Growing Vegetables Year Round

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COOPERATIVE EXTENSION
Empowering People · Providing Solutions

Growing Vegetables Year Round

Ensuring Success

- Site Selection
- Soil Preparation
- Providing Water and Nutrients

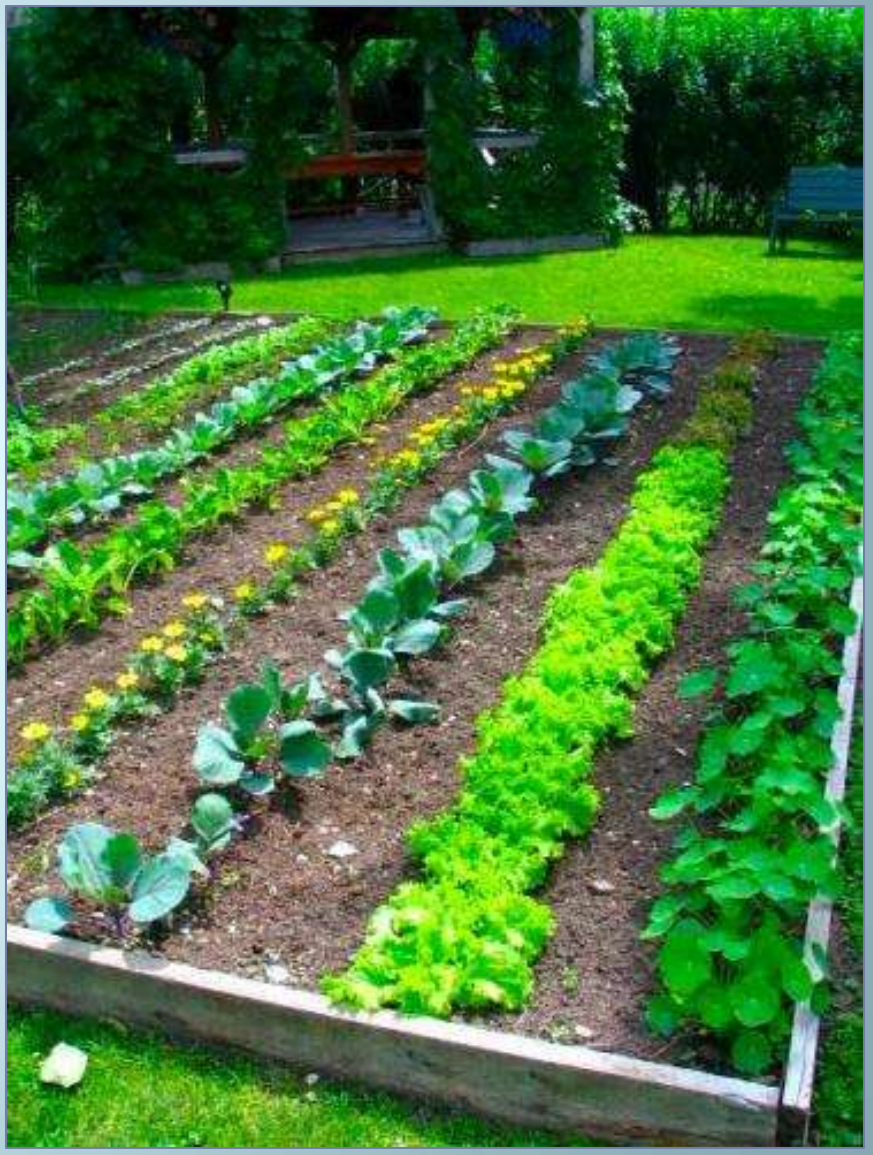
Tips and Crops for

- Spring
- Summer
- Fall

Review these slides online!
http://go.ncsu.edu/veg-resources

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!
  - Leafy greens more shade tolerant
- Near a **water source**!
- **Convenient** to maintain and harvest



Site Selection

- **Relatively 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

Growing Vegetables:
What works for you?

Containers

- Great if limited space or limited sun
- **Water frequently** – daily in summer
- **All require drainage holes!**
  - Several in bottom
  - Can also drill in sides near bottom

Containers

- For best results use purchased **potting soil**
  - Mix of peat, perlite, vermiculite, bark
- **Slow release fertilizers** or incorporate worm castings

Slow Release Fertilizers, examples:
Osmocote (synthetic)
Plant-tone (organic)

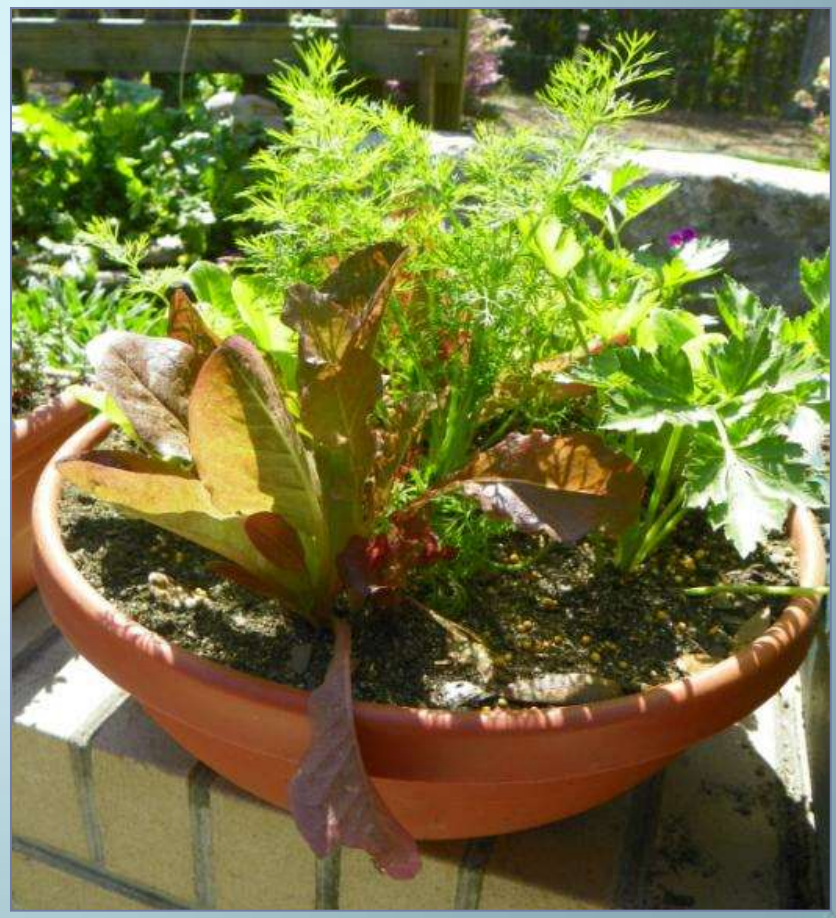
Best Vegetables and Herbs for Containers

Cool Season

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

Warm Season

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



Larger plants require larger/deeper containers

Raised Beds

Benefits:

- Improve drainage
- Soils warm quicker in spring
- Easier to maintain
- Efficient/productive
- Improve accessibility
- Attractive-better fit for small landscapes

Raised Beds

- **At least 8” deep**
  - Till soil underneath before filling
- **4’ wide** or less
- **Length** – depends on material used and space available
- Fill with **mix** of soil and compost (50/50)

Raised Beds

Less maintenance if not surrounded by grass! Mulch paths between beds

Treated or untreated boards

Trex – recycled plastic $$

Blocks

Be Creative

Add vertical support for vines

Keep in mind:

- Moving around beds
- Reaching into beds

In-Ground Gardening

- No construction materials
- Keeps space flexible
- Need large area
- Mound beds in heavy clay or poorly drained soils

Wide Rows

Single Rows

2 Systems:

- Single Rows
- Wide Rows

Wide Rows, Mounded Beds

- Make beds 1’-3’ wide
- Paths 2’-4’ wide
- Mound soil so beds are 6”-12” higher than paths
- Plant 2-3 staggered rows within bed
- Mulch between beds!

