

East Region  
Better Living for Texans (BLT)  
Edible Gardening Booklet

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“The Supplemental Nutrition Assistance Program (SNAP) provides nutrition assistance to people with low income. It can help you buy nutritious foods for a better diet. To find out more, contact the Better Living for Texans Program at 972-952-9235 or 972-952-9243.”

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## Basic Gardening

Nutrition begins in the garden. The three largest levels of MyPlate upon which we base our guidelines for nutritional intake are the Fruit Group, Vegetable Group, and Bread, Cereal, Rice and Pasta Group. All of these groups are derived from plants. In addition, almost every meat listed in MyPlate can be traced back to animals that eat plants. Because so much of our diets are plant-derived, it's important to understand some basic plant life concepts. This understanding will help your gardeners raise healthy plants full of nutritional elements.

## Helpful Background Information

### Plant Classification

Plants are classified into two major groups; angiosperm and gymnosperm. The difference between these two classifications lies in a plant's ability to produce true flowers.

- Gymnosperms, such as pine trees, lack true flowers and produce seeds in cones.
- Angiosperms, such as tomatoes and peaches, produce true flowers. Their seeds are found in their fruits.

### Plant Structures

The fruit is only one part of a plant that can be consumed. Roots, stems, leaves, shoots, flowers, fruits or seeds can be edible, though usually not all from the same plant. Going from the bottom of a plant to the top, examples of dietary plant parts include:

**Roots:** Carrot, turnip, sweet potato, radish, beet, parsnip

**Stem:** Celery and asparagus

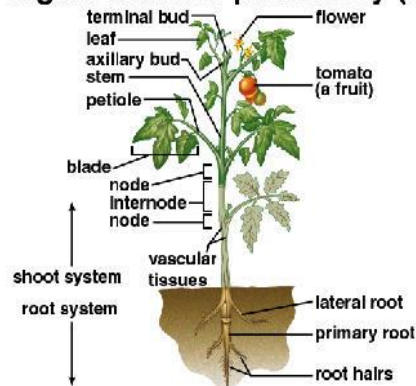
**Leaves:** Parsley, basil, mustard greens, chard, spinach, lettuce, cabbage

**Flowers:** Broccoli and cauliflower

**Fruits:** Tomato, cucumber, pepper, squash, peach, apple, mango, kiwi, and apricot

**Seeds:** Pea, bean, corn, rice, barley, oat, nuts, sunflower and pumpkin

### Organization of plant body (1)



### Roots

Roots are found below the soil surface, and are essential to plants. There are two primary types of root systems: taproot and fibrous root. Taproots are the one primary root with few secondary roots and are found on plants such as carrots, beans and turnips. Fibrous roots are the many roots of similar size found on plants such as lettuce, broccoli, spinach, and tomato. Tiny root hairs located on roots take up water and other nutrients from the soil. Roots transport nutrients and water to other parts of the plant. They also anchor the plant and help protect it from blowing over in winds and rain. Healthy roots are plump and white; unhealthy roots cause plants to wither and die from the lack of water and nutrients.

## Stems

Sometimes called the “backbone” of growth, stems help support the plant and transport water and nutrients. Two components found in stems are xylem and phloem. The xylem channel transports water and minerals; the phloem channel carries food manufactured by the plant.

## Leaves

Leaves, the plant’s “food factories,” transform light energy into plant energy. Chloroplasts inside the leaves make this transformation by changing sunlight, carbon dioxide, water and chlorophyll into sugar/carbohydrates. An actively growing plant with no leaves limits its life span because it’s unable to make food. Leaves also allow transpiration to occur, which helps cool the plant and maintain plant processes.

## Flowers

Flowers are the showery part of the plant. Birds and insects are attracted to flowers and help transfer male pollen to the female pistil. Some flowers have male parts only; others have female parts only. These plants are called dioecious. Holly is one example. Other plants, like corn and squash, and most fruits and vegetables, have both male and female parts on the same flower, and are known as monocious. After pollination and fertilization have occurred, seeds develop.

## Seeds

Seeds can spread by different methods, such as wind and birds, and have different mechanisms to help them disperse. After they settle into the soil, seeds germinate into new plants. Seed germination occurs when environmental conditions are favorable. Most seeds produced in the wild are different from either of their parent plants. Plants that consistently produce the same flowers or colors are sometimes referred to as “true to type.” These plants varieties are available from local nurseries, markets and seed catalogs.

## Fruits

Fruits develop after the flowers have been fertilized. Most fruits and vegetables house their seeds in fruit, which helps protect and disperse them. The true definition of a fruit is “the seed-containing structure that is formed by the pollinated flower.”

## Plant Needs

### **Plants need air, water, sunlight and nutrients to grow.**

**Air-** Plants need carbon dioxide and oxygen from the air in order to perform important processes.

**Water** – Sometimes referred to as the “forgotten nutrient,” water is important for all living organisms. Plants contain 80-95% of water. Plants take up nutrients through water from the soil. Water also helps keep plants cool.

**Sunlight** – Photosynthesis is the conversation of energy from the sun into plant energy. A plant cannot produce its own food without sunlight.

**Nutrients** – There are two types of nutrients: macronutrients and micronutrients. Macronutrients are needed in larger amounts and include nitrogen, phosphorus, potassium, magnesium, calcium and sulfur. Micronutrients are need in smaller amounts; examples include iron, manganese, copper, zinc, boron, molybdenum and chorine. Good soils contain these nutrients but poor soils may be lacking in one or more of the essential elements. Nutrients can be added to the soil by adding synthetic fertilizers (solid or liquid), compost (decayed plant materials) or mineral additives.

**Plant needs are summarized as follows:**

- P Place – in a container or garden for roots to grow
- L Light – sun or artificial light
- A Air – oxygen and carbon dioxide
- N Nutrients – nitrogen, phosphorus, potassium and others
- T Thirst – plants, like all living things, need water
- S Soil – to grow roots



Information obtained from Junior Master Gardener Health and Nutrition from the Garden booklet



# Vegetable Gardening in Containers

Joseph G. Masabni\*

If your vegetable gardening is limited by insufficient space or an unsuitable area, consider raising fresh, nutritious, homegrown vegetables in containers. A window sill, a patio, a balcony or a doorstep will provide sufficient space for a productive mini-garden. Problems with soilborne diseases, nematodes or poor soil conditions can be easily overcome by switching to a container garden. Ready access to containers means that pest management is easier. Container vegetable gardening is a sure way to introduce

children to the joys and rewards of vegetable gardening.





## Crop Selection

Almost any vegetable that will grow in a typical backyard garden will also do well as a container-grown plant. Vegetables that are ideally suited for growing in containers include tomatoes, peppers, eggplant, green onions, beans, lettuce, squash, radishes and parsley. Pole beans and cucumbers also do well in this type of garden, but they do require considerably more space because of their vining growth habit.

Variety selection is extremely important. Most varieties that will do well when planted in a yard garden will also do well in containers. Some varieties of selected vegetables which are ideally suited for these mini-gardens are indicated in Table 1.



**Small fruited tomato varieties make excellent hanging baskets.**

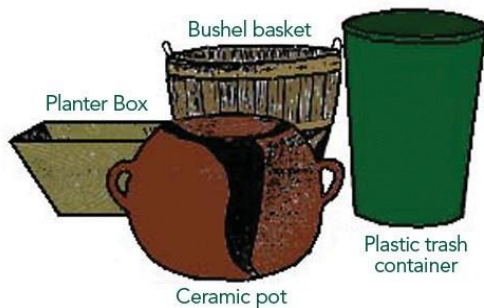
**Table 1. Varieties for Container Grown Vegetables**

Broccoli (2 gallons, 1 plant)	Packman, Bonanza, others
Carrot (1 gallon, 2-3 plants. Use pots 2 inch deeper than the carrot length)	Scarlet Nantes, Gold Nugget, Little Finger, Baby Spike, Thumbelina
Cucumber (1 gallon, 1 plant)	Burpless, Liberty, Early Pik, Crispy, Salty
Eggplant (5 gallons, 1 plant)	Florida Market, Black Beauty, Long Tom
Green Bean (2 gallons minimum, space plants 3 inches apart)	Topcrop, Greencrop, Contender, (Pole) Blue Lake, Kentucky Wonder
Green Onion (1gallon, 3-5 plants)	Beltsville Bunching, Crisal Wax, Evergreen Bunching
Leaf Lettuce (1 gallon, 2 plants)	Buttercrunch, Salad Bowl, Romaine, Dark Green Boston, Ruby, Bibb
Parsley (1gallon, 3 plants)	Evergreen, Moss Curled
Pepper (5 gallons, 1-2 plants)	Yolo Wonder, Keystone Resistant Giant, Canape, Red Cherry (Hot), Jalapeno
Radish (1gallon, 3 plants)	Cherry Belle, Scarlet Globe, (White) Icicle
Spinach (1 gallon, 2 plants)	Any cultivar
Squash (5 gallons, 1 plant)	Dixie, Gold Neck, Early Prolific Straightneck, Zucco (Green), Diplomat, Senator
Tomato (5 gallons, 1 plant)	Patio, Pixie, Tiny Tim, Saladette, Toy Boy, Spring Giant, Tumbling Tom, Small Fry
Turnip (2 gallons, 2 plants)	Any cultivar

## Growing Media

Any growing media must provide water, nutrients, and a physical support in order to grow healthy plants. A good growing media must also drain well. Synthetic or soilless mixes are well suited for vegetable container gardening and may be composed of sawdust, wood chips, peat moss, perlite, or vermiculite. These are free of disease and weed seeds, hold moisture and nutrients but drain well and are light weight. Many synthetic soil mixes such as Jiffy Mix<sup>®</sup>, Bacto<sup>®</sup>, Promix<sup>®</sup>, and Jiffy Pro<sup>®</sup> are available at garden centers. Soilless mixes can also be prepared by mixing horticultural grade vermiculite, peat moss, limestone, superphosphate and garden fertilizer. To 1 bushel each of vermiculite and peat moss, add 10 tablespoons of limestone, 5 tablespoons of 0-20-0 (superphosphate) and 1 cup of garden fertilizer such as 6-12-12 or 5-10-10. Mix the material thoroughly while adding a little water to reduce dust. Wet the mix thoroughly before seeding or transplanting. Soil mixes are made up of equal parts of sphagnum peat moss or compost, pasteurized soil, and vermiculite or perlite. Composted cow manure is then added to improve the soil's physical properties and as a nutrient source. Soil mixes tend to hold water better than soilless mixes.

