

Warm Season Crops for Vegetable Gardens



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NC STATE EXTENSION

COUNTY CENTERS TOPICS GIVE NOW



https://covid19.ces.ncsu.edu/



Vegetable Gardening Resources

• For this class: https://go.ncsu.edu/chathamveggies

Gardening Portal: https://gardening.ces.ncsu.edu/

Extension Gardener Portal:
 https://extensiongardener.ces.ncsu.edu/



Subscribe to the Chatham Gardener Newsletter

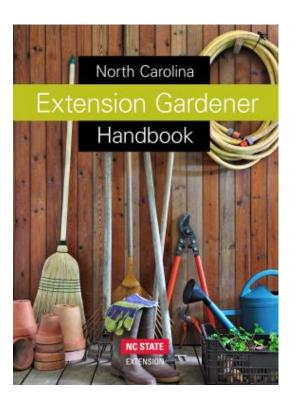
- Sustainable gardening information
- Monthly articles written by Master GardenerSM Volunteers
- Upcoming classes and events
- To subscribe: <u>http://go.ncsu.edu/subscribecg</u>





Extension Gardener Handbook

- Available online for FREE https://content.ces.ncsu.edu/extension-gardener-handbook
- Full-color, hardback copy available from UNC Press (\$60)
- See chapters on <u>Soils</u>, <u>Vegetable</u> <u>Gardening</u>, <u>Organic Gardening</u>, and <u>Composting</u>





Resources

NC State Extension Homegrown

https://homegrown.extension.ncsu.edu

- In the Garden Videos
- In the Kitchen Videos
- On the Farm Videos



In The Garden

From growing your own produce to composing your kitchen scraps, we'll take you through the finer points of putting your green humb to good use. And whether you've got a whole backyard ready to be planted or a couple houseplants on your windows!!, we're here to help. Go ahead, get your hands dirty.



Recent Stories

Inside Scoop. How Ice Cream is Made 🕈

Rainbow Pita Pockets 🔶

Healthy Toss Up Snack for Kids 🕈

Oct 11, 21



Upcoming Workshops

Many more Extension Gardener workshops to come!

https://go.ncsu.edu/chathamgardening

	Workshop	Date (2020)	Time	Cost
	Tree Identification in Winter	Jan. 21	9:30 a.mnoon	\$10
	Tree Identification in Winter	Jan. 22	6-8:30 p.m.	\$10
	Growing Vegetables from Seed	Feb. 5	6-8:30 p.m.	\$10
	Growing Vegetables from Seed	Feb. 6	9:30 a.mnoon	\$10
	Soil & Nutrient Management in Vegetable Gardens	Apr. 2 – Jun 30	Watch anytime online	FREE
	Warm Season Crops for Vegetable	Apr. 15 – Jun 30	Watch anytime online	FREE
	Pest, Disease, & Weed Management in Vegetable Gardens	Jun. 2	9:30 a.mnoon	\$6
	Pest, Disease, & Weed Management in Vegetable Gardens	Jun. 4	6-8:30 p.m.	\$6
	Carolina Lawn Care	Jun. 9	6-8:30 p.m.	\$6
	Carolina Lawn Care	Jun. 10	9:30 a.mnoon	\$6
	What's the Matter with my 'Mater?	Jul. 7	9:30 a.mnoon	\$6
	What's the Matter with my 'Mater?	Jul. 9	6-8:30 p.m.	\$6
	Cool Season Crops for Vegetable Gardens	Aug. 11	9:30 a.mnoon	\$6
	Cool Season Crops for Vegetable Gardens	Aug. 12	6-8:30 p.m.	\$6
	Native Tree Identification	Sep. 1	9:30 a.mnoon	\$10
	Native Tree Identification	Sep. 3	6-8:30 p.m.	\$10
	Fundamentals of Composting	Nov. 5	9:30 a.mnoon	\$6