Improve Your Soil with Organic Matter

- **Incorporate into soil each season**!
  - 2”-3” layer, mix in 6”-8” deep
- Improves drainage and moisture retention
- Feeds microbes
- Provides nutrients and increases soil’s ability to hold nutrients

Organic Matter & Compost

- **Can purchase:**
  - In bulk from mulch dealers
  - In bags from garden centers (eg. soil conditioner)
  - No need to seek out special types (eg. Mushroom compost)
- Don’t use peat moss
- **Or make your own compost!**

Organic Matter:
Amendments vs. Mulch

- **Soil amendments-** composted, suitable for incorporation
  - May also be surface applied (topdress)
- **Mulch-** not decomposed; suitable for surface application only
  - If you can tell what it was, it's not ready to till in!

Too coarse to incorporate!

Soil Test to Determine Soil pH

Measure of soil acidity

Scale 0 to 14

- **6.0 – 6.5 ideal for most vegetables & microbes!**
- Below 5.5 = acid
- Above 7.0 = alkaline

- **Too high or too low** – nutrient problems, root diseases
- **Most piedmont soils too low**

Soil Testing

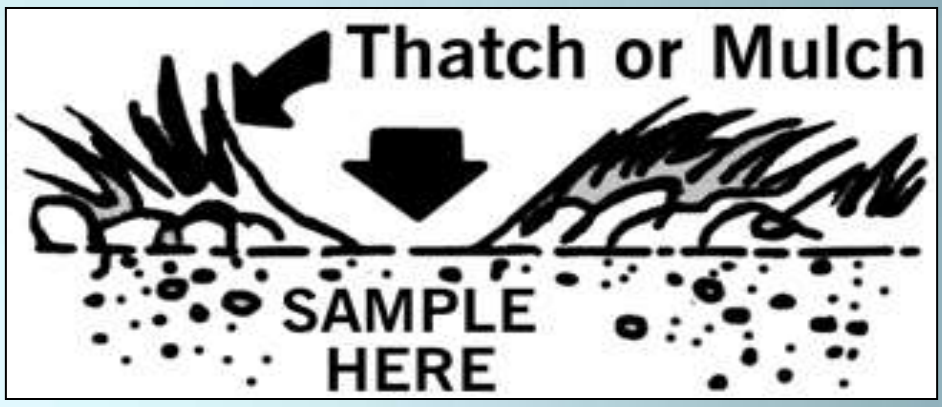
- Boxes and forms available from Extension
- To submit before March 31, mail to NCDA – Raleigh, with $4/box fee

Spring Soil Test Drive:

- Bring completed samples to Extension between March 1 – April 7 and we will deliver week of April 10
- Samples from Chatham County, submitted by resident/land owner

How to Take Soil Samples

- Avoid thatch or mulch
- Take a 'slice' of soil
- **Turf:** 4" deep
- **Landscape beds, Vegetables**: 6" deep
- Mix subsamples together to make one composite sample for each unique area



Sampling Raised Beds

- Typically don’t need to sample each bed separately
- Take 3-4 random samples from each bed and mix all together
- Only sample bed separately if soil distinctly different or crops aren’t growing well in that bed

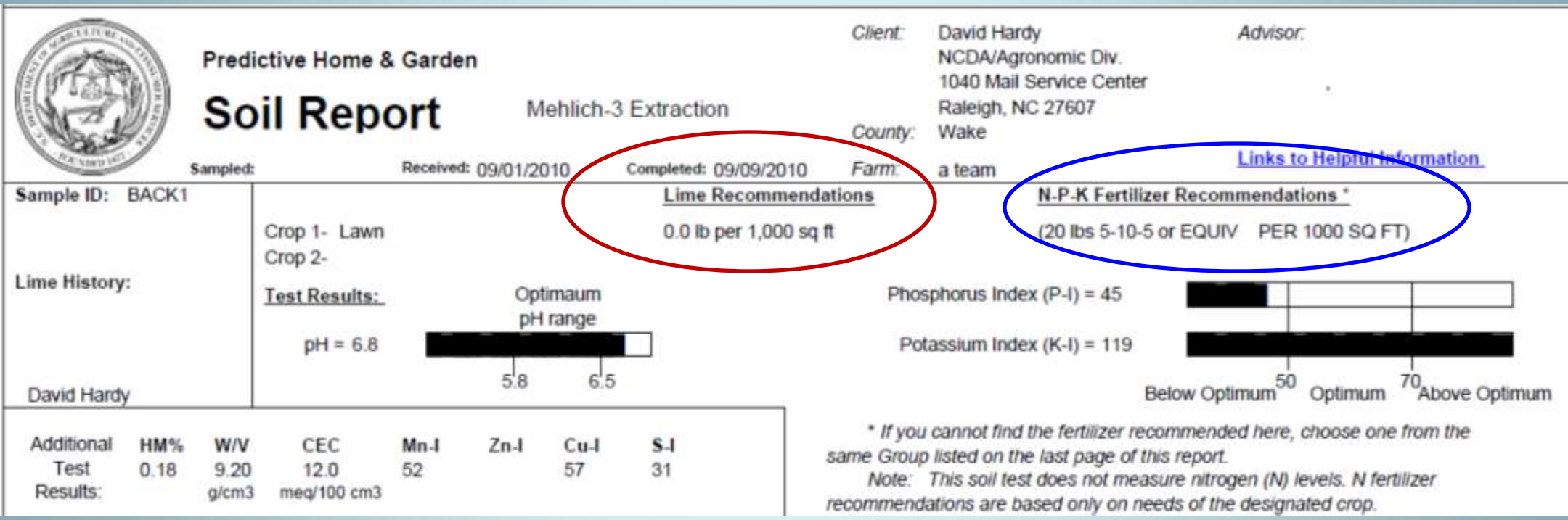
Soil Test Results

- 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 1-4 weeks



Predictive Home & Garden

Soil Report

Mehlich-3 Extraction

Client: David Hardy
NCDA/Agronomic Div.
1040 Mail Service Center
Raleigh, NC 27607

Advisor:

County: Wake

Farm: a team

Links to Helpful Information

Sampled: Received: 09/01/2010 Completed: 09/09/2010

Sample ID: BACK1

Lime History:

David Hardy

Crop 1- Lawn
Crop 2-

Lime Recommendations

0.0 lb per 1,000 sq ft

N-P-K Fertilizer Recommendations *

(20 lbs 5-10-5 or EQUIV PER 1000 SQ FT)

Test Results:

pH = 6.8

Optimaum pH range

5.8 6.5

Phosphorus Index (P-I) = 45

Potassium Index (K-I) = 119

Below Optimum 50 Optimum 70 Above Optimum

Additional Test Results:	HM% 0.18	W/V 9.20 g/cm3	CEC 12.0 meq/100 cm3	Mn-I 52	Zn-I	Cu-I 57	S-I 31

* 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.