## Containers



**Any well-drained container can become a productive mini-garden.**

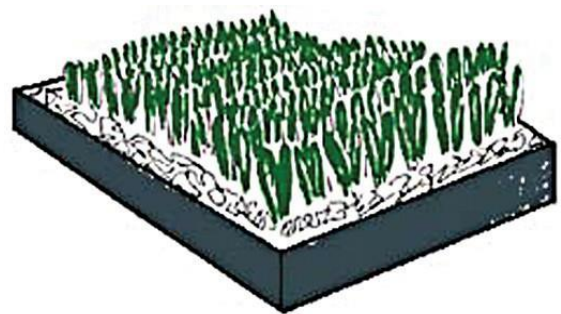
Adding about 1 inch of coarse gravel in the bottom of the container will improve drainage. The drain holes work best when they are located along the side of the container, about  $\frac{1}{4}$  to  $\frac{1}{2}$  inch from the bottom.

Almost any type of container can be used for growing vegetable plants. For example, try using bushel baskets, drums, gallon cans, tubs or wooden boxes. The size of the container will vary according to the crop selection and space available. Pots from 6 to 10 inches in size are satisfactory for green onion, parsley and herbs. For most vegetable crops such as tomatoes, peppers and eggplant, you will find that 5 gallon containers are the most suitable size, while 1 to 2 gallon containers are best for chard and dwarf tomatoes. Smaller container sizes are appropriate for herbs, lettuce, and radish crops. They are fairly easy to handle and provide adequate space for root growth.

Container materials are either porous or nonporous. Glazed, plastic, metal, and glass containers are nonporous. Regardless of the type or size of container used it must drain adequately for successful yields.

## Seeding and Transplanting

Vegetables that can be easily transplanted are best suited for container culture. Transplants may be purchased from local nurseries or can be grown at home. Seeds can also be germinated in a baking pan, plastic tray, pot, or even a cardboard milk carton. Fill the container with the media described above and cover most vegetable seed with  $\frac{1}{4}$  inch to  $\frac{1}{2}$  inch of media to insure good germination. Another method is to use peat pellets or peat pots which are available from nursery supply centers. Landscape cloth or screen in the bottom of the pot will improve drainage and invigorate plant growth.

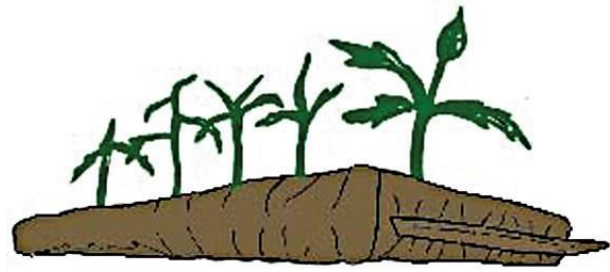


**Green onions, radishes or beets can be grown in a cake pan.**





**Covering the seed flat with a clear plastic bag will hasten germination.**



**A "tube" or bag garden is an easy method to grow vegetables.**

The seed should be started in a warm area that receives sufficient sunlight about 4 to 8 weeks before you plan to transplant them into the final container. Most vegetables should be transplanted into containers when they develop their first two to three true leaves. Transplant the seedlings carefully to avoid injuring the young root system. (See Table 2 for information about different kinds of vegetables.)

**Table 2. Planting Information for Growing Vegetables in Containers**

Crop	Number of days for germination	Number of weeks to optimum age for transplanting	General size of container	Amount of light* required	Number of days from seeding to harvest
Beans	5-8	-	Medium	Sun	45-65
Cucumbers	6-8	3-4	Large	Sun	50-70
Eggplant	8-12	6-8	Large	Sun	90-120
Lettuce, leaf	6-8	3-4	Medium	Partial Shade	45-60
Onions	6-8	6-8	Small	Partial Shade	80-100
Parsley	10-12	-	Small	Partial Shade	70-90
Pepper	10-14	6-8	Large	Sun	90-120
Radish	4-6	-	Small	Partial Shade	20-60
Squash	5-7	3-4	Large	Sun	50-70
Tomato	7-10	5-6	Large	Sun	90-130

\*All vegetables grow best in full sunlight, but those indicated will also do well in partial shade.

## Fertilization

Available fertilizers will be either time-release or water soluble. Time-release fertilizer is mixed with the potting media at planting time. Osmocote® is a pelleted time-release fertilizer with 14-14-14 formulation. Water soluble fertilizers, on the other hand, are added to water and used when plants begin to grow actively. Peters® 20-20-20 or Miracle Gro® 15-30-15 are two examples sold in most garden centers.

The easiest way to add fertilizer to plants growing in containers is to prepare a nutrient solution and then pour it over the soil mix. There are many good commercial fertilizer mixes available to make nutrient solutions. Always follow the application directions on the label. You can make a nutrient solution by dissolving 2 cups of a complete fertilizer such as 10-20-10, 12-24-12, or 8-16-8 in 1 gallon of warm tap water. This mixture is highly concentrated and must be di-



**A potato bag is a unique way to grow potatoes.**

the mix becomes water-logged, the plants will die from lack of oxygen. Avoid wetting the foliage of plants since wet leaves will encourage plant diseases. Remember to use the nutrient solution for each watering except for the weekly leaching when you will use tap water.

Water-holding gels are becoming popular for use in container gardening. These starch-based gels are called hydrogels. They absorb at least 100 times their weight in water and slowly release that water into the soil as it dries. To be effective, they should be incorporated in the soil mix before planting.

Mulches can also be placed on top of the soil mix to reduce water loss. Compost, straw, pine needles, grass clippings, shredded bark, and moss are examples of mulches and vary in their effectiveness.

## Light

Nearly all vegetable plants will grow better in full sunlight than in shade. However, leafy crops such as lettuce, cabbage, greens, spinach and parsley can tolerate more shade than root crops such as radishes, beets, turnips and onions. Fruit bearing plants, such as cucumbers, peppers, tomatoes and eggplant need the most sun of all. One major advantage to gardening in containers is that you can place the vegetables in areas where they can receive the best possible growing conditions.

## Harvesting

Harvest the vegetables at their peak of maturity when a vegetable's full flavor has developed. Vine-ripened tomatoes, tender green beans and crisp lettuce will have the best flavor.

At the end of the harvest season, discard the plant and soil from the pot. Do not reuse the same soil for a second season of production. Infected soil or mix will spread disease into the second season unless it is properly composted. Properly composted planting media can be reused.

luted before it can be used to fertilize the plants. To make the final fertilizing solution, mix 2 tablespoons of the concentrated solution in 1 gallon of water.

If you use transplants, begin watering with the nutrient solution the day you set them out. If you start with seed, apply only tap water to keep the soil mix moist enough until the seeds germinate. Once the plants emerge, begin using the nutrient solution.

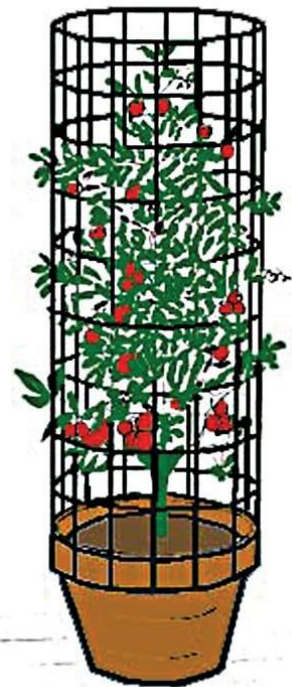
While the frequency of watering will vary from one crop to the next, usually once per day is adequate. If the vegetable produces a lot of foliage, twice a day may be necessary. Plants require less water during periods of slow growth.

At least once a week, it is advisable to leach the unused fertilizer out of the soil mix by watering with tap water. Add enough water to the container to cause free drainage from the bottom. This practice will flush harmful minerals out of the the soil mix.

It is a good idea to occasionally water with a nutrient solution containing minor elements. Use a water-soluble fertilizer that contains iron, zinc, boron and manganese and follow the label directions carefully.

## Watering

Proper watering is essential for a successful container garden and one watering per day is usually adequate. However, poor drainage will slowly kill the plants. If



**“Cages” can be used with containers to support tomatoes, cucumbers and pole beans.**

## Diseases and Insects

Vegetables grown in containers are susceptible to the same insects and diseases that are common to any vegetable garden. You should check your plants periodically for diseases and for foliage and fruit-feeding insects. If you detect plant disease or harmful insects, use EPA-approved fungicides and insecticides in a timely manner. Contact your local county Extension agent for the latest information on disease and insect control on vegetable plants.

**Table 3. Common Problems in Container Gardening**

Symptom	Cause	Corrective Measure
Plants tall, spindly, and unproductive	Insufficient light	Move container to area receiving more light
	Excessive nitrogen	Reduce feeding intervals
Plants yellowing from bottom, lack vigor, poor color	Excessive water	Reduce watering intervals; Check for good drainage
	Low fertility	Increase fertility level of base solution
Plants wilt although sufficient water present	Poor drainage and aeration	Use mix containing higher percent organic matter; increase number of holes for drainage
Marginal burning or firing of the leaves	High salts	Leach container with tap water at regular intervals
Plants stunted in growth; sickly, purplish color	Low temperature	Relocate container to warmer area
	Low phosphate	Increase phosphate level in base solution
Holes in leaves, leaves distorted in shape	Insects	Use EPA-recommended insecticide
Plant leaves with spots; dead dried areas, or powdery or rusty areas	Plant diseases	Remove diseased areas where observed and use EPA-recommended fungicide

## Container Gardening Success

Container gardening can be successful if you follow guidelines above. Plant growth and vigor will vary depending on the location and attention you give your plants. The following guidelines are golden rules for any home vegetable garden:

1. Inspect your plants daily and, if necessary, water, trim, train or pruning.
2. Check your plants daily and remove of pests and weeds and treat diseases.
3. Continue your education by soliciting advice from experienced gardeners.
4. Make time to sit down and enjoy the fruits of your labor.



Joseph Masabni\*



**H**ome gardening continues to grow in popularity. One of every three families does some type of home gardening, according to conservative estimates, with most gardens located in urban areas. Texas gardeners can produce tasty, nutritious vegetables year-round. To be a successful gardener you will need to follow a few basic rules and make practical decisions.

