

Vegetable Gardening

January 21, 2025

Definitions

Organic gardening

Using natural, non-synthetic chemical methods to fertilize, manage pests, diseases and weeds.

Conventional gardening

Relies on chemical intervention to control pests, diseases and weeds and provide plant nutrition.

Sustainable agriculture

Practicing good stewardship in limiting inputs from outside sources and considering health of the complete system.

Regenerative agriculture

Food production practices that focus on rebuilding soil health and conserving water and other resources.

Why is organic important?

Promote the health of the entire system.

- Protect and improve the health of your soil, plants, and the wildlife that depend on the plants.
- Promote environmental stewardship.
- Effective and inexpensive.
- Any step toward organic is a move in a positive direction.
- Ultimately produce a better result.

What will we cover?

Growing healthy plants
Choosing a garden space
Making a plan
Extending the harvest
Managing pests





Growing Healthy Plants

What do plants need to thrive?

Healthy, well-drained soil Proper nutrients Sufficient light Sufficient moisture Proper timing Proper spacing



What is healthy soil?

Mineral matter, organic matter, air, water, and living organisms

Ideal vegetable garden soil

Deep, well-drained

High in organic matter

Has good structure





Why healthy soil matters

Soil ecology is very complex and activity below ground impacts plant health.

- Think of healthy soil as a bank account.
- Feed the soil and let the soil feed the plants.
 - Compost
 - Cover crops
 - Mulch
 - No till or low till



Proper nutrients

- Plants need 16 elements for normal growth
 - Air: carbon, hydrogen, oxygen, nitrogen
 - Soil: P, K, Mg, Ca, S, Fe, C, Mn, Zn, B, Cl, Mo

▶ pH

Soil test



Lab ID: 22-24064

2022-04-27

POWHATAN / 145

Virginia Cooperative Extension Soil Test Report

Questions? Contact:Virginia TPowhatan County Office143910 Old Buckingham Rd.5Suite BBPowhatan, VA 23139804-598-5640

Virginia Tech Soil Testing Laboratory 145 Smyth Hall (0465) 185 Ag Quad Ln Blacksburg, VA 24061 www.soiltest.vt.edu

> F O R

SEE NOTES: 1 19 at www.soiltest.vt.edu under Report Notes

O W N E	MCINTOSH KATRINA 4185 OLD PLANTATION RD	C O P Y
R	POWHATAN, VA 23139	

					SAM	PLE HI	ISTORY	Υ Γ								
Sample	Field	LAST CROP					LAST LIME APPLICATION				SOIL INFORMATION					
ID	ID		Name		Yield	Ν	Months Prev.		Tons/Acre		1 SM	U-2 %	SMU %	J-3 Yield Estima	l Productivity ate Group	
MVEG					1	3-18	1	1-5 1b/100								
	LAB TEST RESULTS (see Note 1)															
Analysi	is P (lb/A)	K (lb/A)	Ca (lb/A)	Mg (lb/A)	Zn (pp	pm)	Mn (p	pm)	Cu (ppm)	F	e (ppn	n)	B (ppm)	S.Salts (ppm)	
Result	122	114	3107	32	21	8.2	2	20.	5	1.9		18.3	3	0.5		
Rating	VH	М	VH	v	н	SUF	F	SUF	F	SUFF	:	SUFF	7	SUFF		
Analysi	s pH	Buffer Index	EstCE (meq/100	C lg)	Acidity (%)	7	Base S	Sat.)	Ca S (%)	at.)	Mg S (%	at.)		K Sat. (%)	Organic Matter (%)	
Result	6.3	6.24	10.2		9.3		90.	7	76.	2	13.	0		1.4	6.0	

FERTILIZER AND LIMESTONE RECOMMENDATIONS

Crop: VEGETABLE GARDEN (210)

608. LIME RECOMMENDATIONS: Apply 5 pounds of agricultural limestone (ground or pulverized) per 100 square feet.

991. "Explanation of Soil Tests, Note 1" and other referenced notes are viewable at www.soiltest.vt.edu under Report Notes.

