



Beets

Beets - Overview

- Cool-season crop
- Grows best in cool temperatures of spring and fall
- Grown mainly for their roots and leaves
- About 10 feet of row per person will provide enough beets

Beets – Site Selection

- Can be planted in partial shade
- Grow best in deep, well drained soil
- Have deep roots that can reach depths of 36-48 inches
- Do not plant where tree roots will compete

Beets – Soil Preparation

- Add organic matter to help loosen the soil
- Do best in sandy soil in spring (soil warms faster) and heavier soil (clay) in fall
- Do not grow well in tight clay soils
- Make sure site has adequate drainage
- Sensitive to soils deficient in boron

Beets - Varieties

- Grown for both the root and tops
- Varieties
 - Chioggia
 - Detroit Dark Red
 - Pacemaker II
 - Red Ace
 - Ruby Queen

Beets – Planting

- Can be grown all winter in much of South Texas
- Farther north, plant as soon as soil can be worked in the spring
- Soil temperature must be at least 40 degrees for beet seeds to sprout

Beets - Planting

- Each seed produces 2 to 6 plants
- Space seeds 1 to 2 inches apart
- Plant about ½ inch deep
- Cover seeds lightly with loose soil
- Plants should be up in 7 to 14 days
- For continuous supply, make several plantings 3 weeks apart

Beets - Fertilizing

- Scatter 1 cup of complete fertilizer (10-20-10) for each 10 feet of row
- Mix scatter 1 tablespoon of fertilizer for each 10 feet of row beside the plants when they are 4 to 6 inches tall

Beets - Watering

- Water well weekly if it does not rain
- Roots can reach 36 inches or more if adequate soil moisture is available

Beets – Care During Season

- Keep plants free of weeds
- Do not work the soil more than 1 inch deep or the root system may be injured
- Begin thinning as soon as they get crowded in the row
- After thinning, plant should be 2 to 3 inches apart

Beets - Harvesting

- Should be ready for harvesting 7 to 8 weeks after planting
- If using only the root, harvest when the size of golf ball or larger
- Leaves can be harvested at any time until they get large and strong flavored
- Use leaves within 1 to 2 days
- Use roots within 1 to 2 weeks

Beets - Insects



Flea Beetle



Aphid



Webworm

Treat with
either Sevin,
Bt, or sulfur



Beet Armyworm

Beets - Diseases

- Diseases are most severe in cloudy, damp weather
- Neem oil, sulfur, or other fungicide are available for use
- Always follow label directions

Beets - Serving

- Can be served fresh, preserved plain or pickled
- Beet greens are an excellent source of vitamin A and calcium



Carrots

Carrots Overview

- Excellent source of vitamin A
- Add color to a meal
- Served cooked or raw
- For home planting, 5 to 10 feet of row per person should be enough for table use
- One foot of row will yield about 1 pound of carrots

Carrots – Site Selection

- Do best in loose, sandy loam soils that are well drained
- In heavy soils, mature more slowly and roots are often misshaped
- Will grow in some shade

Carrots – Soil Preparation

- Clean area of weeds
- Loosen the soil 8 to 12 inches deep
- Do not pack the soil – want good movement of air and water in the soil
- Place carrot rows 1 to 2 feet apart

Carrots - Varieties

- Varieties that do best in Texas
 - Danvers 126
 - Danvers Half Long
 - Imperator 58
 - Nantes
 - Nantes Half Long
 - Red Core Chantenay
 - Royal Chantenay
 - Scarlet Nantes
 - Sugar Snax

Carrots - Planting

- Begin planting as soon as soil can be worked in spring
- In South Texas, plant from July through February
- In other parts of Texas, plant in August
- Plant $\frac{1}{2}$ inch deep
- Scatter 18-20 seeds per foot in the row
- Sprout in 14-21 days

Carrots - Planting

- Grow best in cool temperatures of early spring and late fall
- Night temperatures of 55 degrees F and day temperatures of 75 degrees F are ideal
- High temperature causes poorly colored, low-quality carrots

Carrots - Fertilizing

- Scatter 1 cup of 10-10-10 fertilizer for each 10 feet of row before planting; mix into soil
- Scatter 2 tablespoons fertilizer for 10 feet of row when tops are about 4 inches high
- Fertilize again when tops are 6 to 8 inches high if the tops become pale