### Garden Site

Although many urban gardeners have little choice, selecting a garden site is extremely important. The ideal garden area gets full or nearly full sunlight and has deep, well-drained, fertile soil. The garden should be near a water outlet but not close to competing shrubs or trees. However, if you modify certain cultural practices and select the right crops, almost any site can become a highly productive garden.

### Crop Selection

One of the first things you must do is decide what vegetables to grow. Table 1 lists crops suitable for small and large gardens. You will want to grow vegetables that return a good portion of nutritious food for the time and space they require. Vine crops such as watermelons, cantaloupes, winter squash and cucumbers need large amounts of space, but if you plant them near a fence or trellis you may need less space for vine crops. Plant the vegetables your family will enjoy most. Resist the urge to plant more of any particular vegetable than you need unless you plan to preserve the surplus.





**Table 1. Home garden vegetables.**

Small gardens		Large gardens	
Beets	Green bean	Cantaloupe	Potato
Broccoli	Lettuce	Cauliflower	Pumpkin
Bush squash	Onion	Collard	Southern pea
Cabbage	Parsley	Cucumber	Sweet corn
Carrot	Pepper	Mustard	Sweet potato
Eggplant	Radish	Okra	Watermelon
English pea	Spinach		
Garlic	Tomato		

It is important to select the right variety of each vegetable. If you plant the wrong variety for your area you may not get a satisfactory yield no matter how much care you give the plants. Your county Extension agent can provide a list of varieties that are well adapted to your area of Texas. If you try new varieties and hybrids, limit the size of the plantings.

If your garden does not receive full or nearly full sunlight, try growing leafy crops such as leaf lettuce, mustard and parsley. Table 2 lists vegetables that do well in full sunlight and those that tolerate partial shade.

**Table 2. Light requirements of common vegetables.**

Require bright sunlight		
Bean	Eggplant	Potato
Broccoli	Okra	Pumpkin
Cantaloupe	Onion	Squash
Cauliflower	Pea	Tomato
Cucumber	Pepper	Watermelon
Tolerate partial shade		
Beet	Collard	Parsley
Brussels sprouts	Kale	Radish
Cabbage	Lettuce	Spinach
Carrot	Mustard	Turnip

## Garden Plan

A gardener needs a plan just as an architect does. Careful planning lessens gardening work and increases the return on your labor.

Table 3 shows the relative maturity rates of various vegetable crops. Long-term crops require a long growing period. Plant them where they won't interfere with the care and harvesting of short-term crops. Plant tall-growing crops (okra, staked tomatoes, pole beans, sweet corn) on the north side of the garden where they will not shade or interfere with the growth of low-growing crops such as radishes, leaf lettuce, onions and bush beans. Group crops according to their rate of maturity so a new crop can be planted to take the place of another as soon as it is removed. When you plant a new crop, it should be totally unrelated to the crop it is replacing. This is called crop rotation. Crop rotation helps prevent the buildup of diseases and insects. For example, follow early beans with beets, squash or bell peppers.

**Table 3. Maturity rates of common vegetables.**

Quick (30 to 60 days)		
Beets	Mustard	Summer squash
Bush bean	Radish	Turnip
Leaf lettuce	Spinach	Turnip green
Moderate (60 to 80 days)		
Broccoli	Green onion	Parsley
Chinese cabbage	Kohlrabi	Pepper
Carrot	Lima bean	Tomato
Cucumber	Okra	
Slow (80 days or more)		
Brussels sprouts	Cauliflower	Pumpkin
Bulb onion	Eggplant	Sweet potato
Cabbage	Garlic	Tomato
Cantaloupe	Irish potato	Watermelon

## Soil Preparation

Many garden sites do not have the deep, well-drained, fertile soil that is ideal for growing vegetables. If yours is one of them, you will need to alter the soil to provide good drainage and aeration. If the soil is heavy clay, adding organic matter, sand or gypsum will improve it. Organic matter also improves sandy soils.

To improve clay soils, apply 1 to 2 inches of good sand and 2 to 3 inches of organic matter to the soil surface in late winter or early spring; then turn it under to mix it thoroughly with the soil. It may take several years to improve the soil's physical condition and you'll want to add more organic matter (in the form of composted materials, peanut hulls, rice hulls, grass clippings, etc.) periodically. Turn the soil to a depth of 8 to 10 inches—the deeper the better—each time you add organic matter. Add gypsum at the rate of 6 to 8 pounds per 100 square feet where the soil is heavy clay.

When you add organic matter or sand to the garden site, be careful not to introduce soil pests such as nematodes. Contact your county Extension agent to find out how you can have your soil tested for nematodes by the Texas AgriLife Extension Soil Testing Laboratory.

Never work wet garden soil. To determine if the soil is dry enough for working, squeeze together a small handful of soil. If it sticks together in a ball and does not readily crumble under slight pressure by your thumb and finger, it is too wet for working.

Seeds germinate better in well-prepared soil than in coarse, lumpy soil. Thorough soil preparation makes planting and caring for your crops much easier. It is possible, however, to overdo the preparation of some soils. An ideal soil for planting is granular, not powdery fine.

## Fertilization

Proper fertilization is another important key to successful vegetable gardening. The amount of fertilizer needed depends upon the soil type and the crops you are growing. Texas soils vary

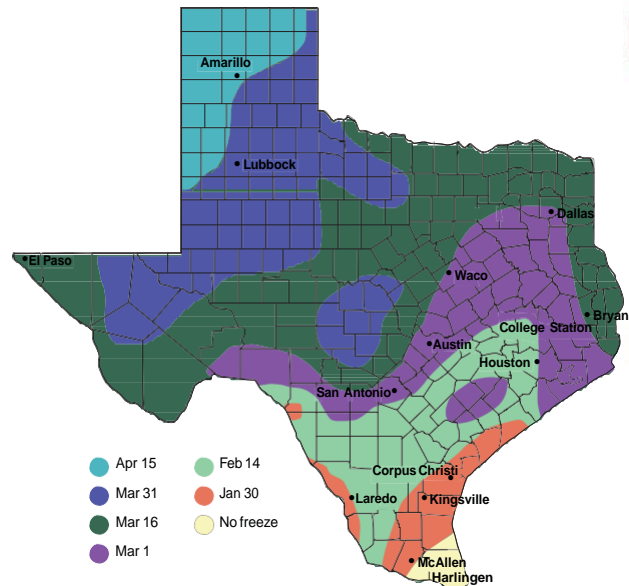


Figure 1. Average date of last spring frost.

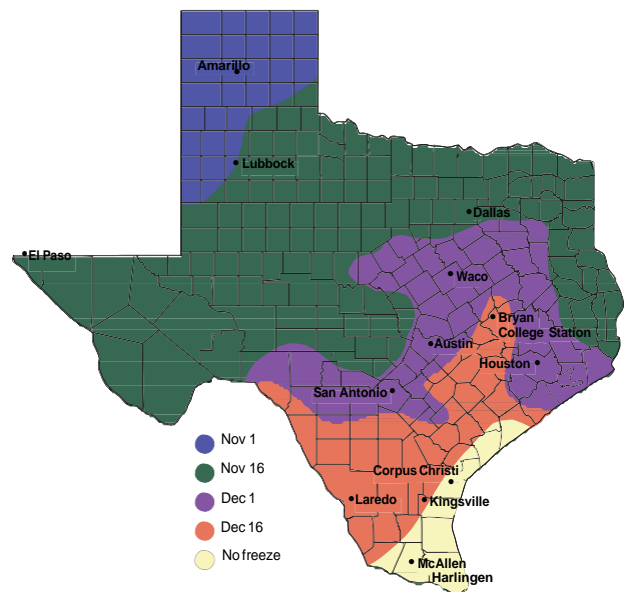


Figure 2. Average date of first fall frost.

from deep sands to fertile, well-drained soils to heavy, dark clays underlaid by layers of caliche rock or hardpan. Crops grown on sandy soils usually respond to liberal amounts of potassium,





whereas crops grown on clay soils do not.

Heavy clay soils can be fertilized much more heavily at planting than can sandy soils. Heavy clay soils and those with lots of organic matter can safely absorb and store fertilizer at three to four times the rate of sandy soils. Thin, sandy soils, which need fertilizer the most, unfortunately cannot be fed as heavily without burning plants. The solution is to feed poor, thin soils more often in lighter doses. For accurate recommendations regarding fertilizer rates, contact your county Extension agent and request a soil test kit.

In general, if your garden is located on deep, sandy soil, apply a complete preplant fertilizer such as 5-10-10 or 6-12-12 at the rate of 1 to 2 pounds per 100 square feet. If your soil has a high percentage of clay, a fertilizer such as 10-20-10 or 12-24-12 applied at 1 to 2 pounds per 100 square feet should be suitable.

Make the preplant fertilizer application a few days before planting. Spade the garden plot,

spread the fertilizer by hand or with a fertilizer distributor, and then work the soil well to properly mix the fertilizer with the soil. After the fertilizer is well mixed with the soil, bed the garden in preparation for planting.

On alkaline soils, apply 1-20-0 (superphosphate) directly beneath the intended seed row or plant row before planting. Apply the superphosphate at a rate of 1 to 1½ pounds per 100 linear feet of row. Make sure the nitrogen material will be 2 to 4 inches below the seed or transplant roots so it won't harm them. Later in the season you can apply additional nitrogen as a furrow or sidedress application. For most soils, 2 to 3 pounds of 21-0-0 (ammonium sulfate) per 100 linear feet of row, applied in the furrow and watered in, is adequate. For crops such as tomatoes, peppers and squash, make this application at first fruit set. Sidedress leafy crops such as cabbage and lettuce when they develop several sets of character leaves.

## Planting

Plant your garden as early as possible in the spring and fall so the vegetables will grow and mature during ideal conditions. Using transplants rather than seeds, when possible, allows crops to mature earlier and extends the productive period of many vegetable crops. Be careful not to plant transplants too deep or too shallow, especially if plants are in containers such as peat pots. Planting too deep often causes developed roots to abort. Planting too shallow may cause roots to dry out.

Some crops can be removed from containers for planting, while others are best transplanted in containers, as indicated in Table 4. When transplanting plants such as tomatoes or peppers, use a starter solution. Purchase starter solution at a nursery or make your own by mixing 2 to 3 cups of fertilizer (such as 10-20-10) in 5 gallons of water. Use the lower rate on light, sandy soils. Pour 1 to 2 pints of starter solution (depending on plant size) into each transplant hole before planting.

This keeps the plants from drying out and gives the young, growing plants the nutrients they need.