More will move online as the pandemic proceeds





Planting Seasons

Cool season

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

Warm season

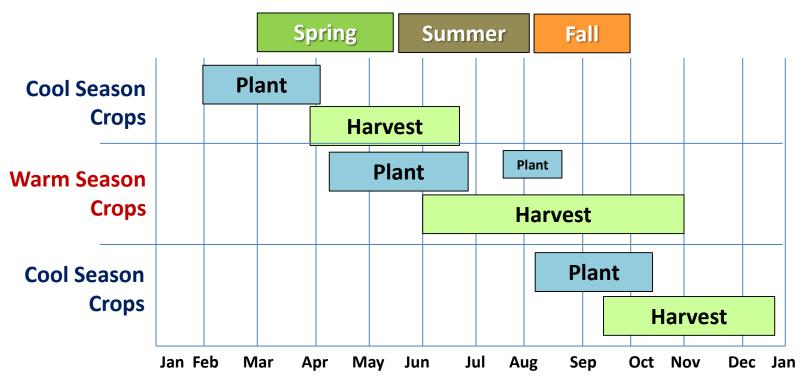
- Plant after average last spring frost date, April 15
- See "Central NC Planting Calendar" for specific dates



Not the same as the produce aisle!

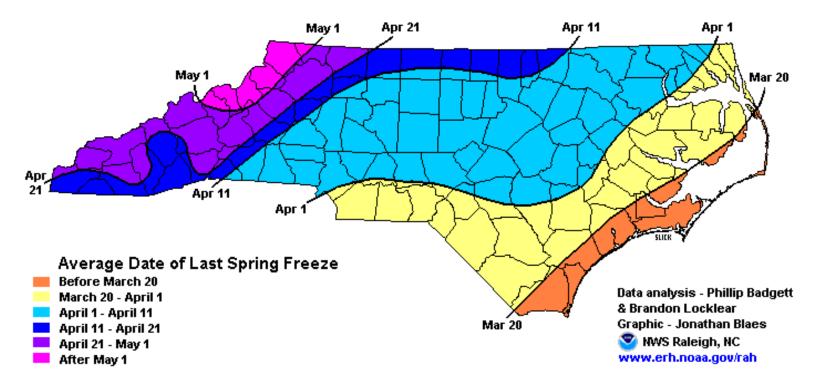


Planting Seasons



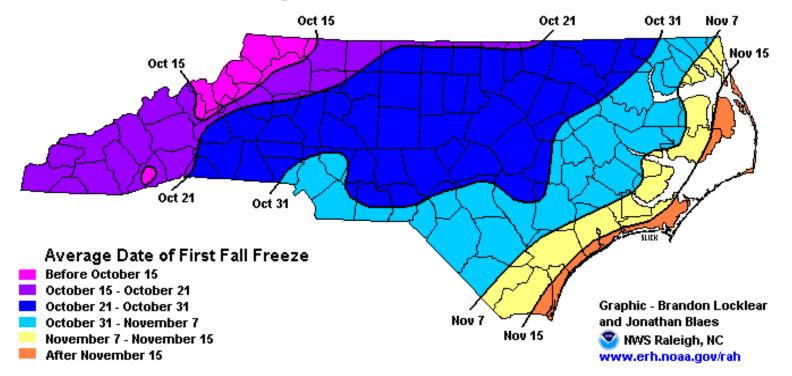


Average Last Frost Date





Average First Frost Date



Planting Calendars

- Use Extension planting calendars
- Do not rely on seed packets for regionally-accurate information!
- Refer to direct planting, not seed starting



Freezing temperatures, high temperatures, humidity, and solar intensity, all common in central North Carolina, can stress plants. To successfully grow plants in this environment, select varieties that are tolerant of temperature extremes, plant at the appropriate times to avoid temperature extremes, or plan to protect the plants. It is possible to grow plants out of season by creating microclimates that differ from the overall climate by providing shade, humidit, or artificial heat.

Seasons

We have three optimal growing seasons: spring, summer, and fall. Both day length and temperature vary dramatically between seasons (short days and cool temperatures in spring and fall, long days and high temperatures in summer). Some plants are adapted to growing in the cool months of the year and will tolerate some frost (cool-season vegetables, Figure 1 (a)), while others do not tolerate frost and should be planted to grow outside only in frost-free months (warm-season plants, Figure 2 (a)). Even warm season plants have their limits and will temporarily stop bearing during heat waves (temperatures in mid 90s).





Figure 1. Cool-season vegetables can tolerate Figure 1. Cool-season vegetables can tolerate tol tol out

Figure 2. Warm-season vegetables don' tolerate frost and should only be planted outside when frost is no longer a threat.

https://content.ces.ncsu.edu/central-north-carolina-planting-calendar-for-annual-vegetables-fruits-and-herbs

Table 1. Garden planting calendar for vegetables, fruits, and herbs in Central North Carolina.