Carrots - Watering

- Water as needed to keep the soil moist to about 3 inches deep

Carrots – Care During Season

- When tops are 4 inches tall, thin plants to 2 inches apart
- Thin to 4 inches apart as they continue to grow
- Overcrowding and rocky soil leads to poor quality carrots

Carrots - Weeds

- Keep the carrot patch free of weeds
- Weeds will take nutrients and moisture from the soil and reduce carrot yields

Carrots - Insects



Cutworms



Wireworms

Control with:

Sevin – synthetic insecticide

Bt or Sulfur – organic options

Before using a pesticide, read the label and always follow cautions, warnings, and directions.

Carrots - Diseases

- Leaf spot
 - Treat with fungicide
 - Remove any plant that becomes yellow and stunted
- Roots with knots
 - Nematodes
 - Treat with neem oil, sulfur, and other fungicides

Carrots - Harvesting

- Should be ready to harvest 70-80 days after planting
- Pull from soil when roots are 1 to 1 1/2 inches in diameter
- To prevent roots from wilting after harvest, remove tops

Carrots - Storage

- Wash and store in bottom of the refrigerator
- Will keep several weeks if placed in plastic bag to increase humidity
- Store at temperature near 32 degrees F



Radishes

Radish - Overview

- Cool season crop
- Do not do well in the hot summer months
- Root is usually eaten raw
- Leaves can be eaten when young and tender
- A row 10 feet long is enough for a family of 4

Radish – Site Selection

- Can grow in partial shade
- Require little room
- Mature quickly
- Well suited to small gardens, flower beds, and containers

Radish – Soil Preparation

- Need loose, well-drained soil to allow roots to expand easily
- Small pieces of plant material can be mixed into the soil to make it richer
- Fertilize with 1 cup of 10-20-10 for each 10 feet of row

Varieties

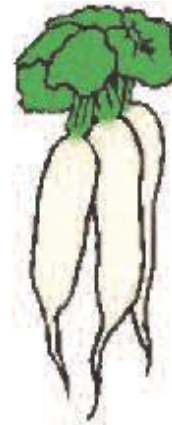
Red Varieties

- Champion
- Cherry Belle
- Early Scarlet
- Early Scarlet Globe



White Varieties

- Chinese White Winter
- Summer Cross
- White Icicle



Radish - Planting

- Plant seeds as soon as soil can be worked in the spring
- Plant seeds $\frac{1}{2}$ inch deep and 1 inch apart in a row. Cover lightly with soil.
- Plants should be up in 4-6 days
- Ready for harvest in 4-5 weeks

Radish – Care During Season

- Water plants well if it doesn't rain
- Begin thinning when roots start expanding. Pull every other plant.
- Keep free of weeds – weeds rob root systems from nutrients and moisture



Radish - Harvesting

- Harvest when young and tender
- If left too long, they get tough, hot tasting, and stringy
- Cut off tops and small roots, wash well and place in plastic bag in refrigerator
- They will keep for 2 to 3 weeks

Radish – Insects and Disease

Insects

- Sevin – synthetic insecticide
- Sulfur – organic
- Bt – organic treatment for caterpillars

- Read label before using and follow label directions!

Disease

- Because radish mature so quickly, disease not usually a problem
- Neem oil, sulfur are available fungicides



Turnips

Turnip - Overview

- Member of the cabbage family
- Cool season crop – grown in cool temperatures of early spring and fall
- Grown for leaves and root
- High in minerals and vitamins A and C

Turnip - Varieties

- A variety developed for root production can be harvested for greens
- A variety developed for greens may not produce a good root

Turnip - Varieties

Greens

- Alamo
- All Top
- Seven Top
- Shogoin
- Topper
- All Top

Roots

- Just Right Hybrid
- Purple Top
- White Globe
- Royal Crown
- Royal Globe
- Tokyo Cross
- White Lady

Turnip – Site Selection

- Full sun
- Well-drained soil
- Easily grown in window boxes and containers



Turnip – Soil Preparation

- If heavy clay soil, add compost or other organic matter
- Heavy soil can cause roots to be rough and poorly shaped
- Loosen soil 10 to 12 inches deep



