



Extension Gardener

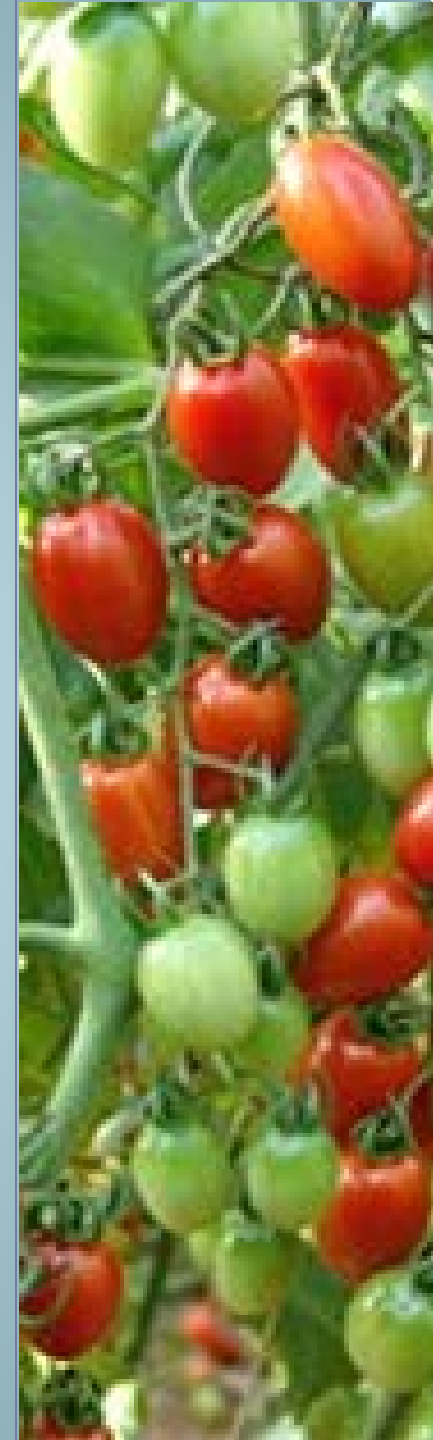
Class 4:

Vegetables and Culinary Herbs

Today's Class:

Growing Vegetables and Culinary Herbs

1. Find the Right Place
2. Improve Your Soil
3. Provide Water and Nutrients
4. Manage Pests
5. Know When, How and What to Plant
6. Using Herbs – Phyllis Smith,
Family Consumer Science Agent,
NCCE – Chatham County Center



Find the Right Place: **Site Selection**

- **SUN!** All vegetables need **at least 6-8 hours of sun** a day, especially in winter
 - Light afternoon shade may benefit summer crops!
- Near a **water source!**
- **Convenient** to maintain and harvest



Away From Trees

- If possible!
- Trees cast shade, roots compete for water and nutrients
- **Space garden away 2 x height of trees**
- Leafy vegetables more shade tolerant – lettuce, spinach, mustard, cabbage

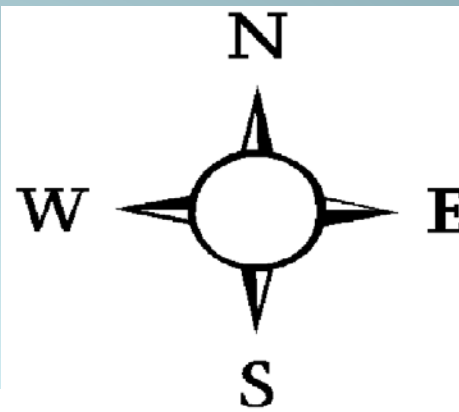


Site Selection

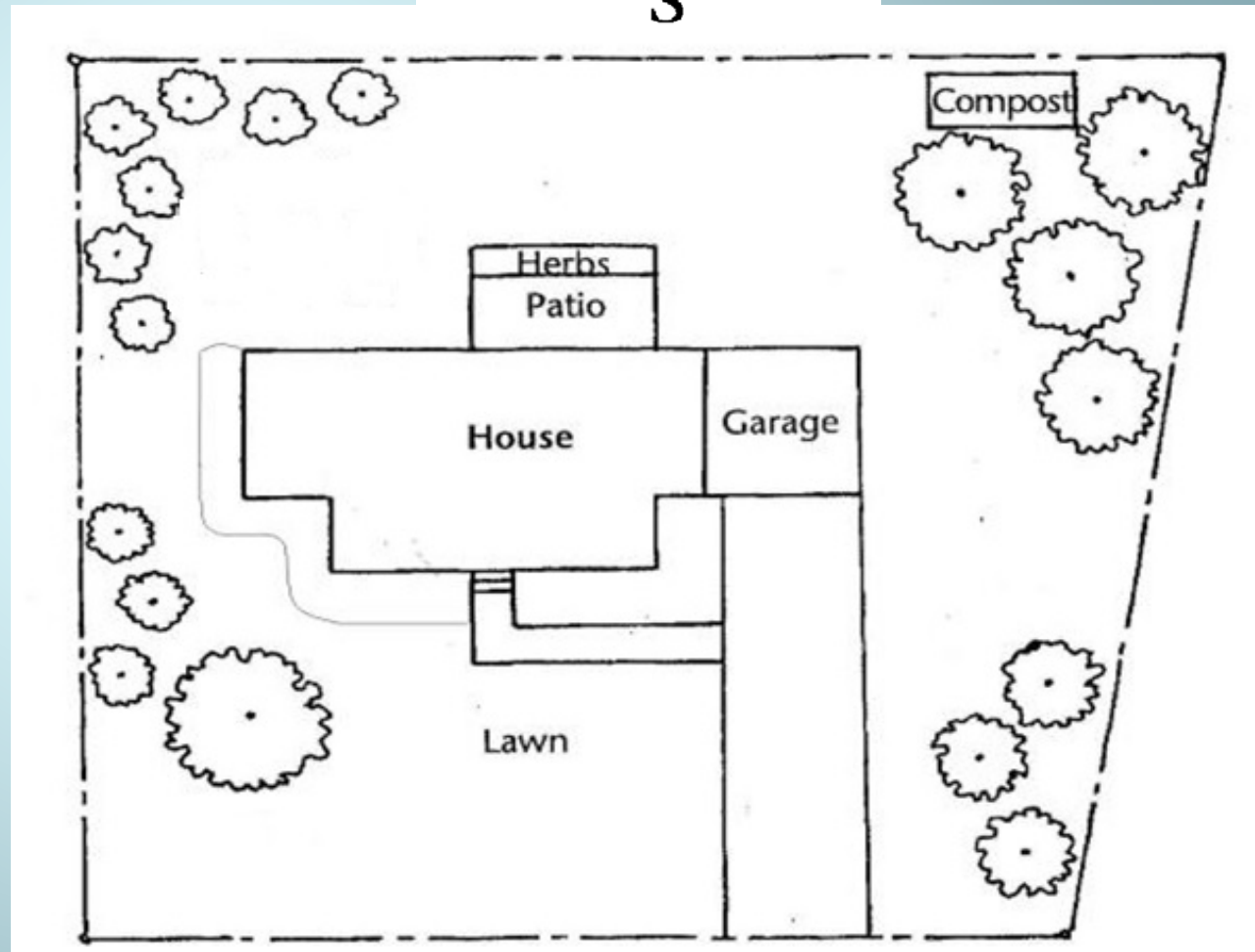
- Level or along contour of slope
 - South facing slope will warm earlier in spring
- All vegetables need **well drained soil**
 - Avoid low lying areas and heavy, wet soils where water ponds
 - Alternative: build raised beds or mounded rows