	Days to Harvest (from seed unless otherwise noted)	Distance Between Plants (inches)	Jan	n Feb		Mar		Apr		Мау		Jun		Jı	Jul		ug	Se	эp	Oct	Nov Dec
Fruit, Herb, or Vegetable			115	1	15	1	15	1	15	1 1	15	1 1	5	1	15	1	15	1	15	115	1 15 1 15
Artichokes, globe	T = 1 year	30					Т	Т	Т												
Artichokes, Jerusalem*	Tu = 6-8 months	9–12					Tu	Tu 🛛	Tu												
Arugula	40-50	6–9		S	S	S	S									S	S	S	S		
Asparagus	C = 2 years	18			С	С	С														
Basil	T = 14–35 S = 50–75	2–8								S,TS	6,T S	S,T S	,TS	5,T	S,T						
Beans, lima/bush	65-80	6							S	S	S	S S	5	S	S						
Beans, lima/pole	75–95	6							S	S	S	S			S						
Beans, snap/bush	50-55	2					S	S	S	S	S	S S	5	S	S	S	S	S	S		
Beans, snap/pole	65–70	6						S	S	S	S	S S	5	S	S	S	S	S	S		
Beets	55-60	2				S	S	S							S	S	S	S			
Broccoli	T = 70–80	18			Т	Т	Т	Т								Т	Т	Т			
Brussels sprouts	T = 40–50 S = 90–100**	14–18												Т	Т	Т	Т				
Cabbage	T = 63–75 S = 90–120**	12		Т	Т	Т	Т	Т							Т	Т	Т	Т			
Cabbage, Chinese	T = 45–55 S = 75–85	12					S,T									S	S		Т	Т	
	Days to Harvest (from seed unless	Distance Between Plants	Jan	Fe	b	Ma	ar	Ар	r	Ma	у	Jun		J	ul	A	ug	Se	эp	Oct	Nov Dec
Fruit, Herb, or Vegetable	otherwise noted)	(inches)	115	1	15	1	15	1	15	1 1	15	1 1	5	1	15	1	15	1	15	115	1 15 <mark>1 15</mark>

https://content.ces.ncsu.edu/central-north-carolina-planting-calendar-for-annual-vegetables-fruits-and-herbs

Planting Seeds

Plant in well prepared, moist soil.

- Water 4-6 in., allow surface to drain
- Water required for germination
- Damping-off diseases

Plant according to recommendations

- Depth = 1-2x diameter, deeper in fall
- Space closer, then thin seedlings

Seed directly in the garden, or in containers for later transplanting

• Cover and firm (not pack) soil









Thinning Seedlings

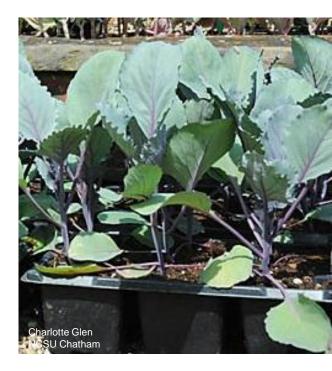


When in doubt... DECAPITATE!

Thin to recommended spacing by snipping with scissors

Seedlings/Starts/Transplants

- Small/young plants
- Easy higher rate of success
- Good when only need a few plants
- Grow your own transplants sow seed 4-6 weeks early





Planting Transplants

- 1) Moisten container
- 2) Remove from pot carefully, preserving roots
- 3) Dig a hole same depth as container
- 4) Row covers or other protection from wind, sun (summer)









Want more information on seed starting?

go.ncsu.edu/veggieseedresources



EXTENSION How Vegetables are Typically Planted

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 cucumber, squash , zucchini, melons

Cool Season

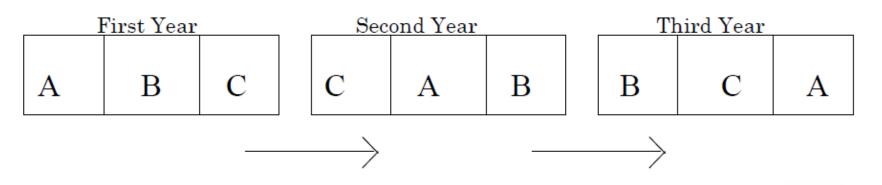
Warm

Season





- Avoid planting crops in the same family in the same location year after year
- Minimum 3 year rotation ideal
- Include cover crops in rotation
- Requires planning and record keeping!