Turnip - Planting

- Plant seeds as soon as soil can be worked in the spring
- Seeds will sprout if soil temperature is 40 degrees F or higher
- For fall crop, start planting 8 to 10 weeks before first expected frost
- Most plants should germinate in 3 to 7 days

Turnip - Fertilizing

- Before planting, till the soil and scatter 2 to 3 pounds of 10-20-10 fertilizer over each 100 square feet
- Phosphorus is especially needed to grow good turnip roots



Turnip – Care During Season

- Pull weeds by hand
- When plants become crowded, thin by pulling
- Leave turnips 3 to 4 inches apart
- When plants are 4-5 inches tall, apply $\frac{1}{2}$ cup fertilizer for each 10 feet of row
- If soil is sandy and the season is wet, apply more fertilizer later

Turnip - Insects



Flea Beetle



Aphid

Treat with
either Sevin,
Bt, or
Malathion



Cabbage Looper

Larva Adult



Root Maggot

Turnip - Disease

- Most severe in cloudy, damp weather
- Treat with fungicide
 - Neem oil
 - Sulfer
- Read and follow label directions

Turnip - Harvesting

- Greens are good until weather gets hot
- Too much heat causes them to be tough and strong flavored
- Cut large outer leaves and leave inner leaves to continue growing
- Most turnip varieties produce greens in 40 days
- Roots generally take 50 to 60 days

Turnip - Harvesting

- Harvest greens when leaves are 4 to 6 inches long
- Roots can be harvested when they are 2 to 2 ½ inches in diameter
- If left longer, roots will get tough and stringy
- Turnips lose quality and go to seed quickly when days become long and hot

Turnip - Storing

- Greens can be stored several days in closed plastic bags in refrigerator
- Roots can be kept for several weeks in a cool, humid area

Turnip - Serving

- Cook greens only until they are tender
- Roots can be served cooked or raw





Garlic

Garlic - Varieties

- California Early
- California Softneck
- Elephant Garlic
- French Mild Silverskin
- Mexican Purple
- New York White

Garlic – Growing Conditions

- Sandy or clay loam with a pH range of 6.0 – 8.4
- Cool conditions during growing season
- Requires temperature below 40 degrees F for 6-8 weeks for vernalization
- Once vernalized, bulbing starts when day length exceeds 13 hours and soil temperature exceeds 60 degrees

What is Vernalization?

- The cooling of seed during germination in order to accelerate flowering when it is planted.

Garlic - Establishment

- Planting Method – transplant cloves
- Optimum Time – when soil temperature at 2” depth less than 85 degrees
- Seeding Depth – 1”
- Seedling Spacing – 3”-4” apart. Allow more space for elephant garlic



Garlic – Fertilizing and Watering

- Apply fertilizer prior to or at planting
- Use a fertilizer higher in nitrogen, same amounts of phosphorus and potassium
- Apply additional nitrogen as rapid growth begins in the spring
- Water is critical from time of rapid growth initiation in spring until maturity (yellowing of tops)
- Water 1"-2" per week
- Discontinue watering after cloves are well filled and desired bulb size is obtained, and 3-5 well formed scales surround bulb

Garlic Diseases

- Botrytis
- Downy Mildew
- Nematode
- Pink Root
- Powdery Mildew
- Purple Blotch
- White Rot
- All can be treated with labeled fungicides

Garlic Insect Pests



Cutworm



Armyworm



Thrips



Mites

Garlic - Harvest

- Harvest 150-200 days after planting
- Harvest when tops dry and begin to fall
- Let dry 10-14 days before use
- Grades: U.S. #1 – uniform, free of defects and true to variety type
- Store at 50 degrees F at 65-70% relative humidity



Jicama

Jicama

- Legume - Grown for large tuberous roots
- Eaten raw or cooked and are used as a source of starch
- Plant is a vine which can grow to 20 feet or more
- Light brown roots can weigh up to 50 pounds
- Most in the market weigh 3 to 5 pounds
- Also known as Yam Bean and Mexican Turnip



Jicama - Culture

- Perennial
- Produce their large roots after several years of growth
- Commonly found in frost-free regions
- In Texas, plant seeds in early spring and harvest small tubers before first killing frost
- Plants exposed to relatively long days of 14-15 hours do not produce tubers
- Areas with mild fall or winter temperatures are best suited for production