When planting seeds, a general rule of thumb is to cover the seed two to three times as deep

**Table 4. Ease of transplanting.**

Easily transplanted		
Beet	Cauliflower	Onion
Broccoli	Chard	Tomato
Cabbage	Lettuce	
Require care		
Carrot	Eggplant	Pepper
Celery	Okra	Spinach
Very difficult without using containers		
Bean	Cucumber	Turnip
Cantaloupe	Pea	Watermelon
Sweet corn	Squash	

as its width. This is especially true for big seeds such as green bean, sweet corn, cucumber, cantaloupe and watermelon. Smaller seeds such as carrot, lettuce or onion can be planted about ¼ to ½ inch deep. Plant seeds fairly thickly; once they have sprouted you can thin plants to an optimum stand. After planting seeds, do not let the soil become so dry that it develops a crust, but do not overwater either. Table 5 indicates the average number of days from planting to emergence.

**Table 5. Days from planting to emergence under good growing conditions.**

Bean	5-10	Cucumber	6-10	Pepper	9-14
Beet	7-10	Eggplant	6-10	Radish	3-6
Broccoli	5-10	Lettuce	6-8	Spinach	7-12
Cabbage	5-10	Okra	7-10	Squash	4-6
Carrot	12-18	Onion	7-10	Tomato	6-12
Cauliflower	5-10	Pea	6-10	Turnip	4-8
Corn	5-8	Parsley	15-21	Watermelon	6-8

## Watering

Apply enough water to wet the soil to a depth of at least 6 inches. For best production, most gardens require about 1 inch of rain or irrigation per week during the growing season. Light, sandy soils usually need to be watered more often than heavier, dark soils. If you use sprinklers, water in the morning so plant foliage

has time to dry before night. This helps prevent foliage diseases, since humidity and cool temperatures encourage disease development on most vegetable crops.

A drip irrigation system is best because it keeps water off plant foliage and uses water most efficiently. Drip irrigation is ideal for use with mulches.

## Weed Control

A long-handled hoe is the best tool for controlling undesirable plants in vegetable gardens. Chemical weed control usually is undesirable and unsatisfactory because of the selective nature of weed control chemicals. The wide variety of vegetable crops normally planted in a small area

prohibits the use of such chemicals. Cultivate and hoe shallowly to avoid injuring vegetable roots near the soil surface. Control weeds when they are small seedlings to prevent them from seeding and re-inoculating the garden area. Mulching is also an effective means of weed control.

## Mulching

Mulching increases yields, conserves moisture, prevents weed growth, regulates soil temperature, and lessens crop loss caused by ground rot. Organic mulches include straw, leaves, grass, bark, compost, sawdust and peat moss. Organic mulches incorporated into the soil will improve the soil tilth, aeration and drainage. The amount of organic mulch to use depends upon the type,

but 1 to 2 inches applied to the garden surface around growing plants is adequate.

When you have finished harvesting and it is time to turn under organic mulch for subsequent crops, add more fertilizer at the rate of about 1 pound per 100 square feet to help soil organisms break down the additional organic matter.





## Pest Control

Diseases and insects can cause problems for Texas gardeners. Long growing seasons with relatively mild winters encourage large insect populations. Avoid spraying when possible, but use recommended and approved chemicals if the situation warrants. Be careful when deciding which chemicals to apply. Spray only those crops listed on the chemical's container. When used according to the manufacturer's directions and label, chemicals pose no threat to the home gardener.

Disease control is really a preventive rather than an eradication procedure. Cool, damp conditions are conducive to foliage diseases. Carefully watch your garden for symptoms of diseases. If necessary, spray with approved fungicides. Publications on disease and insect identification and control are available from your county Extension office and at the Texas AgriLife Extension Bookstore (<http://agrilifebookstore.org>).

## Harvesting

Harvest time brings the reward of planting and caring for your vegetable crops. For best flavor, harvest vegetables when they are mature. A vegetable's full flavor develops only at peak maturity, result-

ing in the excellent taste of vine-ripened tomatoes, tender green beans and crisp, flavorful lettuce. For maximum flavor and nutritional content, harvest the crop the day it is to be canned, frozen or eaten.

## Home Gardening Do's and Don'ts

- Do**
1. Use recommended varieties for your area of the state.
  2. Sample soil and have it tested every 2 to 3 years.
  3. Apply preplant fertilizer to the garden in the recommended amount.
  4. Examine your garden often to keep ahead of potential problems.
  5. Keep the garden free of insects, diseases and weeds.
  6. Use mulches to conserve moisture, control weeds and reduce ground rots.
  7. Water as needed, wetting soil to a depth of 6 inches.
  8. Thin when plants are small.
  9. Avoid excessive walking and working in the garden when the foliage and soil are wet.
  10. Wash your garden tools and sprayer well after each use.
  11. Keep records on garden activities.

- Don't**
1. Depend on varieties not recommended for your area, but do try limited amounts of new releases.
  2. Plant so closely that you cannot walk or work in the garden.
  3. Cultivate so deeply that plant roots are injured.
  4. Shade small plants with taller growing crops.
  5. Water excessively or in late afternoon.
  6. Place fertilizer directly in contact with plant roots or seeds.
  7. Allow weeds to grow large before cultivating.
  8. Apply chemicals or pesticides in a haphazard manner or without reading the label directions.
  9. Use chemicals not specifically recommended for garden crops.
  10. Store leftover diluted spray.



**Table 6. Handy conversion table.**

3 teaspoons = 1 tablespoon	2 pints = 1 quart
2 tablespoons = 1 fluid ounce	4 quarts = 1 gallon
16 tablespoons = 1 cup	1 ounce = approximately 2 tablespoons (dry weight)
2 cups = 1 pint or 16 fluid ounces	

**Table 7. Common garden problems.**

Symptom	Possible causes	Corrective measure(s)
Plants stunted in growth; sickly, yellow color	Not enough soil nutrients or soil pH is abnormal	Use fertilizer and correct pH according to a soil test. Use 2 to 3 pounds of complete fertilizer per 100 square feet in the absence of soil test.
	Plants growing in compacted, poorly drained soil	Modify soil with organic matter or coarse sand.
	Insect or disease damage	Use a regular spray or dust program.
	Iron deficiency	Apply iron to soil or foliage.
Plants stunted in growth; sickly, purplish color	Low temperature	Plant at the proper time. Don't use light-colored mulch too early in the season.
	Low available phosphate	Apply sufficient phosphate at planting.
Holes in leaves; leaves yellowish and dropping, or distorted in shape	Insect damage	Use recommended insecticides at regular intervals.
Plant leaves with spots; dead, dried areas; or powdery or rusty areas	Plant disease	Use resistant varieties; remove diseased plants and use a regular spray program.
Plants wilt even though they have sufficient water	Soluble salts too high or root system damage	Have soil tested. Use soil insecticides, fungicides and resistant varieties.
	Poor drainage and aeration	Add organic matter or sand to the soil.
	Insect or nematode damage	Use recommended varieties and apply soil insecticides or nematicides.
Plants tall, spindly and unproductive	Excessive shade	Relocate to a sunny area. Keep down weeds.
	Excessive nitrogen	Reduce applications of nitrogen
Blossom drop (tomato)	Hot, dry periods	Use mulch and water. Plant heat-tolerant varieties.
	Minor element deficiencies	Use fertilizer containing zinc, iron and manganese.
Failure to set fruit (vine crop)	Poor pollination	Avoid spraying when bees are present.
Leathery, dry, brown blemish on the blossom end of tomato, pepper and watermelon	Blossom end rot	Keep the soil moisture uniform. Avoid overwatering and excessive nitrogen.





**Table 8. Vegetable planting.**

Vegetables	Seed or plants per 100 feet	Depth of planting (in)	Distance between rows (in)	Distance between plants (in)	Height of crop (ft)	Spring planting relative to frost-free date	Fall planting relative to first freeze date
Asparagus	1 oz seed or 66 plants	1-1½ or 6-8	36-48	18	5	4 to 6 weeks before	not recommended
Beans, snap bush	½ lb seed	1-1½	30-36	3-4	1½	1 to 4 weeks after	8 to 10 weeks before
Beans, snap pole	½ lb seed	1-1½	36-48	4-6	6	1 to 4 weeks after	14 to 16 weeks before
Beans, Lima bush	½ lb seed	1-1½	30-36	3-4	1½	1 to 4 weeks after	8 to 10 weeks before
Beans, Lima pole	¼ lb seed	1-1½	36-48	12-18	6	1 to 4 weeks after	14 to 16 weeks before
Beets	1 oz seed	1	14-24	2	1½	4 to 6 weeks before	8 to 10 weeks before
Broccoli	¼ oz seed	½	24-36	14-24	3	4 to 6 weeks before	10 to 16 weeks before
Brussels Sprouts	¼ oz seed	½	24-36	14-24	2	4 to 6 weeks before	10 to 14 weeks before
Cabbage	¼ oz seed	½	24-36	14-24	1½	4 to 6 weeks before	10 to 16 weeks before
Cabbage, Chinese	¼ oz seed	½	18-30	7-12	1½	4 to 6 weeks before	12 to 14 weeks before
Carrot	½ oz seed	½	14-24	2	1	4 to 6 weeks before	12 to 14 weeks before
Cauliflower	¼ oz seed	½	24-36	14-24	3	not recommended	10 to 16 weeks before
Chard, Swiss	2 oz seed	1	18-30	6	1½	2 to 6 weeks before	12 to 16 weeks before
Collard (Kale)	¼ oz seed	½	18-36	6-12	2	2 to 6 weeks before	8 to 12 weeks before
Corn, sweet	3-4 oz seed	½	24-36	9-12	6	1 to 6 weeks after	12 to 14 weeks before
Cucumber	½ oz seed	½	48-72	8-12	1	1 to 6 weeks after	10 to 12 weeks before
Eggplant	1/8 oz seed	½	30-26	18-24	3	2 to 6 weeks after	12 to 16 weeks before
Garlic	1 lb seed	½	14-24	2-4	1	not recommended	4 to 6 weeks before
Kohlrabi	¼ oz seed	½	14-24	4-6	1½	2 to 6 weeks before	12 to 16 weeks before
Lettuce	¼ oz seed	½	18-24	2-3	1	6 weeks before or 2 weeks after	10 to 14 weeks before
Muskmelon (Cantaloupe)	½ oz seed	1	60-96	24-36	1	1 to 6 weeks after	14 to 16 weeks before

