of sustainable food gardening and food security. As Central Texas' population has grown, water use has increased, causing reservoir levels to fall to often alarmingly low levels. To ensure that future generations have access to potable water, it is vital that we grow our food in water-wise ways. Below are tips for how to conserve water in your garden.

Build the Soil: Healthy, living soil holds more water than degraded soil.

Appropriate Watering: Reduce evaporation by watering in the early morning or late evening, and water the soil, not plant foliage.

Mulch: Covering your garden with a two to four-inch layer of mulch reduces evaporation from the soil, cutting down on watering needs. Mulching also suppresses weeds and builds the soil. Make sure to leave a little space between mulch and plant stems to prevent fungal infections. Mulch options include:

* Leaves
* Pine needles
* Straw (avoid hay as it contains seeds)
* Other fine, aged plant material (avoid coarse wood chips)

Western shade: Western shade protects gardens from the summer's hot evening sun, reducing evaporation from the soil.

Drip Irrigation/Soaker Hoses: By delivering water directly to the soil, drip hoses reduce water loss to evaporation.

Put Your Garden to Sleep during the Summer: Because water use is greatest during summer while plant yields are often low, consider putting your garden to sleep from mid to late summer by covering your beds with a thick layer of mulch or by planting a summer cover crop such as black-eyed, cream or purple hull peas.

4) AIR

Plants require oxygen to grow. Ensure that your soil is aerated by:

• Double digging new garden beds (*explained on pages 15-16*)
• Amending your soil with compost
• Adding earthworms to your beds
• Avoid compacting the soil by not walking where you plant

Plants also benefit from air circulation above ground as air helps prevent fungal and pest infections. To ensure adequate air circulation, do not over crowd your plants.

PREPARING YOUR GARDEN BEDS

PREPARING YOUR GARDEN BEDS

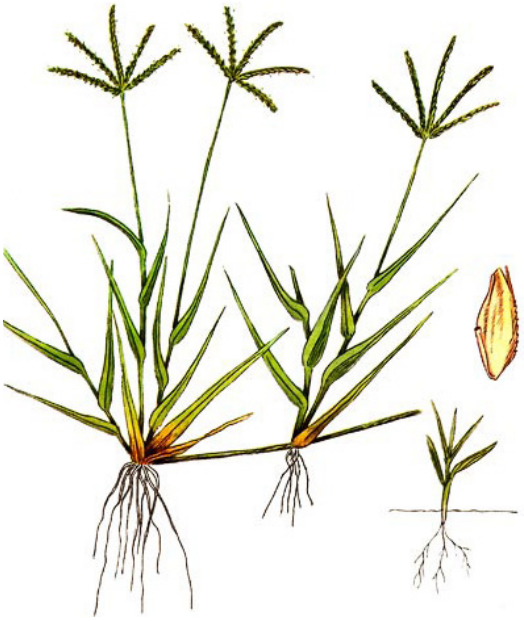
Some new gardeners are lucky enough to inherit beds that are already or have recently been cultivated. If you are one of these fortunate few, preparing your garden for planting is easy. Remove any weeds. Cover your beds with a two to four-inch layer of compost and gently turn the compost into the existing soil. Break up any large chunks of earth. Remove any rocks and large twigs. Even out the surface of the bed so it is flat then plant.

Establishing a new garden or reviving a long-abandoned garden is trickier, often requiring tilling to loosen the soil or purchases of new soil if there is none on site. Each garden site is different as is each gardener's vision. This means there is no single right way to establish or revive a garden. Is there already a decent amount of soil on site? If yes, what is the quality of the soil? Is it relatively dark and loose or is it pale and compacted? Is the area covered in weeds? If yes, what sort of weeds, and how difficult will they be to remove? Are you able to bend down to garden? Do you have children or pets that might disturb your beds? Do you prefer the tidy aesthetic of raised beds or the natural aesthetic of in-ground beds? How much money are you willing to spend?

The answers to these questions will determine whether you establish an in-ground bed, a raised bed, or some combination of the two. Alternatively, you may not have a yard at all and instead intend to garden on a patio or balcony. If this is the case, you will need to establish container gardens.

Whatever type of garden you choose, remember:
- Choose a site that receives 6-10 hours of sunlight throughout the year
- Ensure that your plants have a minimum of 12 inches of well-amended, loose soil
- Make sure your water source is nearby

It is also important to weed your site thoroughly before planting. This is particularly true if your site contains Bermuda grass, for if not weeded properly, such grass will easily overgrow your bed. First, outline your garden. Then, if there is sod in the chosen area, cut the grass out using a hoe (or mattock). Bermuda grass can regrow from a tiny piece of root, so make sure to remove any and all roots that you find. Do not use a tiller as this will break the roots into tiny pieces and turn them into the soil, making them difficult to remove. It is also recommended to weed a one-foot pathway around the garden to act as a weed barrier. If you are feeling particularly diligent, you can set lumber, metal or snuggly-fitted stone eight inches into the ground. While this is not necessary, it provides an additional physical barrier to grass. Weeding will most likely be the most difficult part of preparing your new garden, but weeding properly will save you a great deal of time and energy in the future.



Bermuda Grass

Last but not least, to ensure that you can easily reach all parts of your bed, it is recommended that beds not be wider than four feet. If you plan on gardening with children, you may want to limit the width of your beds to two or three feet. We also recommend that paths between beds be at least 1.5 feet wide.

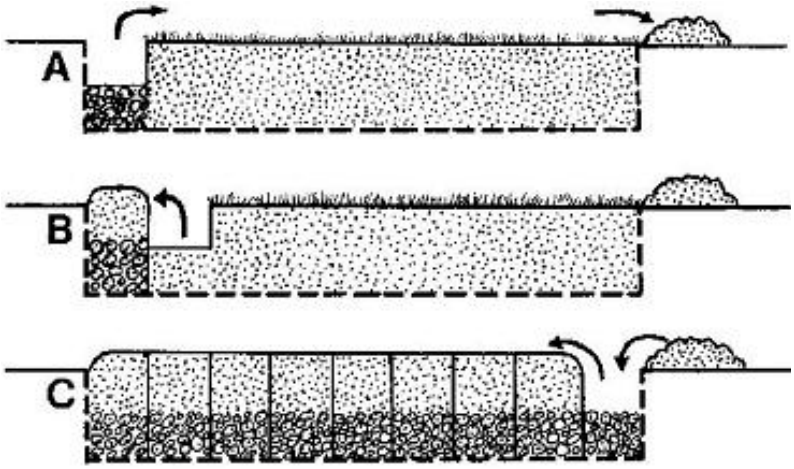
IN-GROUND BEDS

In-ground beds are ideal for sites that already have at least 12 inches of soil. Some of the benefits and drawbacks of in-ground beds are listed below.

Benefits	Drawbacks
• fully exposed to surrounding soil biology	• often require extensive weeding to establish
• soil temperatures do not fluctuate as dramatically as raised beds and container gardens	• often require large amounts of time and labor to loosen and amend existing soil *(see explanation of double digging on opposite page)*
• soil tends not to dry out as quickly as raised beds and container gardens	• more vulnerable to disturbance from pets and children
• relatively cheap to install	• require gardeners to bend down

Double Digging

New garden sites often have compact soil that needs to be loosened and amended in order to improve drainage, give roots room to grow and ensure that plants have the nutrients they require. Double digging is a labor-intensive but simple, cheap way to prepare new beds for planting. **Note:** This is a technique for starting new beds. Once a bed has been double dug, if it remains in production, it does not need to be double dug again.



Step 1: Call 811 to ensure there are no utility lines where you plan to dig.

Step 2: Begin at one end of the garden and dig a trench across the bed's width. The trench should be around one foot deep. Place the excavated dirt into a wheelbarrow or at the opposite end of the garden. Remove any grass and other weeds as you dig and discard away from your garden.

Step 3: Work a spading fork into the floor of the trench and slowly rock the fork back and forth to loosen the soil another foot down.

Step 4: Dig another, equal-sized trench next to the first, this time placing the excavated soil in the first trench. Use the garden fork to loosen the soil at the bottom of the second trench. (Avoid stepping on the soil you have just loosened!)

Step 5: Repeat Step 4 until you reach the end of the bed, then fill the last trench with the soil in the wheelbarrow.

Step 6: Add a three-inch layer of compost to the garden bed and turn the compost into the soil. Break up large chunks of earth, remove any rocks and smooth the beds over so that the soil is flat.

Step 7: Mulch your beds with leaves or straw. You are now ready to plant!

RAISED BEDS

Raised beds are ideal for sites with very little or very poor soil and for gardeners with physical disabilities. Additional benefits as well as drawbacks of raised beds are listed below.

Benefits	Drawbacks
• often require less time and labor to establish than in-ground beds	• can be relatively expensive to establish due to cost of siding and soil
• less vulnerable to disturbance from pets and children	• soil temperatures fluctuate more than in-ground beds
• do not require gardeners to bend down	• soil tends to dry out more quickly than in-ground beds
• tidy aesthetic	• limited exposure to surrounding soil biology

Siding

Raised beds can be made of wood, stone, pavers, bricks or cinder blocks. Avoid using tires and pressure treated wood, as they contain chemicals that leach into the soil. It is also best to avoid metal siding, as metal heats up during summer, raising soil temperatures and stressing plants.

To build a simple, 4x4 ft. wooden raised bed, see the instructions below.

Materials

- Cardboard and newspaper (more is better!)
- 1/2 cubic yard of good garden soil
- (2) 2” x 12” x 8 ft. lumber boards, cut in half
- (8) 2½ in. nails
- Sandpaper

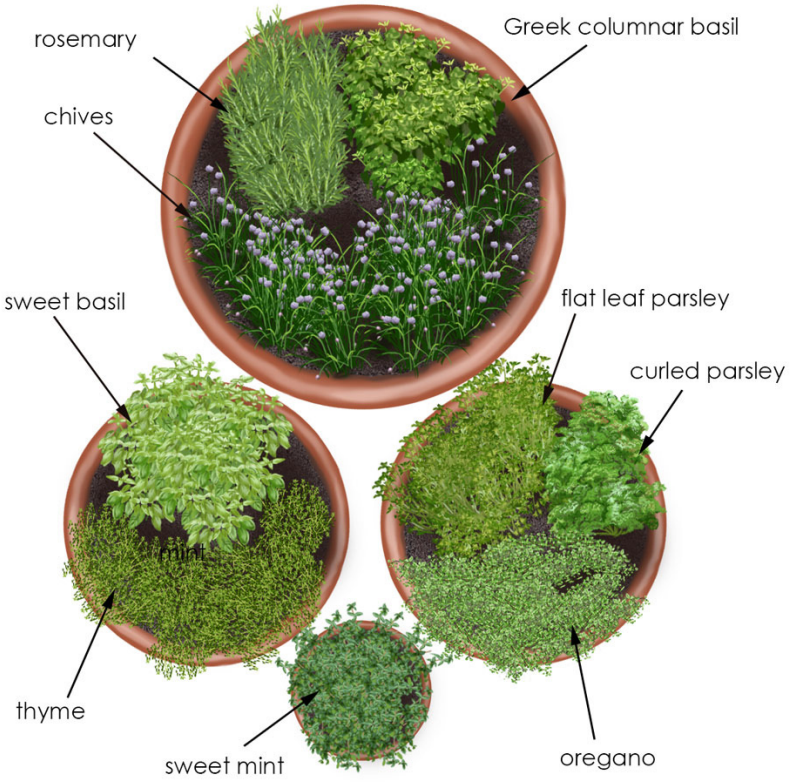
Construction

1) Prepare the site: Choose a flat area or level the area, then use the cardboard and newspaper to create a weed barrier. Lay two to three layers of cardboard over the bed’s intended location and at least two feet outside of where the bed will be placed. Overlap the cardboard’s edges by at least four inches. Cover edges with two to three layers of newspaper and seal by wetting the entire area. This is called sheet mulching. It provides a temporary weed barrier, as the cardboard and newspaper eventually breaks down.