Plant Families

Brassicaceae (Mustard Family):

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

Cucurbitaceae (Squash Family):

- Cucumbers, Squash, Zucchini, Winter Squash, Pumpkins, Cantaloupe, Watermelons
- **Solanaceae** (Nightshade Family)
- Tomatoes, Peppers, Eggplant, Potatoes
- Fabaceae (Bean Family)
- Garden peas, peanuts, green beans, lima beans, southern peas



Plant Families

Amarylidaceae (Onion Family)

• Onions, garlic, leeks, scallions

Apiaceae (Carrot Family)

• Carrots, parsnips, dill, fennel, parsley, cilantro

Amaranthaceae (Amaranth Family)

• Spinach, Swiss Chard and Beets

Vegetables with no close relatives:

- Lettuce, endive (Asteraceae)
- Sweet Corn (Poaceae includes grains like wheat, rice, barley, etc.)
- Sweet Potato (Convolvulaceae)
- Okra (Malvaceae includes cotton, hibiscus, cacao)





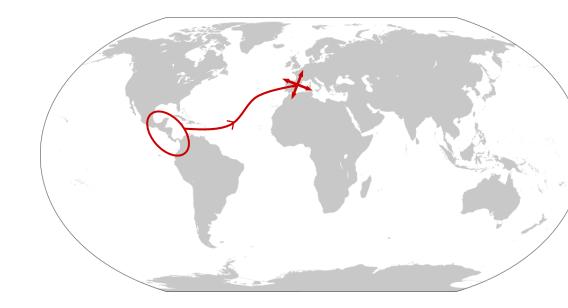


Tomatoes Solanum lycopersicum (Solanaceae)



Buzz Pollination PLOS





Relatives: Potato, eggplant, pepper, nightshade What you eat: Mature fruit (botanical berries)

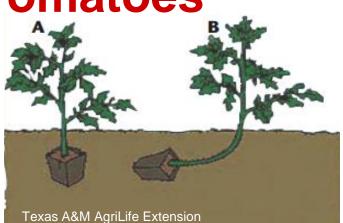
Planting Tomatoes

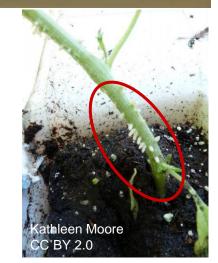
Start Seeds Indoors

- 1/4 in. deep
- Seed heating mat 65-85° F
- 5-7 weeks before last frost (Feb-Mar)
- <u>https://go.ncsu.edu/veggieseedresources</u>

Transplants (purchased or grown yourself)

- Mid-April to July, August
- Plant a little deeper than rootball, on side if leggy
- 18-24" apart, 3' between rows







Planting Tomatoes

Cages



- Less pruning (suckering) required
- Allow 6 in. openings for accessibility

Stakes



- Train to 1 or 2 stems, remove suckers
- 6-8' tall, 8-12" deep

Suckering Tomatoes

Prune lateral shoots on staked tomatoes

Indeterminate Cultivars

- Remove all suckers
- **Determinate Cultivars**
- Remove suckers below
 first fruit cluster



Gary Gao Ohio State Extension



Growing Tomatoes

Fertilizer

- Soil Test!
 - If unavailable: 3 lbs. 5-10-10 or 7.5 lbs. 3-4-3 (organic) per 100 ft²
 - pH 6.0-6.5

Side Dressing

0.5 lb. actual N /1000 ft² 4 weeks and 8 weeks after transplant

= 2 lbs. calcium nitrate or 2-3 lbs. of blood meal per 100 ft²

Watering

- 1-1.5" per week equivalent
- Moisten to a depth of 6 inches
- Consistent moisture to reduce Blossom End Rot
- Organic mulches