Reports from most recent 3 years

http://www.ncagr.gov/agronomi/pals

Raising pH

- **Raise with lime based on soil test results**
  - Dolomitic lime also supplies magnesium
- **Must mix into the soil, takes 6 months** to completely react
- **Wood ashes** – have 1/3 liming potential of garden lime
- **Lowering pH with sulfur** – usually not necessary unless over 7.5

Supply Nutrients
N – P - K

Based on soil test results

- **N** = Nitrogen, supports growth. Important for leafy crops (lettuce, cabbage, etc). Leaches rapidly, **too much = less blooms**
- **P** = Phosporus for roots, flowers, seeds. Important for root crops (carrots, beets, etc). Must be incorporated
- **K** = Potassium, makes plants hardier, **flavor** – especially for tomatoes and melons

Fertilizers

Types of fertilizers:

- **10-10-10, 8-8-8 and other granular fertilizers**
  - N dissolves 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

Slow Release Fertilizers

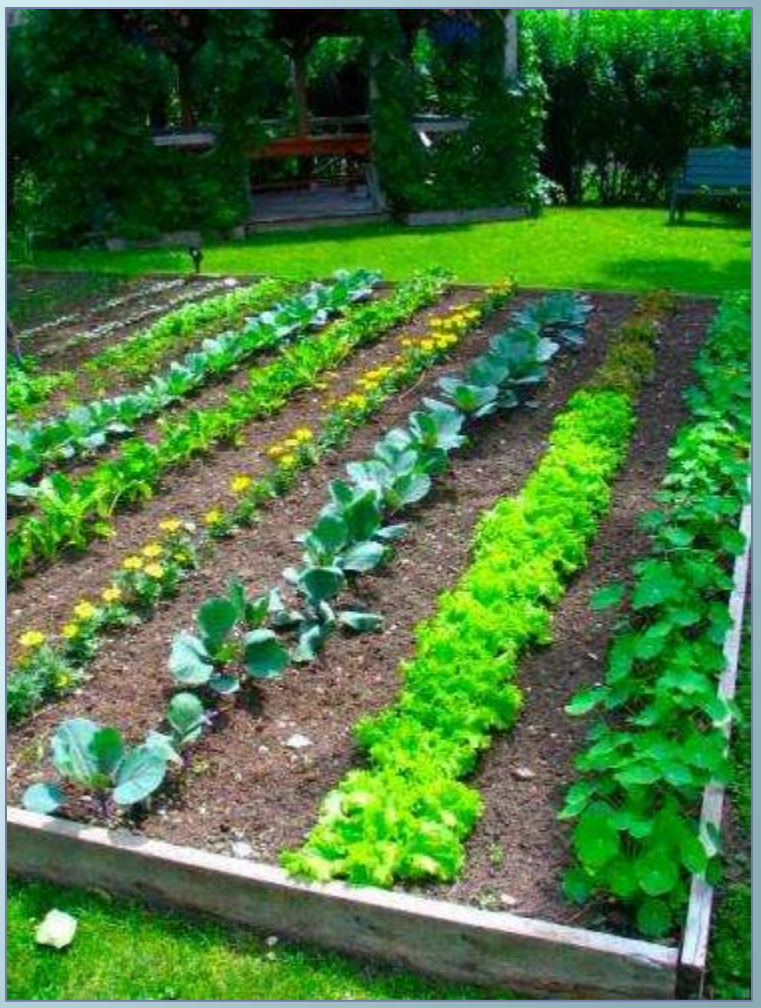
- **Time release fertilizers** (e.g. Osmocote) = slowly release nutrients over 2-4 months
- **Organic fertilizers** (e.g. Plant-tone) naturally slow release – nutrients not readily available in cold weather
- **More expensive, but worth it!**
- Apply at planting time and again 2 months later or at bloom

Compost vs. Fertilizer

- **Compost** = Improves soil structure, improves nutrient holding capacity of soil, supports microbes, adds some nutrients but not always enough; N not immediately available
  - Typical analysis: 2-1-1
  - Extremely variable!
- **Fertilizers** = more concentrated source of nutrients. Added in much smaller amounts. Typical analysis:
  - Organic: 5-3-3
  - Synthetic: 14-14-14

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

Cool Season

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

Selecting 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)

Variety Selection

- Choose **disease resistant cultivars** when possible – research possible diseases and resistant varieties
- **Keep records** – what varieties do well for you
- **No GMO varieties** are marketed to home gardeners

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

F_1 Hybrid

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

When to Plant

- **Based upon temperature adaptation of crops**
- **Not the same as the produce aisle!**
- Not the same as other areas of the country!

When to Plant

Cool Season Crops:

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

Warm Season Crops:

- Plant after average last spring frost date, **~April 15**
- Second planting **July-Aug** for fall harvest

Central North Carolina Planting Calendar for Annual Vegetables, Fruits, and Herbs

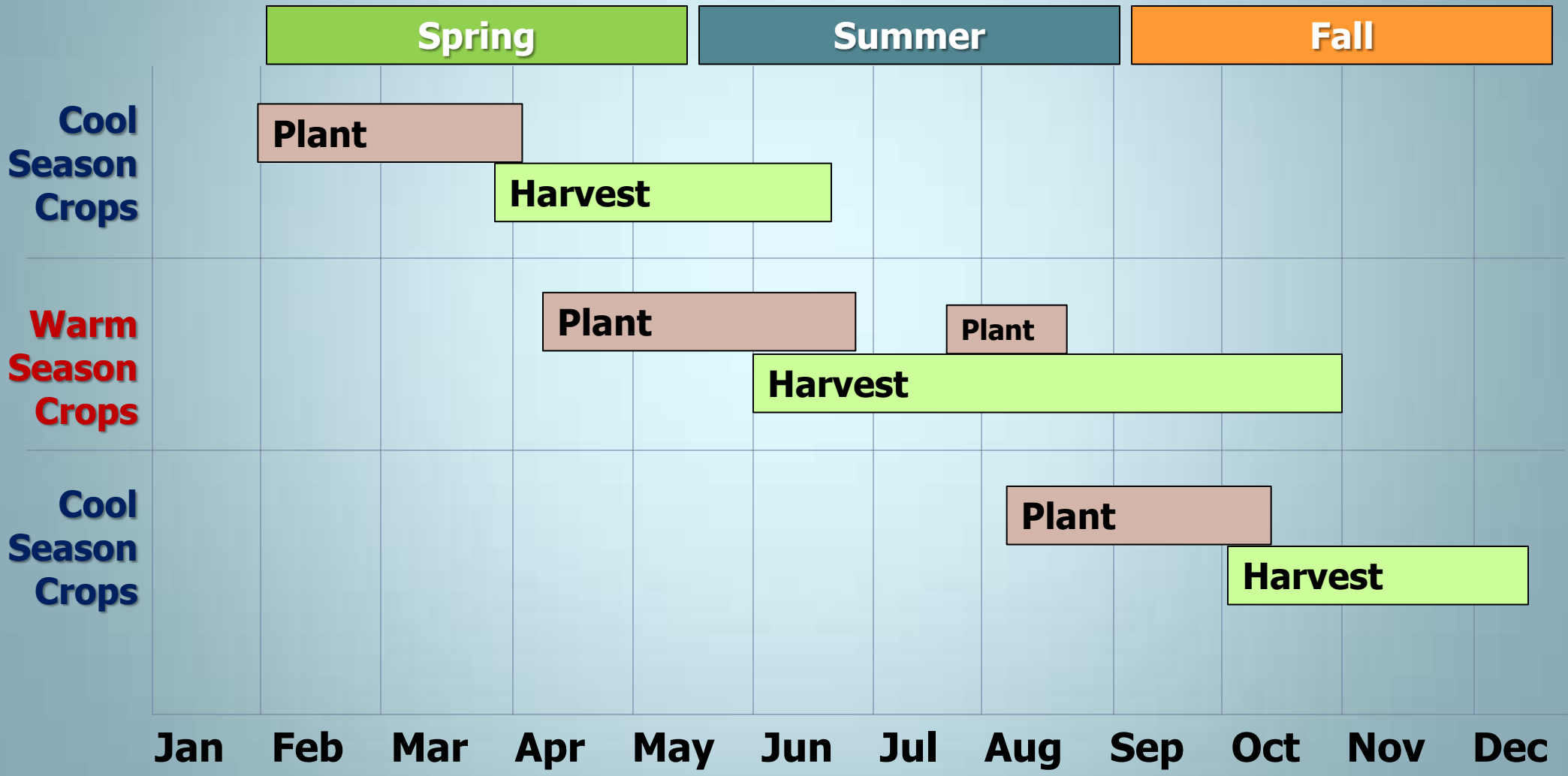
Central North Carolina is a wonderful place to garden. Almost any type of vegetable or f be grown successfully provided you choose appropriate varieties and plant at the right t climate, the season, and potential pests all affect the selection of what and when to pla