2) Assemble the bed: Sand the ends of the lumber boards to avoid splinters then assemble the bed by laying the lumber boards together so that crowns face inward and the boards are off-set. Nail the boards together and place bed on top of cardboarded area. Fill the bed with garden soil, mix in compost, then mulch and plant.

Tip for cheaply filling raised beds: If your raised bed is 24 inches high or taller, you can save money on soil by filling the bottom six inches of the bed with unfinished compost. First, place a layer of leaves, twigs and branches at the bottom of the bed to trap air, then cover with a few inches of raw compost and a second layer of leaves and twigs. By the time plant roots reach the bottom of the bed, the compost will have broken down into soil.

CONTAINER GARDENING



Container gardens are ideal for small spaces with little to no soil, including balconies, courtyards, decks and patios. They are also ideal for renters and individuals with limited mobility or limited time to care for a large landscape.

Types of Containers

There are two types of containers: porous and non-porous. Pots that are porous look more natural but can deteriorate quickly if consistently exposed to moisture and freezing temperatures. During winter months, they should be brought inside to prevent cracking. Non-porous containers have a longer life span and may be stored outdoors in the winter; however, they are often made of potentially harmful materials such as plastic.

Types of Porous Containers	**Types of Non-Porous Containers**
• Clay pots	• Glazed pots
• Wooden pots	• Plastic pots
• Pots made of pressed fiber such as baskets	• Metal pots

The cheapest way to establish a container garden is to recycle materials that are no longer being used. Items that can be recycled into containers include bathtubs, buckets, baskets, crates, dresser drawers, wheelbarrows and sinks. Avoid tires and treated wood as they will leech chemicals into the soil. We also recommend avoiding metal as it will heat up in the summer, and your soil will dry out more quickly.

If your containers are made of non-porous materials, make sure they have drainage holes so that your soil does not become water logged. Two to four holes are recommended depending on the size of your pot. If a container has no holes, you may be able to drill some yourself.

Container Size

Vegetable plants do not grow well if their roots are restricted, so it is important to make sure your containers are large enough for the plants you want to cultivate. Most herbs grow well in four-gallon (or eight to 12-inch diameter) pots. Basil, chives and cilantro can be grown in smaller, three-gallon pots. See page 20 for a list of recommended container sizes for popular vegetable plants.

Container Location

Place your containers where they receive six to ten hours of full sun each day. Soil is heavy, so move your containers into position before filling them.

Container Soil

Container soil needs to provide water, nutrients, oxygen and support for plants. Garden soil tends to compact in containers, reducing the amount of water and oxygen available to plants. To keep your container soil from compacting, you can buy potting mix or you can make your own. *(Recipe is below)*

Potting Mix: Most potting mixtures do not actually contain soil. Instead, they contain three basic ingredients: peat moss, which retains moisture, pine bark, which adds nutrients, and either perlite or vermiculite, which are lightweight volcanic rocks that are naturally filled with air and promote drainage. You can buy potting soil in any gardening store.

Do-It-Yourself Potting Soil: Garden soil can be used as a container medium but it needs to be modified. Though it requires a little more work than buying potting mix, creating your own soil mixture can save you money because potting soil is relatively expensive. Garden soil mixtures can also help your plants by adding beneficial microorganisms and nutrients to your containers. Make your own potting soil by adding one part garden soil that has been amended with compost, one part shredded coconut husks, called coconut coir (we do not recommend using peat moss as it is an unsustainable product), and one part perlite, vermiculite, coarse builders sand or shredded leaves. Do not use fine beach sand or play sand.

Because container soil sometimes harbors pathogens, many gardeners change the soil in their containers after each growing season. Other gardeners empty their containers after one or two growing seasons or if their plants are attacked by a disease or pests. How often you empty your containers is up to you.

Watering and Fertilizing Container Gardens

Containers hold a limited amount of soil. They therefore store less water and need to be watered more frequently than garden beds. Every time you irrigate plants, water carries away some of the nutrients in the soil. Consequently, container gardens also require more frequent fertilizing.

There are two-types of fertilizers: slow or timed-release fertilizers and water-soluble fertilizers. For environmental reasons, always use organic fertilizers, which you can find at most local nurseries.

Slow-release fertilizers provide a steady supply of nutrients to plants over an extended period of time (usually months). They include compost as well as granular fertilizers, which you can buy at most gardening stores. One or both of these should be added to your soil before you plant.

Water-soluble fertilizers release nutrients to plant roots immediately and for short periods of time. Depending on your plants' needs and your soil, you may never use water-soluble fertilizers, or you may water with fertilizer every one to two weeks. If you use water-soluble fertilizers, follow product directions for concentrations and timing.

Different plants need different amounts of water and nutrients. It is best to grow plants with similar needs in the same container. Below are some recommended combinations of herbs and edible flowers:

Grows in relatively dry, poor soil	Requires regular watering and rich soil
Oregano Sage Thyme Lavender Rosemary Calendula	Cilantro (in fall and winter) Basil (in spring and summer) Chives Marjoram Parsley Tarragon

Note: Because mint is an agressive plant, is it best to grow it alone it its own container.

Vegetable Container Gardening Guide

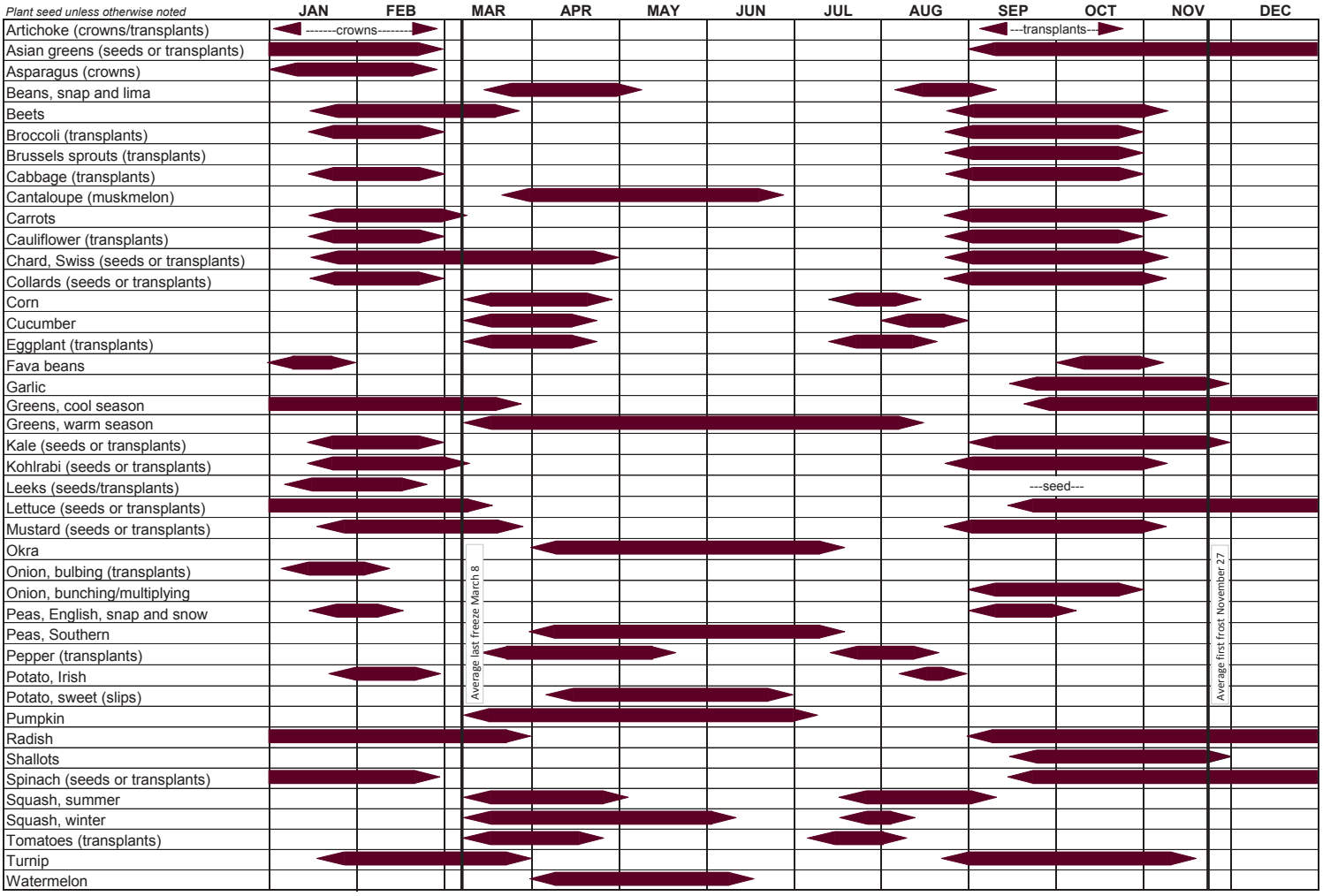
Vegetable Plant	Light Requirement	Minimum Container Size	Space Between Plants
Arugula	Full Sun / Partial Shade	1/2 gallon	3-4 inches
Beans, Bush	Full Sun	2 gallon	2-3 inches
Beans, Pole	Full Sun	5 gallon	2-4 inches
Beets	Full Sun / Partial Shade	1/2 gallon	2-3 inches
Broccoli	Full Sun	5 gallon	12-18 inches
Carrots	Full Sun / Partial Shade	1 quart	2-3 inches
Cabbage	Full Sun / Partial Shade	5 gallon	12-18 inches
Chard, Swiss	Full Sun / Partial Shade	1/2 gallon	4-6 inches
Collards	Full Sun	5 gallon	5-7 inches
Cucumbers	Full Sun	5 gallon	14-18 inches
Eggplant	Full Sun	5 gallon	1 Plant per container
Kale	Full Sun / Partial Shade	5 gallon	10-15 inches
Lettuce, Leaf	Full Sun / Partial Shade	1/2 gallon	4-6 inches
Onions, Green	Full Sun / Partial Shade	1/2 gallon	2-3 inches
Peas	Full Sun / Partial Shade	2-5 gallon	3-4 inches
Peas, Snow	Full Sun / Partial Shade	2-5 gallon	3-4 inches
Peppers, Bell	Full Sun	2 gallon	1 Plant per container
Peppers, Hot	Full Sun	5 gallon	1-2 Plants per container
Radishes	Full Sun / Partial Shade	1 Pint	1 Plant per container
Squash	Full Sun	5 gallon	1 Plant per container
Squash, Summer	Full Sun	5 gallon	1 Plant per container
Tomato	Full Sun	5 gallon	1 Plant per container
Tomato, Cherry	Full Sun	1 gallon	1 Plant per container
Turnips	Full Sun	1 gallon	2-3 inches
Zucchini	Full Sun	5 gallon	1 Plant per container

PLANTING

PLANTING CALENDAR

Because different plants do well at different times of the year, it is important for beginner gardeners to consult a local planting calendar before sowing seeds or transplanting. Fortunately, Travis County Agrilife has made a seasonal planting guide just for this purpose. The guide includes average first and last frost dates. These as important to know as they will determine when you put plants that are not frost resistant into your garden.

Seasonal Planting Guide



You will see that the calendar recommends starting some plants from transplants as opposed to seeds. This is recommended because we have relatively short periods of mild weather. While established plants can handle freezes and/or hot weather, new plants cannot. Consequently, we have a long growing season but relatively short planting seasons. By starting plants from seedlings as opposed to seeds, we can get a head start on the planting season, increasing our chances of success.