Choosing Tomato Cultivars

Growth Habit

- Dwarf (containers*)
- Compact/Determinate
- Indeterminate

Fruit Characteristics

- Color
- Size
- Fresh vs. Paste
- Acidity

Ripening Period

- Early, mid, late
- Determinate vs. indeterminate

Genetics

- Open Pollinated
- Hybrid

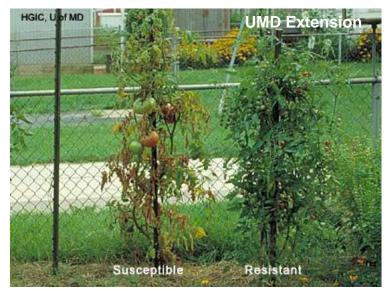
Disease Resistance

* <u>https://chatham.ces.ncsu.edu/fall-vegetable-gardening-in-containers/fall-vegetable-gardening-in-containers-resources/</u>

Tomato Disease Resistance

Look for abbreviations

- V Verticilim Wilt
- F Fusarium Wilt
- (RK)N Nematodes
- **EB** Early Bight
- LB Late Blight
- T(MV) Tobacco Mosaic Virus
- S Septoria leaf spot
- **Bacterial wilt** (grafted)
 - Extension Master Gardener Fundraiser next year!





What's the Matter with my 'Mater?

- July 7 & 9 if quarantine lifted
- Sooner if not (online)

https://chatham.ces.ncsu.edu/whats-thematter-with-my-mater/

Diagnosis and Management of Pests and Diseases of Tomatoes



Late blight of tomato. Photo by Dr. Inga Meadows, NC State University.

Extension Gardener Workshop

Vegetable Boot Camp (Part 5 of 6)

Access to fresh tomatoes is among the most rewarding aspects of home vegetable gardening, and at time the most challenging. Warm nights, high rain and humidity, and resulting pest and disease pressure can frustrate even experienced gardeners.

Cherry

- 'Sweet 100'
- 'Sweet Million'
- 'Sun Gold'
- 'Juliet'

Main Crop Hybrids

- 'Celebrity'
- 'Better Boy'
- 'Floramerica'

Tomato Cultivars

Early Ripening

- 'Early Girl'
- 'Bush Early Girl'

For Containers

- 'Husky Gold' & 'Husky Pink'
- 'Tiny Tim'

Heirloom

- 'German Johnson'
- 'Cherokee Purple'
- 'Brandywine'
- 'Green Zebra'



Harvesting Tomatoes

Harvest

- 60-85 days after transplant
- Full color but still firm
- Red pigment degrades > 86°F
- Green tomatoes can ripen off vine if blushed

Storage

- On the counter
- Light not a factor
- Respond to ethylene (climacteric fruit)









Peppers *Capsicum spp.* (Solanaceae)

C. annum

- Bell
- Poblano
- Jalapeno
- Many others

C. baccatum

• Aji Amarillo

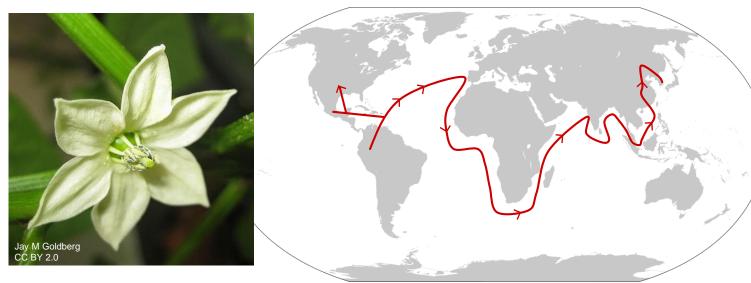
C. chinense

- Habenero
- Scotch bonnet

C. frutescens

- Piri piri
- Tabasco
- Xiaomila

Relatives: eggplant, potato, tomato, nightshade What you eat: Fruits (botanical berries)





Planting Peppers

Start Seeds Indoors

- 1/4 in. deep
- Seed heating mat 65-75° F
- 6-8 weeks before last frost (Feb-Mar)
- <u>https://go.ncsu.edu/veggieseedresources</u>
- **Transplants** (purchased or grown yourself)
- Mid-April through mid-June
- Plant as deep as root ball or pot
- 12-18 inches apart









Growing Peppers

Fertilizer

- Soil Test
 - If unavailable 3 lbs. 5-10-10 per 100 ft^2
 - pH 5.8-6.5

Side Dressing

0.5 lb. actual N /1000 ft² 1 month after transplant*

= 0.5 lbs. of blood meal per 100 ft²

Watering

- 1" per week equivalent
- Moisten to a depth of 6 inches
- Critical during fruit development
- Consistent moisture to reduce Blossom End Rot