Adapted to Climate: Freezing temperatures, high temperatures, humidity, and solar intensity, all common in central North Carolina, can put stress on plants. To successfully grow plants in this environment, select varieties that are toler- ant of temperature extremes, plant at the appro-

between seasons (short days and cold tures in winter to long days and high t tures in summer). Since few annual pl suited to thrive in both circumstances portant to choose plants that mature c ensure a complete life cycle within on

Available Online

Planting Seasons



Optimal Planting Dates

- Most likely to provide best growing conditions for crop
- **Depend on crop type**
  - cool season
  - warm season
- Can plant 1-2 weeks earlier in spring/later in fall with protection

Use cold frames and row cover to extend planting season

Optimal Planting Dates

- **Range of dates**
- 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)

Spring Garden

- **Plant cool season crops** in Feb-March-April to harvest in spring/early summer
  - **Growing transplants**: start seed in sunny, cool location ~6 weeks before planting date
- **Challenge: Cold, wet soil**
  - Prepare in fall, mulch over winter
  - Use cold frames to warm soil

Cold Frames

Face south for maximum sun exposure

Challenges: Heat Effects

- **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!**

Challenge: Deer

- **Fencing** only effective method of keeping critters out
- **Complete enclosure**
  - Deer will search for openings!
- **At least 8’ tall if not electric**
- **Extend 6” into soil**

Wire Mesh Fencing

Challenge: Caterpillars

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

Imported Cabbageworm

Peas, Please!

Garden, Sugar Snap and Snow Peas

- Harvest in 60 days
- Sow Feb – March
- Powdery Mildew a problem on later crops
- Sugar snaps and snow peas more heat tolerant
- Vines - need support

Irish Potatoes

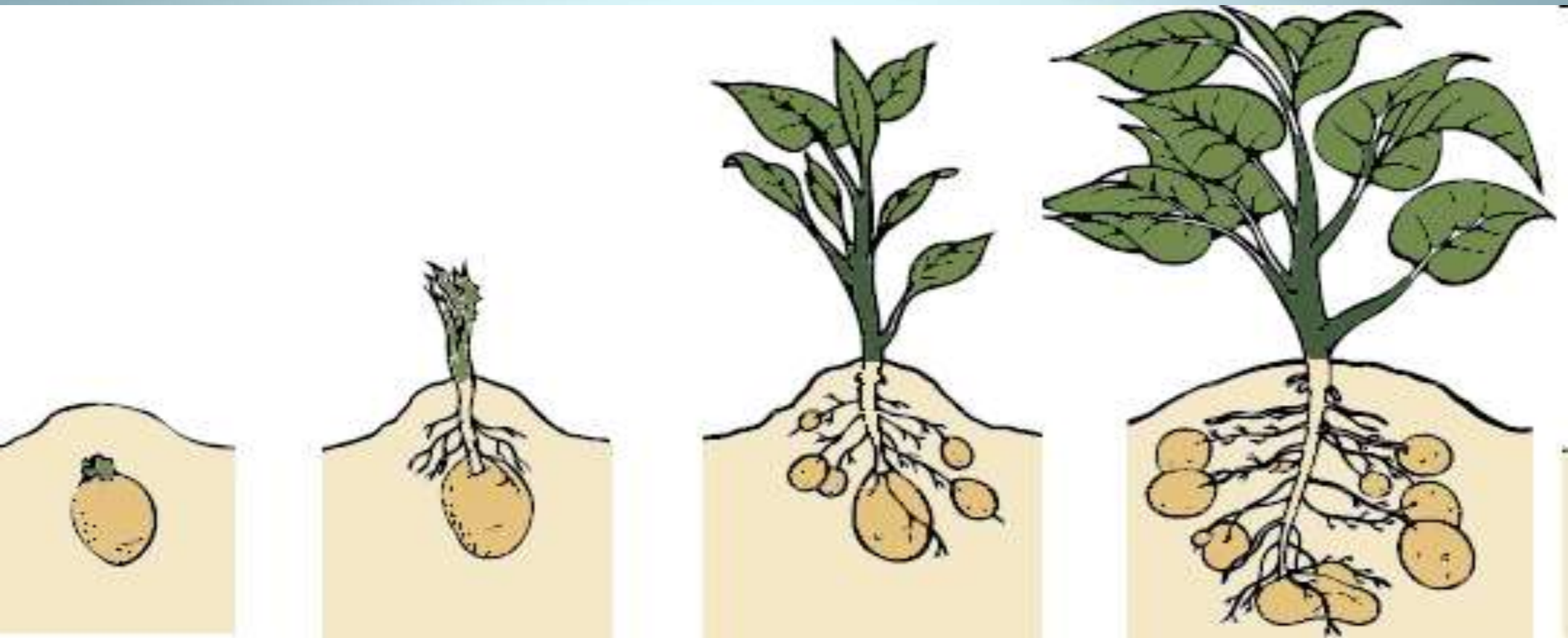
- 90 – 120 days
- **Start with certified seed potatoes**, plant in March
- ‘Yukon Gold’, ‘Kennebec’, ‘Pontiac’
- Baking potatoes not adapted to NC

Preparing Seed Potatoes

- Cut potatoes so each is ~ size of egg and has at least 1 eye
- Can presprout seed potatoes in warm, sunny place 2-3 weeks before planting

Growing Potatoes

Mound soil – potatoes develop between ‘seed’ and soil level



Potatoes

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

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, mid Feb – April,
- Grow in part shade in summer
- Iceberg lettuce will not grow here!

Spinach

- Matures 30-40 days, sow mid Feb through mid April
- **Need fresh seed**
- Grow in rows or 12” wide beds – sow new rows every couple of weeks
- Transplants also available

Other Salad Greens

Arugula/Roquette

- Matures in 50 days, sow direct in garden Feb-March
- Pungent, spicy taste

Mesclun Mixes

- Seed mixes of several types of salad greens, may include lettuce
- Grow in patches like leaf lettuce

Mustard and Turnip Greens

- Mature in 35-50 days, sow direct in wide rows mid Feb - mid April
- Sow new patch every couple of weeks for extended harvest
- Can be grown mixed together or separate
- Some turnip varieties only produce greens – no roots

Mustard leaves have curly edges

Turnip greens are slightly prickly

Swiss Chard

- Mature in 30 days,
- Seed/transplant March-April
- Harvest by picking leaves – multiple harvests per plant
- Varieties with colorful mid ribs available

Crucifers/ Cole Crops

Broccoli, Cauliflower, Cabbage, Collards, Kale

- Plant transplants mid Feb – mid March
- Space 18” to 2’ apart
- Spring crops tend to bolt – easier to grow in fall
- Flavor affected by warm temps

Spring cabbage cvs. mature quicker, eg. ‘Early Jersey Wakefield’

Root Crops

Carrots, beets, kohlrabi, rutabaga, radish, turnips

- **Do not transplant** – almost always sown in place in the garden, mid Feb - March
- 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!