PLANTING SEEDS

Some seeds, like carrots and radishes, are best planted in rows. Other seeds, like pumpkins and tomatoes, are best planted in individual holes. Still other seeds, like lettuce and parsley, can be broadcast over an area. Because different seeds have different planting preferences, read the directions on seed packets, and if you can, ask an experienced gardener.

Step 1: Read the seed packet. This will tell you how deep to plant seeds, how far apart and how many seeds per hole.

Step 2: Plant and water. Make sure to water with a watering can or a hose nozzle so you do not disturb the soil.

Step 3: Keep your garden beds moist. Remember, this means that, when the weather is warm and dry, you must water every day until seeds have sprouted and formed true leaves.

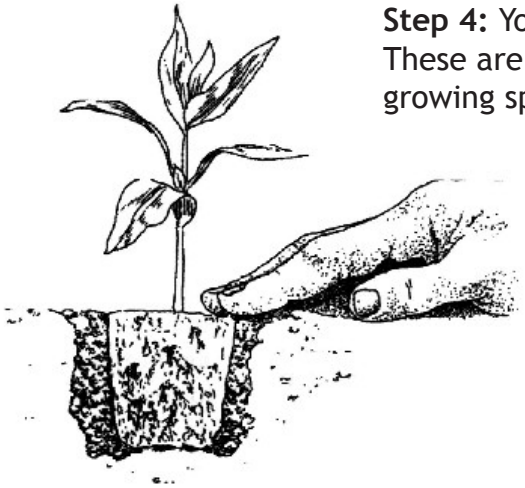
Step 4: If plants become crowded as they grow, thin them out by pinching the stem of excess plants at the soil line. Always choose the weakest, smallest plants to thin. It is better to have fewer healthier plants than too many plants that are unable to get enough nutrients and water to thrive. Thin plants repeatedly as they grow until the recommended spacing is achieved.

PLANTING SEEDLINGS

Step 1: Water your seedlings and garden beds.

Step 2: Loosen seedlings by squeezing their pots.

Step 3: Remove seedlings from their pots by holding the pots upside down and continuing to squeeze and tap them. If need be, <u>gently</u> pull on the plant stem.

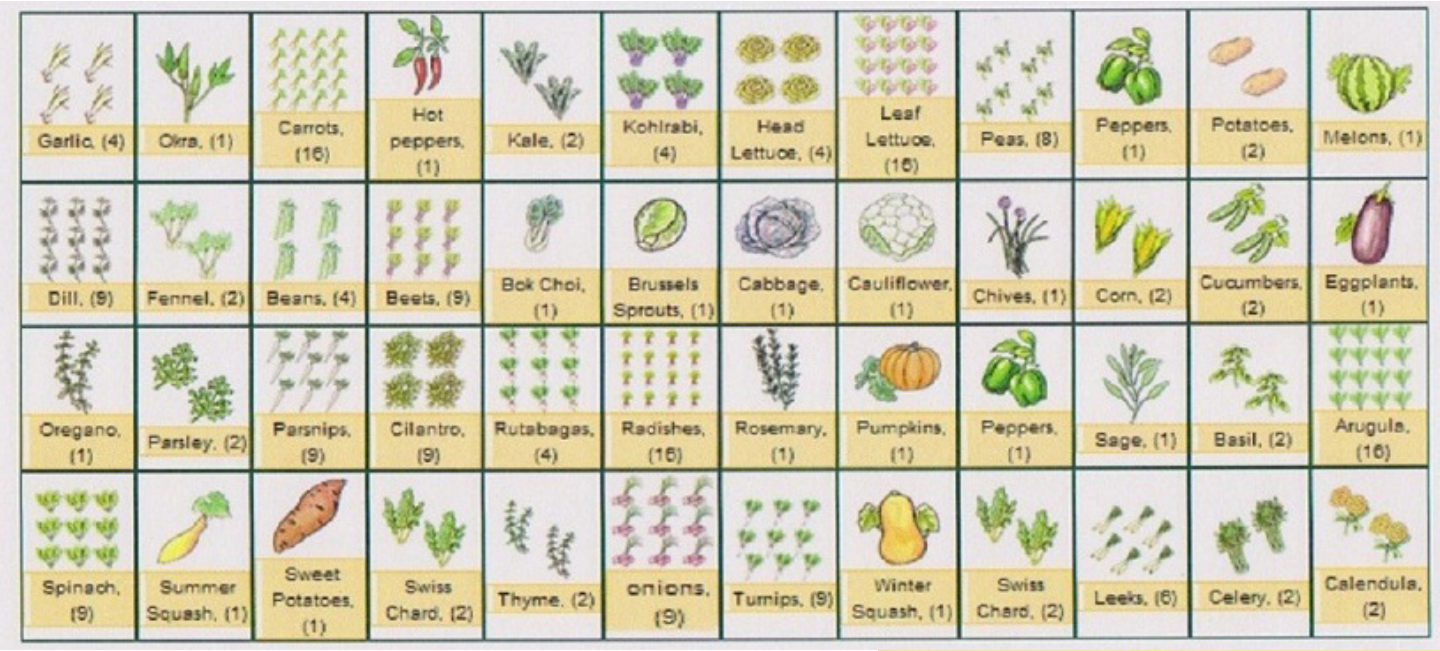


Step 4: You may see roots growing in a circle aorund the root ball. These are called bound roots and they occur when a plant has limited growing space. Loosen any bound roots by gently pulling them apart.

Step 5: Dig holes in the ground as deep as the seedlings' root balls and place seedlings so that the bottom of their stem islevel with the ground. Fill holes with soil.
<u>Note</u>: Tomatoes are an exception. It is best to plant their root balls a few inches below the soil line as this encourages additional rootgrowth.

Step 6: <u>Water seedlings deeply</u> so that water soaks through the entire root ball. Continue watering every few days until the plants have taken. Once you see new growth, you can begin to water less frequently.

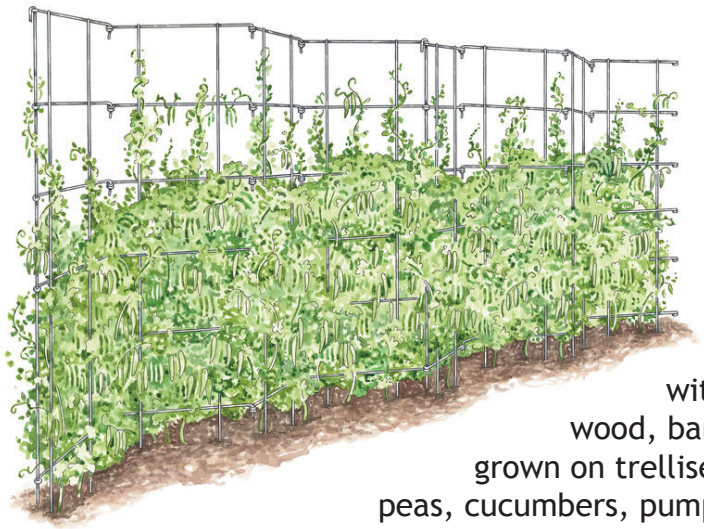
SQUARE FOOT GARDENING



Square foot gardening helps maximize garden space. The technique is ideal for new gardeners as it tells gardeners how densely to plant their beds. The practice requires well-amended soil.

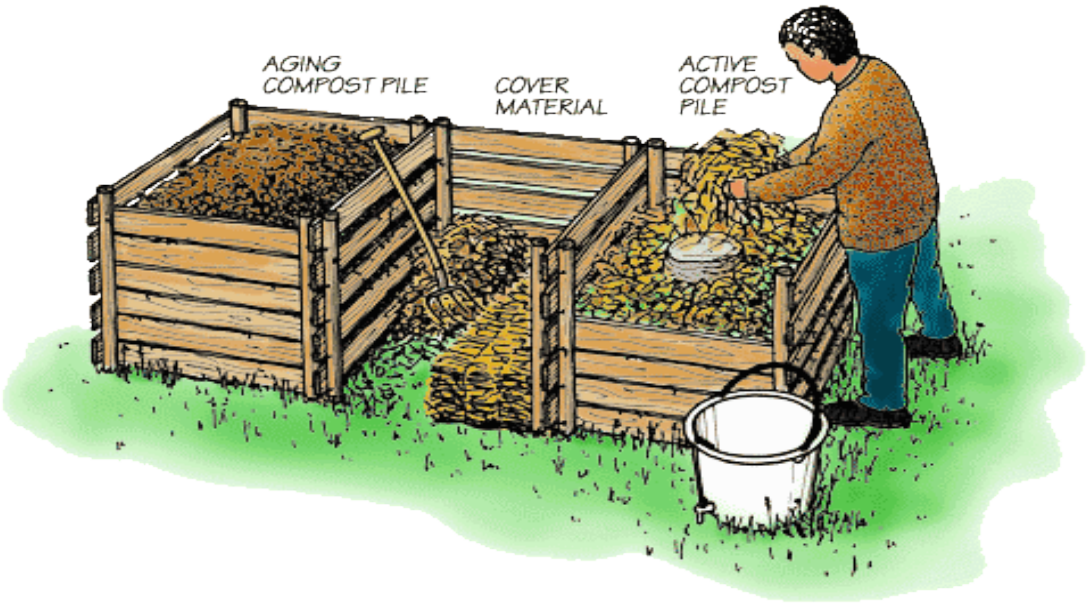
Use string and upholstery tacks to divide your beds into square feet, and use square foot gardening charts *(see the example above)* to plant each foot as densely as possible.

This garden is filled with easy-to-grow veggies.



You can also maximize your gardening space with vertical gardening. Trellises can me made out of wood, bamboo, metal or plastic. Plants that thrive when grown on trellises include pole beans as well as a wide variety of peas, cucumbers, pumpkins, melons and tomatoes.

COMPOST



Composting is a natural process whereby organisms consume organic matter and break it down into humus, a nutrient-rich, soil-like material. Contrary to popular belief, IT IS EASY TO COMPOST. If built properly, a compost pile will not smell or attract (many) rodents, and it will provide your garden with a steady supply of nutrients and beneficial organisms, ensuring that your plants thrive.

Why compost?

* Composting ensures that your garden has a steady supply or nutrients and soil organisms
* Composting reduces waste
* Composting reduces greenhouse emissions (Rotting food in landfills releases methane, a potent greenhouse gas, into the atmosphere.)
* Composting saves money otherwise spent on soil amendments
* Composting is fun and interesting, particularly for kids

Commonly Asked Questions

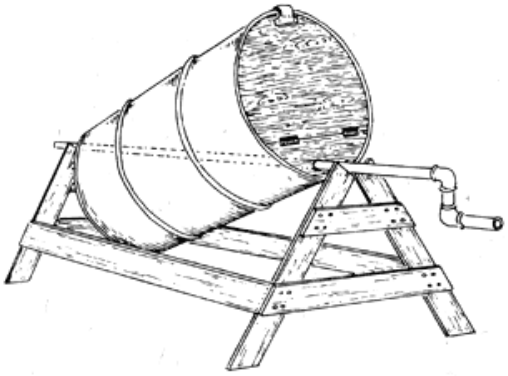
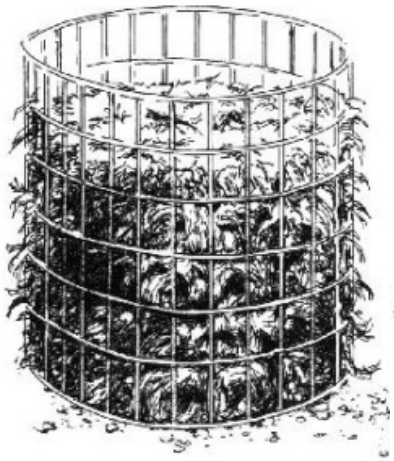
What do I need to compost?
In order to thrive, compost organisms require water, air and a balance of nitrogen and carbon. Sources of nitrogen are called “green” or “wet” materials because they are often (but not always) green and wet. Sources of carbon are called “brown” or “dry” materials because they are brown and dry.