Jicama - Selection

- Suitable for consumption at any stage of growth (size)
- Look for well formed tubers that appear fresh and are free of cracks and bruises
- Store for relatively long periods in refrigeration
- Conversion of starch to sugar occurs if stored from excessive periods and should be avoided



Onion

Onions - Overview

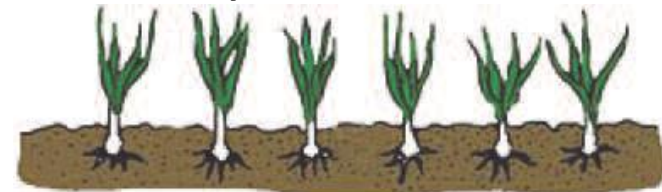
- Grow very well in Texas
- Green onions may be eaten fresh or chopped and added to salads
- Bulb onions may be sliced and eaten raw or battered and fried as onion rings
- Mostly used as a flavoring in other food dishes
- Great source of vitamins A and C

Onions - Varieties

Short day (11–12-hour day length)	
Yellow	Chula Vista, Cougar, Jaguar, Legend, Linda Vista, Mercedes, Prowler, Safari, Sweet Sunrise, TX 1015Y, Early Grano 502, Granex
White	Cirrus, Marquesa, TX Early White, Crystal Wax
Red	Red Bone, Rio Santiago, Sakata Red, Red Burgandy
Intermediate day (12–13-hour day length)	
Yellow	Caballero, Cimarron, Riviera, Utopia, Yula
White	Alabaster, Mid Star, Sierra Blanca, Spano
Red	Fuego
Long day (14–16-hour day length)	
Yellow	Armada, Capri, Durango, El Charo, Ole, Seville, Sweet Perfection, Valdez, Vaquero, Vega
White	Blanco Duro, Sterling, White Spanish Sweet
Red	Tango

Onions - Planting

- Plant in area with full sunlight and well drained soils
- Work soil 8-10 inches deep and remove rocks and break up clods
- Can be planted from seeds, small bulbs called sets, or transplants
- If planting seeds, plant $\frac{1}{4}$ " deep during October through December
- When plants are 6 inches high, thin to one plant every 2 to 3 inches
- If using sets or transplants, plant them $\frac{3}{4}$ " deep and 3 inches apart
- Plant sets and transplants in January or February



Onions – Fertilizing and Watering

- Use 2-3 pounds of a 10-10-10 fertilizer over a 100-square-foot area
- Carefully mix into the top 3 to 4 inches of soil
- Water once a week in the spring
- Water more during dry, windy weather
- Water slowly and deeply to help grow strong, healthy roots

Onions – Care during the Season

- Remove weeds to reduce competition for nutrients
- Fertilize when onions have 5 to 6 leaves to help grow larger plants and bigger bulbs
- Use about $\frac{1}{2}$ cup fertilizer for each 10 feet of row
- Water after adding fertilizer
- Each leaf forms a ring in the onion – more leaves means more rings and bigger bulbs

Onions - Insects

- Onions have few insect problems
- Thrips may be found between the center leaves

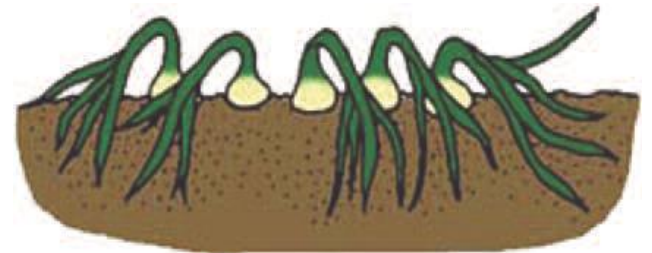


Onions - Disease

- May be a problem
- Brown leaf tips or brown spots on the middle and lower parts of leaves may be caused by plant diseases
- Sulfur, Neem oil, and other fungicides can be used
- Read product label before using

Onions - Harvesting

- Should be able to harvest in May/June
- If used as green onions, harvest from the time they are pencil size until they begin to form bulbs
- Onions are ready when the main stem begins to get weak and fall
- Let onion dry 1 to 2 days, then remove tops and roots and let them continue to dry
- Store in a refrigerator crisper or in a dry, airy place