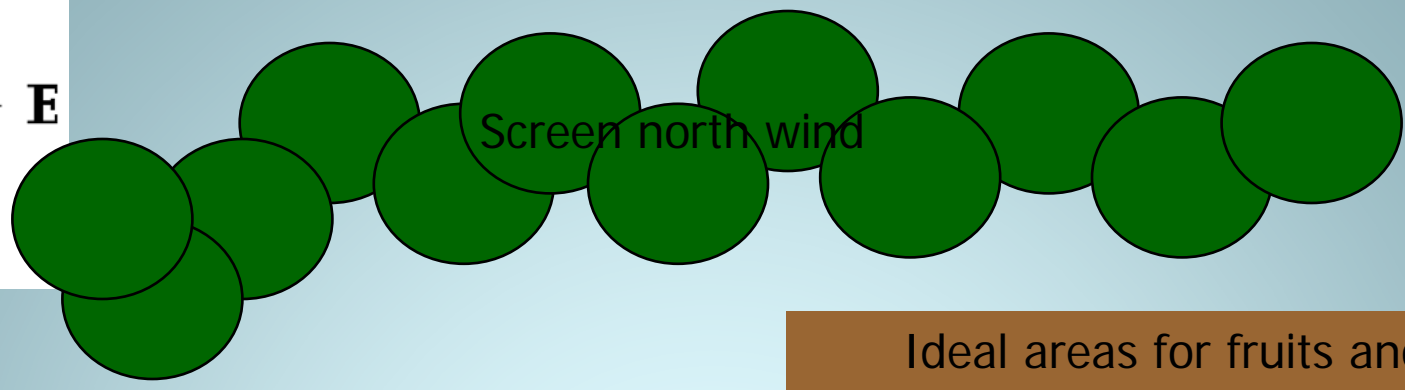
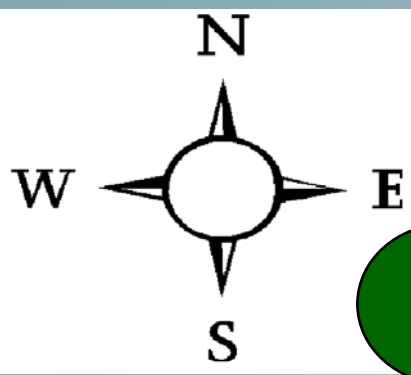


Site Plan

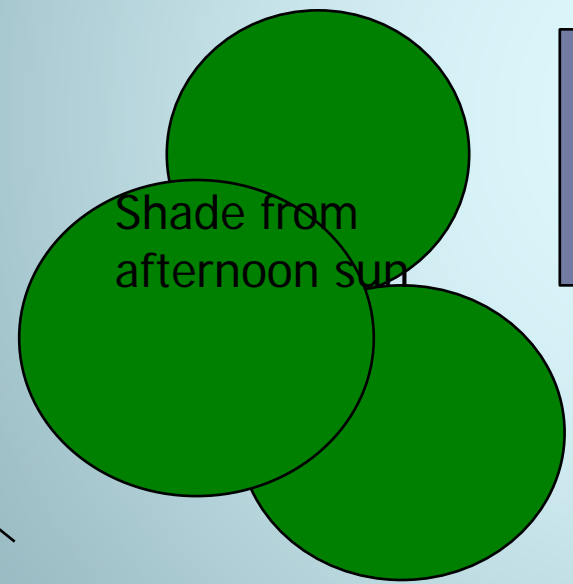


- **Ideal:** location that is open to the south
- **To determine:** stand with your back to the north





Ideal areas for fruits and vegetables

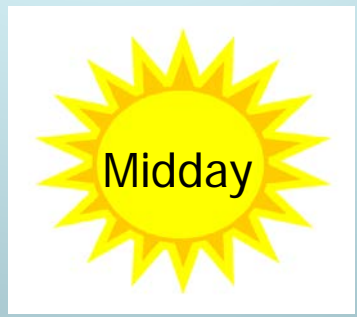


Morning Sun

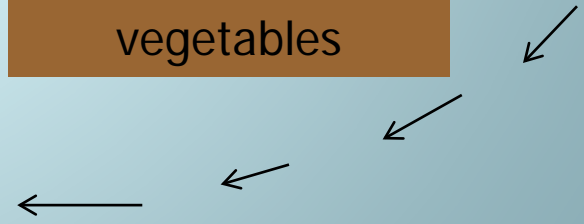


Full sun all day

Ideal areas for fruits and vegetables



Ideal areas for fruits and vegetables



Soil Preparation

- **Remove weeds/grass first!**
OPTIONS:
 - Kill with herbicide
 - Plan in advance – smother with black plastic, newspaper/cardboard covered with mulch, old carpet
 - Remove with sod cutter

Bermuda and perennial weeds will persist!



Soil Problems

- **Too much clay**
 - Compaction, poor drainage
 - Crusts when dry
 - Slower to warm up
- **Never work wet clay!**
 - Can prepare beds in fall to avoid working wet soils in spring - Plant with cover crop or cover with mulch for winter



Improve Your Soil with Organic Matter

- Incorporate into soil each season!
 - 2"-3" layer, mix in 6"-8" deep
- Compost, pine bark, rotted leaves, **aged** manure
 - **NOT** sand, peat moss, vermiculite or potting soil!



Grow Your Own

- **Cover Crops** – are sown direct and mowed or turned in just as begin to bloom
- **Warm season cover crops:**
 - Sow mid-April - August
 - Cowpeas, soybeans, crowder peas = add nitrogen
 - Buckwheat = very quick, turn under in 30-45 days
- **Cool season cover crops:**
 - Sow Sept or Feb-March
 - Hairy vetch, crimson clover = add nitrogen
 - Mustard, rapeseed = suppress nematodes

Crimson clover = cool season
Buckwheat = warm season



Alternative: Raised Beds

- Want **at least 8"** deep
- **4' wide** or less
- **Length** – depends on material used and space available
- Fill with **mix** of soil and compost
 - Till soil underneath before filling





Trex – recycled plastic \$\$



Treated or untreated boards

Raised Beds



Concrete blocks

Mounded Beds

Mound soil 6"-12" above soil level, make beds 12"-36" wide. Plant 2-3 rows per bed. Mulch between beds



Containers

- Great if limited space or limited sun
- Larger plants need larger containers!
 - All require drainage holes!
- For best results use **potting soil** (not garden soil) and **slow release fertilizers**
- Water frequently – daily in summer



Grow Bags



Get Creative!

Best Vegetables and Herbs for Containers

Cool Season

- Lettuce, Spinach
- Cabbage
- Broccoli
- Parsley, Cilantro
- Radish
- Swiss Chard

Warm Season

- Basil
- Tomatoes
- Squash
- Cucumbers
- Peppers
- Eggplant

Perennial Herbs: Chives, Oregano, Thyme, Rosemary, Sage



Provide Water and Nutrients

- Vegetables need a **steady supply** of water and nutrients to produce well
- **Most herbs need less**
- Need to **supplement water** if it does rain
- Most soils need **additional nutrients** (fertilizers)
- **Compost** does not supply enough nutrients



Water

- How often depends on weather and soil
- Most vegetables require **1" water per week**
 - 2, ½" applications/week once established
 - May - September
- Water soil, not the plant
 - Wet leaves invite disease!



Leaf spot diseases are worse during wet weather or with overhead irrigation.