Nitrogen-rich materials include:
* Vegetable and fruit scraps
* Tea bags and coffee grounds
* Fresh leaves and green yard scraps
* Manure
* Urine
* Hair

Carbon-rich materials include:
* Dead leaves and other brown yard scraps
* Branches and twigs
* Woodchips and sawdust
* Shredded paper and cardboard
* Cotton or wool rags and shirts
* Nut shells

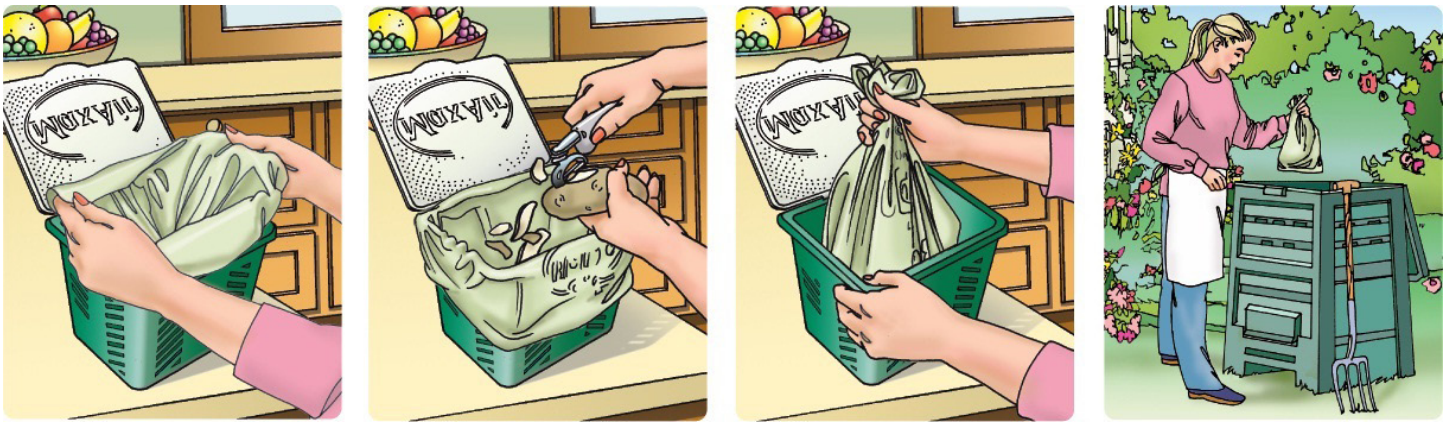
Avoid oils, meat, dairy, cooked foods, bones, diseased or insect-ridden plants, yard trimmings with seeds or chemical pesticides, and pet and human manure. It is also best to avoid paper and cardboard that has been bleached, dyed or waxed.

What type of compost system works best?
Compost systems come in all shapes and sizes. The simplest system is nothing more than a pile on the ground. You can create a structure using wooden pallets, chicken wire or stone. You can also compost inside a barrel; however, because the barrel is isolated from soil organisms, it is important to inoculate it with organisms by adding fresh compost.


Where should I place my compost pile?
Compost organisms do not require sun and will die if the pile dries out, so it is best to place compost piles in the shade and near a water source. Compost piles should also be located close to your garden so it is easy to move finished compost to your beds. Avoid placing piles directly against a building.

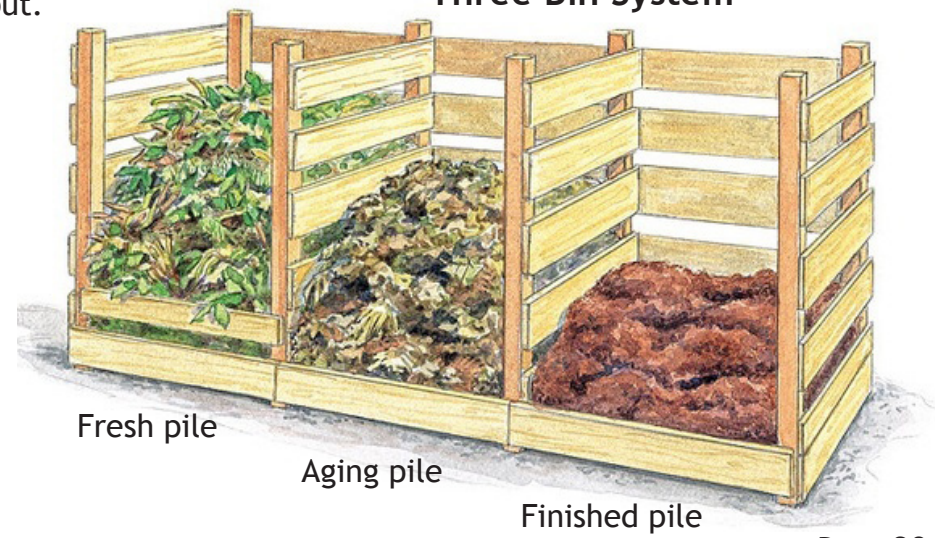
How do I build a compost pile?
Store your food scraps indoors in a small, covered container. When the container is full, empty it into your compost pile. Every time you empty food scraps into the compost, cover them with a thick layer of brown materials so that none of the food scraps are visible. (We recommend keeping a pile of leaves next to your compost pile so that it is easy to add brown materials.) Make sure the pile is moist but not wet.



You can occasionally turn your compost to aerate it and speed up the composting process; however, if you add enough carbon, turning is not necessary. As the materials break down, the pile will get warm and might even produce steam. This means it's working as the steam is being produced by millions of bacteria that are consuming your food scraps. Once you can no longer identify your food or yard scraps, your compost is ready.

How long does the composting process take?
Composting can take anywhere from two to 12 months depending on the size of your pile, what you add to it and how often you turn it. Some tips for speeding up the composting process include:
• Cut your food and yard scraps into small pieces before adding them to the pile.
• Build large piles (at least one cubic foot). This will create habitat for a critical mass of compost organisms, accelerating the composting process.
• Do not let your compost pile dry out.
• Turn your pile weekly or monthly.
• Observe your pile until you figure out the best ratio of nitrogen to carbon.
• Create a three-bin system. This way, you can add fresh materials to one pile while another pile ages, and you have a third pile of finished compost that you can use in your garden.

Three Bin System



Troubleshooting Compost

To prevent your pile from smelling and attracting pests, always ensure that the outer layer of the pile is covered in brown materials. If your pile is not composting properly (for example, if it is stagnant or smells), your microorganisms are not getting the right combination of air, water and nutrients that they need.

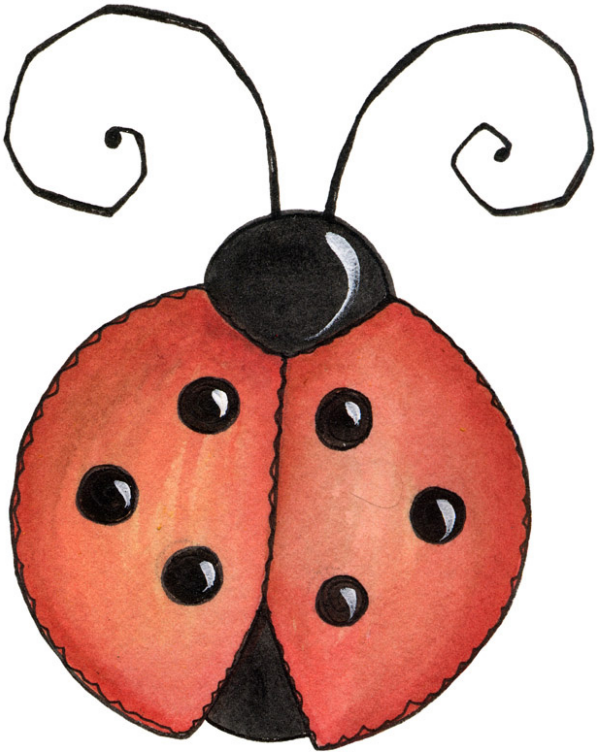
Common Problems and Solutions

Problem	Cause	Solution
Compost pile is not heating up	Not enough nitrogen (green/ wet materials) or water	Add fresh lawn clippings, food scraps, tea bags, etc. and moisten with water
Compost pile smells	Not enough carbon (brown/dry materials) or too wet	Add leaves, twigs, shredded paper, cardboard, etc. and reduce amount of watering
Compost is attracting rats and other pests	Too much nitrogen	Add carbon and ensure that the outer layer of the pile is covered in carbon
Compost is attracting cockroaches	Too much carbon	Add nitrogen

Tips

• Leave any cardboard outside where it will be rained on. Once the cardboard has gotten wet, it is easier to tear into small pieces.
• Keep a second container, such as a waste backet, indoors to store household brown waste, such as unbleached paper towels and toilet paper rolls. Empty this container into your compost pile along with your food scraps.

DISEASE & PEST MANAGEMENT



DISEASE AND PEST MANAGEMENT

Diseases and pests are part of nature and will always be present in the garden, even if minimally. Indeed, a gardener's adage recommends that food gardeners always grow at least three of every plant: one to go to seed, one to eat and one for the pests. There are, however, a number of ways to minimize the occurrence of diseases and pests. The best way to prevent garden diseases and pests is to keep your plants healthy by growing them in nutrient-rich, well-draining soil and by watering them appropriately. More targeted practices can be broken down into biological, cultural, mechanical and chemical control.

Biological control

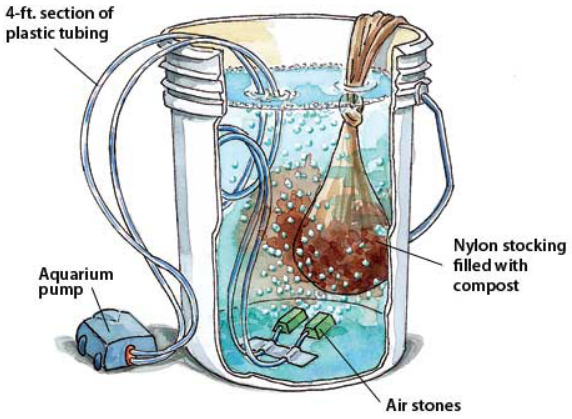
Biological control refers to the cultivation of a diverse web of soil organisms that outcompete diseases and pests. Create thriving soil webs by:

- Amending your soil with compost
- Spraying your plants with compost tea
- Providing habitat for beneficial insects and other animals that eat pests
- Not killing beneficial insects

The Benefits of Compost and Compost Tea

In addition to containing nutrients, compost and compost teas are full of microorganisms that control diseases by outcompeting them. By applying compost to the soil, you can prevent and mitigate diseases. You also boost plants' resistance to pests. Compost tea is best used on plants already affected by disease. To make compost tea, follow the instrusctions below.

Materials:
- 4-5 cups of finished compost
- Water (if possible, chlorine free)
- 5 gallon bucket
- Small aquarium pump
- 1/4 cup molasses
- Nylon stockings
- Duck tape



Fill your nylon stockings with compost and tie them closed. Fill your bucket with water, add molasses, then suspend the nylon stockings inside. Hook up your aquarium pump. Duct tape the tubing to the bottom of the bucket so the pump does not float. Run the pump for 24-36 hours. When the tea turns coffee brown, it's ready to use. Spray tea directly onto plant foliage. Compost tea doesn't store well, so the sooner you apply it, the better.