225. FERTILIZER RECOMMENDATIONS: Apply a nitrogen-only fertilizer, such as one of the following amounts per 100 sq. ft. --- 1.25 lbs (2 cups) of nitrate of soda (16-0-0) or 1.33 lbs (2 2/3 cups) of calcium nitrate (15-0-0) or 1.0 lb (2 1/2 cups) of ammonium sulfate (21-0-0) or 0.4 lbs (1 cup) of urea (46-0-0). Do not over fertilize! These products will burn plants at high rates! If you are unable to find one of these fertilizers, apply a turf-type (lawn maintenance) fertilizer that is high in nitrogen with little or no phosphorus and potassium at a rate close to 0.2 lb of nitrogen per 100 sq. ft., such as applying two-thirds of a pound of either 26-0-2 or 32-0-4. For additional information on fertilization, see Note 19.

Sufficient light

- 6-8 hours direct sunlight for most edibles, 8-10 for heavy fruiting plants
- Leafy greens can grow in more shade



Sufficient moisture

- More plants die from overwatering rather than under watering.
- 1 inch per week = ~2/3 gal/sq ft
- Mulch is the best way to control moisture.
- Water deeply yet infrequently
 Roots will go where the water is
 Seedlings are an exception
 When in doubt, do the finger test



Overhead vs. surface watering

Provide water low to the ground and delivered at a slow rate (reduces runoff and erosion)

- Watering overhead sprays the foliage and doesn't provide even water distribution.
- Wet foliage increases vulnerability to disease
- Broadcasting water increases the water evaporation rates, decreasing what the plant uses.
- Drip irrigation and soaker hoses on programmable timers



Timing

- There is no single best time of year to plant everything.
- Plant what is appropriate for the season
- Use succession planting to extend the season
- If desired, season extension structures can be used
 - Cold frames
 - Row covers
 - Greenhouses



Timing - what you need to know

- Your hardiness zone
- Know your average last and first frost dates
- Days to maturity
- Type of crop

Use seed catalogs, seed packets and plant tags as a resource for growing information



USDA Plant Hardiness Zone

- Impacts the length of the growing season
- Based on average minimum winter temperatures over 30 yrs
- Virginia: Zones 5, 6, 7, and 8
- Goochland/Powhatan: Zone 7a
 - Average minimum winter temperature 0 10°F
 - Average 61 to 90 days above 86° F
 - Average last Spring frost Apr 15 25
 - Average first Fall frost Oct 15 25



Virginia Hardiness Zones







Timing - maturity rate

The time span it takes to grow to produce edible fruit.

For example:

- Tomatoes 45 days after transplant, some 70 days
- Radish will "fruit" and can be harvested just 30 days after germination
- Cantaloupe can take 80 days or more before harvest
- Use maturity date to extend your season
 - Succession planting
 - Grow different varieties with different maturity dates

Maturity rate

Understand planting limitations

- Use maturity rate and last frost date to calculate
- Plan for your plant to mature before frost comes.

Example:

- First fall frost date = October 15
- Tomato plant = 60 days to maturity
- Avg harvest period = 6-8 weeks
- That plant must be growing by Jul 15
- Better option is to allow a cushion of time and plant by Jul 1



Timing: cool vs. warm season crops

Preferred growing season.

Plant hardiness and frost tolerance.

Three- season or year-round food production.



Cool season crops

- Lettuce
- Cabbage
- Spinach
- Brussels sprouts
- Kale
- Collards
- Mustard
- Potatoes

- Arugula
- Broccoli
- Cauliflower
- Beets
- Onions
- Carrots
- Peas
- Swiss chard



Warm season crops

- Corn
- Cucumbers
- Cantaloupe
- Eggplant
- Southern peas
- Okra

- Peppers
- Winter and summer squash
- Sweet potatoes
- Tomatoes
- Melons
- Beans



Resources

- https://ext.vt.edu/lawngarden/home-vegetables.html
- https://www.johnnyseeds.com/ growers-library/seed-plantingschedule-calculator.html





Spacing

- Light exposure and air circulation
 - High humidity areas
 - Challenging
- Read the tags and seed packets
- Sowing seed
 - Germination rates
 - Sow 2-3 seeds to ensure higher success rate
 - "Thinning" necessary tough love



Depth of planting seeds

Seed packets indicate proper depth.

