Vegetable Gardening

2024 Master Gardener Training

2/28/2024

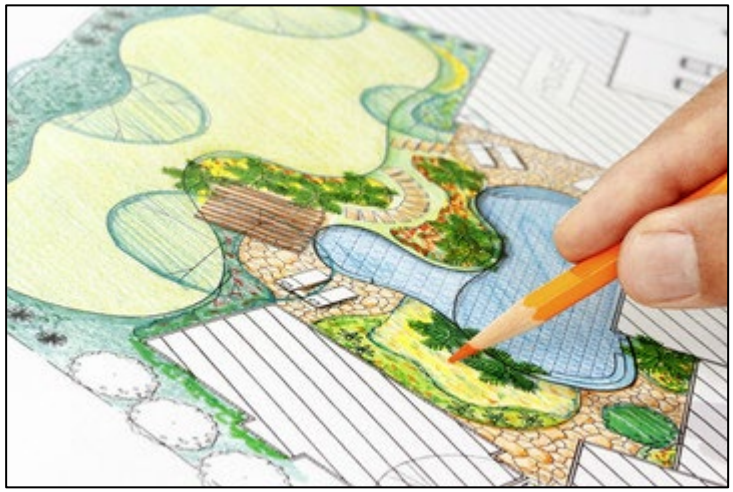
Site Selection

- 6-8 hours of sun (preferably more)
  - Morning sun, afternoon shade?
  - Consider aspect, trees, etc.
- Water available for irrigation
- Soil: Well-drained
- Fencing/gates
- Gentle slope if possible

Sun Requirements & Competition

- Fruits: 6 to 8 hours of full exposure
  - Afternoon shade could be beneficial
- Leafy greens and root vegetables can tolerate partial shade
- Don’t plant in shady areas between houses and walls
- Avoid north-facing aspects that are consistently shaded
- Avoid planting under trees or near invasive weeds
  - Compete with garden for resources

Planning a Garden



- Sketch a plan
  - Keep in garden journal
  - Record size of the area
- Decide which species you want to plant
  - Can be site dependent
- Space considerations
  - Containers
  - Bush varieties
  - Vertical gardening
  - See MG manual for space requirements for veggies/person
- Mark where veggies are on sketch
  - Consider working and growing space
- Arrange according to harvest timing
- Don’t let taller plants shade smaller/younger

Raised Bed Gardening

Pros

- Soil warms up quickly in spring
- Drains well (depending on soil)
- Increases available root area
- Less compaction (not walked on)
- Potential for greater yields

Cons

- Soil warms up quickly in spring
- Expense/labor to install
- Soil dries out more quickly
- Relatively permanent structure
- Less compatible on slopes

Use recommended varieties

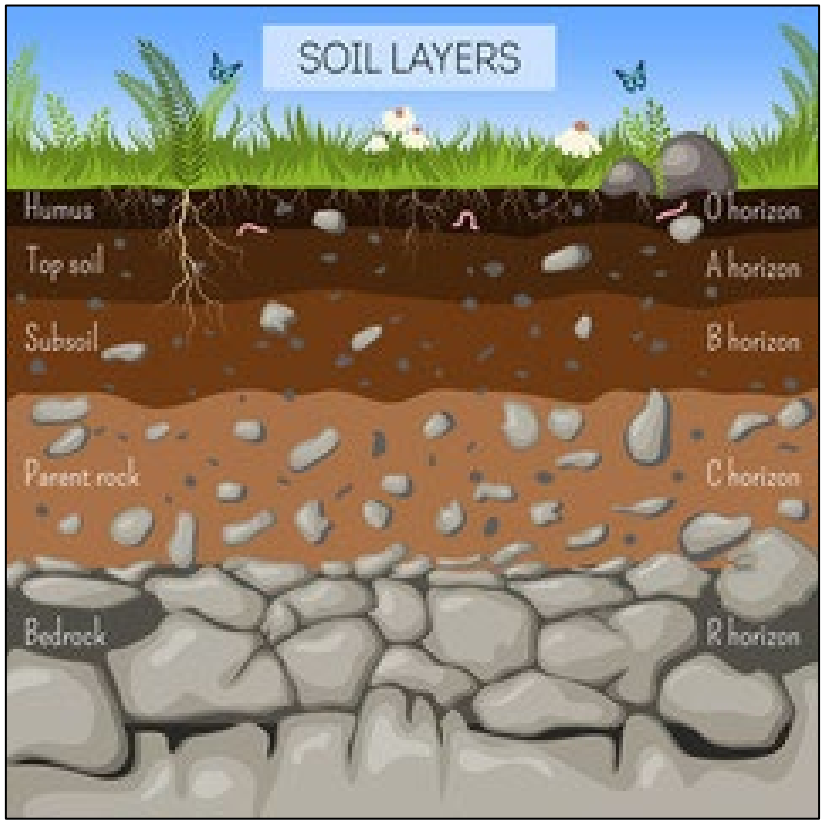
- Talk to reputable stores
- Try new each year
- Local Extension
- Community