Growing Peppers

Ratooning

- If flower/fruit production declines by late summer...
- Cut to 6-8" to induce re-growth
- Fertilize 2-3 lbs. 5-0-10, 4-0-8, or 10-0-20 per 100 ft.²
- Harvest until first frost









Open Pollinated Bell Pepper Cultivars









'Purple Beauty'

'Capistrano'



Hybrid Bell Pepper Cultivars



'Giant Marconi'







'Lilac'



Open Pollinated Hot Pepper Cultivars







'Anaheim'

'Carolina Cayenne'

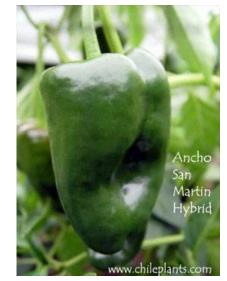
'Jalapeño M'



Hybrid Hot Pepper Cultivars



'Tigerpaw NR' Habanero



'San Martin' Poblano/Ancho



'TAM Jalapeño'

NC COOPERATIVE

Picking Peppers

Harvest

- 75-80 days after transplant
- Use a knife or pruners (delicate stems)
- Be careful with hot peppers!
- Bell Peppers Green or just after mature color is achieved
- Jalapenos When fruit turns dark green
- Hot peppers When color & size of cultivar is achieved

Storage

- 45-50°F up to two weeks
- Air dry (hot peppers)

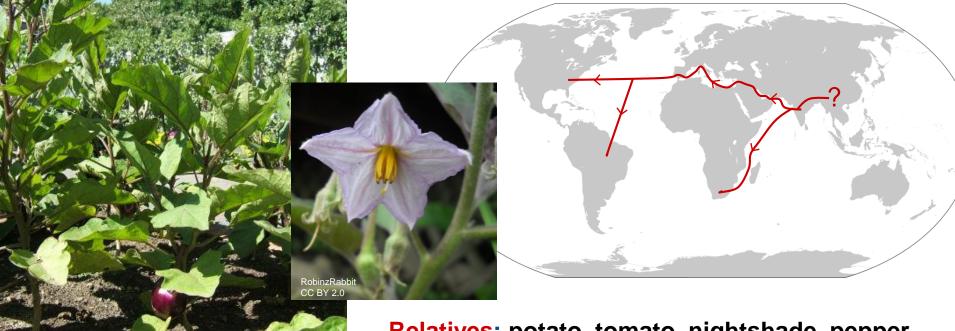








Eggplant (Aubergine, Brinjal) Solanum melongena (Solanaceae)



Relatives: potato, tomato, nightshade, pepper What you eat: Immature fruits (botanical berries)



Eggplant...ing

Start Seeds Indoors

- 1/4 in. deep
- Seed heating mat 75-85° F
- 8 weeks before last frost (Mid-Feb.)
- <u>https://go.ncsu.edu/veggieseedresources</u>
- **Transplants** (purchased or grown yourself)
- Mid-April through mid-June, August
- Plant as deep as root ball or pot
- 18-24 inches apart







NC COOPERATIVE

Growing Eggplant

Ratooning

- First crop competed by July
- Cut to 6-8" to induce re-growth
 Leave 2-3 leaf axils
- Fertilize 2-3 lbs. 5-0-10, 4-0-8, 10-0-20 or other 1:2 N:K per 100 ft.²
- Harvest until first frost







Italian-Type Eggplant Cultivars



'Black Beauty'



'Dusky'



East Asian-Type Eggplant Cultivars





'lchiban'

'Ping Tung Long'



South Asian-Type Eggplant Cultivars





'Kermit' (Thai)

'Calliope' (Indian)

NC COOPERATIVE

Harvesting Eggplant

Harvest

- 60-90 days after transplant
- Sufficient size, glossy color
- Indentation remains when pressed
- Use a knife or pruners (thick pedicels)
- 1-2 times per week

Storage

• 45-50°F up to two weeks





NC COOPERATIVE EXTENSION

Southern Peas (cowpeas) Vigna unguiculata (Fabaceae)