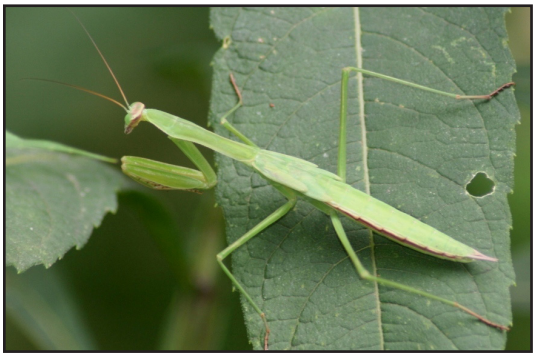
What is a beneficial insect?

Beneficial insects support gardens by eating pests, pollinating plants, aerating the soil and forming part of a larger garden ecology that supports plant health. See the following pages for a list of common beneficial insects.

Common Beneficial Insects

Praying mantes are generalist predators and will eat any insects they find.

Adult Praying Mantes

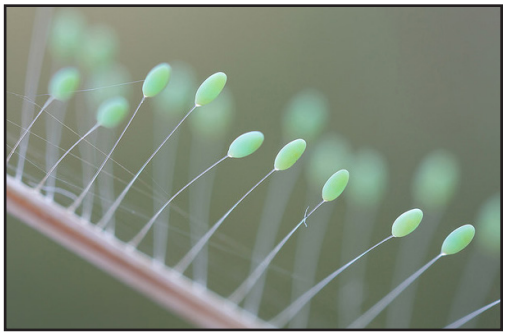


Praying Mantis Eggs

Green lacewings are voracious predators. Nicknamed “aphid lions,” they devour aphids and other garden pests by the dozens.

Adult Lacewing

Lacewing Eggs



Braconid wasps are parasitic insects that prey on a number of garden pests, including hornworms. Females lay their eggs just under the skin hornworms. When the eggs hatch, they feed on the worm, eating it alive.

Adult Braconid Wasp

Braconid Wasp Eggs

Ground beetle larvae develop in the soil and prey on slugs, root maggots, cutworms and other pests that live in and on the soil. A few species venture up plant stems and hunt for caterpillars or insect eggs.

Adult Ground Beetle

Ground Beetle Larva

Painted lady butterfly caterpillars feed mainly on thistle and do minimal damage to vegetables. **Swallowtail caterpillars** eat dill and fennel; however, because these plants grow quickly, the caterpillars do minimal damage.

Painted lady butterfly caterpillars

Swallowtail caterpillars

How to Attract Beneficial Insects to Your Garden

To attract beneficial insects to your garden, provide them with habitat by cultivating colorful, fragrant flowers, groundcovers and shrubs. Ladybugs and praying mantes like angelica, marigolds, and yarrow. Swallowtail caterpillars feed on dill, parsley and fennel. You can also attract beneficial insects by leaving umbelliferous plants (e.g. dill, parsley, fennel, carrots and cilantro) in your garden long enough to flower. **Note:** Unless you are saving seed, it is not recommended to leave brassica plants (e.g. cabbage, broccoli, cauliflower, kale) in your garden as older brassicas tend to attract aphids and other pests.

During the summer, it is helpful to leave a shallow dish of water near your garden. This will deter larger animals, like squirrels, from eating your melons since often they bite into unripe fruit rinds looking for water. By leaving a dish of water in your garden, you will also attract larger animals that eat pests, including lizards, turtles, frogs and birds.

Last but not least, do not kill beneficial insects! If you are checking for pests and find unfamiliar insects on your plants, be it adult insects, pupa, larvae or eggs, educate yourself about what kind of bug you have found before disturbing it. If it is a beneficial insect, leave it alone!

Cultural Control

Cultural control refers to cultivation practices that reduce the occurrence of pests and diseases. These practices include:

• Intersperse pest-prone plants such as cabbage and tomato with pungent plants such as onion, cilantro and basil.

• Reduce pest habitat by removing dead plant debris and keeping your garden area free of weeds.

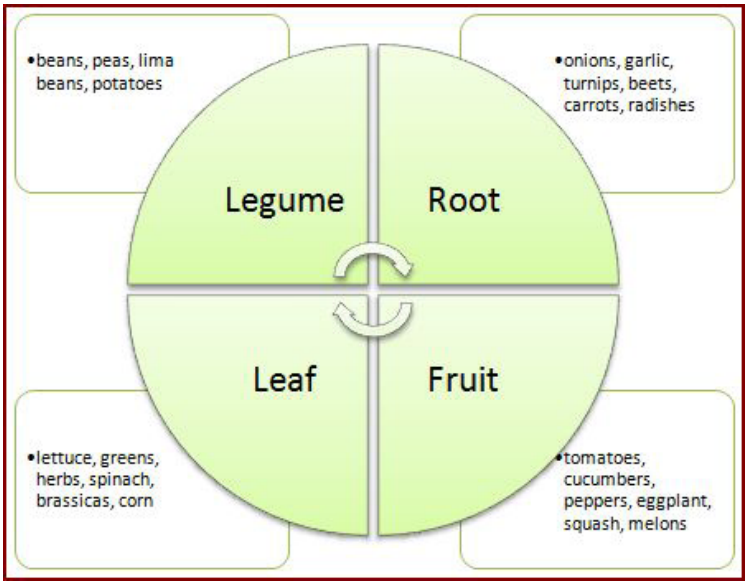
• Rotate your crops every season or every other season.

• Grow "trap plants" near your garden to attract and trap pests. These include milk weed, which attracts aphids.

• Minimize fungal infections by avoiding overhead watering. Instead, water the soil, and do not over water.

• Do not overcrowd your plants.

• Choose pest and disease resistant plant varieties as well as locally appropriate varieties. (*See the index for a list of recommended vegetable varieties produced by Travis County's Agrilife Extension.*)



Crop Rotation Guide

Mechanical Control

Mechanical control refers to the management of pests using physical means, including:

* Removing pests by hand (The best time to check for pests is in the early morning or late evening as bugs often hide during the day.)

* Using a strong spray of water to dislodge pests from leaves and stems

* Row covers, nets and fences (This can also protect your crops from larger pests, such as birds and squirrels.)

Note: Row covers keep pests as well as beneficial insects, including pollinators, away from your plants.

Chemical Control

Chemical control refers to the use of pesticides. On the following page, you can find recipes for a few organic pesticides. Though less harmful than artificial pesticides, natural pesticides do not distinguish between good and bad insects and should be used sparingly. Organic Pesticide Recipes

Baking Soda: Mixed at the rate of 4 teaspoons per gallon of water, baking soda makes an excellent fungicide for black spot, powdery mildew, brown patch and other fungal problems. Add 1 teaspoon of liquid soap or vegetable oil to the mix. Potassium bicarbonate is also effective and better for the soil.

Garlic Spray: About six cloves mixed into one gallon of water will give you a weak spray. This may be enough for preventative measures. For a stronger spray, use up to two full bulbs of garlic pureed into ½ cup of water. Crush your garlic and put it into a bowl. Cover with boiling water and let it steep overnight. Strain before you put it into a spray bottle so the garlic pieces won't clog the nozzle.To repel a wider variety of pests, add a tablespoon of crushed hot pepper or a hot pepper sauce to the water while the garlic steeps. Add a tablespoon of liquid soap or vegetable oil to the mixture, which coats larvae and eggs and smothers them.

Citrus Oil Spray: Fill a container ½ full with citrus peelings or pulp. Orange is best. Fill the remainder of the container with water. Let mixture sit in a cool place for a week. Strain. Use 1 cup of the concentrate per gallon of spray. Note: Commercial orange oil is more powerful than homemade orange oil and can burn plants. Use it at a rate of less than 2 ounces per gallon of water and always mix it with molasses and compost tea.

Safety Tips:
- Always label any homemade garden spray that you intend to store.
- Store out of reach of children and pets.
- Only spray on days that are not windy or you risk spraying yourself.

Common Vegetable Garden Pests

Adult Cabbage Loopers

Cabbage Looper Eggs

Cabbage loopers chew large, irregular holes in brassicas, including cabbage, broccoli, cauliflower, kale and Brussel sprouts. They are most active in warm weather.

You can prevent looper attacks by checking under the leaves and on the stems of plants and picking off any larvae and eggs before they start an outbreak. Check for loopers in the morning or on overcast days as they tend to hide once the sun is out. Cabbage looper larvae are also easy targets for predators. In particular, parsley, dill, fennel, coriander and sweet alyssum attract the kinds of insects and other animals that prey on these worms.

Also known as plant lice, **aphids** are small sap-sucking insects that live on the stems and undersides of leaves. They are most common during warm weather and can be avoided entirely during cold months.

Crowded plants are more susceptible to aphid infestations, so make sure your crops have adequate space. If you have a small infestation, wipe the aphids off with your fingers or a soft cloth, or spray the leaves with a strong jet of water. Check back every day or two and repeat until you stop seeing the insects.

If you have a large infestation, try pepper or garlic sprays, or remove the affected plants from your garden.

Leaf footed bugs commonly infest tomatoes but feed on almost any plant. Weeds provide them with a food source during winter and spring, when fruits are not available, so try to eliminate weedy areas near your garden or keep them mowed. At regular intervals, examine your garden for all stages of the pest and handpick them off plants.The bugs may be hidden inside dense foliage layers or fruit clusters, so lookc closely. Natural predators of leaf footed bugs include birds, spiders and assassin bugs.

Cutworms are caterpillars that eat almost all vegetable plants but are especially fond of tomatoes and peppers. Different species range in color from grey and pink to green and black. They can be solid, spotted or striped and tend to curl up when not on the move.

Cutworms do the most damage early in the spring gardening season, when they emerge from hibernation. They chew through the base of plant stems and often cut off the plant from underneath the soil. In most cases, entire plants will be destroyed.

To control cutworms, patrol your garden during dusk and evening hours or on cloudy days, when the caterpillars feed. You can also make plant collars by placing a four-inch piece of cardboard around each plant stem. This helps prevent cutworms from reaching tender stems, especially right at transplanting. The moths prefer to lay eggs in high grass and weeds, so make sure your garden remains tidy.

If your squash plants suddenly wilt and you see holes in their stems, you likely have **squash vine borers**, a moth whose larvae feed off squash stems. This pest is so common in Central Texas that many gardeners choose not to grow yellow or winter squash, all of which are particularly susceptible to bores. Instead, gardeners devote their garden space to less pest-prone vegetables. If you are determined to grow yellow or winter squash, you can guard against squash vine borers using the steps below:

- Sow your squash early in the summer, and don't plant squash in the same beds for two consecutive years as borers overwinter in cocoons in the soil.
- Protect your squash plant with row covers, which prevent moths from laying eggs.
- Plant fennel, dill and cilantro near your squash and let these plants flower. This will attract parasitic wasps, which feed off borers.
- If you catch borers VERY early, you can remove them. Slit the lower stem lengthwise with a sharp knife, remove the larva by hand, then cover the slit with moist soil to promote the formation of secondary roots.
- You can also control the presence of borer cocoons in the soil by introducing chickens into your garden. Just make sure to protect the plants you want to keep as chickens will quickly eat whatever plant foliage they can access.

Tomato hornworms eat tomatoes, peppers, eggplant and potatoes. They can be up to five inches long. Because they are large, the easiest way to get rid of hornworms is to pick them off plants; however, if you see a hornworm covered with white egg sacs, leave it be as the eggs belong to a Braconid wasp. Let the eggs hatch, and you will have an army of wasps ready to defend your garden against all types of pests. You can also control hornworm populations by interspersing your plants with marigolds.