Better Ways to Water



Temporary Soaker Hoses



Permanent Drip Lines

Mulching Vegetable Gardens

- Reduces weeds and some diseases;
Conserves water
- Any biodegradable material, 2" layer
 - Grass clippings (aged): **No Herbicides!**
 - Newspaper - underlayer
 - Straw or leaves - chopped
- **Till in at end of season**
 - Mulch in fall, till in before spring planting



Soil Test to Determine Soil pH

- **Soil pH**
 - **6.0 – 6.5** ideal for most vegetables
 - Below 5.5 = acid
 - Above 7.0 = alkaline
- **Too high or too low** – nutrient problems, root diseases
- Sample every **2-3 years** for vegetable gardens
- Peak season fee: \$4 sample, December-March



Soil Test Results


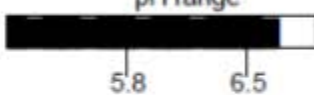


- Will tell you the **pH** of your soil
 - **If you need to add lime**, and how much
- What **nutrients** are needed and how much of each to add
- **Does not determine:**
 - If diseases or chemicals are present in the soil
 - Drainage problems
 - If compost needs to be added



Blossom End Rot
is caused by calcium deficiency due to low pH, and/or uneven watering

Soil Test Report:

Posted online within 1-3 weeks

 <p>Predictive Home & Garden Soil Report</p>	<p>Mehlich-3 Extraction</p>		<p>Client: David Hardy NCDA/Agronomic Div. 1040 Mail Service Center Raleigh, NC 27607</p>	<p>Advisor:</p>																
	<p>Sampled:</p>	<p>Received: 09/01/2010</p>	<p>Completed: 09/09/2010</p>	<p>County: Wake</p>	<p>Farm: a team</p>															
<p>Sample ID: BACK1</p>	<p>Crop 1- Lawn Crop 2-</p>	<p><u>Lime Recommendations</u> 0.0 lb per 1,000 sq ft</p>	<p><u>N-P-K Fertilizer Recommendations *</u> (20 lbs 5-10-5 or EQUIV PER 1000 SQ FT)</p>																	
<p>Lime History:</p>	<p><u>Test Results:</u> pH = 6.8</p>	<p>Optimum pH range 5.8 6.5</p> 	<p>Phosphorus Index (P-I) = 45</p>																	
<p>David Hardy</p>	<table border="1"> <thead> <tr> <th>Additional Test Results:</th> <th>HM%</th> <th>W/V</th> <th>CEC</th> <th>Mn-I</th> <th>Zn-I</th> <th>Cu-I</th> <th>S-I</th> </tr> </thead> <tbody> <tr> <td></td> <td>0.18</td> <td>9.20 g/cm3</td> <td>12.0 meq/100 cm3</td> <td>52</td> <td></td> <td>57</td> <td>31</td> </tr> </tbody> </table>		Additional Test Results:	HM%	W/V	CEC	Mn-I	Zn-I	Cu-I	S-I		0.18	9.20 g/cm3	12.0 meq/100 cm3	52		57	31	<p>Potassium Index (K-I) = 119</p>	 <p>Below Optimum 50 Optimum 70 Above Optimum</p>
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	0.18	9.20 g/cm3	12.0 meq/100 cm3	52		57	31													
<p>* If you cannot find the fertilizer recommended here, choose one from the same Group listed on the last page of this report. Note: This soil test does not measure nitrogen (N) levels. N fertilizer recommendations are based only on needs of the designated crop.</p>																				

Reports from 2012 – present available online:
<http://www.ncagr.gov/agronomi/pals/>

Raising Soil pH

- **Raise with garden/agricultural lime based on soil test results**
- Target range **6.0 – 6.5** for most soils
- Must mix into the soil 6" + deep,
- **Takes 6 months** to completely react
- **Dolomitic lime** also supplies Magnesium, a nutrient often deficient in unimproved soils



Only apply fast acting lime in areas where plants are not growing

Fertilizers

- Contain Nitrogen, Phosphorous, Potassium (N-P-K)
 - **N** = green leafy growth. Important for leafy crops (lettuce, cabbage, etc)
 - Leaches rapidly, too much = less blooms
 - **P** = roots, flowers, seeds. Important for root crops (carrots, beets, etc)
 - Soil levels often high, must be incorporated
 - **K** = makes plants hardier, flavor – especially for tomatoes and melons
 - Soil levels often low (especially sand)

Can be derived from
natural or **synthetic** sources

N - **P** - **K**



Fertilizers

Types of fertilizers:

- **10-10-10, 8-8-8 and other granular fertilizers**
 - N dissolve in water and washes away
 - Apply only small amounts at a time, reapply every 4-6 weeks
- **Liquid fertilizers** (Miracle Grow, Compost tea, Fish Emulsion) = fast food, quick boost but no sustained feeding
 - Good when first plant or when plants need a quick boost



24-8-16

Types of Fertilizers

SLOW RELEASE FERTILIZERS:

- **Time release fertilizers** (e.g. Osmocote) = slowly release nutrients over 2-4 months
- **Organic fertilizers** (e.g. Plant-tone) naturally slow release – nutrients not readily available in cold weather
- **More expensive, but worth it!**
- Apply at planting time and again 2-3 months later



Managing Insects and Diseases

- If you plant it, they will come!!!
- **Scout** regularly to find problems before they become widespread
- Most insects and diseases **only infest certain type of crop or crop family** (eg. Tomato family = tomatoes, peppers, eggplants, potatoes)



Aphids

UC Statewide IPM Project
© Regents, University of California



Cabbage Looper

Good Practice to Avoid Pests

- **Start with a good site**
 - Sun and well drained soil
- **Clean up crop debris**
 - Compost if not diseased or pest infested
- **Plant at correct time**
- **Support healthy growth!**
Prepare soil, fertilize, water
- **Space plants properly and avoid wetting leaves**



Proper Spacing

- **Plan for mature size**
- Allows air flow between plants to **promote drying** & prevent disease
- **Allow adequate space to minimize:**
 - Competition for Water, Nutrients, & Light
 - Habitat for pests

Proper spacing depends on mature size of plant – most plants do best when leaves just touch at full size



Handpicking

- **Inspect** plants for egg clusters and insect pests
- Squish or drop them in sudsy water
- Remove diseased leaves early



**Squish
Squash
Bug
Eggs**

Exclusion

Floating row covers can keep **flying adult insects** from laying eggs on vegetables – e.g. Cabbage whites

Will also keep out pollinators – not an issue for leafy crops

Cover when insects are active – stake down edges

Lay directly onto crop or install PVC supports

Cabbage White



Protect and Encourage Beneficials

- **Plant flowers** to attract pollinators and beneficial insects
- **Best flowers for beneficials:**
 - **Herbs:** fennel, dill, cilantro, basil, lemon balm
 - **Flowers:** purple coneflower, black eyed Susans, Salvias, Asclepias, Zinnia, Yarrow
 - **Cover Crops:** buckwheat, hairy vetch
- **Minimize use of pesticides,** especially insecticides



Fennel Flower - Plants with lots of small flowers attract more beneficials

Diversity

- Avoid placing all plants of one kind together
- If space, plant in different areas of the yard
- Alternate groups of different plants within rows or patches
- **Flowers help attract beneficials and confuse pests**



Soil Solarization

- **Kills weed seed, diseases and insects** in soil surface (3"-4")
- Till beds, water, and cover with clear plastic **for 6-8 weeks in July-August**
- **Disturb soil as little possible afterward** to avoid bring untreated soil up to the surface.



Crop Rotation

Avoid planting crops in the same family in the same location multiple years in a row.

- Three year rotation recommended



Cabbage, collards, kale, Brussels sprouts, broccoli, cauliflower, turnips, and mustard are all in the same family!

