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 $\frac{1}{2}$ 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

Treat with either Sevin, Bt, or sulfur

Webworm

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 ½ 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

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 ½ 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
- Cabbage Looper
- Root Maggot

Treat with either Sevin, Bt, or Malathion
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 tot 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

- **Armyworm**
- **Cutworm**
- **Mites**
- **Thrips**
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
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)

<table>
<thead>
<tr>
<th>Color</th>
<th>Varieties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow</td>
<td>Chula Vista, Cougar, Jaguar, Legend, Linda Vista, Mercedes, Prowler, Safari, Sweet Sunrise, TX 1015Y, Early Grano 502, Granex</td>
</tr>
<tr>
<td>White</td>
<td>Cirrus, Marquesa, TX Early White, Crystal Wax</td>
</tr>
<tr>
<td>Red</td>
<td>Red Bone, Rio Santiago, Sakata Red, Red Burgandy</td>
</tr>
</tbody>
</table>

#### Intermediate day (12–13-hour day length)

<table>
<thead>
<tr>
<th>Color</th>
<th>Varieties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow</td>
<td>Caballero, Cimarron, Riviera, Utopia, Yula</td>
</tr>
<tr>
<td>White</td>
<td>Alabaster, Mid Star, Sierra Blanca, Spano</td>
</tr>
<tr>
<td>Red</td>
<td>Fuego</td>
</tr>
</tbody>
</table>

#### Long day (14–16-hour day length)

<table>
<thead>
<tr>
<th>Color</th>
<th>Varieties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow</td>
<td>Armada, Capri, Durango, El Charo, Ole, Seville, Sweet Perfection, Valdez, Vaquero, Vega</td>
</tr>
<tr>
<td>White</td>
<td>Blanco Duro, Sterling, White Spanish Sweet</td>
</tr>
<tr>
<td>Red</td>
<td>Tango</td>
</tr>
</tbody>
</table>
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 ¼” 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 ¾” 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-feet 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 ½ 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
- Colorado Potato Beetle
- Flea 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 as 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 soil 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

<table>
<thead>
<tr>
<th>Pest</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diseases</strong></td>
<td></td>
</tr>
<tr>
<td>Leaf spots</td>
<td>Clove, neem oil, rosemary, sulfur, thyme oil</td>
</tr>
<tr>
<td>Nematodes</td>
<td>Azadirachtin, sesame oil*</td>
</tr>
<tr>
<td><strong>Insects</strong></td>
<td></td>
</tr>
<tr>
<td>Beetles</td>
<td>Azadirachtin, garlic juice extract, pyrethrins</td>
</tr>
<tr>
<td>Cutworms</td>
<td>Azadirachtin, Bt</td>
</tr>
<tr>
<td>Weevils</td>
<td>Azadirachtin, garlic juice extract</td>
</tr>
</tbody>
</table>

*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