Radish

- Mature in 25 – 30 days, sow every 7-10 days, mid Feb – mid March
- Hot temps, water stress can cause strong flavor and woody texture
- Harvest when 1” in diameter
- **Daikon:** long white radish, takes longer to mature

Carrots

- Mature in 60-90 days
- Sow in place, **slow to germinate**
- Sow shallow, keep moist
- Pelleted seed are easier
- Shorter varieties easier in spring – mature faster, before hot weather

Beets and Turnips

- Mature in 40-50 days, sow March
- Harvest when size of tennis ball
- **Can also harvest greens** – over harvest of greens reduces root size

Kohlrabi

- Not a root crop – swollen stem forms above soil level
- Cabbage relative
- Mature in 45 days, sow mid-Feb - April

Onions

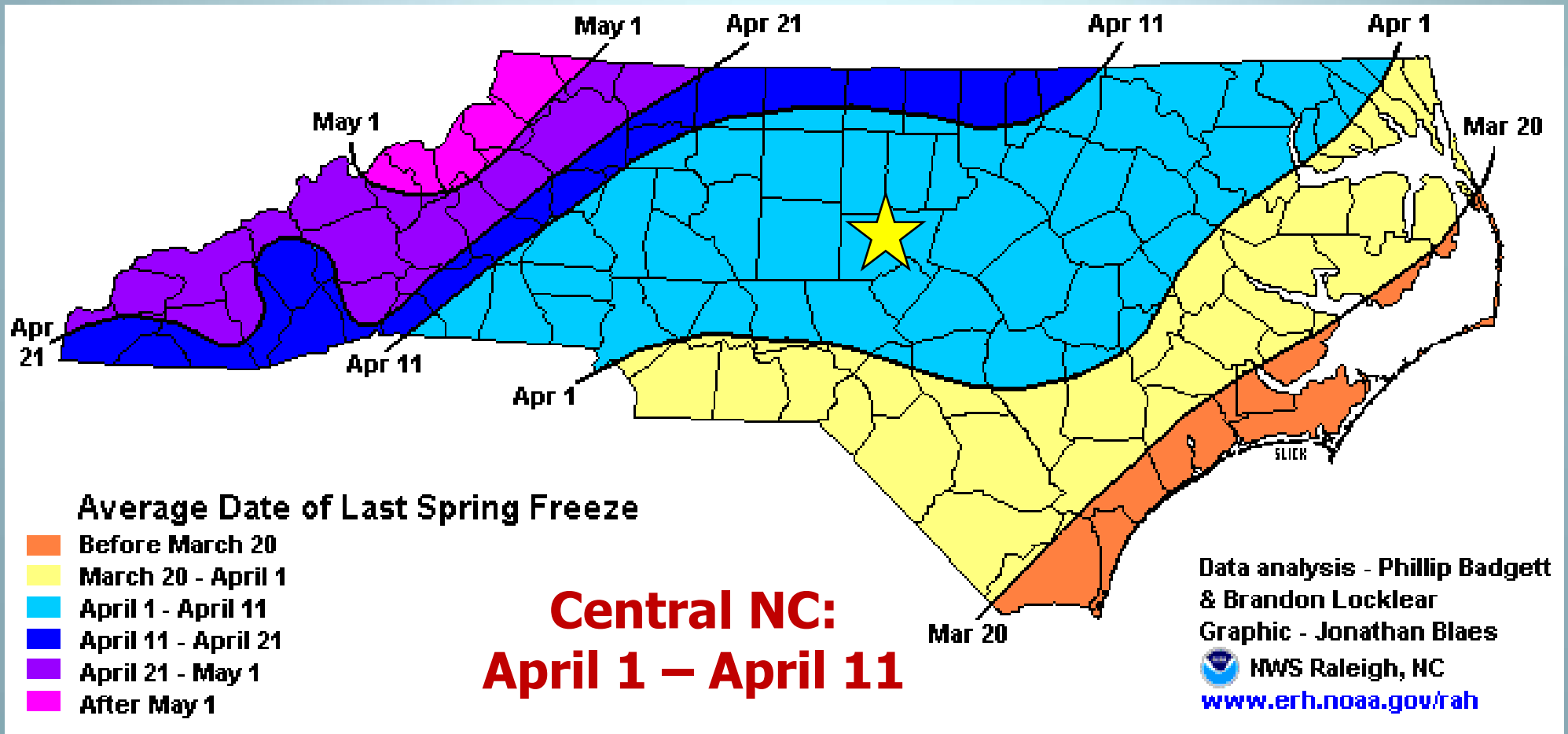
- For bulb onions, plant "sets" or transplants, mid Feb – March OR seed in fall
  - Short Day Varieties! Harvest in June/July
- For scallions (green onions), seed mid Feb - April

Leeks

- Sow/transplant March-April
- **Plant in a shallow trench**
- **Fill soil in around as leeks grow** up to produce long white shanks
- Harvest summer/fall

Summer Garden

Plant warm season crops outside after threat of frost, 1-2 weeks earlier with protection



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)
- Drought stress will reduce production!

Warm Season Crops

Most are bee pollinated

- Plant flowers to attract!
- Can intermix with crops or plant dedicated border
- **Some flowers better than others** - see Top 25 list
- Visit **Pollinator Paradise Garden**, Chatham Mills

Learn more:
carolinapollinatorgarden.org

If space is available allow cool season crops to bloom, such as this broccoli

Challenge: Heat Waves

- **Shade Cloth** – blocks 30% of light
- Keep lettuce, spinach, Swiss chard **producing longer into summer**
- **Start seeds** in summer, reduce stress on transplants
- **Shield summer crops** during extended periods of 90°+ days

Challenge: Drought

- **Water!** Goal = keep top 6-8” of soil moist
  - **Raised beds & sandy soils** require more frequent watering
- **Drip systems** best
- Soaker hoses will last 1-2 seasons

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**

Challenge: Pests

Bring samples or email pictures for ID

Extension Master Gardeners available to help you:

Mon & Thurs, 1 – 4pm

Good pictures are clear and close up!

Good samples are fresh and show all the details!

DEAD PLANTS TELL NO TALES!

Challenge: 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
  - **Not selective**= must apply carefully to avoid damaging vegetables

Too late for weed control!

Sweet Corn

- Plant early April
- **Wind pollinated**
- Plant in blocks of at least 3-4 rows
- Require lots of Nitrogen (slow release)
- **Drought sensitive!**
- Plant in soils with plenty of organic matter

Plant Early!

- Seedlings tolerate light frost – can sow late March
- **Corn earworm** is more severe in late crops – plant early
- One harvest per stalk - Stagger plantings every 2 weeks

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!

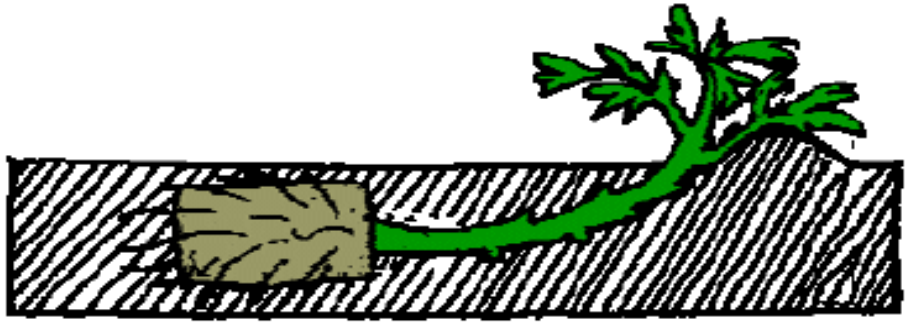
Tomatoes!