Plant Families

Brassicas (Mustard Family):

- Broccoli, Brussel Sprouts, Cauliflower, Cabbage, Collards, Kale, Mustard, Radish, Turnips, Rutabaga, Kohlrabi

Cucurbits (Squash Family):

- Cucumbers, Squash, Zucchini, Winter Squash, Pumpkins, Cantaloupe, Watermelons

Solanaceous (Nightshade Family)

- Tomatoes, Peppers, Eggplant, Potatoes

Legumes (Bean Family)

- Garden peas, peanuts, green beans, lima beans, southern peas



Plant Families

Alliums (Onion Family)

- Onions, garlic, leeks, scallions

Carrot Family

- Carrots, parsnips, dill, fennel, parsley, cilantro

Goosefoot Family:

- Spinach, Swiss Chard and Beets

Vegetables with no close relatives:

- Lettuce, endive
- Sweet Corn
- Sweet Potato
- Okra



Managing Pests and Diseases

- Even with good practices, pests will still be a **problem**
- Most **serious pests** will require treatment
- **Organic** and **synthetic** insecticides and fungicides are available
- Have problem **positively ID'd** before treating!
- **Not all pests can be treated**

Wilt diseases persist in the soil and cannot be treated



Common Garden Insecticides

- **Synthetic Insecticides:**
 - Malathion, Carbaryl (Sevin) – older
 - Cyfluthrin, Permethrin - newer
- **Organic Insecticides:**
 - **Spinosad** = caterpillars, Colorado potato beetle
 - **B.t.** – caterpillars only
 - **Insecticidal Soap** = aphids
 - **Neem, Pyrethrin** = many pests
- **Check pre-harvest interval!**



**Active ingredients
are listed on the
label**

Protect Pollinators!

- Many vegetables are pollinated by honeybees and other pollinators
- Many pollinators, especially honeybees, are very susceptible to most insecticides
- **Never apply insecticides to open flowers**
- Spray late in the evening when bees are not active
- Avoid using dust formulations – eg. Sevin dust



Common Garden Fungicides

- **Synthetic Fungicides:** Myclobutanil (Immunox), Mancozeb, Thiophanate methyl, Chlorothalonil (Daconil)
- **Organic Fungicides:** Copper, Sulfur, Bacillus subtilis (Serenade), Remedy (Potassium bicarbonate)
- **Control leaf diseases only:** leaf spots, powdery mildew, downy mildew, leaf blights



Other Pests

- Deer
- Rabbits
- Squirrels
- Raccoons

Solution:

Fencing – 8'
tall to keep out
deer



Control Weeds

- **Mulch** minimizes annual weeds
 - Ground leaves, straw, ground pine bark
 - Can use black plastic beneath mulch between rows
- **Hand weeding/hoeing**
- **Organic herbicides** only burn weeds – effective for small annual weeds not perennials
- Some vegetables (tomatoes!) are very sensitive to glyphosate and 2,4-D



Too late for weed control!

Know When, What, and How to Plant

- **What:** seeds or transplants
- **How:** successive or one time
- **When:** warm season or cool season



What to Plant

Transplants

- Small/young plants
- **Easy** – higher rate of success!
- Good when only need a few plants
- For crops planted as individual plants (tomatoes, peppers, cabbage)
- Can grow your own transplants – sow seed 4-6 weeks before you plan to set out



What to Plant

Seed

- Greater variety
- **Sow directly into garden**
 - Some must be seeded – root crops
 - Salad greens patches
- **Sow in containers**
 - To grow transplants
 - To grow in containers
- Most vegetable seed store for years – plastic bag in refrigerator



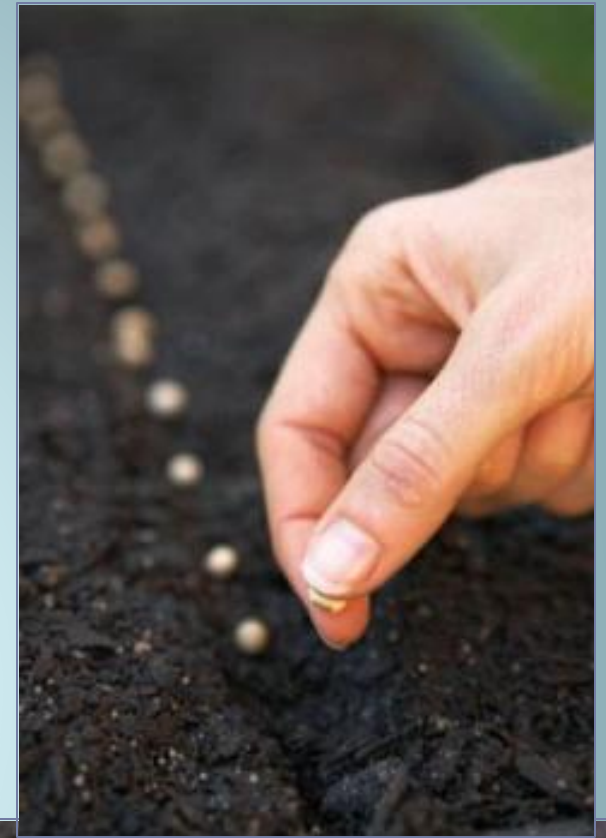
Sowing Direct

- Well prepared soil
- Keep moist!

Options:

- Sow in place where will grow, thin after seedlings emerge
- Sow and then transplant to permanent location

Sow carefully or thin to correct spacing



How Vegetables are Typically Planted

Warm Season

- **Seed Sown Direct**

- **Beans and Field Peas**
- **Peanuts**
- **Sweet Corn**
- **Radish**
- **Rutabaga**
- **Turnips, Mustard**
- **Carrots**
- **Beets**
- **Garden Peas**
- **Potatoes (seed potatoes)**

Cool Season

- **As Transplants**

- **Tomatoes**
- **Peppers**
- **Eggplants**
- **Sweet Potatoes**
- **Okra**
- **Basil**
- **Broccoli, Cauliflower**
- **Cabbage, Collards**
- **Kale**
- **Garlic – cloves**

Both ways: lettuce , spinach, parsley, dill, cilantro, onions (seed or sets);
cucumber, squash , zucchini, melons

Some can be planted either way:

- **Lettuce and Spinach**
 - Can be planted as single plants or sown direct as 'bed' – common method for Mesclun mixes (also how mustard greens are typically grown)
- **Cucumbers, Squash, Zucchini, Pumpkins, Melons**
 - Large, fast growing seed, easy to start in small pots, ready to transplant in 2-3 weeks



Types of Vegetable Varieties

Open Pollinated

- **'Heirloom' varieties** – can save own seed and varieties will come true to type

Hybrid

- Result of a cross between 2 or more parents – saved seed do not come true
- Usually more uniform, more vigorous, more disease resistant

F₁ Hybrid

- Specific type of hybrid – first generation
- Usually much more expensive!