Why this is important

Some seeds need sunlight to germinate

Some require only a light covering to keep moisture level

Some require more time and deeper sowing

Typically correlates to seed size

Sow 2-3 times seed width



Depth of planting seedlings

Look at the plant tag

- Rule of thumb plant at the depth the plant is in the container
- Exception: tomatoes







Choosing a Garden Space

Orientation and layout

- Light requirements
- Proximity to water, tools, structures, & the back door
- Common water requirements
 - Drainage
 - Place plants with similar water needs together
- Mature plant size
 - Put taller plants on north or west side



No-till beds

- Mounded soil or a bed of soil raised above its surrounding
- Creates a deep and wide growing area for plant roots
- Provides control over health of soil and drainage
- Less soil disturbance = fewer weeds
- Easy to start & maintain



No-till beds

- Consider one-time till for compacted soil
- Mow area very short or solarize for aggressive weed control
- Cover with cardboard or newspaper
- Add 3-4 inches compost
- Top with 6-8 inches of mulch (wood chips, straw, leaves)
- Cover crop
- Optimal in fall
- Soil test before planting



Raised beds

Control soil inputs

- Intensive planting
- Better disease resistance
- Creates a deep and wide growing area for plant roots
- Moisture level may be difficult to control
- Can be expensive



Raised beds - structure

► Wood

- treated vs. untreated
- Composite wood

► Metal

Coated

Cinderblocks, railroad ties, tires (not recommended)



Raised beds -dimensions

- 12-18" high most comfortable
 3-4' wide
- Length is whatever is convenient to you and your space
- Accessibility recommendations
 - ▶ 30" high
 - 22" wide
 - ▶ 12" deep



Perfect soil recipe

- No fill dirt!
- 50% high quality top soil
- ► 30% compost
- 20% combination of:
 - Shredded, aged leaves
 - Composted cow or chicken manure
 - Mineralized soil blend
 - Worm castings (vermicompost)
 - Mushroom compost
 - Ground bark



Get a soil test before planting!

Container gardening

- Choosing containers
 - Large enough for plants
 - Holds soil without tipping or spilling
 - Adequate drainage
 - Have never held toxic products
 - Clay, plastic, metal, wood, fabric



Container gardening media

 Lightweight potting mix
 Porous for air and water movement

Do not use soilless mix (too light)

Choose high quality







Container gardening

- Choose plant varieties carefully
 - Highly productive
 - Dwarf varieties
- Space for support structures
- Do not add rocks for drainage
- Change the soil every 1-2 years



Other methods



https://hgic.clemson.edu/ factsheet/straw-bale-gardening/



www.permaculture.co.uk/articles/the-many-benefits-of-hugelkultur/



https://gardenseason.com/hydroponic-tower/



Planning Your Garden

Have a plan!

- Plan your garden space for fullest potential
- Record keeping
- Proper timing
- Crop rotation
- Season extension

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Where to begin?

- What do you eat?
- How much time are you willing to invest?
- How much space do you have?Economic value per sq ft



What grows here?

- Tomatoes
- Peppers
- Eggplant
- Herbs
- Lettuce
- Leafy greens
- Potatoes
- Sweet potatoes
- Winter and summer squash
- Cucumbers
- Asparagus
- Okra
- Corn

- Garlic
- Onions, leeks, shallots
- Peas
- Beans
- **E**damame
- Beets
- Carrots and parsnips
- **Turnips**
- Radishes
- Asparagus
- Artichokes
- Peanuts

Don't forget fruit!