- **Plant mid April/May –** earlier with frost protection
- **Space plants 3’ apart**
- **Cage** or stake 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

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:
  - **V -** Verticillium
  - **F** - Fusarium
  - **N** - Nematodes
- **No tomato is resistant to all** (or even most) tomato diseases!
- **No resistance to most soil borne wilt diseases**

Reliable Hybrid Varieties

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

'Juliet' Tomato

Tomato Relatives: Eggplant & Peppers

- Generally easy
- **Susceptible to wilt diseases**
- **Hot peppers and Eggplant** have good drought resistance
- **Sweet peppers** very productive when watered and fertilized
- Wait to plant when really warm (May)

Cucumbers, Summer Squash & Zucchini

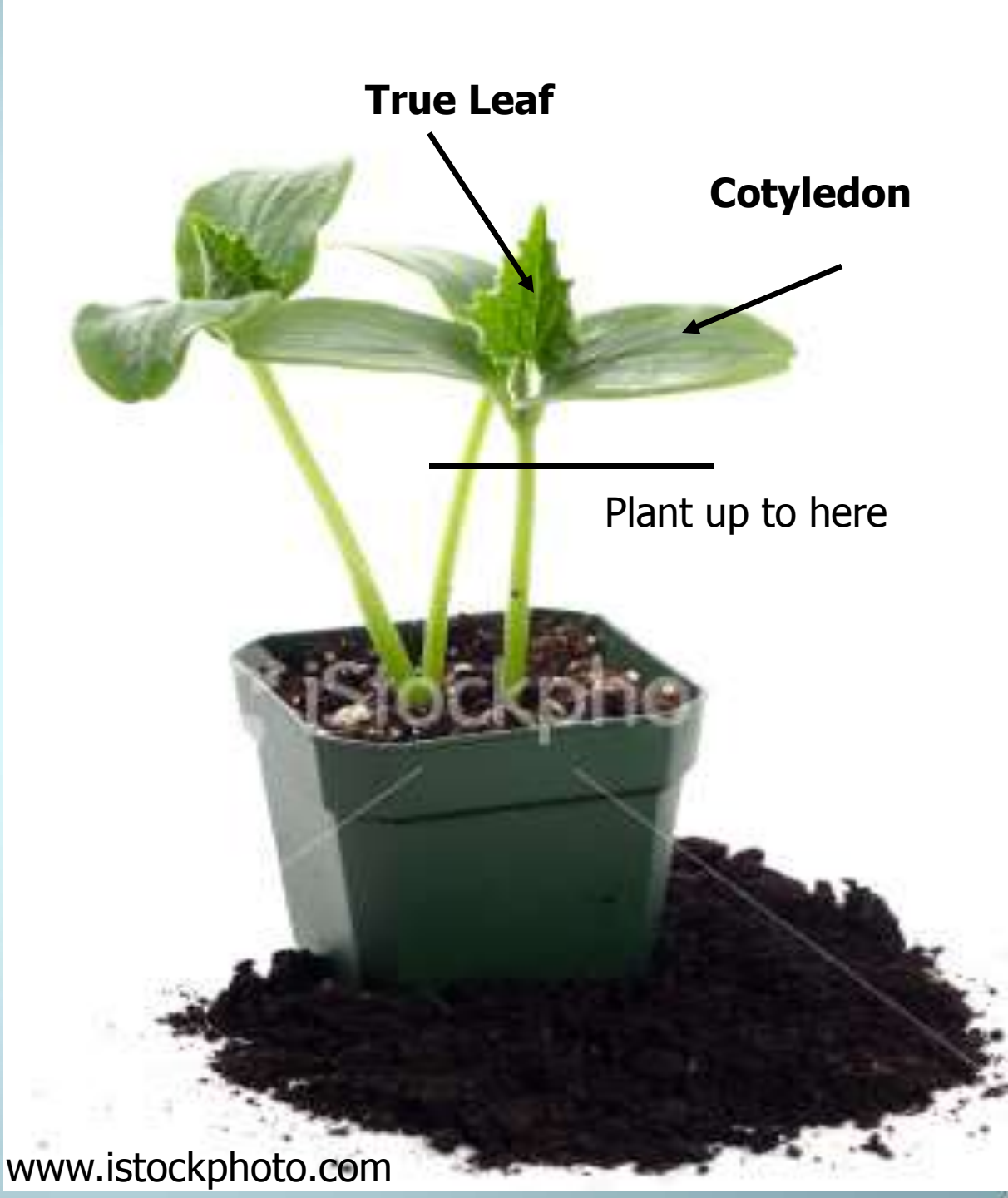
- Easy to grow from seed – sow mid-April – May
- Can also establish from transplants
- Winter squash (acorn, butternut, pumpkins) can also be planted now or later in summer

Planting

Plant cukes, squash, and melons up to the **cotyledons** for healthier plants

Do not worry about this if direct seeding in the garden

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

Squash Vine Borer

- Attack squash and zucchini in May/June and August
- **Plant as early as possible** – early April
- Crop rotation helps, but adults fly
- **Spray** Pyrethrin, Neem (organic), or Permethrin (synthetic) beginning mid-May, every 7-14 days, lower part of stem
- **Inject B.t.** (organic) into stem

Melons

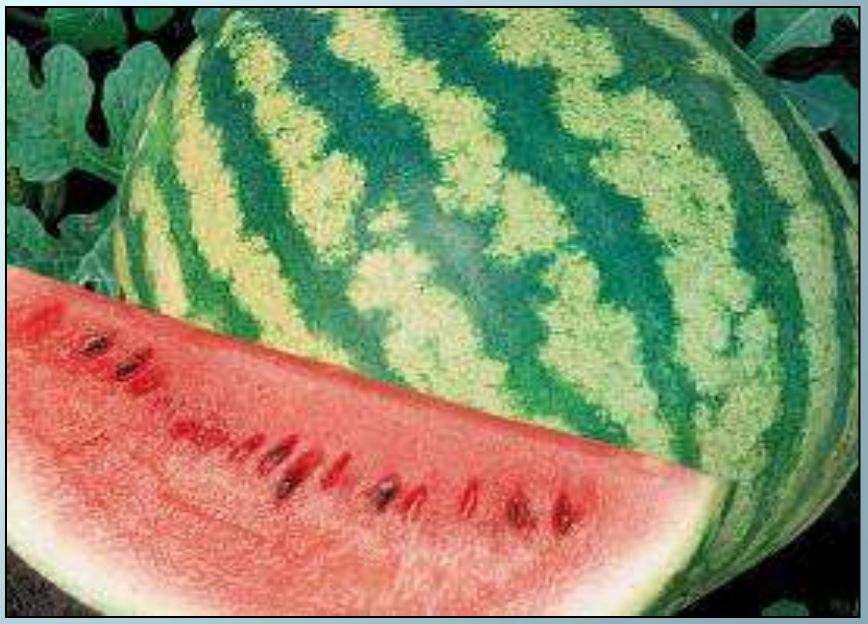
Wait until really warm to plant

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



Beans and Their Relatives

Beans-Lima, Butter, Green

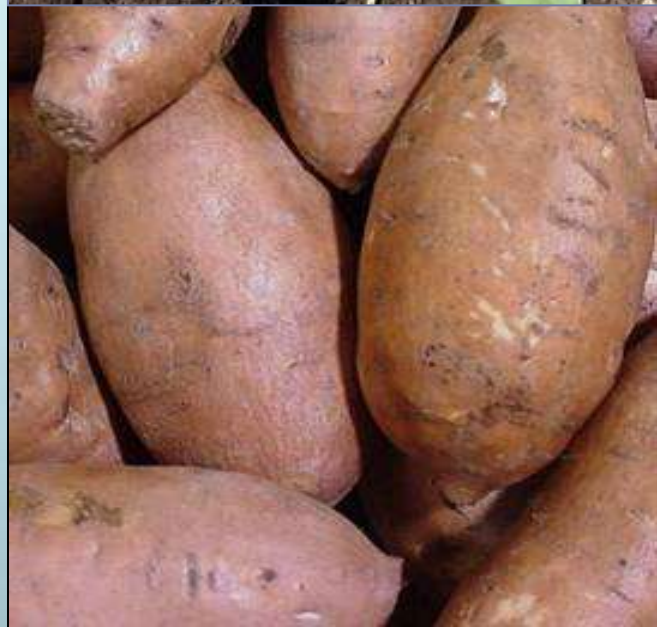
- Can inoculate seed with nitrogen fixing bacteria
- Don’t bear heavily in hot weather
- Bush and pole varieties