Plant Recommended Varieties

- New varieties are always coming out!
- For tried and true **check Extension publications:**
- **Extension Search:**
<https://search.extension.org>
- Searches all Extension and University Publications
 - Look for fact sheets from southern states (NC, SC, VA, GA)



How to Plant

- Sow or plant new crop every 2-3 weeks to extend harvest time
 - **Necessary for 1-time harvest crops** (eg. Cabbage, corn, root crops)
 - **Not needed for crops with long harvest season** (tomatoes, peppers, melons, kale)



When: Planting Seasons

Cool season:

- Plant **July-Sept** for fall crop
- **Feb-April** for spring crop

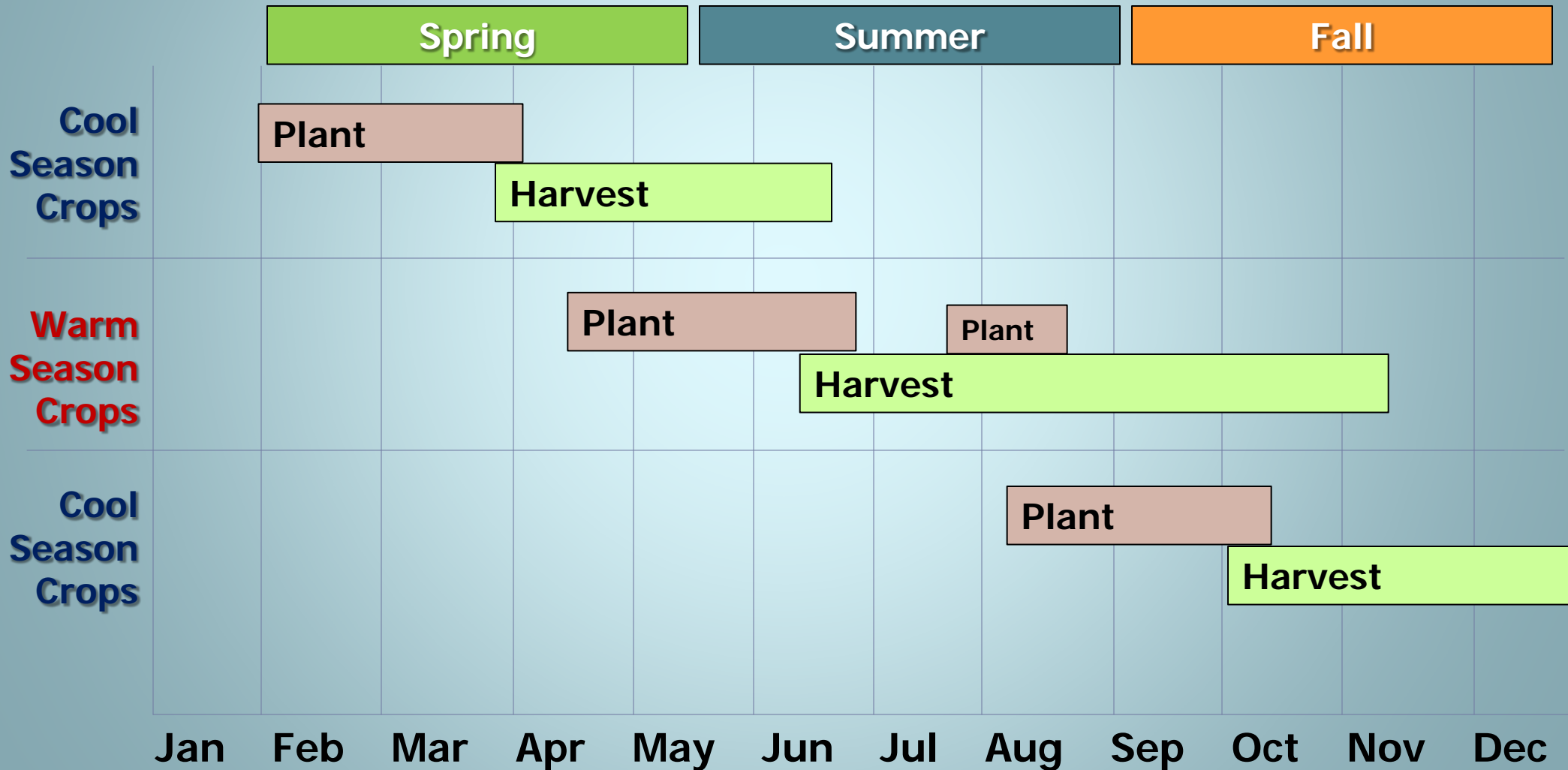
Warm season:

- Plant after average last spring frost date, April 15
- See "Central NC Planting Calendar" for specific dates



Not the same as the produce aisle!

Planting Seasons



Extend Season

- **Cold Frames** – unheated
- Keep cool season crops producing later in the season OR start earlier in spring
- Not enough protection for warm season crops in winter



Extend Winter Harvest

- Row cover fabrics – spun polyester
 - 2-4 degrees protection in spring
 - 8-10 degrees in fall
- Stake down edges well
- If use plastic, vent during sunny days



Warm Season Crops

- Need warm (70's – 80's) temps to grow well, and warm soil temperatures (at least 60)
- **Soil warms slower than air!**
- Not frost tolerant, but some will tolerate cooler temps
- **Hot temperatures will reduce production** (mid 90's and above)



WARM SEASON CROPS

- **Basil**
- Beans – lima, snap/green, bush/pole
- **Southern Peas:** black-eye, cow, crowder
- Corn
- Cucumbers, Squash, Zucchini
- **Winter Squash, Pumpkins**
- **Melons**
- Tomatoes, **Eggplant, Peppers**
- **Okra**
- **Peanuts**
- **Sweet Potatoes**

Bold – most cold sensitive

Underline – most challenging

Cool Season Crops that may produce into mid summer with light shade:

- Lettuce
- Arugula/Rocket
- Green Onions
- Spinach
- Swiss Chard

Fast maturing warm season crops – can plant early August for fall crop

- Cucumbers
- Squash and Zucchini
- Basil
- Tomatoes (plant July)

Tomatoes!

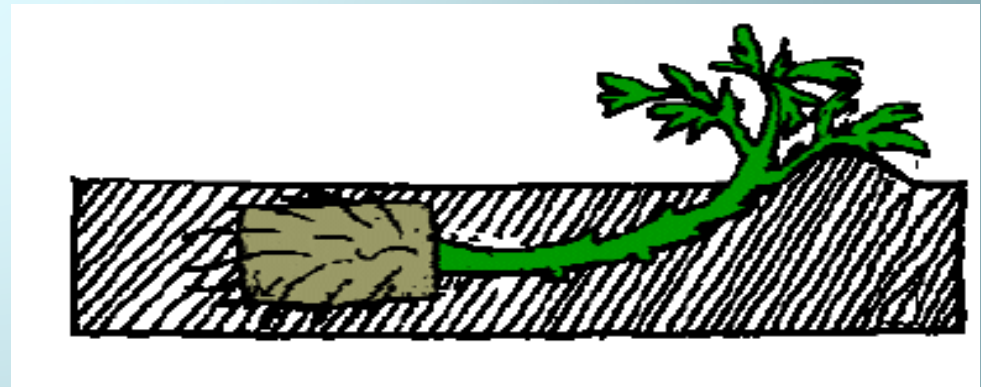
- **Plant as early as possible** – protect from frost!
- **Space plants 3' apart**
- **Cage** tomatoes at planting time
- Avoid planting tomatoes in **same location** year after year
- Plant **multiple varieties**
- Plant in a couple of **different locations**

Cages should be at least 4' tall – taller indeterminate varieties



Plant Deep!

- Tomatoes will produce roots along their stems – **deep planted tomatoes** have larger root systems



Tall, leggy tomatoes can be planted laying sideways, with the top 3-4 sets of leaves above ground

Types of Tomatoes

- **Determinate**
 - Mature crop all at once
 - Good for canning
 - Plants stay smaller
- **Indeterminate**
 - Set successive crops over long season
 - Keep growing = tall plants
 - **Semi-determinate** keep producing over long season but plants stay relatively compact



Indeterminate varieties need tall support trellises

Types of Tomatoes

- **Round Fruited**
 - Varieties producing medium size tomatoes grow best
 - **Beefsteak** types are most difficult
- **Paste Tomatoes**
 - Aka Roma or Pear tomatoes
 - For cooking and canning
 - Generally easy and productive
- **Cherry and Grape**
 - Easiest!, most are indeterminate
 - Very reliable and productive
 - Best type for beginners!