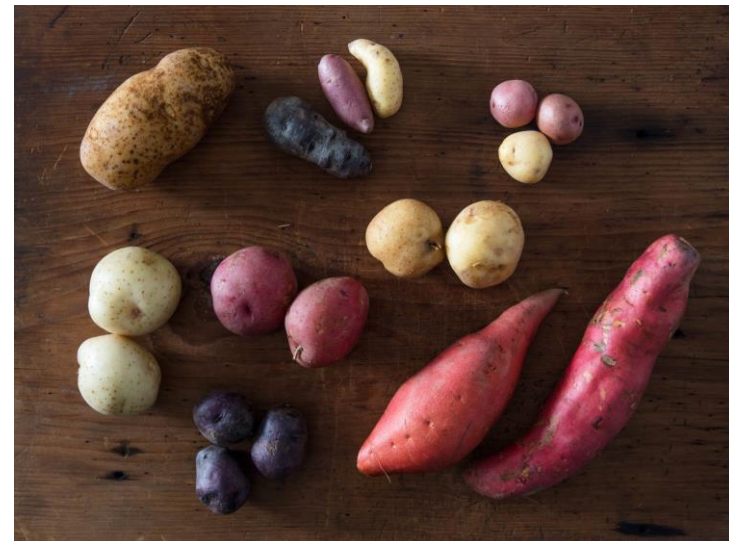
Potatoes

Potatoes - Overview

- The average American eats about 125 pounds of potatoes and potato products each year
- Edible part of the plant is an underground stem called a tuber (not a root)
- Contains 2% protein and 18% starch
- Cool-season crop; grow best in early spring and late fall
- Tops cannot withstand frost

Potatoes - Varieties

- Most common types of Irish potatoes are red and white
- Most red varieties store longer than white varieties
- Most white varieties have better cooking qualities than red varieties



Potatoes - Varieties

Red Flesh

- Dark Red Norland
- Norland
- Red LaSoda
- Viking

Yellow Flesh

- Yukon Gold

White Flesh

- Atlantic
- Gemchip
- Kennebec
- Superior

Russet

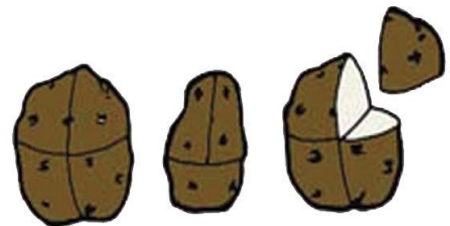
- Century Russet
- Norgold M
- Russet Norkatah

Potatoes – Seed Preparation

- Not grown from seed but from part of the potato itself
- Buy seed potatoes that are free of disease and chemicals – don't buy potatoes from the grocery store for planting
- Seed potato contains buds of “eyes” that sprout and grow into plants
- Seed piece provides food for the plant until it can develop a root system
- One pound of seed potatoes will make 9 to 10 seed pieces

Potatoes – Seed Preparation

- For spring planting, cut large seed potatoes into pieces about the size of a medium chicken egg
- Each seed piece must have at least one good eye
- Cut the seeds 5 to 6 days before planting
- Place seeds in a well-ventilated spot so it can heal over to prevent rotting when planted
- For fall planting, plant small, uncut potatoes, about 1 ½” in size, because they are more resistant to rotting



Potatoes - Planting

- Chose site that gets full sun in loose, well-drained, slightly acidic soil
- Apply fertilizer before planting – 2 to 3 pounds of 10-20-10 for each 30 feet row.
- Apply in bands 2 inches to each side and 1 inch below seed piece
- Do not allow fertilizer to touch the seed piece



Potatoes - Planting

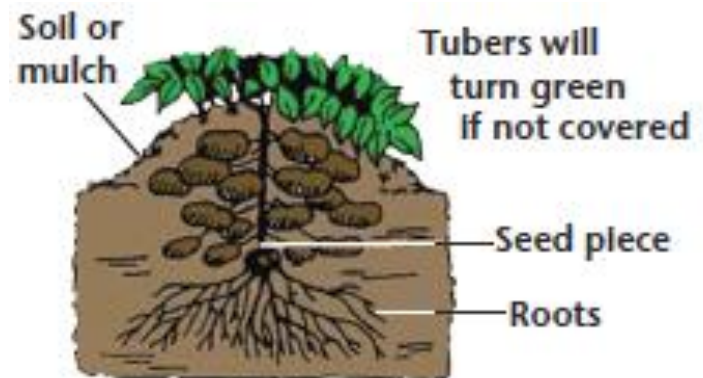
- Plant when soil temperature 4 inches deep reaches about 50 degrees, or about 3 weeks before the last spring frost (February-early March)
- In fall, plant about 110 days before the first expected frost (mid-August)
- Plant about 3 inches deep, 10-12 inches apart