Starting with transplants

- Extend growing season
- Available at any garden center.
- Avoid plants with damage, pests and discolored leaves.
- Organic vs conventional
- Just because it's available for purchase doesn't mean you should plant it!



Transplanting (warm season)

Plant or transplant outside after all risk of frost has passed

- Start seeds indoors ~8 weeks before the last projected frost date of your area.
- Harden off before planting out.

Transplant out on a shady day or in the afternoon.



Starting from seeds

Cost saving

- Increased selection
- Better established plant
- Reputable seed companies



Johnny's, Southern Exposure Seed Exchange, Seed Savers Exchange, Territorial Seeds, High Mowing Seeds, Pinetree

Choosing varieties

- Bush and vining types
- Hybrid and Open-pollinated (Heirloom)
- Indeterminate and determinate



Crop rotation

Mixing up plant placement each year (plant families).

Plants interact with soil differently, and each is susceptible to different pests and diseases.

Through crop rotation, you can create a better soil balance and reduce pests and disease issues.

3 year minimum rotation







Extending the harvest

Methods and structures

Frost protection

► 32° F

- Warm season crops need protection for season extension.
- Cool weather crops can handle frost, and may improve flavor.

Winter garden



Floating row cover

- Lightweight spun or woven fabric
- Benefits:
 - Allows rain and sun to pass through
 - Keeps insects out
 - Reduces wind damage
 - Increases temp underneath by 10°F
- Cover at night, uncover during the day
- Different thicknesses for different uses
 - Frost protection for earlier and later harvests
- Remove after flowering begins for pollination
 - Early morning best time



Cold frame

- Simple structures wood, straw bales, reused windows
- Capture the sun's heat
- Protect from wind chill
- Harden off seedlings
- Great for growing lettuce over winter (vent on warm days)









Mini-greenhouse/low tunnel

- Hoop structure
- Cover with greenhouse plastic or plastic sheeting
- Warms soil for earlier spring planting
- Wind and frost protection
- Easy to make
- Moveable



High tunnel / hoophouse

Unheated

- Can be combined with other techniques for more cold protection
- Zone 7 winter day length benefit
- Must be vented during warm days
- Open for pollinators



Greenhouses

Highest cost

- Trap and hold as much daytime heat as possible
- Heat management in summer
- Supplemental heat in winter
 - Overwinter exotic plants
 - Grow tropical fruits and citrus

Important to look for pests





Managing Pests

Constant vigilance

Healthy plants resist pests.

Control pests and weeds while they are young.

Your hands are your best tools.

Use chemicals as your last resort





Insect control

Not all bugs are bad bugs!

- Plant lots of flowers and blooming herbs to supply nectar for beneficial insects and insect eating birds.
- Use floating row covers.



Weeds, weeds, weeds

- Use no-till practices
- Disturb soil as little as possible
- Use mulch and cover crops
- Pull weeds when they are young
- Don't let weeds go to seed



Dealing with disease

- Inevitable but manageable
- Choose varieties of plants with disease resistance.
- Mulch to keep soil-borne diseases under control.
- Remove and discard diseased leaves and fruit.
- Clean up fallen fruit.



Putting the garden to bed

Remove remaining weeds and fallen fruit.

Remove spent annuals.

Don't leave exposed soil - mulch or cover crop.

Spring garden season begins in the fall.



Resources

- https://ext.vt.edu/lawn-garden/home-vegetables.html, Virginia Cooperative Extension website
- https://www.pubs.ext.vt.edu/426/426-336/426-336.html Vegetables Gardening in Containers, Virginia Cooperative Extension website
- Johnny's Seeds website
- Southern Exposure Seed Exchange website
- Books
 - Grow Great Vegetables Virginia by Ira Wallace
 - *Epic Tomatoes* by Craig LeHoullier
 - The Vegetable Gardening Book by Joe Lamp'l
 - Weedless Gardening by Lee Reich





Thank You!