Southern Peas

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

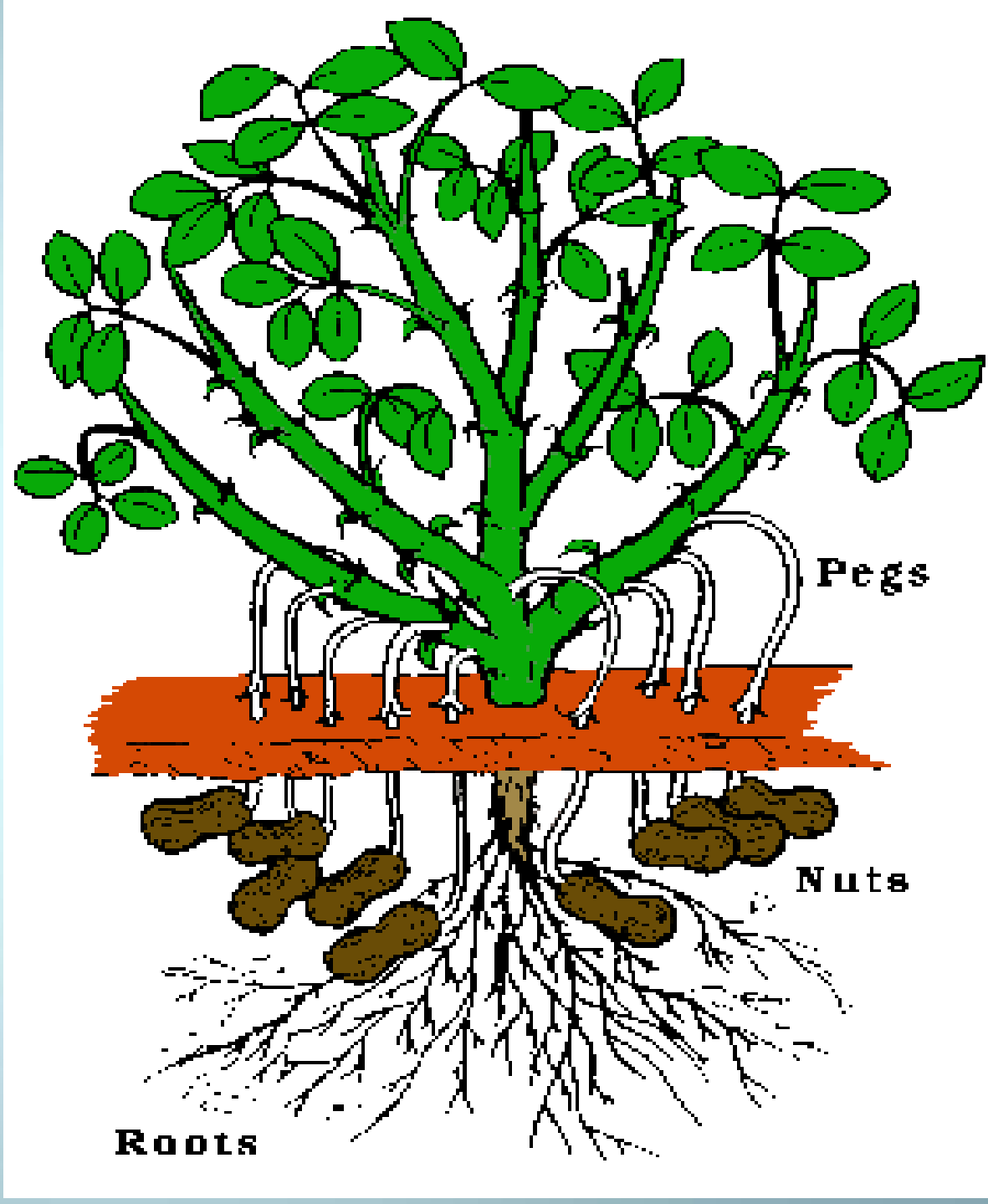
Sweet Potatoes

- Vigorous vines! Set out transplants in May
- Need loose, well drained soil
- **Varieties:** 'Beauregard', 'Jewell', 'Puerto Rico'
- Cure after harvest to increase sugar content
  - Harvest (don't wash), store in garage or shed (80°) with damp burlap over top
- **Deer love sweet potato vines!**



Peanuts

- Need very well drained soil
- Very frost sensitive – plant in May, harvest Sept.
- Peanuts form on ‘pegs’ that grow into the ground from flowers on lower stems



Fall: The Forgotten Season

Warm season crops

- Second planting July/August will keep producing until frost

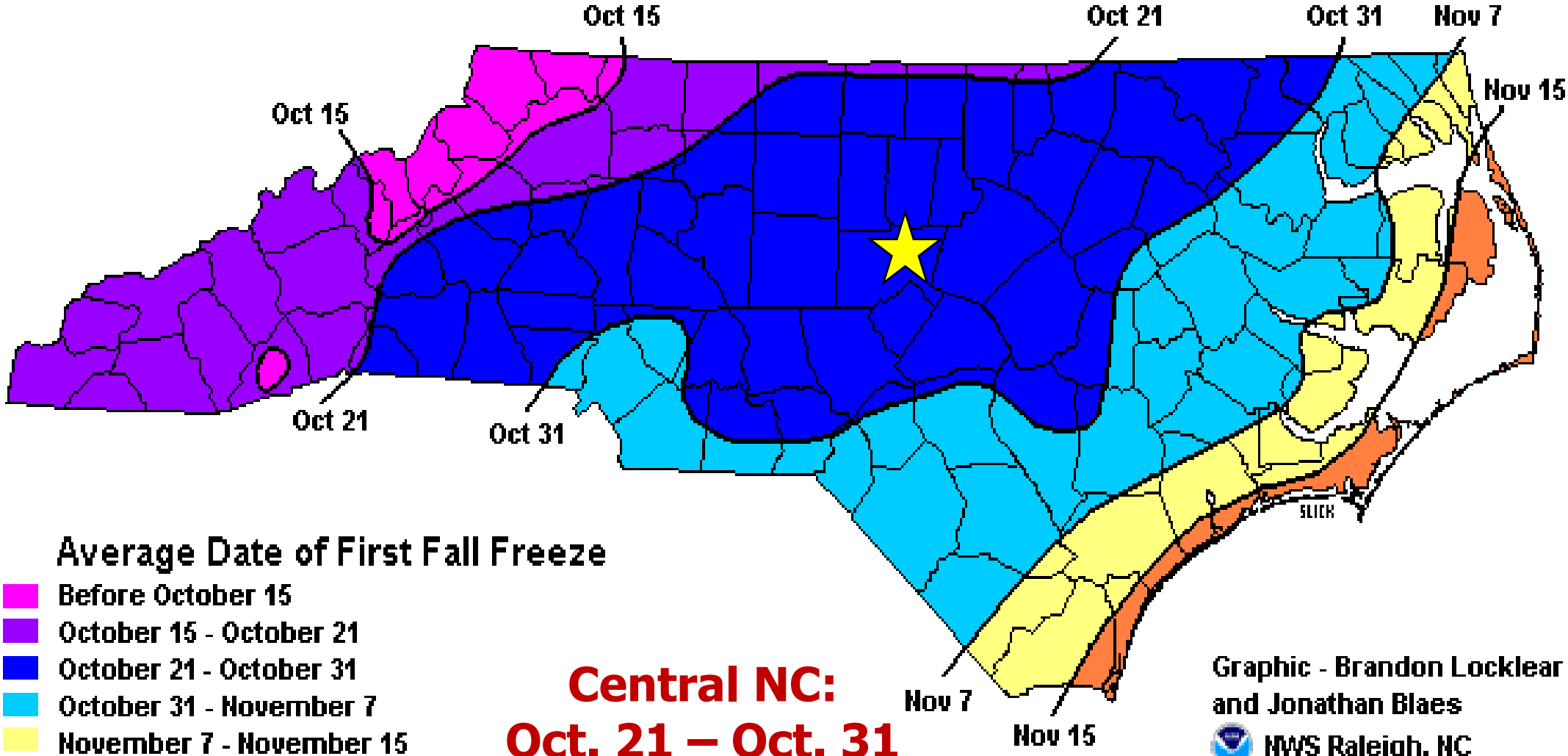
Cool season crops

- Planted Aug-Sept will produce fall and into winter with protection

Challenge:

