1 Vegetable Gardening

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2 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.

3 **What will we cover?**

Growing healthy plants

Choosing a garden space

Making a plan

Extending the harvest

Managing pests

4 **Growing Healthy Plants**

5 **What do plants need to thrive?**

Healthy, well-drained soil

Proper nutrients

Sufficient light

- Sufficient moisture
- Proper spacing
- Proper timing

6 **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

7 **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 / Green manures
  - Mulch
  - No till or low till

8 **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

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10 **Sufficient light**

6-8 hours direct sunlight for most edibles, 8-10 for heavy fruiting plants

Leafy greens can grow in more shade

11 **Sufficient moisture**

More plants die from overwatering rather than under watering.

1 inch per week = ~2/3 gal per 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.

12 **Watering techniques**

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

13 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

14 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

15 **Depth of planting seedlings**

Look at the plant tag

Rule of thumb – plant at the depth the plant is in the container

Exception: tomatoes

16 **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

17 **Timing - what you need to know**

Your hardiness zone

Know your average last and first frost dates

Days to maturity

Crop hardiness

18 **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/7b

Average extreme 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

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20 **Timing - maturity rate**

The time span it takes to grow to produce edible fruit

For example:

Tomatoes 60 days after transplant, some 80 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 - Stagger planting by 2 weeks

Grow different varieties with different maturity dates

21 **How late can I plant?**

Understand planting limitations

Use maturity rate and first fall frost date to calculate

Plan for your plant to mature before frost comes.

Example:

First fall frost date = October 15

Avg harvest period = 6 weeks

Tomato plant = 60 days to maturity

That plant must be in the ground by Jul 15

Time from seed to transplant = 6 weeks

Sow seed on May 4

22 **Timing: cool vs. warm season crops**

Preferred growing season.

Plant hardiness and frost tolerance.

Three- season or year-round food production.

23 Cool season crops

Lettuce

Cabbage

Spinach

Brussels sprouts

Kale

Collards

Mustard

Potatoes

24 Warm season crops

Corn

Cucumbers

Cantaloupe

Eggplant

- Southern peas
- Okra

25 **Resources**

- https://ext.vt.edu/lawn-garden/home-vegetables.html
- https://www.johnnyseeds.com/growers-library/seed-planting-schedule-calculator.html

26 **Choosing a Garden Space**

27 **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

28 **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

29 **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

30 **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

31 **Raised beds - structure**

- Wood

- treated vs. untreated
- Composite wood
- Metal
  - Coated
- Old cinderblocks, railroad ties, tires (not recommended)

32 **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

33 **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

34 **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

35 **Container gardening media**

- Lightweight potting mix
  - Porous for air and water movement
  - Do not use soilless mix (too light)
- Choose high quality

36 **Container gardening**

- Choose plant varieties carefully

Tomatoes

Peppers

Eggplant

Herbs

Lettuce

Leafy greens

Potatoes

Sweet potatoes

Winter and summer squash

Cucumbers

Asparagus

Okra

Corn

42 Starting with transplants

Extend growing season

Available at any garden center.

Avoid plants with damage, pests and discolored leaves.

Just because it’s available for purchase doesn’t mean you should plant it!

43 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.

44 Starting from seeds

Cost saving

Increased selection

Better established plant

Reputable seed companies

45 Choosing varieties

Bush and vining types

Hybrid and Open-pollinated (Heirloom)

Indeterminate and determinate

46 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

47

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49 **Extending the harvest**

Methods and structures

50 **Frost protection**

32° F air temperature vs soil temperature

Warm season crops need protection for season extension.

Cool weather crops can handle frost, and may improve flavor.

- Winter garden

51 **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

52 **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)

53 **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

54 **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

55 **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

56 **Managing Pests**

57 **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

58 **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.

59 **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

60 **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.

61 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.

62 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