*(continued on next page)*



**Table 8. Vegetable planting continued.**

Vegetables	Seed or plants per 100 feet	Depth of planting (in)	Distance between rows (in)	Distance between plants (in)	Height of crop (ft)	Spring planting relative to frost-free date	Fall planting relative to first freeze date
Mustard	¼ oz seed	½	14-24	6-12	1½	1 to 6 weeks after	10 to 16 weeks before
Okra	2 oz seed	1	36-42	12-24	6	2 to 6 weeks after	12 to 16 weeks before
Onion (plants)	No seed/ 400-600 plants	½	14-24	2-3	1½	4 to 10 weeks before	not recommended
Onion (seed)	1 oz seed	½	14-24	2-3	1½	6 to 8 weeks before	8 to 10 weeks before
Parsley	¼ oz seed	1/8	14-24	2-4	½	1 to 6 weeks before	6 to 16 weeks before
Peas, English	1 lb seed	2-3	18-36	1	2	2 to 8 weeks before	2 to 12 weeks before
Peas, Southern	½ lb seed	2-3	24-36	4-6	2½	2 to 10 weeks after	10-12 weeks before
Pepper	1/8 oz seed	½	30-36	18-24	3	1 to 8 weeks after	12 to 16 weeks before
Potato, Irish	6-10 lb seed	4	30-36	10-15	2	4 to 6 weeks before	14 to 16 weeks before
Potato, sweet	No seed/ 75- 100 plants	3-5	36-48	12-16	1	2 to 8 weeks after	not recommended
Pumpkin	½ oz seed	½	60-96	36-48	1	1 to 4 weeks after	12 to 14 weeks before
Radish	1 oz seed	½	14-24	1	½	6 weeks before/ 4 weeks after	1 to 8 weeks before
Spinach	1 oz seed	½	14-24	3-4	1	1 to 8 weeks before	2 to 16 weeks before
Squash, summer	1 oz seed	½	36-60	18-36	3	1 to 4 weeks after	12 to 15 weeks before
Squash, winter	½ oz seed	½	60-96	24-48	1	1 to 4 weeks after	12 to 14 weeks before
Tomato	1/8 oz seed or 50 plants	½ or 4-6	36-48	36-48	3	1 to 8 weeks after	12 to 14 weeks before
Turnip, greens	½ oz seed	½	14-24	2-3	1½	2 to 6 weeks before	2 to 12 weeks before
Turnip, roots	½ oz seed	½	14-24	2-3	1½	2 to 6 weeks before	2 to 12 weeks before
Watermelon	1 oz seed	½	72-96	36-72	1	1 to 6 weeks after	14 to 16 weeks before





**Table 9. Vegetable harvest and yield.**

Vegetable	Days to harvest	Length of harvest	Yield/100 ft	Approximate planting/person	
				Fresh	Canned/frozen
Asparagus	730	60	30 lb	10-15 plants	10-15 plants
Beans, snap—bush	45-60	14	120 lb	15-16 ft	15-20 ft
Beans, snap—pole	60-70	30	150 lb	5-6 ft	8-10ft
Beans, Lima—bush	65-80	14	25 lb shelled	10-15 ft	15-20 ft
Beans, Lima—pole	75-85	40	50 lb shelled	5-6 ft	8-10ft
Beet	50-60	30	150 lb	5-10ft	10-20 ft
Broccoli	60-80	40	100 lb	3-5 plants	5-6 plants
Brussels Sprouts	90-100	21	75 lb	2-5 plants	5-8 plants
Cabbage	60-90	40	150 lb	3-4 plants	5-10 plants
Cabbage, Chinese	65-70	21	80 heads	3-10ft	N/A
Carrot	70-80	21	100 lb	5-10ft	10-15 ft
Cauliflower	70-90	14	100 lb	3-5 plants	8-12 plants
Chard, Swiss	45-55	40	75 lb	3-5 plants	8-12 plants
Collard (Kale)	50-80	60	100 lb	5-10ft	5-10ft
Corn, sweet	70-90	10	10 dozen	10-15 ft	30-50 ft
Cucumber	50-70	30	120 lb	1-2 hills	3-5 hills
Eggplant	80-90	90	100 lb	2-3 plants	2-3 plants
Garlic	140-150	N/A	40 lb	N/A	1-5 ft
Kohlrabi	55-75	14	75 lb	3-5 ft	5-10ft
Lettuce	40-80	21	50 lb	5-15ft	N/A
Muskmelon/ Cantaloupe	85-100	30	100 fruits	3-5 hills	N/A
Mustard	30-40	30	100 lb	5-10ft	10-15 ft
Okra	55-65	90	100 lb	4-6 ft	6-10ft
Onion (bulb)	80-120	N/A	100 lb	3-5 ft	30-50 ft
Onion (seed)	90-120	N/A	100 lb	3-5 ft	30-50 ft
Parsley	70-90	90	30 lb	1-3 ft	1-3 ft
Pea, English	55-90	7	20 lb	15-20 ft	40-60 ft
Pea, Southern	60-70	30	40 lb	10-15 ft	20-50 ft
Pepper	60-90	90	60 lb	3-5 plants	3-5 plants
Potato, Irish	75-100	N/A	100 lb	50-100 ft	N/A
Potato, sweet	100-130	N/A	100 lb	5-10 plants	10-20 plants
Pumpkin	75-100	N/A	100 lb	1-2 hills	1-2 hills
Radish	25-40	N/A	100 bunches	3-5 ft	N/A
Spinach	40-60	40	3bushels	5-10ft	10-15 ft

*(continued on next page)*



**Table 9. Vegetable harvest and yield.**

Vegetable	Daysto harvest	Length of harvest	Yield/100 ft	Approximate planting/person	
				Fresh	Canned/frozen
Squash, summer	50-60	40	150 lb	2-3 hills	2-3 hills
Squash, winter	85-100	N/A	100 lb	1-3 hills	1-3 hills
Tomato	70-90	40	100 lb	3-5 plants	5-10 plants
Turnip, greens	30	40	50-100 lb	5-10 ft	N/A
Turnip, roots	30-60	30	50-100 lb	5-10 ft	5-10 ft
Watermelon	80-100	30	40 fruits	2-4 hills	N/A

This publication was revised from earlier versions authored by Sam Cotner and Frank J. Dainello, Professors Emeritus and former Extension Horticulturists.

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# Fall Vegetable Gardening Guide

Larry Stein and Joe Masabni\*

**M**ost gardeners plant their vegetables in the spring to harvest in late spring to early summer. In most areas of Texas, it is possible to have a fall vegetable garden also, but it will need to be managed somewhat differently than a spring garden.

## Locating the garden

If your spring garden was successful, the same location should work well in the fall. When planning a new garden, keep in mind that vegetable crops must have at least 8 hours of direct sun each day and should be planted where the soil drains well.

## Preparing the soil

If you're using an established garden area, pull out all plant material—the remains of your spring crop and any weeds that have grown up in the garden. Don't put plant residue from a spring garden into your compost bin because it is likely to be contaminated with insects and disease pathogens.

For a new garden site, remove all the grass. Just tilling it into the soil will not eliminate all the grass sprigs; they will continue to grow and interfere with the garden. Likewise, for a raised garden, remove all turf before building the frame and filling it with soil.

Grass and weeds can be killed with an herbicide that contains glyphosate. Several products are available, including Roundup® and Kleenup®.

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After removing the grass, shovel the garden area to a depth of 10 to 12 inches. Rototillers will not penetrate adequately, but they can be used to loosen and mix shoveled areas.

Spread 1 to 2 inches of coarse, washed sand and 2 to 3 inches of organic matter on the garden surface and till it into the soil to improve the soil's physical quality. The soil will need to be improved over time rather than in just a season or two. If you are building a raised bed garden, don't skimp on the soil. Use weed-free loam or sandy loam soil.

Adding fertilizer is the next step. You have two options:

- Apply 1 pound of ammonium sulfate (21-0-0) per 100 square feet (10 feet by 10 feet) before planting. Then sprinkle 1 tablespoon of ammonium sulfate around each plant every 3 weeks and water it in.
- Or, apply 2 to 3 pounds of a slow-release fertilizer (19-5-9, 21-7-14, or 25-5-10) per 100 square feet of garden area. Apply 1 tablespoon of ammonium sulfate (21-0-0) around each plant every 3 weeks and water it in. This second method should produce a more abundant harvest, especially with hybrid tomatoes and peppers.

Do not add too much ammonium sulfate, and do not put it too close to the plants. It can seriously damage them.

Horse or cattle manure may be substituted for commercial fertilizer at a rate of 60 to 80 pounds per



100 square feet of garden area. Never use poultry manure on a fall garden.

After adding fertilizer, mix the soil thoroughly and prepare beds on which to plant rows of vegetables. These beds should be 30 to 36 inches apart so you can move easily through the garden area when the plants grow larger. Pile and firm the planting beds.

Then water the entire garden with a sprinkler for at least 2 hours. Allow the area to dry for several days, and it will be ready to plant.

## Planting

Fall crops generally do better when started from transplants than from seed. Transplants should always be used for growing tomatoes and peppers.