Field Pea

• Vining, dark cooking liquid

Crowder Pea

Starchy seeds, dark cooking liqu

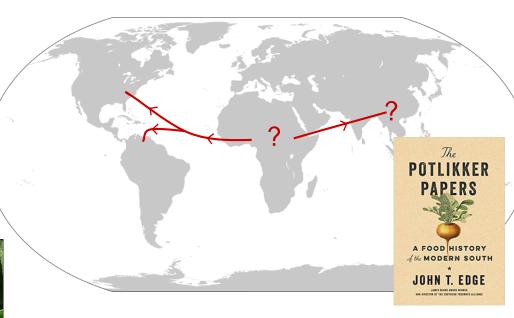
Cream Pea

• Small plants, light cooking liquid

Back-eyed Pea

Intermediate





Relatives: peas, beans, all other legumes What you eat: Immature seeds



Planting Southern Peas

Plant Seeds Directly Outdoors

- Must have warm soils, > 60 ° F
- ³⁄₄ 1 ¹⁄₂ in. deep
- 3-6 in. apart within rows, 3-4' between
- Two weeks after last frost
 - April June, Aug.
- Succession plant every 3 weeks









Growing Southern Peas

Fertilizer

Soil Test

- If unavailable 2 lbs. 5-10-10 per 100 ft²
- Careful: too much N = low yield
- pH 5.8-7.0

Watering

- Water after planting
- Irrigation normally not necessary









Southern Peas Blackeye Cultivars



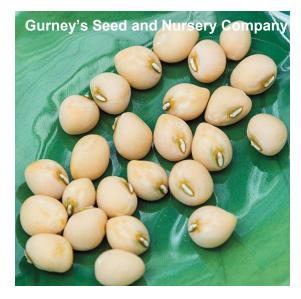


'California Blackeye #5'

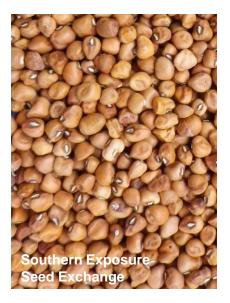
'Purple Hull Pinkeye'



Southern Peas Cream and Crowder Cultivars







'Zipper Cream'

'Mississippi Purple'

'Colossus 80'

NC COOPERATIVE EXTENSION

Harvesting Southern Peas

Harvest

- 55-125 days after planting
- Produce for 3-5 weeks
- Easily shelled, seeds swollen in pod
- Before pods start to dry, change color
- Keep in shade while harvesting
- Shell after harvesting

Storage

- Blanch, cool, and freeze fresh peas
- Or allow to dry on plant





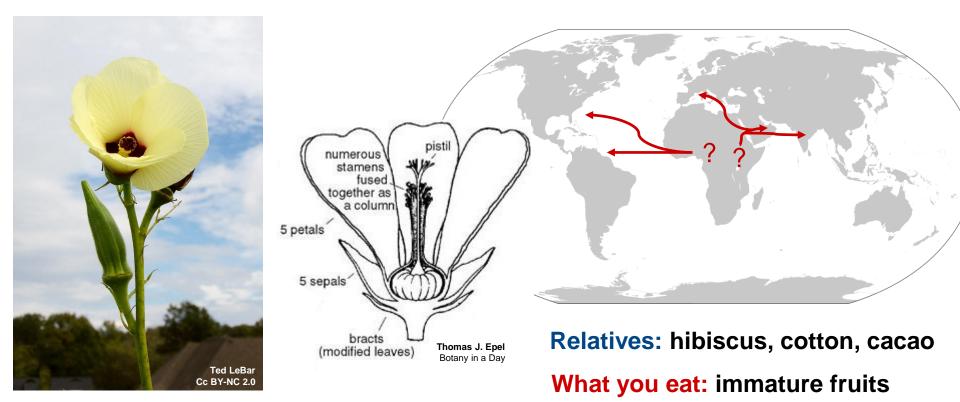








Abelmoschus esculentus (Malvaceae)





Planting Okra

Seed

- Soils ≥ 70° F
- ³/₄ in. 1" deep, 2-3" apart
- Thin to 12" spacing
- May and August

Transplants

• Start indoors in late March











Growing Okra

Fertilizer

- Soil Test
- pH 5.8-6.5
- Side Dressing

0.5-1 lb. actual N /1000 ft² when 2 ft. high = 5-10 lbs. of blood meal per 1000 ft²