Imported fire ants prefer poor, sandy and disturbed soils. They are active in warm weather and are particularly fond of okra, sunflowers, eggplant and black-eyed peas. Once established, their colonies are almost impossible to eliminate, but there are ways of keeping the ants outside of your garden. First and foremost, build your soil. You can disturb mounds by shooting them with strong sprays of water. You can also use a shovel, but move quickly as the ants will swarm up the shovel to your hands. If bothered enough, the ants will relocate. Some gardeners have also reported success with: molasses and citrus oil sprays; "Come and Get It," a granular fire ant killer; by adding beneficial nematodes to the soil; and by tossing corn meal over the mounds.

Common Garden Diseases

The best ways to prevent garden diseases are:
• Do not over or under water your garden
• Grow your plants in well-amended soil
• Build your soil biology by adding compost, mulching and gardening organically. By doing so, you will ensure that beneficial microbes outcompete pathogens.

Some common garden diseases are listed below.

Powdery mildew is a common disease on many vegetables, fruit and flowers. A fungal infection, it is characterized by a powdery white to gray fungal growth on leaves, stems and heads. It can affect the flavor of melons and squash and reduce their yield. Woody species such as grapes and fruit are more seriously affected, and new growth is often distorted, causing young fruit to develop rough skin.

Contrary to popular belief, powdery mildew does not require free water to establish and grow. The fungus warm temperatures and shady conditions and is sensitive to extreme heat and direct sunlight.

In most cases, good cultural practices will adequately control powdery mildew. These practices include:
• Select powdery mildew resistant varieties.
• Plant in full sunlight in a well-drained area.
• Do not crowd plants. Air flow and ventilation will discourage mildew growth.
• Powdery mildew thrives where high rates of nitrogen have been used because high nitrogen promotes tender leaf formation, causing dense stands that are more susceptible to infections. Avoid over-fertilizing and fertilize using compost, which slowly releases nutrients as plants need them.
• Prune infected plants to get rid of infected parts and increase airflow. If infections are severe, remove entire plants.
• Disinfect your pruning tool in a vinegar solution of one part white vinegar to four parts water after each cut.

Organic sprays can also be used on plants that have been infected. Baking soda, in particular, increases the surface pH of the leaf, making it unsuitable for the growth of powdery mildew spores. Be sure to spray the undersides of leaves as well as the upper surfaces when using sprays.

Downy mildew is also caused by a fungal infection on plant leaves. It is most common on summer plantings and usually affects cucumber and cantaloupe, though all cucurbits are susceptible.

Infected leaves generally die but may remain erect while the edges of the leaf blades curl inward. Usually, leaves near the center of a hill or row are infected first. The infected area spreads outward, causing defoliation, stunted growth and poor fruit development.

Downy mildew fungus is easily carried by wind currents, rain splash, farm implements and the hands and clothes of farm workers. Unlike powdery mildew, it requires humidity to flourish. Therefore, downy mildew is most aggressive when heavy dews, fog and frequent rains occur.

Because this disease is carried to most fields on light winds, crop rotation and sanitation have a limited effect on the incidence of downy mildew. Effective cultural management practices include:
• Select growing sites with good drainage, full sunlight and low humidity.
• Water the soil, not leaves.
• When detected early, disease spread might be slowed somewhat by removing and destroying infected plants and by taking care not to transport the disease by hand or on infected tools and equipment.

Root rot is often caused by fungi in the soil and occurs when plants are grown in waterlogged or drought conditions. If major roots or the crown are affected by root rot, the entire plant can wilt and die rapidly. If only the small "feeder" rootlets are affected, the plant may decline slowly and appear sickly and unproductive. Sick or damaged roots may be present only on part of a plant's root system, resulting in a one-sided appearance of symptoms on leaves and stems. The first symptom of poor root health is usually dull foliage color. Sometimes leaves turn yellow and wilt. These changes may occur quickly or may take months to develop.

Management strategies include improving soil drainage and use of proper planting techniques. Planting holes should be large enough to accommodate roots without crowding. Before planting, loosen some of the roots on the root ball to encourage root growth into the surrounding soil. Never set the plant deeper than originally grown. Mulch the soil surface lightly to reduce the likelihood of heat and moisture stress.

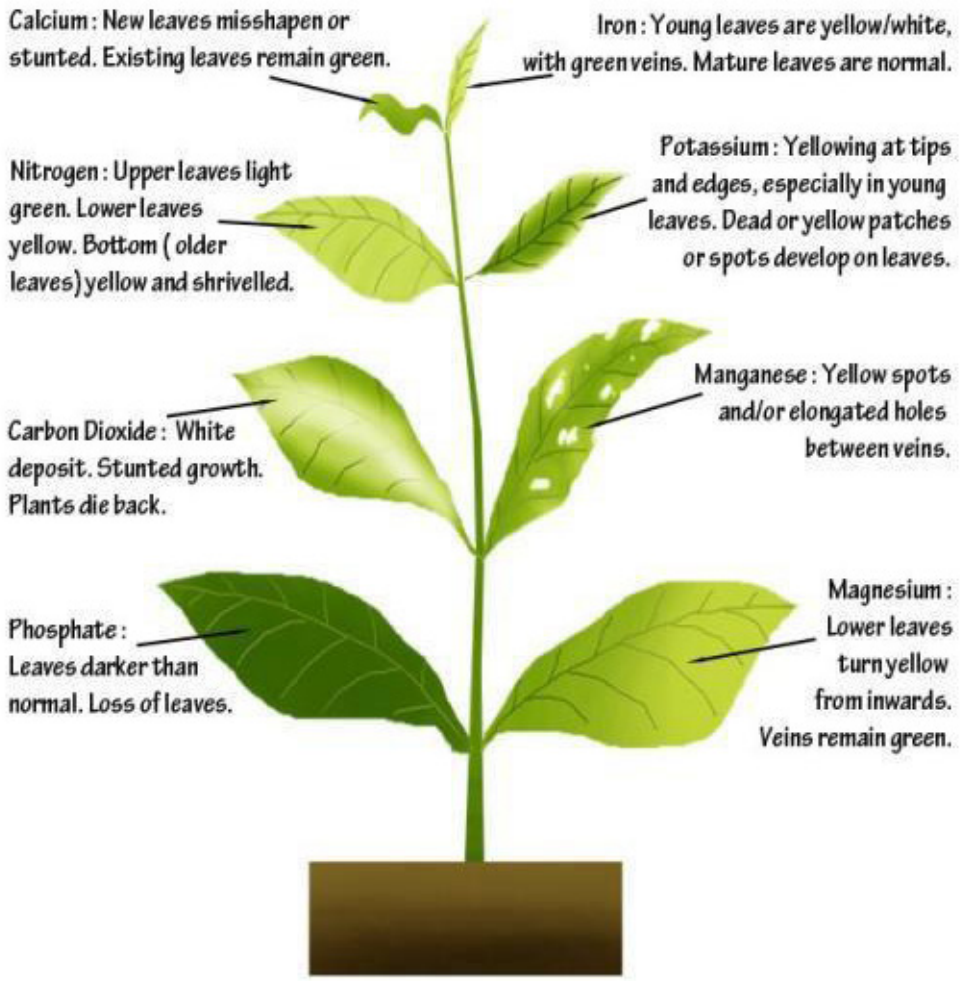
Treatments that may help infected plants include:
• Avoid over-watering.
• Remove some soil or mulch to expose the base of the plant to drying conditions. However, do not expose roots.
• Do not fertilize plants during hot, dry weather.

Damping off refers to a handful of fungal diseases, including several root rots and molds, that cause seedlings to die. Seedlings may start to grow and whither, break off or collapse. You may see some gradual discoloring or it may happen very suddenly. Often, it appears that the seedling has been pinched off at the soil line.

Damping off can be prevented by sowing seeds in a sterilized growing medium, although fungal spores may still be introduced to the medium, either on the seeds, in water or on the wind. You can also prevent the disease by not overcrowding seedlings (this ensures better air cirulcation), by ensuring that seedlings receive adequate sunlight and by not overwatering them. To reduce survival of pathogens, remove and discard diseased plants. Organic sprays have proven effective when used on infected plants, including garlic and chamomile sprays. The latter consists of a strong brew of chamomile tea.

Disease vs. Nutrient Deficiency

New gardeners often confuse plant diseases with nutrient deficiencies. To help prevent this confusion, below is a guide to signs of common nutrient deficiencies in plants. Remember, because new gardens do not have an established soil biology, plants will often struggle to absorb nutrients, but don't worry. You can respond to nutrient dificiencies by continuing top dressing with compost, by spraying foliage with compost tea and by applying organic, liquid fertilizers to your plants.



Signs Of Nutrient Deficiency

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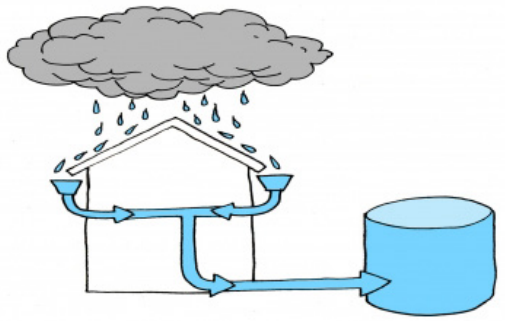
RAINWATER CATCHMENT



Why Collect Rainwater?

• Tap water contains chlorine and other anti-bacterial agents that harm soil organisms, slowing plant development. Rain water does not contain these chemicals.
• Rain captures nitrogen from the air and deposits it in your soil.
• Seeds watered with rain have a higher germination rate than seeds watered from the tap.
• Long-term financial savings
• Conserves water

To determine how much rainwater you can capture off a given area, use the following equation:

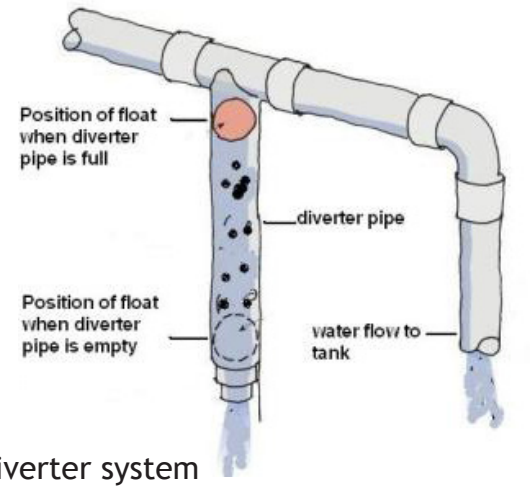
Gallons of rainwater collected =
Catchment area (ft^2) x amount of rain (in) x conversion factor (0.63)

Amount of Water Captured off a 1000 ft^2 Roof

Rainfall	Gallons of water captured
1 inch	623
2 inches	1,246
32 inches (Austin's annual precipitation)	20,160

Storing Rainwater in Tanks

• If collecting rainwater off of uncoated lead flashings, treated timber, and bitumen-based roofing, do not use this rain to water food gardens as it will contain chemicals that are harmful to human health when ingested.
• Rainwater tanks can be made of plastic, concrete, fiberglass or steel
• Tanks should be opaque and a dark color to prevent sunlight from reaching stored water and causing algal blooms (Ideally, tanks should also be located in a shady spot.)
• Tanks should be sealed to avoid creating mosquito habitat
• Water is heavy (one gallon of water weighs 8.3454 pounds, so when full, a 1,000 gallon tank will weigh 834 pounds, or almost half a ton). Make sure that whatever foundation your place your tanks on can bear the weight without cracking.
• Tanks should be elevated to so that gravity provides decent water pressure through the hose. If it is not possible to elevate tanks, you will need a pump.
• Place screens over your gutters or clean your gutters at regular intervals
• Plan for overflow
• Integrate a first flush diverter system to prevent the first 5-6 gallons of water, which may be contaminated with leaves, animal droppings and other residue, from entering the tank.