Medium round



Beefsteak



Paste



Cherry

Heirloom Tomatoes

- Local selections that have been preserved over the years
- **Flavor but little disease resistance**
- Some better adapted to south than others:
 - 'German Johnson', 'Homestead', 'Cherokee Purple', 'Marglobe'
- Most are **indeterminate**
- **Can save seed** – come "true to type"



Disease Resistance

- **Hybrids** developed for disease resistance
- Most important disease resistance to look for:
 - **F** - Fusarium
 - **N** - Nematodes
 - **TSW** – Tomato Spotted Wilt Virus
- **No tomato is resistant to all** (or even most) tomato diseases!
- **No resistance to soil borne wilt diseases**



Planting resistant varieties is the **ONLY** way to manage tomato spotted wilt virus.

Heirloom varieties have no resistance to this disease.

Most Reliable Varieties

- **Celebrity**
 - Determinate, large round, F & N resistant
 - **Bush Celebrity** is good for containers
- **Better Boy**
 - Indeterminate, large round, F & N resistant
- **Big Beef**
 - Indeterminate, extra large fruit, F & N resistant
 - **Big Boy** is similar, NOT F,N resistant
- **Cherry Tomatoes**
 - **Sweet 100, Sweet Million, and Juliet** are favorites



'Juliet' Tomato

Wilt Diseases

- **Soil Borne**

- No way to treat – persist for years
- Do not grow tomatoes in these soils (or eggplant, peppers)
- Try large containers

Pathogens include:

- Fusarium wilt
- Southern bacterial wilt
- Southern stem blight



Blossom End Rot

- Technically caused by calcium deficiency in developing fruits
- Maybe result of low soil pH
 - Soil test and apply lime as recommended
- **Often due to over fertilization (too much N) or uneven moisture**
- **Keep evenly moist!** Water regularly and mulch



Early Blight

- **Foliage Disease**
- Distinctive bulls-eye leaf spots
- **Starts on bottom leaves and move up the plant**
- Plants look '**burnt up**' by late summer – does not cause wilting
- **Spray:** organic – *B.t. subtilis* (Serenade) and copper; synthetic - mancozeb



Tomato Hornworms

- Voracious feeders!
- Usually first show up in June
- Hand pick or spray
- **Organic:** B.t. (Dipel) or Spinosad
- **Synthetic:** permethrin – check pre harvest interval



Parasitic Wasps



Bugs!

- Feed on fruits with needle like mouthparts
- **Cause 'cloudy spot'**
- No good organic control except hand picking
- **Synthetic:**
- Permethrin

Feeding injury causes yellow spots to form just under skin – does not affect flavor. Fruits are still edible



Leaf footed bug



Young leaf footed bugs



Stink Bugs

Tomato Relatives: Eggplant & Peppers

- Generally easy
- **Susceptible to wilt diseases and TSWV**
- Hot peppers have good drought resistance
- Bells very productive when watered and fertilized
- Wait to plant when really warm (late April)



Cucumbers, Pumpkins, Squash & Zucchini

- Easy to grow from seed
- Winter squash are grown during summer!
- **Common question:** Plants have been blooming for a week but no fruits – why?



Female Flower

Young fruit -
Cucumber



Male Flower



Cucumbers, squash, zucchini, melons, pumpkins – male flowers produced first few weeks, typically more male than female flowers

Planting

- Plant cukes, squash, and melons up to the **cotyledons** for healthier plants
- Do not worry about this if direct seeding in the garden



Squash Vine Borer

- Attack squash and zucchini in May/June and August
- **Plant as early as possible** – late March
- **Spray** Pyrethrin, Neem (organic), or Permethrin (synthetic) beginning mid-May, every 7-14 days, lower part of stem



Squash Bugs

- Feed on plant – cause wilting
- Look for eggs and adults under leaf and squish
- Spray: Permethrin (synthetic), Pyrethrin (organic), Neem – nymphs only



Downy Mildew

Cucumbers

- Effects pickling cucumbers more severely
- Late crops often wiped out – very prevalent by mid summer
- Difficult to control
- Spray at first symptoms: copper and chlorothalonil (Daconil) – minimally effective



Melons

Wait until really warm to plant

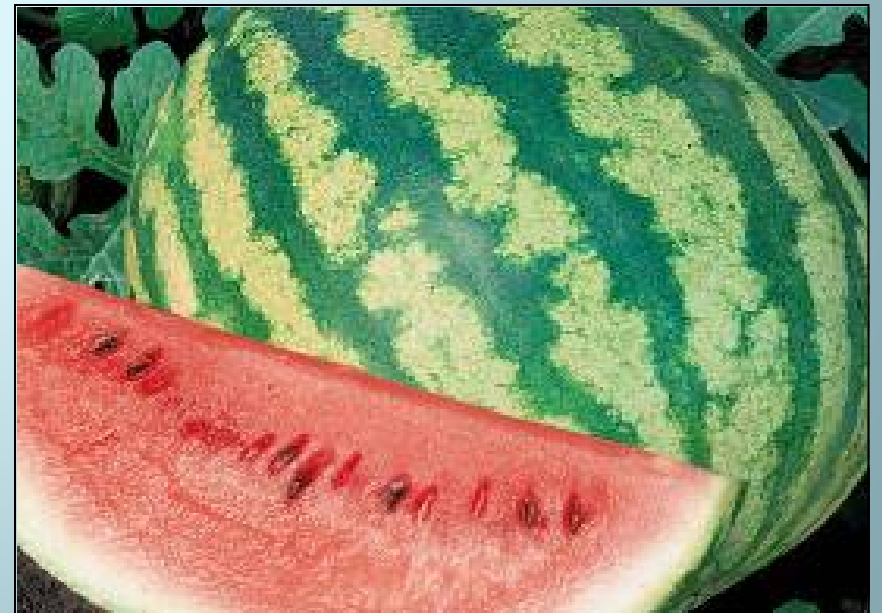
Cantaloupe

- Prefer drier conditions
- More compact vines, space 3'
- More leaf disease problems than watermelons



Watermelons

- Need consistent moisture
- Space 6'-8'
- Seedless varieties are expensive
- 'Crimson Sweet', 'Jubilee' – reliable, seeded



Melons and cucumbers can climb!



Sweet Corn

- Plant early April
- In blocks of at least 3-4 rows
- **Wind pollinated**
- Lots of Nitrogen (slow release)
- Stagger plantings every 2 weeks
- **Drought sensitive!**



Sweet Corn

- **Sugary Varieties (SU1)**
 - Traditional – sugars break down quickly
 - Silver Queen, Seneca Chief
- **Sugary Enhanced (Se)**
 - Higher levels of sugar
 - Bodacious, Legend
- **Super-sweet Varieties (sh2)**
 - More sugar than SU1 and does not break down rapidly
 - Serendipity

These are not GMO!



Corn Earworm

- Late planted corn more severely effected – **plant early** (late March)! Plant so ready for harvest before mid July
- Apply 5 drops mineral oil to corn silks 5 days after silk emergence. Mix a *B.t.* product with oil to improve control, use ratio of 1 part *B.t.* to 20 parts oil.