Potatoes – Fertilizing and Watering

- When plants are 4 inches tall, apply 1 cup fertilizer for each 30 feet of row. Apply beside the plants
- Water in fertilizer after application
- Keep the soil moisture supply constant
- Too much water enlarges the pores on the tubers and makes them rot easily in storage
- Too little water can cause cracking of the tubers in the soil

Potatoes – Care during the Season

- All tubers will arise from above the seed piece
- Because the seed piece is only 3 inches deep, soil must be pulled towards the plant as it grows
- As the potatoes enlarge, they must be protected from sunlight or they will turn green



Potatoes - Insects



Aphids



Wireworm



Flea Beetle



Colorado Potato
Beetle



Leafhopper

Potatoes - Diseases

- Treating seed with fungicide before planting can be helpful
- Neem oil, sulfur, and other fungicides are labeled for use on potatoes
- Rotational planting in the garden helps control most diseases
- If possible, do not plant potatoes, eggplant, okra, pepper or tomato in the same place more than once every 3 years

Potatoes – Harvesting and Storing

- Ready to harvest when tops begin to die and potato skin becomes firm, usually 95-110 days after planting
- Skin is set when it does not scrape off easily when rubbed
- Most potatoes should weigh 6 to 12 ounces at harvest
- “New Potatoes” can be harvested at any time during the growing period
- Dig potatoes when the soil is moist so soil will shake away from spuds
- Pull potatoes from vine and try not to damage the potato
- Allow to dry, then store in a cool spot with good ventilation

Sweet Potato



Sweet Potatoes - Overview

- Excellent source of beta-carotene, which is converted by the body into Vitamin A
- Member of the Morning Glory family
- Produces colorful flowers as well as trailing vines often used as groundcovers
- Perennial plant, originating in the tropical Americas
- In the US, it is treated as a warm-season annual
- Texas is the 5th largest producer in the US
- Production concentrated in Van Zandt County

Sweet Potatoes – Varieties

- Hundreds of varieties
- Common food varieties:
 - Beauregard – most popular
 - Centennial
 - Jewell
 - Vardaman



Sweet Potatoes - Climate

- Hot days and warm nights are ideal
- Extremely heat tolerant
- Can tolerate light frost as long as the soil temperature stays above 55 degrees F
- Like full sun
- Planted in a well-drained, fine sandy loam soil with a slightly acidic pH 5 to 7.5

Sweet Potatoes – Propagation

- Propagated from slips, also called vine cuttings
- Can be produced at home, purchased, or ordered
- Wait 2 weeks after the last frost to begin planting outside
- Optimal planting time is when soil temperature at planting depth is over 65 degrees in the spring and at least 150 days before anticipated 55-degree temperature in the fall (March)



Sweet Potatoes – Watering

- Sweet potatoes need 10 to 20 inches of water per season
- Water as needed
- Transplanted slips are extremely sensitive to water stress during the first month of establishment
- To keep tubers from rotting, do not water in the last 2 to 3 weeks before harvest

Sweet Potatoes – Disease and Insects

Pest	Control
<i>Diseases</i>	
Leaf spots	Clove, neem oil, rosemary, sulfur, thyme oil
Nematodes	Azadirachtin, sesame oil*
<i>Insects</i>	
Beetles	Azadirachtin, garlic juice extract, pyrethrins
Cutworms	Azadirachtin, Bt
Weevils	Azadirachtin, garlic juice extract

**Not listed by the Organic Materials Review Institute (OMRI)*

Sweet Potatoes - Harvesting

- Sweet potato has a delicate skin that is easily bruised at harvest
- Harvest immediately before or just after the first fall frost
- Harvest when leaves turn yellow – growth has stopped and the roots have matured