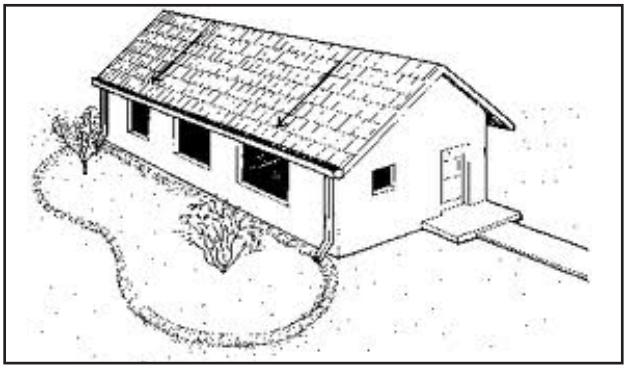


Example of a first flush diverter system

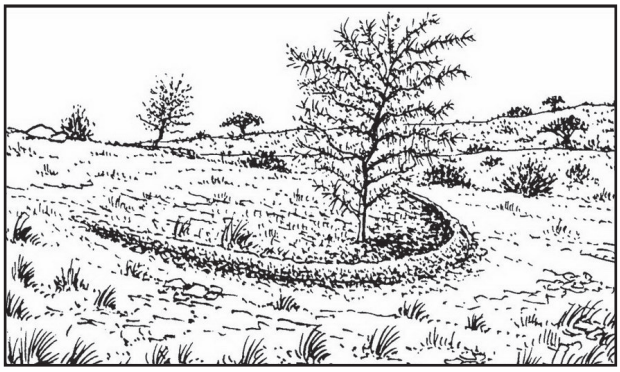
Storing Rainwater in the Ground

You can also store rain in the ground using berms, swales and rain gardens. Berms are long, narrow mounds of dirt that enclose an area, trapping water inside. Swales are low-lying tracts of land where water settles and percolates into the ground. They can be created by building berms perpendicular to a slope.

Berm



Berm and Swale



Rain gardens are dug 6-8 inches into the ground, causing rain to flow into the beds. They are also perfect for low-lying areas that are prone to flooding. Because rain gardens often capture run-off from roads, and because this run-off is contaminated with metals and salts, such gardens are usually planted with non-edible plants. Ideally, they are landscaped using native and naturalized plants that can handle both saturated and dry soils.

Successful rainwater harvesting requires knowledge of how rain flows over the land. Before constructing berms, swales or rain gardens, go outside when it is raining and observe!

TRICKS OF THE TRADE

Start small: Gardening takes time. Instead of starting big and losing control of the whole garden, start small and expand slowly.

Close by and close together: The saying "out of sight, out of mind," holds true for gardening. To ensure that you don't forget to water, weed or harvest, locate your garden where you will see it, and keep the beds close together.

Bolting: When a plant "bolts," it produces flowers then seeds.

Annuals: Annual plants complete their entire life cycle in one growing season. This means that, over the course of growing season (which varies from location to location depending on the time between the last frost in the spring and the first frost in the fall) a plant will grow from seed to adult then bolt and die. Edible annuals include (but are not limited to) lettuce, spinach, radish, broccoli, cucumber, cilantro, basil and corn.

Biennials: Biennial plants complete their life cycle over the course of two growing seasons. Edible biennials include (but are not limited to) Brussels Sprouts, parsley, chard, beets, cabbage, carrots, cauliflower, celery, chard, collard, endive, kale, kohlrabi, leeks, onions, parsley, parsnip and turnips.

Perennials: Perennial plants complete their life cycle over the course of three or more seasons. Edible perennials include many herbs such as rosemary, sage, lavender, fennel, oregano and thyme. They also include artichokes, asparagus, rhubarb and fruit trees and vines. Whether plants are annual, biennial and perennial varies from region to region. For example, tomatoes, which cannot withstand cold weather, are annual plants in Central Texas because they die off each winter. In tropical regions, tomato plants can live for years.

Protecting a garden from freezes: Before a freeze, saturate your soil with water. At all times, regulate soil temperatures by mulching your garden beds. To protect your rain barrels from hard freezes, place them adjacent to a building, preferably on the south or west side. If expecting a hard freeze, undo fittings and hoses and store indoors. If your barrels are small, empty them and set them upside down.

"Side dress": Side dressing is a way of amending a garden without damaging the roots of established plants. Side dress your garden by laying compost on top of the soil, alongside plants, and simply leave it to sit or gently turn it into the soil with a trowel or hand cultivator.

Free mulch and brown composting materials: Each fall, gather bags of leaves from the sidewalks. (Before taking any leaves, make sure to look inside the bags to ensure they aren't full of weeds.) Keep the leaves bagged and store beside a house or in a shed or garage.

Companion Planting: Companion planting is a practice of growing certain plants side by side because they benefit one another. Companion plants help each other grow because: they attract beneficial insects and/or repel garden pests; the natural chemicals produced by one plant improve the flavor and/or growth of another plant; and they have different root depths and/or nutrients needs and therefore do not compete with one another. *(See the companion planting chart on the back of your laminated planting calendar.)*

DAILY GARDEN CARE

Successful food gardeners incorporate garden observation and care into their daily rituals. They may start their day with a meander through their garden beds, poking their fingers into the soil or lifting a leaf here and there to check for pests or to see if fruit is hiding beneath the foliage. They may drink their morning coffee or tea at a table just next to the garden, where they can watch bees and butterflies flying from flower to flower and jot down observations in their garden journals. Alternatively, they may tend their gardens in the evening, after temperatures have cooled and all their other work is done. Whatever the case, even the most seasoned food growers visit their gardens almost daily, for regular visits enable gardeners to note patterns, catch problems early and determine what if any work needs doing.

Daily gardening tasks include watering and "spot weeding." Other daily tasks vary from season to season. Towards the end of a growing season, gardeners will clear their beds of old plants, and they will take advantage of the bare beds to do a thorough weeding. They will also amend the soil with compost.

After a garden has been newly planted, and unless it rains, Central Texas gardeners generally water their beds every day or every two to three days, depending on the season. If weeds appear here and there, gardeners will spot weed with a hand trowel, being careful not to disturb areas that have been planted. Apart from these small tasks, there is not much to do except wait for seeds to germinate and for transplants to grow.

Most seeds will sprout and form their first true leaves within three to four weeks, and most seedlings will establish themselves within two weeks. At this point, gardeners can water less, but there are other daily tasks to do. If it is not too late in the planting season, and if gardeners have a large enough space, they might do another round of planting to ensure a longer harvest period. This is called "succession planting." If seedlings do not seem to be growing, or if they are growing slowly, a gardener may try to stimulate root growth by watering with seaweed or fish emulsion. If plants are growing but appear yellow or spotty, they may be struggling to absorb nutrients from the soil. If this is the case, a gardener may "top dress" beds by mulching them with a layer of compost. Additionally, carrots will need to be thinned as they grow, tomatoes will need to be caged (the earlier the better so as not to puncture a root!), and trellises will need to be placed alongside pole beans, peas and other climbing vegetables.

As the season progresses, leafy plants will grow large enough to yield a harvest, and fruiting plants will begin to flower. At this point, plants need be watered only two to three times a week, but they must be watered more deeply. If need be, gardeners may top dress their beds again, ensuring that plants have all the nutrients they need throughout the growing season. Gardeners may prune their tomato plants by removing any suckers, resulting in less unwieldy plants. They may also decide to let the suckers grow. They may find that the mulch they laid over their garden a month ago has broken down, and their beds need to be re-mulched with leaves, bark or straw. If some plants have died, gardeners may replant in the open spaces.

Wise gardeners will also check their plants for pests before they notice any damage. Ideally, they will search

for pests early in the morning or on cloudy days. If they notice a fungal infection, they may cut back infected foliage and perhaps thin their plants a bit more. If they see snails on their greens, they may search their garden for any stones or bricks that are providing the snails with habitat. Squirrels and birds love tomatoes, melons and other fruit, so in the spring, gardeners may place netting over their beds before their plants bear fruit.

About three or four months after planting, most plants are ready to harvest. Adult plants produce rapidly, so it is important to visit your vegetable garden every day or other day to harvest, or you might miss your chance. When harvesting greens, it is best to pick the entire leaf and stem and to harvest the outermost leaves first. It is also important to leave enough foliage on plants so that they can continue to photosynthesize and grow. Onions, carrots and beets are ready to harvest when you see the roots sticking out of the soil. Potatoes and garlic are ready to harvest when their tops brown and die back. Fruit, including tomatoes, eggplant, cucumber and melon, is ready to harvest when it breaks away easily from the stem. If you have to tug at a fruit, leave it be for a few more days. Okra should be harvested regularly, for once the pods are larger than two inches, they are too fibrous to eat.

Towards the end of the season, most plants will start to die. Fruiting plants will stop producing new fruit, and their foliage will brown and dry. Leafy annual plants will start to bolt then produce flowers and seed. Likewise, any remaining heads of broccoli, cauliflower or cabbage will break apart and send up long stalks that quickly form small yellow flowers.

As plants bolt, their leaves become bitter, and they change shape and texture. To produce seed, plants must pull large amounts of nitrogen from the soil. Additionally, old plants can be pest prone. In order to conserve nitrogen and avoid pests, gardeners may decide to remove bolting plants from their gardens. On the other hand, flowers attract beneficial insects, so gardeners may let one or two bolting plants complete their life cycles. Other gardeners might decide to save seed from particularly tasty and hardy plants, in which case they will leave these plants in their garden until seeds have matured and dried.

Whatever gardeners decide, little by little, they will clear their garden beds and once again prepare them for planting. Central Texas winters are ideal for growing cool-weather crops, and if the weather is cool, gardeners may decide to replant their beds right away. In the summer, they might put their beds to sleep by clearing them and covering them with a thick layer of mulch, or they might plant their beds with a cover crop. Come fall, they will cut the cover crop into the soil, where it will act as a green manure. If they find themselves with down time between seasons, they may turn their compost piles, install drip hose lines, and reflect on their successes and mistakes. Did one type of lettuce bolt early, while another type thrived? Were their kale plants too crowded, resulting in an infestation of aphids? Did they tie up their tomatoes too late, causing the plants' limbs to break? Did they sow their carrot seeds too densely, making thinning a never ending chore?

As a new gardener, such reflections will help you develop your gardening skills as well as an intuitive sense of daily gardening chores. Throughout the process, if you continue to build your soil, amending it with compost and mulch, gardening will become easier and easier. Soon, the tomato, lettuce and parsley seeds that fell of their own accord into your beds will produce "volunteers." Tiny chive plants will develop into oniony patches. Pests and weeds will always be present, but with an hour or less of maintenance here and there, they will be easy to control. Before you know it, with only a little work, your food garden will produce regular and bountiful harvests that you and your family, friends, neighbors and coworkers can regularly enjoy.