The trick to establishing healthy transplants during late summer is to make sure they have plenty of water. Transplants in peat pots or cell packs with restricted root zones require at least 2 weeks for their root systems to enlarge enough to support active plant

**Table 1. Average planting dates for fall vegetables in various growing regions of Texas.**

Vegetables	Region I	Region II	Region III	Region IV	Region V
Beans, snap bush	Jul 15	Aug 1	Sep 1	Sep 10	Oct 1
Beans, Lima bush	Jul 15	Jul 25	Aug 20	Sep 1	Sep 15
Beets	Aug 15	Sep 1	Oct 15	Nov 1	Dec 15
Broccoli	Jul 15	Aug 1	Sep 1	Oct 1	Nov 1
Brussels sprouts	Jul 15	Aug 1	Sep 1	Oct 1	Nov 1
Cabbage	Jul 15	Aug 1	Sep 1	Oct 1	Nov 1
Carrots	Jul 15	Aug 15	Nov 10	Nov 20	Dec 15
Cauliflower	Jul 15	Aug 1	Sep 1	Oct 1	Nov 1
Chard, Swiss	Aug 1	Aug 15	Oct 1	Oct 20	Dec 15
Collards	Aug 1	Aug 15	Oct 10	Oct 20	Dec 15
Corn, sweet	Jul 1	Aug 10	Aug 20	Sep 10	Sep 20
Cucumber	Jul 15	Aug 1	Sep 1	Sep 10	Oct 1
Eggplant	Jul 1	Jun 15	Jul 1	Jul 10	Aug 1
Garlic (cloves)	Jul	Aug	Oct	Nov	Dec
Kohlrabi	Aug 15	Sep 1	Sep 10	Oct 1	Nov 1
Lettuce, leaf	Sep 1	Sep 15	Oct 10	Nov 1	Dec 1
Mustard	Sep 1	Oct 1	Nov 1	Dec 1	Dec 15
Onion (seed)	Not recommended	Not recommended	Nov 1	Dec 1	Dec 15
Parsley	Sep 15	Oct 1	Oct 10	Nov 1	Dec 1
Peas, southern	Jun 15	Jul 1	Aug 1	Aug 15	Sep 1
Pepper	Jun 1	Jun 15	Jul 1	Jul 15	Aug 1
Potato	Not recommended	Aug 1	Sep 1	Oct 1	Not recommended
Pumpkin	Jun 1	Jul 1	Aug 1	Aug 10	Sep 1
Radish	Sep 1	Oct 1	Nov 25	Dec 1	Dec 15
Spinach	Aug 15	Sep 1	Nov 15	Dec 1	Dec 15
Squash, summer	Aug 1	Aug 15	Sep 10	Oct 1	Oct 10
Squash, winter	Jun 15	Jul 1	Aug 10	Sep 1	Sep 10
Tomato	Jun 1	Jun 15	Jul 1	Jul 10	Aug 1
Turnip	Sep 1	Oct 15	Nov 1	Dec 1	Dec 15

**Table 2. Last optimum dates for seeding or transplanting.**

Vegetable	Region I	Region II	Region III	Region IV	Region V
Eggplant, peppers, tomato	Jun 25	Jul 10	Jul 25	Aug 10	Sep 1
Broccoli, Brussels sprouts, cabbage, cauliflower	Aug 1	Aug 20	Sep 20	Oct 20	Nov 20

growth. Until that time, they may need to be watered every day or the plants will be stunted or even die.

However, too much water is just as harmful as not enough. Soaking-wet soil will cause root rotting and subsequent stunting or death. So check the soil moisture by feeling the soil before applying water. If the soil balls together, it still has enough water; if not, apply water.

Buy the largest transplants possible. Even though larger transplants cost more, their root systems will spread faster and the plants will produce more fruit sooner.

Or, grow your own larger transplants by planting small ones in potting soil and evenly mixing in slow-release fertilizer pellets such as Osmocote®. Add a water-soluble fertilizer to the irrigation water and place the plants in full sun (with shade after 3 p.m.). Keep the transplants moist, but don't over-water them.

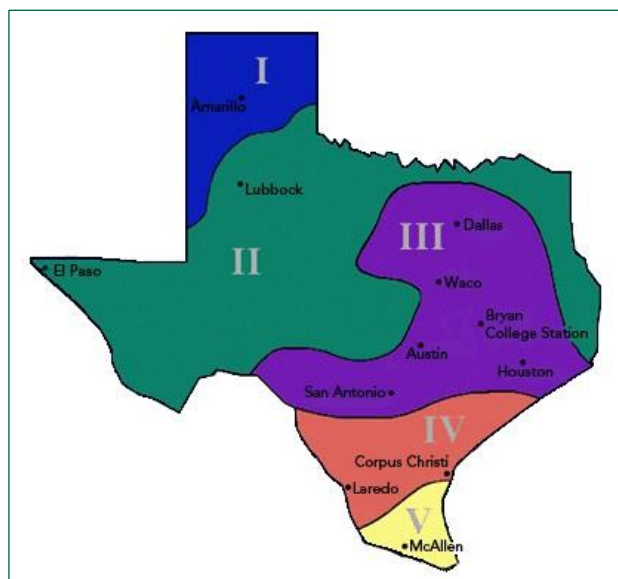
Plant shade-tolerant crops between taller growing vegetables such as tomatoes.

Planting at the proper time is probably the most important factor in successful fall gardening. Table 1 lists average planting dates for each region.

When making planting decisions, compare the temperature extremes in the USDA Hardiness Zone Map at <http://aggie-horticulture.tamu.edu/wildseed/info/hardiness.jpeg> in your area to those of the Texas zones. With these dates in mind, determine which frost-susceptible vegetables to plant, when to plant, and whether to use transplants or seeds.

**Table 3. Average minimum temperatures for Texas gardening zones.**

Texas gardening zone	USDA Hardiness Zone	Average minimum temperature
Zone I	Zone 6	-10–0°F
Zone II	Zone 7	0–10°F
Zone III	Zone 8	10–20°F
Zone IV	Zone 9A	20–25°F
Zone V	Zone 9B	25–30°F



**Figure 1. Gardening regions of Texas.**

Season	Frost-susceptible crops (will be killed or injured by temperatures below 32°F)	Frost-tolerant crops (can withstand temperatures below 32°F)
Early-season vegetables: 30 to 60 days to harvest	Bush bean, summer squash	Beet, leaf lettuce, mustard, radish, spinach, turnip, turnip green
Mid-season vegetables: 60 to 80 days to harvest	Cucumber, sweet corn, lima bean, okra, pepper, cherry tomato	Broccoli, carrots, Chinese cabbage, green onion, kohlrabi, parsley
Late-season vegetables: 80+ days to harvest	Cantaloupe, eggplant, Irish potato, pumpkin, sweet potato, tomato, watermelon, winter squash	Brussels sprouts, bulb onion, cabbage, cauliflower, garlic



Fall vegetable crops are categorized as long-term and short-term crops. The duration of these crops depends on the date of the first killing frost and the cold tolerance of the vegetables.

Group the plants according to their frost tolerance. Plant long-term, frost-tolerant vegetables together. Frost-tolerant vegetables include beet, broccoli, Brussels sprouts, cabbage, carrot, cauliflower, chard, collard, garlic, kale, lettuce, mustard, onion, parsley, spinach and turnip.

Also, plant short-term, frost-susceptible vegetables together so that they can be removed after being killed by frost. Frost-susceptible vegetables include bean, cantaloupe, corn, cucumber, eggplant, okra,

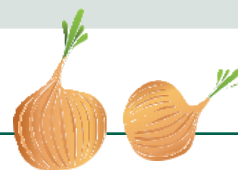
pea, peppers, Irish potato, sweet potato, squash, tomato, and watermelon.

## Search for these Texas varieties

Although many varieties of garden vegetables are available, only three or four varieties of any one vegetable are well suited or adapted to a particular area of Texas. Choose the varieties that are proven to do well in your area of the state.

The varieties listed below are recommended for Texas gardens. Your county Extension agent may have lists of other varieties that should do well for you.

Asparagus	Jersey Giant, Jersey Knight
Beans	<i>Snap</i> : Blue Lake, Derby, Roma II, Topcrop <i>Pinto</i> : Arapaho, Dwarf Horticultural <i>Lima</i> : Henderson Bush, Jackson Wonder, King of the Garden
Beets	Detroit Dark Red, Ruby Queen
Broccoli	Green Magic, Packman, Premium Crop
Cabbage	Bravo, Market Prize, Rio Verde
Carrots	Imperator 58, Nantes Half Long, Red Core Chantenay
Cauliflower	Snow Crown, Snowball Y Improved
Chinese cabbage	Jade Pagoda, Michihili
Cucumbers	<i>Slicers</i> : Dasher II, Poinsett 76, Sweet Slice, Sweet Success <i>Pickling</i> : Calypso, Carolina, County Fair 87
Eggplant	Black Beauty, Black Magic, California White, Early Long Purple
Oriental eggplant	Ichiban, Millionaire, Pingtong Long
Garlic	California Early, California White, Elephant Garlic
Greens	<i>Collards</i> : Blue Max, Georgia Southern <i>Swiss Chard</i> : Bright Lights, Lucullus, Ruby
Kale	Dwarf Blue Curled Vates, Green Curled, Nero di Toscano
Lettuce	<i>Crisphead or Iceberg</i> : Mission <i>Looseleaf</i> : Red Sails, Salad Bowl <i>Butterhead or Bibb</i> : Buttercrunch, Esmeralda, Summer Bibb <i>Romaine</i> : Paris Island, Winter Density
Melons	<i>Cantaloupe</i> : Caravelle, Minnesota Midget, Mission, Primo <i>Honeydew</i> : Sweet Delight, TAM Dew
Mustard	Tendergreen, Southern Giant Curl
Okra	Cajun Delight, Clemson Spineless, Emerald, Lee
Onions	<i>Bulb</i> : Candy (Long Day), Early Grano 502 (Short Day), Granex (Short Day), Texas 1015 Y (Short Day) <i>Green</i> : Evergreen Long White, White Spear







Pepper	<i>Bell:</i> Big Bertha, Camelot, Jupiter <i>Hot:</i> Hot Jalapeño, TAM Hidalgo Serrano <i>Sweet jalapeño-shaped:</i> TAM Mild Jalapeño
Potatoes	<i>Irish: Red:</i> Norland, Purple Viking, Red LaSoda <i>Irish: White:</i> Kennebec <i>Sweet:</i> Beauregard, Centennial, Jewel
Pumpkin	<i>Large:</i> Big Max, Connecticut Field <i>Medium:</i> Bumpkin, Howden, Jack O'Lantern <i>Small:</i> Jack-Be-Little, Lady Godiva, Munchkin
Radish	Champion, White Icicle
Southern peas	<i>Purple hull:</i> Texas Pink Eye <i>Cream:</i> Texas Cream 8, Zipper Cream <i>Black eye:</i> California #5 <i>Crowder:</i> Mississippi Silver
Spinach	Bloomsdale, Early Hybrid, Melody
Squash	<i>Summer:</i> Burpee's Butterstick, Dixie, Multipik <i>Zucchini:</i> Black Magic, Eight Ball Tigress, Gold Rush <i>Winter:</i> Butternut types, Cushaw, Royal (Acorn)
Sweet corn	Kandy Korn (se), Silver Queen (white, su), Summer Sweet (sh2), Sweet G-90 (bicolor, su)
Tomatillo	<i>Tomatillo:</i> De Milpa (Purple), Goldie (Yellow), Toma Verde
Tomatoes	Medium 4–11 oz: Amelia, Better Bush, Celebrity Small <3 oz: Cherry Grande, Gold Nugget, Juliet Paste: Roma, Viva Italia
Turnips	Tokyo Cross, White Lady
Watermelon	<i>Standard:</i> Jamboree, Petite Sweet, Supersweet <i>Seedless:</i> Gem Dandy, Summersweet 5244, Tri X-313

## Fall is for herbs

Herbs are plants that are used as flavoring in foods. The common herbs used in cooking are referred to as culinary herbs. Mild or savory herbs impart a delicate flavor to food, while the stronger or pungent herbs add zest. Herbs are also planted for their ornamental value.