- Warm, dry soils
- Plant seeds deeper (up to 1”)
- Water, shade seeds/new transplants

For warm season crops, plant 10-12 weeks before first fall freeze



Cool Season Vegetables

Tolerate frost:

Hardy: tolerate heavy frost (below 28 degrees), can produce into the 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

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

Extend Growing Season

- **Cold Frames**
- Keep crops producing later in the season
- **Not enough protection to keep warm season crops going in winter**

High Tunnel

- Unheated greenhouse
- Grow cool season crops all winter
- Sides roll up for ventilation

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!

Broccoli and Cauliflower

- Mature in 50-70 days
- Start seed early August, set out transplants mid August – mid September
- **Half hardy** – harvest through Dec.
- **Broccoli** - After harvest main head, **side shoots** will develop
  - Sprouting types/Calabrese – lots of side shoots!
- **Cauliflower** – pull up after harvest, no side shoots
  - **Cauliflower more difficult than broccoli**

Cabbage

- Mature in 65-90 days
- Sow early Aug. or set out transplants late Aug. – early Sept.
- Consistent moisture and nutrients results in high quality heads
- Most varieties very hardy, can stay in garden through winter
- Pointed/Spring cabbage faster to mature but does not store as well

Napa/Chinese Cabbage
Bok Choy/Pac Choi

- Mature in 40-60 days
- Sow early Aug. or set out transplants in late Aug. – early Sept.
- **Less hardy** - harvest before hard frost (28 degrees)
- **Flea beetles** love them! Cover with row cover or spray pyrethrin/permethrin

Collards and Kale

- Mature in 55-75 days, sow early Aug. or set out transplants early Sept. – early Oct.
- Plant in rows as single plants
- Very cold hardy will produce through winter
- Crop leaves from bottom up
- **Cabbage-Collards** lighter green, more tender leaf

Kale!

Red Russian

Toscana

Winterbor

Brussels Sprout

- Mature in 85-110 days, sow seed July, plant homegrown or purchased transplants in August.
- Harvest in spring
- Very cold hardy

Crucifer Pests: Caterpillars

- Be on the lookout!
- All become moths – can cover with row cover to exclude
- **Organic Insecticides**
  - **B.t.** (*Bacillus thuringiensis*)
  - **Spinosad**
  - **Neem** and **Pyrethrin**

Aphids

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

Turnip Aphids

Root Crops

- **Carrots, beets, rutabaga, radish, turnips, kohlrabi**
- Sow Aug-Early Sept.
- Harvest beets, turnips, rutabaga before hard frost
- Can leave carrots to overwinter in soil

Carrots can overwinter in the soil

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

Head Lettuce

- **Romaine/Cos** and **Butterhead/Bibb** do well
- **Romaine** mature in 50-60 days, sow late August and Feb
- **Bibb** types mature in 40-50 days, sow late August and Feb-March
- **Iceberg** is finicky in our area

Onions and Their Relatives

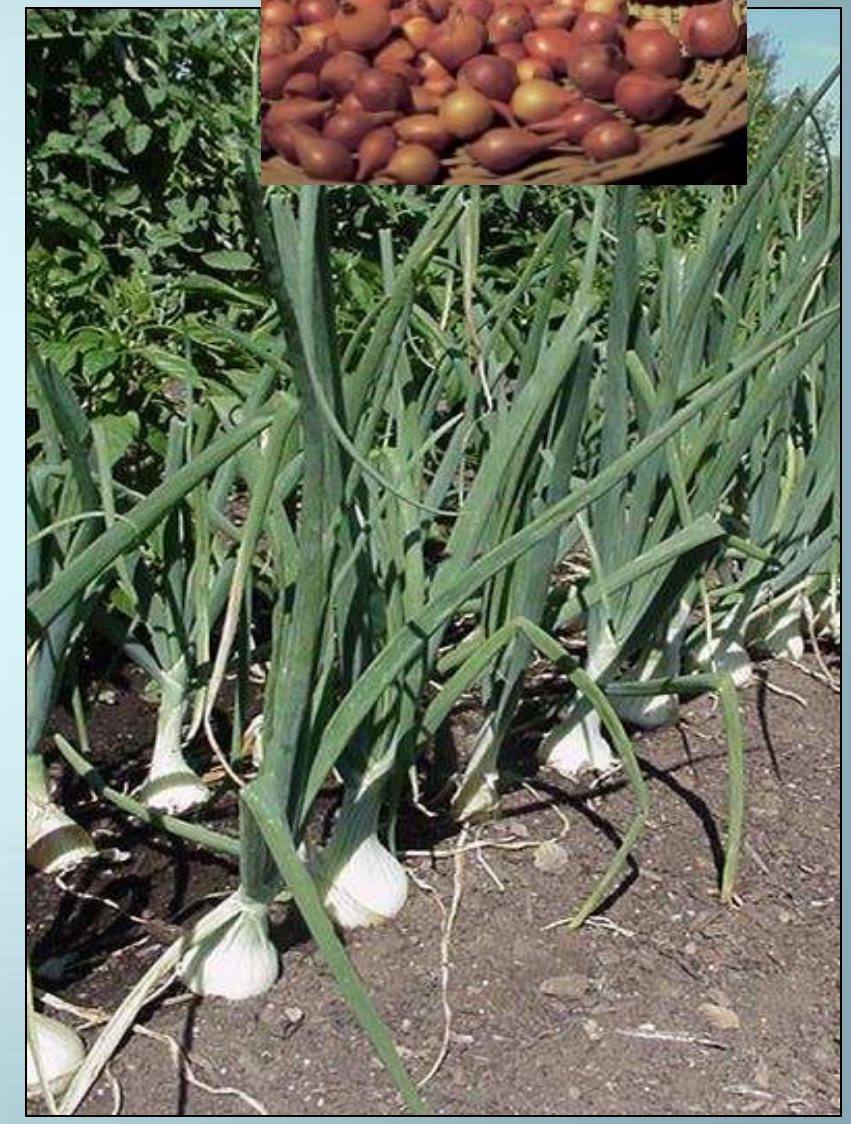
- **Onions, Garlic, Leeks**
- Do best in our area when fall planted!
- Harvested in spring
- **Heavy feeders** – like lots of organic matter and consistent moisture and nutrients
- Need good drainage

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

Cover Crops

Don’t leave bare soil overwinter!

Cool season cover crops:

- Sow Sept
- Hairy vetch, crimson clover = add nitrogen
- Mustard, rapeseed, wheat, rye

Warm season cover crops:

- Sow mid-April - August
- Cowpeas, soybeans, crowder peas = add nitrogen
- Buckwheat = very quick, turn under in 30-45 days

Crimson clover = cool season
Buckwheat = warm season

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In Chatham County,

- 919-542-8202
- charlotte_glen@ncsu.edu

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