Watering

- 1" per week equivalent
- Moisten to a depth of 6 inches









Growing Okra

Ratooning

- Flower/Fruit production may decline by late summer
- Cut to 6-8" to induce regrowth
- Fertilize 2-3 lbs. 5-0-10, 4-0-8, or 10-0-20 per 100 ft.²
- Harvest until first frost









Okra Cultivars







'Clemson Spineless 80'

'Red Burgundy'

'Cajun Delight'



Okra Cultivars







'Cow Horn'

'Lee'

'Annie Oakley II'



Harvesting and Storing Okra

Harvest

- Continuous, every other day
- Fruits 2-3 in. long (most varieties)
 - 60-70 days from seed
- Use a knife or pruners
- Wear gloves

Storage

- Short refrigerator life
- Do not wash before storing
- Pickling: <u>https://foodsafety.ces.ncsu.edu/fermentation-and-pickling/</u>





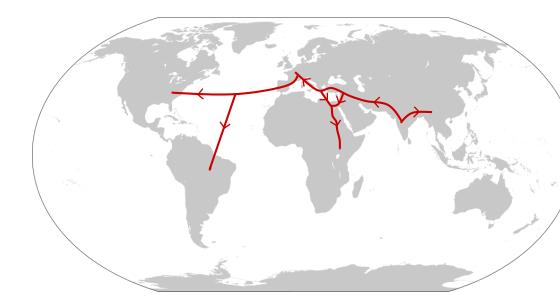




Cucumber

Cucumis sativus (Cucurbitaceae)





Relatives: Squashes, pumpkins, gourds What you eat: Immature fruits (pepo)



Cucumber Cucumis sativus (Cucurbitaceae)

Female (Pistillate) Flower

Male (Staminate) Flower

Monoecious, Protandrous Flowers

- Male flowers produced in greater numbers during early development
- No fruit initially don't worry!

Neil Bromhall https://completegarden.wordpress.com/

NC COOPERATIVE

Planting Cucumber

Seed

- Soils ≥ 70° F
- 1/2 " deep, 2-3" apart
 - Thin to 8-12" when vines 4-5"
- Mid-Apr. Mid-Aug.
- Spreading: 5' between rows
- Trellising: 3' between rows

Transplants

- Start 2-3 weeks before last frost (late March)
- Plant at final spacing as above





NC COOPERATIVE

Growing Cucumber

Fertilizer

- Soil Test
 - If unavailable, 3 lbs. of 5-10-10 per 100 ft.²
 - pH 6.0-6.5

Side Dressing

0.5 lb. actual N per 100 ft. of row

= 5 lbs. of blood meal or

2 lbs. calcium nitrate per 100 ft[.] row

Watering

- Shallow root system
- Mulch helps: pine straw or mulch
- Water soil, not leaves (disease)









Cucumber Cultivars





Pickling

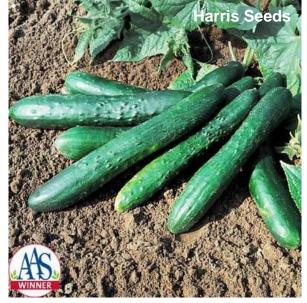
Slicing



Vining Slicing Cucumber Cultivars



'Dasher II'



'Sweet Success'



'Straight 8'



Bush Slicing Cucumber Cultivars





'Fanfare'

'Salad Bush'



Pickling Cucumber Cultivars





'Calypso'

'National Pickling'



Harvesting and Storing Cucumber

Harvest

- Continuous
- Before skin starts to yellow
- Pickling: 2-6 in. long
- Slicing: 6-10 in. long
- Use a knife or pruners

Storage

- Refrigerate for up to a week
- Pickling: https://foodsafety.ces.ncsu.edu/fermentation-and-pickling/









Additional Resources

Including a copy of the presentation

https://go.ncsu.edu/chathamveggies



NC STA



Questions from this class?

Matt Jones

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Other gardening questions?



Master Gardener | Chatham County

Plant Clinic: MW 1:00-4:00, F 9:00-12:00 **chathamemgv@gmail.com** 919-545-2715 (Except during COVID-19)



Please Complete the Evaluation!

https://go.ncsu.edu/veggie-evaluation2