### Planting and propagation

Select a sunny, well-drained location. At planting, apply a slow-release fertilizer at the rate of 2 pounds per 100 square feet.

Herbs can be annuals (live only one season) or perennials (grow back from their root systems each year). Annual herbs can be planted in an annual flower garden or vegetable garden. Plant perennial herbs at the side of the garden where they won't interfere with next year's soil preparation.

Some herbs can be established by planting the

seed directly in the garden or by starting seed indoors for later transplanting to the garden. You can obtain seed from a local garden center or seed catalog, or save the seeds produced by the herb plants for next year's crop.

To save your own seeds, harvest the entire seed head after it has dried on the plant. Then allow the seeds to dry in a protected location that is cool and dry. After the seeds are thoroughly dry, separate them from the seed heads and discard the trash.

Store the seeds in sealed, labeled jars in a dark, cool, dry location. Some herb seeds such as dill, anise, caraway, or coriander can be used for flavorings.

Perennial herbs can be propagated by cuttings or by division. Herbs such as sage and thyme can be propagated by cuttings. Chives can be propagated by dividing the roots or crowns.

Divide the plants every 3 to 4 years in the early spring. Dig them up and cut them into several sections. Or, cut 4- to 6-inch sections of the stem and place the cuttings in moist sand in a shady area. In 4 to 8 weeks, roots should form on these cuttings.

Care for the herb garden is the same as for a vegetable or flower garden.

## Watering

Water as necessary during dry periods. Generally, herbs need about 1 inch of water per week, either from rainfall or from irrigation. Mulch will help conserve soil moisture as well as reduce weed growth. Because mints prefer moist soil, they must be watered more often.

## Harvesting

The leaves of many herbs, such as parsley and chives, can be harvested for fresh seasonings. Gradually remove a few leaves from the plants as you need them. Don't remove all the foliage at one time. With proper care, these plants will produce over a long period.

To harvest rosemary and thyme, clip the tops when the plants are in full bloom. The leaves and flowers are usually harvested together.

Basil, mint, sage, and sweet marjoram are harvested just before the plant starts to bloom. Parsley leaves can be cut and dried anytime.

## Drying

After harvest, hang the herbs in loosely tied bundles in a well-ventilated room. You can also spread the branches on a screen, cheesecloth, or hardware cloth. Spread the leaves on flat trays. Cover the herbs with a cloth that will keep dust off but allow moisture to pass through.

Many of the herbs we grow today are from the Mediterranean region, so hot, dry summer weather suits them perfectly. Herbs need good drainage (they do best in a raised bed) and the right exposure. Most require full sun. Mints and a few other herbs grow well in shade or partial shade.

The herbs below grow well in Texas.

**Basil:** This is one of the easiest herbs to grow, even from seed. However, basil is tender, so expect to lose it at the first sign of frost.

Many varieties and flavors of basil are available. The most common is sweet green basil. More-unusual varieties are cinnamon, Cuban, globe, holy,

lemon, licorice, purple ruffled, Japanese sawtooth, and Thai. Not all are used in cooking.

Basil is the herb to use in all tomato dishes. It can be chopped fine and mixed with butter. Add fresh chopped leaves to vinegar, crushed garlic, and olive oil to make an excellent dressing for sliced tomatoes. It is also used in eggplant, pork, roast chicken, scrambled eggs, and squash dishes.

**Chamomile** makes wonderful herbal tea. There are two varieties: English and German chamomile. The dried blossoms of either can be used to make tea. The tea can also be used as a hair rinse.

To make tea, pour boiling water over about 1 tablespoon of chamomile leaves for each cup desired and let it steep for about 10 to 15 minutes. Filter it through a tea strainer, and add lemon and honey to mask the bitter taste.

Chamomile is an easy plant to grow from seed. Roman chamomile is a low-growing ground cover.

**Catnip:** Many cats like to roll all over catnip and any surrounding plants, so it may be best to grow this herb in a hanging basket. Although it is sometimes used to make a hot tea, catnip is of interest mainly to cats.

**Comfrey** is a vigorous herb with large, "donkey-ear" leaves that look like green sandpaper. A tea can be made from the leaves or roots.

**Lemon balm** is a member of the mint family and can be very vigorous. It's best to grow lemon balm in a confined bed area or in containers. It can be started from seeds, cuttings or roots. Once established, it will spread and self-sow, so give it plenty of room.

The leaves have a strong lemon odor; they can be used to make tea or flavor regular teas. Lemon balm is also added to fish dishes.

**Marjoram** and **oregano** are similar, but the flavor of marjoram is sweeter and more delicate. They're both easy to grow and can be used year round.

Varieties of marjoram include creeping golden marjoram, pot marjoram, sweet marjoram, and winter marjoram. They are best grown from transplants or root cuttings.

The most common types of oregano in Texas are *Origanum vulgare*, the low-spreading plant used in Italian or Greek foods, and *Lippia graveolens* or *Lippia palmeri*, the bushy shrub known as Mexican oregano.

Marjoram and oregano can be used in the same foods—meats, pizza, soups, stews, stuffing, and spaghetti sauce. The leaves are best used dried.

**Mints:** There are many mints. The easiest to grow is spearmint; peppermint is more difficult. Most mints are tough, hardy plants. Other mints include apple mint, pineapple mint, and orange mint, which is so vigorous that it soon becomes a weed.

All mints appreciate moisture and do best where they get afternoon shade. A good place to plant spearmint is at the base of a downspout. Mints can be grown from cuttings, roots, or transplants. Mint plants cross-pollinate easily, so hybrids abound. Spearmint and peppermint are used as culinary herbs and to make teas.

**Rosemary:** There are many forms of rosemary, ranging from a low-growing groundcover to a bush that grows up to 4 feet tall. Rosemary is a hardy plant that thrives in hot, dry climates.

A strong herb, it often used in meat dishes, especially chicken. Use a branch of rosemary as a basting brush for barbecued chicken, or place a few leaves on top of roasts or baked chicken.

**Chives:** The smallest member of the onion family, chives are easily grown from seeds or transplants. Use this herb any way you would use onions. It can be used as garnish or added to baked potatoes, cottage cheese, omelets, and sauces.

**Coriander** is also known as cilantro or Chinese parsley. It is easily grown from seed and can sometimes be found growing wild. To have a steady supply of young leaves, sow seeds every few weeks.

Coriander is used in Mexican dishes. The leaves have a strong, “clean” flavor. Use only young leaves; the older ones are too strong.

The seeds have a flavor similar to orange and are used in pastries, sausage, and cooked fruit. They are also an important ingredient in pickling spice and curry powder.

**Dill** is one of the easiest herbs to grow from seed. It will easily become a weed if the seed heads are allowed to dry on the plant. The large green caterpillars that eat dill will turn into swallowtail butterflies, so plant enough for you and them.

Dill is used in pickling. It can also be added to fish, cottage cheese, cream cheese, salad dressings, and most vegetables. The dried seed can be added to bread dough for a caraway-like flavor.

**Parsley** is probably the most used and least eaten herb in the world because it is used mostly as a garnish. Parsley is a biennial, producing leaves the first year and flowers the next. There are two forms: the flat-leaved or Italian parsley, and the curly or French parsley. Many hybrids of each are available as seeds or transplants.

The seeds germinate slowly, but parsley is worth the wait. It is loaded with vitamins and minerals. It can be battered and deep-fried, or browned with butter and garlic to make a basting sauce for grilled meats.

**Sage** doubles as a durable landscape plant. It is very drought resistant and can be killed by over-watering. Although sage is best started from transplants or cuttings, it can be started from seed.

Varieties of sage include blue, clary, garden, golden, pineapple, and tri-color. All can be used in cooking.

Sage leaves should always be dried before use. It can be used in black-eyed peas, chicken, egg and cheese dishes, pork, and poultry stuffing. When dried, leaves will keep their flavor for years.

**Thyme** is a good ornamental in beds and rock gardens. There are more than 400 species of thyme, including common, English, golden, lemon, mother-of-thyme, silver, and woolly.

Thyme is used in soups and fish, meat, poultry, and vegetable dishes. Add a pinch of thyme to a tablespoon of honey and mix with drained cooked carrots and onions. Thyme is a key herb in making Cajun gumbo.

Along with sage, rosemary, marjoram, and oregano, thyme should be considered a basic of every herb garden.

## Caring for vegetable plants

### Watering

Many people consider watering one of the most enjoyable jobs in the garden. However, many gardening problems—including diseases, bitter fruit, poor fertility, poor quality, sunscald, and poor yield—can be related to improper watering.

Do not water lightly several times a week, which causes poor root development. Instead, water thoroughly, soaking the soil to a depth of 6 inches, and only when the plants need it. An inch or two of water applied once a week is usually enough for most vegetable gardens in Texas.

Determine when to water by examining the soil, not the plants. If the soil surface appears dry, scratch it to a depth of 1 inch to see if the soil is moist. If so, do not water. If the soil is dry at a depth of 1 inch, it's time to water.

Light, sandy soils drain quickly and must be watered more often than heavy clay soils, so check sandy soil more often.

One of the best ways to water a garden is with a drip irrigation system. Drip irrigation controls the application of water by releasing it slowly over a long period. When the rate of drip irrigation is adjusted correctly, there will be no puddles, runoff, or saturated soil.

When buying a drip irrigation system, look for one that can be adapted to your garden's size and shape. The hose will need to be placed along each row to irrigate the plants' root zones.

Before laying out the drip irrigation hose, firm the soil in the rows to help the water move laterally in the soil as well as downward. For the pre-plant irrigation, you may need to sprinkle the entire garden to settle the soil enough for drip irrigation water to move laterally, especially in sandy soils.

## Protecting plants from insects and diseases

Expect insect and disease problems. When they appear, the first step is to identify the cause correctly. For help in identifying insect damage and disease symptoms, refer to publications in Extension's Easy Gardening series (<http://agriflifebookstore.org>).

To produce a good yield, protect the plants much as possible. Many pesticides can help protect vegetables from insects and diseases. Before buying, read the product label carefully to make sure it is the right one for your intended use. Always follow the label directions carefully.