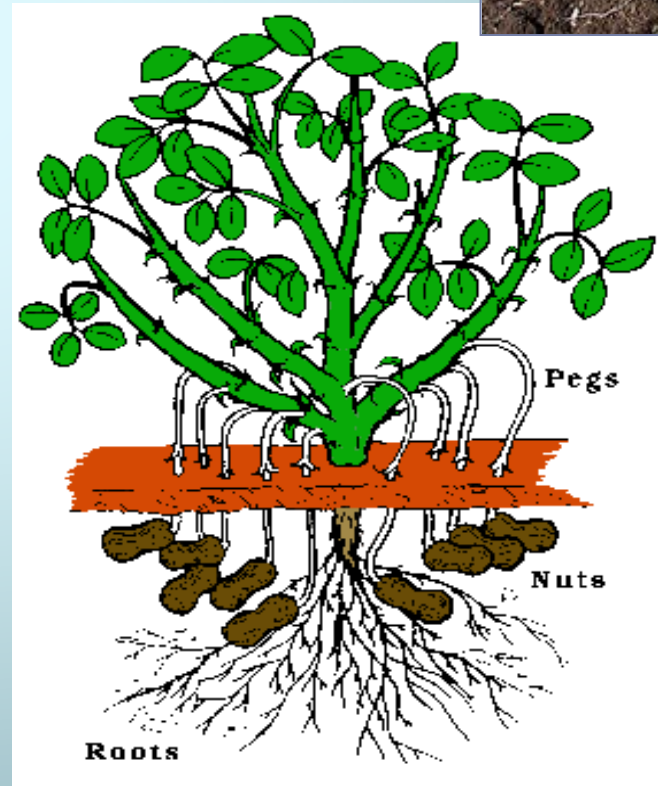
Basil

- Loves heat - Do not plant out too early
- Easy from cuttings or seed
 - Successive sowings
 - Can overwinter indoors
- Prevent drought stress
- Pinch regularly, cut off flowers for more leaves or leave flowers for bees!
- Many varieties available



Sweet Potatoes and Peanuts

- Need very well drained, sandy soil
- Very frost sensitive
- **Sweet potatoes** need a lot of space!
- **Peanuts** form on 'pegs' that grow into the ground from flowers on lower stems
- **Deer love both!**



Beans and Their Relatives

Beans-Lima, Butter, Green

- Can inoculate seed with nitrogen fixing bacteria
- Don't bear heavily in hot weather
- Bush and pole varieties

Southern Peas

- Field Peas, Black Eye Peas
- Need warm soils
- Low bushy plants



Cowpea Curculio

- Type of weevil
- Adults feed on southern peas with p-s mouthparts
- Larvae feed inside peas
- **Difficult to control** – newer pyrethroids just after bloom until harvest
- **Crop rotation!**



Cool Season Vegetables

Tolerate frost:

Hardy: tolerate heavy frost (below 28 degrees), can produce through winter

- Cabbage, kale, collards, carrots
- Spinach, turnips, mustard greens, broccoli

Half-hardy: tolerate light frost (28 - 30 degrees), usually productive through December – extend season with cold frames or row covers

- Beets, cauliflower, chard, lettuce, Chinese cabbage



COOL SEASON CROPS

Fall and Spring Crops:

- Cilantro, **Parsley**, Dill
- Arugula/Rocket
- Beets
- Broccoli, Cabbage
- **Collards, Kale**
- **Carrots, Parsnips**
- Celery
- **Onions** (bulbs) and Green Onions
- Kohlrabi
- Lettuce and **Spinach**
- Mustard, Turnips, Rutabaga
- Pac Choi/Bok Choy
- Radish
- Swiss Chard

Spring planted only:

- Garden Peas, Sugar Snaps, Snow Peas
- Potatoes

Fall planted only:

- **Brussels Sprouts**
- Cauliflower
- **Garlic**
- **Leeks**
- Chinese cabbage
- Romaine Lettuce

Bold = most cold hardy

Underline = most challenging to grow

Heat and Cool Season Crops

- **Flavor not as good** when mature in warm weather
- **Bolting** – late plantings of cool season crops are more prone to bolting
- If have room, allow CS crops to bloom – attract pollinators and beneficials
- Blossoms edible!



Cool Season Annual Herbs

- Fall crop: Sow direct or in containers August
- Do not transplant easily
- **Parsley**
 - Hardier – may live through winter
 - Soak seed in water 6-8 hrs.
 - Flat leaf (Italian) and curly leaf types
- **Cilantro** – seed called coriander
- **Dill**



Caterpillars

- Black swallowtail larva feed on all members of parsley/carrot family
- Handpick – grow perennial fennel as 'nursery' crop
- Spray with B.t, spinosad, etc.



Root Crops

- Carrots, beets, kohlrabi, rutabaga, radish, turnips
- **Do not transplant** – almost always sown in place in the garden
- Need loose, well drained soil for good root development
- Harvest once, must succession sow



Root crops can be grown in containers – carrots need deep pots!

Leafy Greens

- Lettuce, mustard and turnip greens, chard, spinach
- Most are quick growing, ready to harvest in 30 to 40 days
- Can be sown direct in wide or single rows
- Lettuce, spinach and chard often available as transplants
- **Multiple harvest**, except head lettuce



Lettuce grown in 18" wide rows

Leaf Lettuce

- Do not form dense heads
- **Easiest lettuce**– transplants and seed available
- Many color variations, leaf shapes
- Can plant as single plants or in patches
- Make **successive sowings** every 2 weeks through May – later in part shade
- Iceberg lettuce will not grow here!



Crucifers/Cole Crops

- **Broccoli, Cauliflower, Cabbage, Collards, Kale, Brussel Sprouts**
- Slower growing, productive over longer time – many are **winter hardy**
- Can be grown from seed sown in early August
- Or set out as transplants in September
- Large plants, space individual plants 18" to 2' apart



Give cole crops plenty of space!

Crucifer Pests:

Caterpillars

- Be on the lookout!
- All become moths – can cover with row cover
- **Organic Insecticides**
 - **B.t.** (*Bacillus thuringiensis*)
 - **Spinosad**
 - **Neem** and **Pyrethrin**
- **Synthetic Insecticides:**
 - Sevin (carbaryl)
 - malathion, permethrin



Aphids

- Small soft bodied insects that feed on plant sap
- Populations build up quickly
- Cause distorted leaves
- Have many natural enemies
- Control: **Organic** - Horticultural oil, Insecticidal soap, Neem, Pyrethrin
- **Conventional:** malathion, Permethrin



Onions and Their Relatives

- Onions, Garlic, Leeks
- Do best in our area when fall planted!
- Harvested in spring
- **Heavy feeders** – like lots of organic matter and consistent moisture and nutrients
- Need good drainage



Green onions/scallions are very easy to grow spring-fall. Ready to harvest in 50-60 days.

Onions

- Sow direct in October to harvest in April-May
- Short Day varieties: 'Grano', 'Granex', 'Texas Super Sweet'
- Seed usually more successful and cost less than sets
- Thin in Jan to 4" apart for larger bulbs
- Need lots of Nitrogen in spring, but **no sulfur**

Onion Sets



Garlic

- Plant in Sept/Oct to harvest in late spring
- **Grown from cloves**
- **Soft Neck** varieties grow best in the south – have stronger flavor
- **Elephant garlic** also does well – very large with mild flavor



Spring Only Crops

Garden, Sugar Snap and Snow Peas

- Harvest in 60 days
- Sow It. Jan – early March
- Powdery Mildew a problem on later crops
- Vine support, grow 3'-4'