GARDENING RESOURCES

Local Nurseries and Garden Related Stores

Barton Springs Nursery 3601 Bee Caves Road Austin, TX 78746 Ph: (512) 328-6655 http://www.bartonspringsnursery.net/	**It's About Thyme** 11726 Manchaca Road Austin, TX 78748 Ph: (512) 280-1192 www.itsaboutthyme.com
Breed & Co. 718 W. 29th St. Austin, TX 78705 Ph: (512) 474-6679 Sells hardware and garden materials.	**Jardinero's Nursery** 2320 East Cesar Chavez Austin, TX 78702 Ph: (512) 774-7443 http://www.jardinerosnursery.com/
Buck Moore Feed & Supply 5237 N. Lamar Blvd Austin, TX 78751 Ph: (512) 451-3469 Offers organic chicken feed, bulk seed, seedlings and organic soil amendments.	**Natural Gardener** 8648 Old Bee Caves Road Austin, TX 78735 Ph: (512) 288-6113 www.naturalgardeneraustin.com
Callahan's General Store 501 Bastrop Hwy Austin, Texas 78741 Ph: (512) 385-3452 www.callahansgeneralstore.com Local farm, ranch and gardening supply store.	**Pots and Plants Garden Center** 5902 Bee Caves Road Austin, TX 78746 Oh: (512) 327-4564 http://plasticpinkflamingos.com/ Specializes in native and adapted plants.
Gabriel Valley Farms 440 Old Hwy. 29 East Georgetown, TX 78626 Ph: (512) www.gabrielvalleyfarms.com Wholesale nursery specializing in Certified Organic herbs and vegetables.	**Shoal Creek Nursery** 2710 Hancock Austin, TX 78731 Ph: (512) 458-5909 www.shoalcreeknursery.com
The Great Outdoors Nursery & Landscaping 2730 South Congress Avenue Austin, TX 78704 Ph: (512) 448-2992 www.gonursery.com	**Texas Metal Tanks** 16299 Fitzhugh Road Dripping Springs 78620 Ph: 512-565-0875 http://www.texasmetaltanks.com/ Rainwater tank vender. Installs tanks.

Bulk Soil, Compost and Mulch Suppliers

Geo Growers (Southwest) 12002 Hwy 290 (512) 892-2722 http://www.geogrowers.net/	**Kinser Ranch** (Southwest) 10701 Kinser Lane (512) 477-9025 http://firewoodandmulchaustintx.com/
Daniel's Stone and Landscaping Supplies (Southwest) 12015 W Hwy 290 (512) 288-8488 http://danielstoneandlandscaping.com/	**Rock n Dirt Yard** (South) 8401 S 1st St. (512) 461-7607 http://www.rockndirtyard.com/
Gardenville (Southwest & Southeast) 4001 Ranch Rd 620 S, (512)263-5265 3606 FM1327, (512) 329-4900 https://www.garden-ville.com/	**Whittlesey Landscape Supplies** (North) 3219 S I-35 (512) 989-7625 http://www.989rock.com/
Organics By Gosh (East) 13602 FM 969 (512) 276-1211 www.organicsbygosh.com/	**Whittlesey Landscape Supplies** (East) 629 Dalton Ln (512) 385-0732

Free and Low-Cost Gardening Materials

Tools

Keep Austin Beautiful Tool Shack
KAP's Tool Shack provides tools for community-driven beautification, improvement and maintenance projects. Supplies are available on a first come first serve basis, so please reserve your tools at least two weeks in advance.
Phone: (512) 391-0617 x 905
http://www.keepaustinbeautiful.org/toolshack

Austin Parks Foundation
Austin Parks Foundation has a tool warehouse with hundreds of hand tools that may be borrowed for park improvement projects. The It's My Park Tool Trailer is also available for use year-round by volunteer groups.
Phone: (512) 477-1566
Email: tools@austinparks.org
http://www.austinparks.org/tools.html

Organic Fertilizers

Austin Resource Recovery Hazardous Household Waste Facility
Address: 2514 Business Center Drive, Austin TX 78744
Hours: Monday – Friday, 9am-5pm; Saturday: 7am-noon
Phone: (512) 974-4308
http://www.austintexas.gov/hhw

Spread the Harvest
Sustainable Food Center's Spread the Harvest program offers members access to free organic fertilizer. The program is open to low-income and school gardeners. After joining, participants can pick up fertilizer at SFC's office anytime Monday-Friday, 9am-5pm.
Address: 2291 E. 17th Street, Building C, Austin TX 78702
Phone: (512) 220-1083

Mulch

P&R Tree Service
Phone: (512) 845-1682; (512) 775-2248
Woodchip availability depends on the arborist's tree pruning and removal jobs. In order to deliver, arborists need enough space to maneuver a large truck.

Texas Tree
Phone: (512) 848-0731
Email: uj.tree@gmail.com
Woodchip availability depends on the arborist's tree pruning and removal jobs. In order to deliver, arborists need enough space to maneuver a large truck.

Austin Resource Recovery Center
Mulch is available free of charge for self-loading and takeaway.
Address: 3810 Todd Lane, Austin TX 78744
Hours: Monday – Friday, 8am-4pm
Phone: (512) 974-4373
http://austintexas.gov/department/resource-recovery-center

Soil Amendments

Keep Austin Beautiful
Keep Austin beautiful hosts bi-annual resource give-away days during which they distribute free native plants, seeds, compost and mulch.
Phone: (512) 391-0617
http://www.keepaustinbeautiful.org/

Building Supplies

Habitat for Humanity Re-Store
Address: 310 Comal Street, Austin TX 78702
Hours: Monday-Saturday, 9am-6pm
http://www.re-store.com/

Austin craigslist
http://austin.craigslist.org

Austin Freecycle
https://groups.freecycle.org/AustinMN/description

Fruit & Native Shade Trees

TreeFolks
TreeFolks grows Central Texas urban forests through tree planting, education, and community partnerships. It gives away thousands of saplings at multiple events between October and February.
Phone: (512) 443-5323
Email: admin@treefolks.org
http://www.treefolks.org/

Keep Austin Beautiful
Phone: (512) 391-0617
http://www.keepaustinbeautiful.org/

Telephone Assistance

Master Gardener Horticulture Hotline
Travis County Master Gardener volunteers provide free, year-long gardening advice to homeowners. They will help you sort through all of your plant questions and issues; provide up-to-date, research-based advice from Extension; and offer you free, relevant publications.
Hours: Weekdays, 9am-5pm
Phone: (512) 854-9600
http://aggie-horticulture.tamu.edu/travis/get-help/

Education Resources

Austin Organic Gardeners
http://www.main.org/aog/
Information on organic gardening techniques. Hold monthly meetings with guest speakers.

Austin Permaculture Guild
The Austin Permaculture Guild hosts multiple Permaculture Design Courses per year including a "10 Saturdays" format class that is ideal for students with a busy schedule as well as a two week intensive class for full immersion into the permaculture lifestyle.
http://www.austinperm.com/courses/

Central Texas Horticulture
Run by Travis County's Texas A&M Agrilife Extenion, Central Texas Horticulture offers a number of gardening classes and workshops.
http://aggie-horticulture.tamu.edu/travis/local-extension-resources/calendar-2/

City of Austin Grow Green
http://www.ci.austin.tx.us/growgreen/
Grow Green is a comprehensive landscaping program that provides Austin area homeowners with earth-wise solutions to their yard care problems.

Dirt Doctor Howard Garrett
http://www.dirtdoctor.com/
Information on organic gardening in Texas, including pictures, an interactive forum, books for sale, and links to organic gardening sources near you.

National Gardening Association
http://www.garden.org/home
Regional and national gardening information for home gardens, community gardens, and school gardens.

National Sustainable Agriculture Information Service (ATTRA)
https://attra.ncat.org/
Manages by the National Center for appropriate technology, ATTRA provides information and assistance to individuals involved in sustainable agriculture.

Natural Gardener
The Natural Gardener is an organic nursery that holds free gardening classes most Saturday mornings throughout the year.
Phone: (512) 288-6113
http://www.naturalgardeneraustin.com/

Sustainable Food Center
SFC's Grow Local program offers a number of food gardening classes throughout the year.
Phone: (512) 220-1083
Email: Katie@sustainablefoodcenter.org

Texas A&M AgriLife Extension Services
The Texas A&M AgriLife Extension Services in Travis County provide a high level of expertise in horticulture and other service areas.
http://travis-tx.tamu.edu/horticulture/

Texas A&M University Plant Answers
http://aggie-horticulture.tamu.edu/plantanswers/index.html
Plant Answers is a searchable database of information on plants. Find information on growing everything from vegetables to roses.

Texas Organic Farmers and Gardeners Association
http://www.tofga.org/
Information on basic organic gardening, lawn care, insects, and home remedies, along with local food and farming in Texas.

Texas Parks and Wildlife - Texas Plant Information Database
http://tpid.tpwd.state.tx.us/
Extensive information about native and a few selected naturalized plants that have value for landscape restoration, especially erosion control and wildlife use.

Other Gardening and Garden-Related Organizations

Central Texas School Garden Network (CTSGN)
https://groups.google.com/forum/#!forum/centraltxschoolgardennetwork
This online listserv and page is for anyone affiliated with school gardens in Central Texas – parents, teachers, organizations, or community members - and is used to share information and resources related to school gardening. Request to join the group on the webpage.

Coalition of Austin Community Gardens (CACG)
http://communitygardensaustin.org/
The Coalition of Austin Community Gardens' webpage includes a map of community gardens and basic information about most community gardens in the Austin area.

Compost Coalition
www.compostcoalition.com
The compost coalition works to keep organic materials out of landfills and return the nutrients back to our soils by connecting those producing "waste" with those that can use it.

East Side Compost Pedallers
https://www.compostpedallers.com/
100% bike-powered compost recycling program that collects compostables from homes and businesses and pedals them to nearby urban farms and community gardens.

Green Corn Project
The Green Corn Project is a grassroots, volunteer-run organization dedicated to helping Central Texans in need grow their own organic vegetables by installing organic food gardens for elderly, low-income, and disabled community members as well as for elementary schools, community centers, and shelters in underserved areas of Austin.
http://www.greencornproject.org/

Ground to Ground
http://aggie-horticulture.tamu.edu/travis/ground-to-ground/
Ground to Ground is a city-wide campaign that diverts nutrient-rich coffee grounds from landfills and puts them back to work in Central Texans' yards, farms, and gardens. Any resident can pick up free buckets of post-brew grounds. The only commitment required is to rinse and return the bucket to the business.

Lady Bird Johnson Wildflower Center
http://www.wildflower.org
The Wildflower Center is a botanical garden dedicated to native plants. It specializes in sustainable use and conservation of native wildflowers, plants, and landscapes.

One World Permaculture
http://www.oneworldpermaculture.com/
Provides individuals and organizations with permaculture education, consultation, design, installation, and maintenance services.

Urban Patchwork
www.urbanpatchwork.org
Urban Patchwork is Austin's first non-profit neighborhood farm network. The group work with neighbors to turn unused yard space into farmland that provides fresh, organically grown produce and eggs to the nearby residents of each neighborhood farm.

Urban Roots
http://www.urbanrootsatx.org/
Urban Roots is a youth development organization that uses sustainable agriculture to transform the lives of young people and increase access to healthy food in Austin.

Yard to Market Coop
http://www.yardtomarket.coop/
Yard to Market Coop manages farm stands at local Farmers' Markets where backyard gardeners can sell produce.

Recommended Reading

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Ashworth, Suzanne. Seed to Seed: Seed Saving and Growing Techniques for Vegetable Gardeners. Iowa: Seed Savers Exchange, Inc. 2002.

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Jeavons, John & Carol Cox. The Sustainable Vegetable Garden. California: Ten Speed Press, 1999.

Lancaster, Brad. Rainwater Harvesting for Drylands and Beyond (Vol. 1): Guiding Principles to Welcome Rain into Your Life and Landscape. Tucson: Rainsource Press, 2006.

Sperry, Neil. Neil Sperry's Complete Guide to Texas Gardening. Texas: Taylor Publishing. Co, 1991.

Travis County Master Gardener Association. Garden Guide for Austin & Vicinity. Texas: Travis County Master Gardener Association, 2003.