Other techniques do not use pesticides; they protect the plants before they are damaged. One method is to protect the plants with covers that keep insects away. Insects damage plants by feeding on them, and some insects—including aphids, whiteflies, thrips, and leaf-feeding beetles—also transmit diseases. Although it is impossible to keep insects away from plants entirely, plant covers can help.

Covers can be of clear plastic or a translucent, fabric-like material known as row cover or spunweb. Covers can be used on row crops but are easiest to use on plants that are caged, such as tomatoes and peppers. Install the cages around young transplants

and cover them to the ground with the plant covers. Anchor the covers securely in the soil.

Because heat can build up under plastic covering, ventilate it during the day if temperatures are in the high 70s or more. Ventilate the cages by opening the top and raising the plastic 4 to 6 inches off the ground at the bottom. The cover will still protect the plants because most insects do not enter from the top.

On cold nights, close the covers. Remove plastic covering entirely when the foliage begins to touch the edges and bunch against the sides of plastic. For tomatoes, this will usually be about the time the plant has marble-sized fruit.

Plants covered with spunweb never need to be uncovered. Spunweb will not overheat plants because the temperature inside the material is about 15°F cooler than the outside temperature. Used in the fall, spunweb also gives plants some shading from the hot sun.

However, spunweb does not provide as much cold protection as plastic, so each cage will have to be artificially heated (such as with Christmas lights) if temperatures fall below freezing.

Cover can also protect the plants from wind. Winds as low as 15 mph can significantly slow plant growth, delay harvest, and decrease yields.

You may wonder if plants will set fruit when covered with plastic or spunweb, since no bees or other insects are able to enter. It's not a problem for tomatoes, peppers, and eggplants, which are 85 percent self-pollinated; that is, they don't need insect pollination to set fruit.

To ensure adequate pollination for other vegetables, shake the covered cages vigorously every day after bloom begins, or thump the bloom clusters daily with your finger. You can also artificially set early blooms by spraying bloom clusters with a plant hormone spray such as Blossom-Set®. The resulting fruit will have fewer seeds.

Spunweb will protect seedlings from birds and other pests, and cole crops (such as broccoli and cabbage) from leaf-eating caterpillars. You can also use spunweb to "vine ripen" fruit.

Nematodes are a common garden problem. They can severely damage all crops except corn, garlic, onions, and nematode-resistant tomatoes. The symptoms of nematode damage above ground are like those of many other root diseases or of environmental problems such as inadequate water or nutrient deficiency: The plants look wilted or stunted, have chlorotic or pale green leaves, and yield less produce.



## Garden problem guide

Symptom	Possible causes	Possible cures
Dying young plants	Fertilizer burn	Mix the fertilizer thoroughly with the soil; don't apply too much fertilizer.
	Disease (damping off)	Use treated seed, or drench transplants with a fungicide.
Stunted plants, pale to yellow leaves	Low soil fertility	Test the soil for nutrients needed.
	Poor soil drainage	Add organic matter or plant in raised beds.
	Shallow or compacted soil	Work the soil deeper.
	Insects or diseases	Identify the cause and use appropriate control measures.
Stunted plants, purplish color	Nematodes	Plant Elbon rye in the fall; solarize the soil; plant marigolds in summer.
	Low temperature	Plant at the recommended time.
Holes in leaves	Lack of phosphorus	Add phosphorus fertilizer.
	Insects	Identify the insect and use appropriate control measures.
Spots, molds, darkened areas on leaves and stems	Disease	Identify the cause; spray or dust at the recommended rate and time.
	Chemical burn	Use recommended chemicals at the recommended rate and time.
	Fertilizer burn	Keep fertilizer off plants.
Wilting plants	Dry soil	Irrigate if possible.
	Excess soil moisture	Avoid overwatering.
	Disease	Use resistant varieties if possible.
Weak, spindly plants	Too much shade	Move the garden to a sunny area.
	Plants too crowded	Seed at the recommended rate; thin the plants.
Failure to set fruit	Improper temperatures	Plant at the recommended time.
	Too much nitrogen	Avoid excessive fertilization.
	Insects	Identify the insect and use appropriate control measures.
Tomato leaf curl	Heavy pruning in hot weather	Do not prune; use cages.
	Varietal problem	Use a different variety.
Dry brown to black rot on blossom end of tomato	Low soil calcium	Add gypsum.
	Extremely dry soil	Irrigate and mulch.
	Too much water	Plant on raised beds or reduce irrigation.
Misshapen tomatoes (catfacing)	Cool weather during blooming	Plant at the recommended time.
	Stink bug damage	Apply insecticides.
Abnormal leaves and growth	2,4-D weed killer	Do not use a sprayer that previously contained 2,4-D; do not allow the spray to drift to the garden.
	Virus disease	Remove the infected plants to prevent spreading; control the insects that transmit the virus.





The most characteristic symptoms of nematode damage are underground. Infected roots will swell and form knots or galls. Fast-growing annuals will have large, fleshy galls; woody perennials will have small, hard galls. Infected tubers, corms, or other edible roots will have small swellings or pimples on the surface.

There are several ways to combat nematodes. For a spring garden, plant cereal rye (Elbon) in the fall.

For fall gardens, solarize or pasteurize the soil in July by tilling it well and watering until it is very moist; then cover the soil with clear plastic. Seal the edges and leave the plastic in place for at least a month. Do not use black plastic because the soil will not heat up enough to destroy the nematodes. Solarization also helps control fungi and weeds.

In areas heavily infested with nematodes, plant marigolds in the garden area in August. Marigold roots release a substance that is toxic to nematodes. Plant marigolds 12 inches apart and allow them to grow until the fall planting of cole crops (such as broccoli, cabbage, cauliflower, kale, mustard, and turnips) begins in October. Then remove the tops of the marigolds and till their roots into the soil.

Many gardeners avoid planting marigolds because they attract spider mites to the garden. However, the spider mites will be virtually eliminated when the garden is tilled in August for planting with marigolds. Because mite populations decline as the weather cools in the fall, they will not have time to increase to damaging numbers when the fall garden crops are growing.

## Harvesting fall produce

To get the best results from your garden, harvest produce properly and at the right time. Below are some tips to help you.

**Beans, snap:** For maximum tenderness, harvest beans before maturity when the pods are not completely full. Wash and refrigerate them immediately.

**Beets:** Pull early beets when they are about 2 inches in diameter. Larger beets are woody, especially in warm, dry weather. Remove all but about 1 to 1½ inches of the tops. Wash and refrigerate them immediately.

**Broccoli:** Harvest broccoli heads when they are firm, compact, and 4 to 8 inches in diameter. Determine the maximum size by watching the floret development. Broccoli heads are composed of many

individual flowers called florets. The head is as large as it will be when the individual groups of florets begin to loosen, emerge from the surface of the head, and are not tightly clustered. Cut the stalk below the head, leaving 8 to 10 inches of stem and attached leaves. Chill the heads immediately.

**Brussels sprouts:** Harvesting usually begins 3 to 3½ months after transplanting. Early sprouts should be picked several times, taking the lowest on the plant each time; otherwise, they will open and become yellow. The first harvest should occur before the lower leaves begin to turn yellow; otherwise, the sprouts will toughen and lose their delicate flavor.

When picking Brussels sprouts, break off the leaf below the sprout and then remove the sprout by breaking it from the stalk. As the lower leaves and sprouts are removed, the plant continues to push out new leaves at the top, and new buds, or sprouts, are formed. Remove all lower sprouts, even those that do not make solid little heads.

**Cabbage:** Cabbage is mature and as large as it will get when the head becomes solid and the sides or top cannot be pressed in with the thumb. Mature heads often split open.

To delay the harvest of mature cabbage yet prevent this splitting, twist the entire plant slightly to break several roots. The breakage will reduce the uptake of water from the soil and delay splitting.

**Cauliflower:** Harvest cauliflower heads when they are firm, compact, and 4 to 8 inches in diameter. Like broccoli, the heads are as large as they will get when the individual groups of florets begin to loosen and emerge from the head. To harvest cauliflower, cut the stalk just below the head.

The yellowish color of the cauliflower surface is caused by exposure to sunlight. To prevent discoloration, when the small bud head appears in the center of the plant, draw the lower leaves of the plant loosely over the bud in a tent-like fashion. Tie the leaves together with a string or rubber band.

The leaves of cauliflower, broccoli, and Brussels sprouts also can be harvested and eaten as greens.

**Carrot:** There are many varieties of carrots with different potential sizes and lengths. Most mature fully within 60 to 85 days but can be harvested earlier.

The crown size can indicate maturity. The crown, where the foliage attaches to the root, is usually at least ¾ inch in diameter when the carrot is mature. Another test for maturity is to pull the largest carrot



and examine the bottom or growing tip. If the tip is orange, the carrot is mature. If the tip is white, the carrot is still growing.

There is no need to harvest the carrot crop all at once. Carrots can be left in the ground for several weeks after they mature. In fact, the best place in Texas to store carrots is in cool garden soil.

**Cucumber:** Harvest cucumbers when they are bright, firm, and green but before they get too large. About 1 to 2 inches in diameter is right, with the smaller size best for pickling.

Discard all nubbins (small, undeveloped cucumbers), and poorly shaped or light-colored fruits. If possible, do not store cucumbers in the refrigerator for more than 2 days. It is best to pickle cucumbers the same day they are picked.

**Greens:** Harvest greens while the leaves are young and tender and before they start turning yellow or brown. Slight bronze tints are normal on mustard greens. Avoid wilted or flaccid leaves. Wash and chill them immediately.

**Peppers:** Harvest peppers when they are 4 to 5 inches long and have full, well-formed lobes. Immature peppers are pale, soft, pliable, and thin fleshed. Wash and chill the peppers immediately.

**Spinach:** Harvest spinach when six or more crisp, dark green leaves have formed. Wash them gently and chill immediately. Cut the leaves from the plant to encourage re-sprouting.

**Squash:** Harvest yellow crookneck squash when it is 4 to 6 inches long; harvest yellow straight-neck squash when it is 6 to 9 inches long; and harvest white scallop squash when it is 3 to 4 inches in diameter. A glossy color indicates tenderness.

Wash, dry, and store squash in a warm area of the refrigerator. Like cucumbers, squash are susceptible to chilling injury and should not be stored for more than 2 days.

**Tomato:** Harvest tomatoes at the pink stage, and ripen them in a warm area of the house. Harvesting at this time will not affect flavor, and it may prevent damage by insects and birds.

## Acknowledgment

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