Spring Only Crops

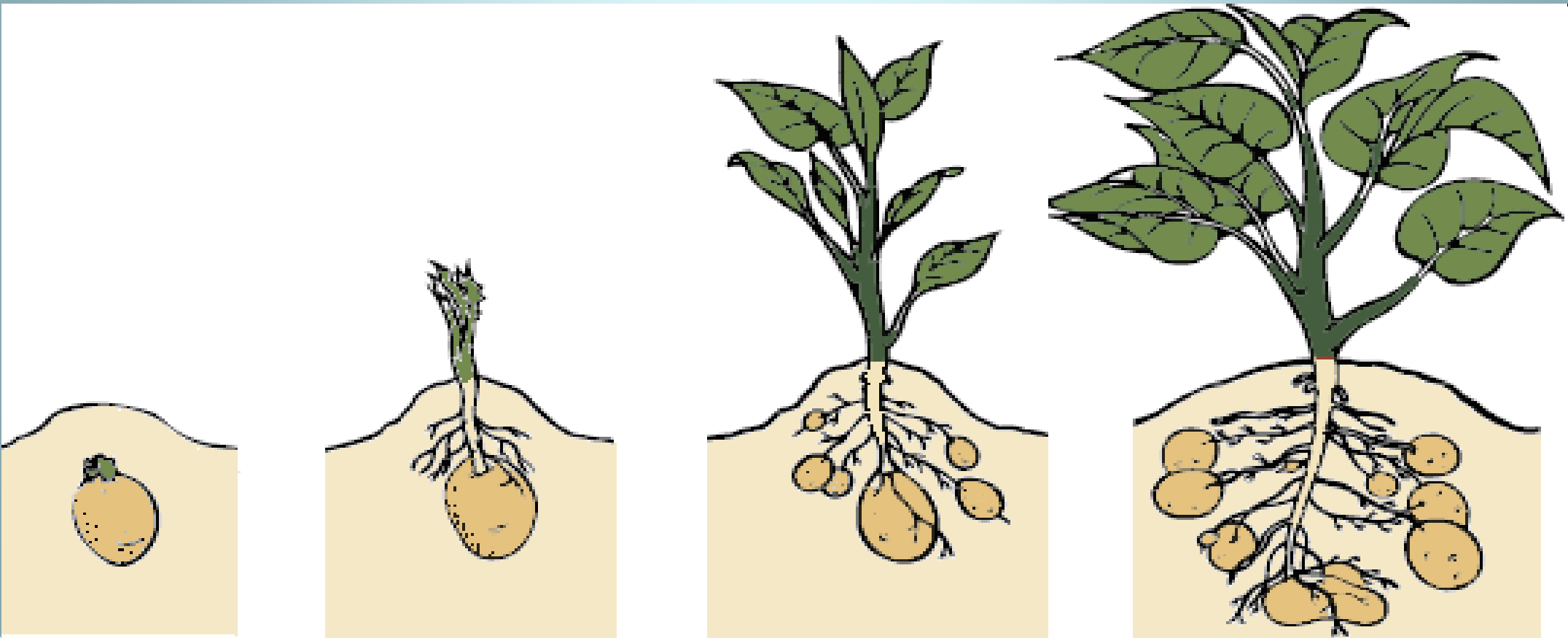
Potatoes

- 90 – 120 days
- Start with certified seed potatoes, Feb. – mid March
- 'Yukon Gold', 'Kennebec', 'Pontiac'
- Mound soil around plants through the growing season for more production
- Baking potatoes will not grow here!



Growing Potatoes

- **Mound soil** – all potatoes develop between 'seed' and soil level



Spring Only Crops

Potatoes

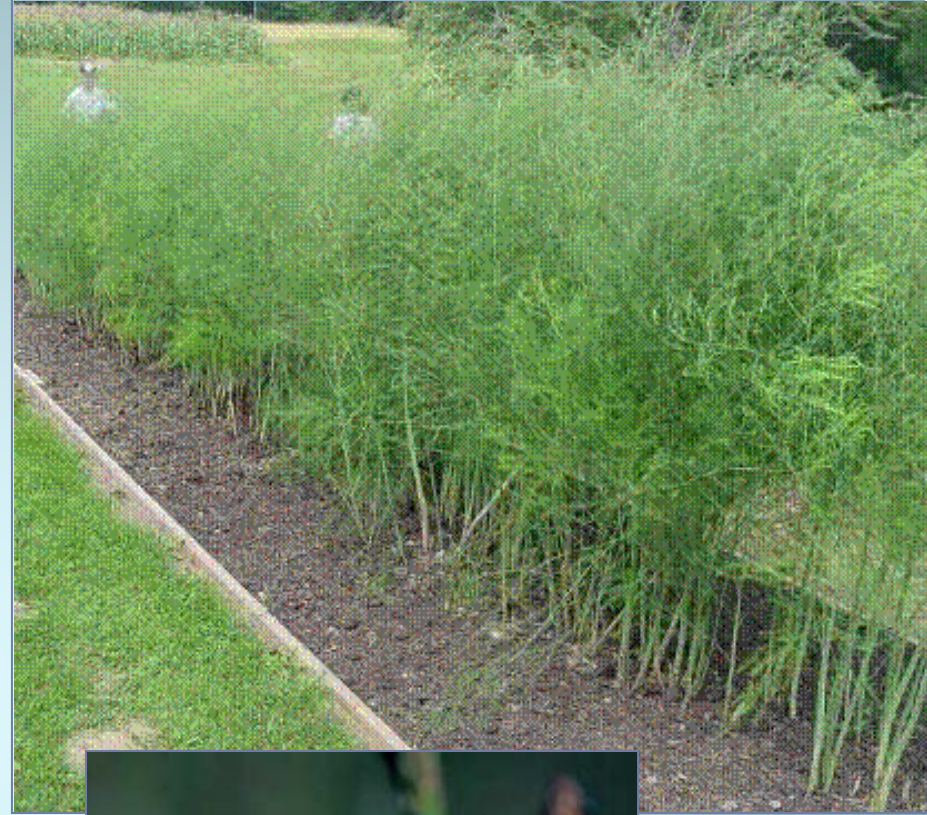
- Watch out for **Colorado Potato Beetles!**
- **Larva and adults** feed on foliage
- Handpick or spray:
 - Spinosad
 - B.t. for CPB
 - Sevin (some are resistant)



Perennial Crops

Asparagus

- Very salt tolerant
- Plant crowns in early spring
- Well amended soil
- Wait 2 years to harvest
- Harvest spears in spring
- Overharvest = small spears
- Male 'Jersey' varieties more productive



Mediterranean Herbs

Rosemary (shrub)

Sage, Oregano and Marjoram

Thyme and Lemon Thyme

- All are perennial
- Require full sun, excellent drainage
- Drought tolerant
- Irrigation and fertilizer lead to disease problems and reduce flavor
- Bay needs sheltered spot
- Thyme most sensitive to moisture



Chives



Chives

Allium schoenoprasum

Extremely easy from seed or division. Long lived, self seed. Sun well drained soil, drought tolerant.



Garlic Chives

Allium tuberosum

Taller than chives, same requirements. Self seeds prolifically.

Mints

All spread extremely vigorously!!



Spearmint

Mentha spicata

Sun to part shade,
moist to average soil.



Peppermint

Mentha piperita

Grow in containers
above ground.



Pineapple Mint

Mentha suaveolens
'Variegata'



Apple Mint

Mentha suaveolens

Fennel

- Perennial parsley relative
- Anise flavor
- Sun - light shade, moist to dry soils
- 3'-5' tall, yellow flowers in summer - attracts beneficials
- Larval host -Black Swallowtail
- **Florence Fennel** is related but different, grow as a summer annual



Other Perennial Herbs



Lemon Balm

Melissa officinalis

Very easy - sun to part shade, well drained soil. Easy from seed or cuttings.

Salad Burnet

Poterium sanguisorba

Sun to light shade, well drained soil. Leaves have cucumber flavor - best in spring and fall.



Horseradish

Armoracia rusticana

Sun, rich, moist soil. Harvest roots by digging into clump rather than digging whole clump up.



Non Hardy Perennial Herbs

Bring inside during winter or protect from frost



Lemongrass

*Cymbopogon
flexuosus*



Lemon Verbena

Aloysia triphylla



Culinary Ginger

Zingiber officinale

Next Week:

Fruits and Berries

- Evening Class, 6:00-8:30 – Tuesday, 4/21
- Morning Class, 9:30-Noon – Wednesday, 4/22