Use Good Material and Equipment

- Seeds
  - New or saved?
  - Storage conditions?
    - Cool and dry
- Transplants
  - Inspect for insects, wilting, discoloration, etiolation, spots, lesions

Garden Soil

- Bagged products: is it soil?
- Loams are ideal
- Clays can hold water too tightly and not allow for root growth
- Sands are well-draining, but lack nutrients, organic matter
- Potting soil, should be replaced each year
  - Nutritional, pests, disease
- Purchased soil: avoid rocks, undesirable weeds, foreign objects, heavy clay



Soil Preparation

- Test soil and follow recommendations
  - Incorporate in root zone (top 6”)
- Organic Matter/Compost
- Check pH - 6.5-7.0 is best – add soil sulfur if needed (2-4lbs/100 ft_2)
- Till?
  - Don’t work if soil too wet
  - crumbly
- Irrigate to settle
- Allow to dry
- Rake to level OR Skip last three steps and tamp aggressively with an iron rake

Organic Matter Review

- Makes soil loose/friable and easy to work
- Improves nutrient and water-holding capacity
- Slow-release nutrients
- Micronutrients
- Low burn potential/low total nutrients/variability
- Apply by inches on top (1-3”) and incorporate down 6-12”
- Examples:
  - well-rotted manure: safety, salt levels, weeds
  - Compost: hot or cold
  - leaf mulch, clippings

Fertility Report

Project:

Lab Number	Sample ID

Soil Complete Test

Test	*Method*	*Result*	*Units*	*Levels*
pH	1:1	8.6	SU	Very High
Electrical Conductivity, EC	1:1	0.84	dS/m	Medium
Calcium, Ca	NH4OAc (pH 8.5)	2,100	ppm	High
Magnesium, Mg	NH4OAc (pH 8.5)	310	ppm	Very High
Sodium, Na	NH4OAc (pH 8.5)	310	ppm	Very High
Potassium, K	NH4OAc (pH 8.5)	160	ppm	Medium
Zinc, Zn	DTPA	3.4	ppm	High
Iron, Fe	DTPA	4.3	ppm	Medium
Manganese, Mn	DTPA	7.8	ppm	Medium
Copper, Cu	DTPA	0.87	ppm	High
Nickel, Ni	DTPA	0.13	ppm	
Nitrate-N, NO3-N	Cd-Reduction	13	ppm	Medium
Phosphate-P, PO4-P	Olsen	8.3	ppm	Low
Sulfate-S, SO4-S	Hot Water	25	ppm	High
Boron, B	Hot Water	1.2	ppm	Medium
Free Lime, FL	Acid Test	High		
ESP	Calculated	9.1	%	
CEC	Calculated	14.8	meq/100g	

Soil: Organic Matter

Test	*Method*	*Result*	*Units*	*Levels*
Organic Matter (LOI)	Loss on Ignition	1.1	%	

Date: 9/02/2023
Report: 947898
Information provided by the laboratory: Landscape

The pH of the soil is high at 8.6.
EC is moderately low and no high salt issues are present. Actual Sodium, 310 ppm, is high but within a workable range.
Till in 15 lbs. Sulfur/1000sq.ft to lower pH and increase availability of nutrients.

Nitrate-N is moderate at 13 ppm. Phosphate-P is low, and Potassium is moderately low. Apply 1.5 lbs. N/1000 sq.ft, 1 lb. P_2O_5/1000 sq.ft. and 1 lb. K_2O/1000 sq.ft.

The Ca:Mg ratio is fine at 7:1.
Micronutrients, Fe, Zn, Mn, Cu, B, are adequate and in good proportion to each other. Lowering soil pH with Sulfur will increase micronutrient availability.

Thank you,

Note: Soil Nutrient interpretations and recommendations are based on the Soil Complete/Standard Analysis Report provided Motzz Laboratory.

Fertilizer Analysis

- Label must contain percent (by weight) of
  - total nitrogen (N)
  - available phosphate (as P_2O_5)
    - P_2O_5 times 0.43 = P
  - soluble potash (as K_2O)
    - K_2O times 0.83 = K
- Other nutrients may be specified

Annual Fertility

Pre-planting incorporation:

- Nitrogen: 3-4lbs/100ft^2
- Phosphorus: 2lbs/100ft^2
- Sulfur: 2-4lbs/100 ft^2

In-Season side-dressing:

- After emergence, transplanting, thinning, runner development, flowering
- .5lb/ 100ft of row

- Compost-Slow release

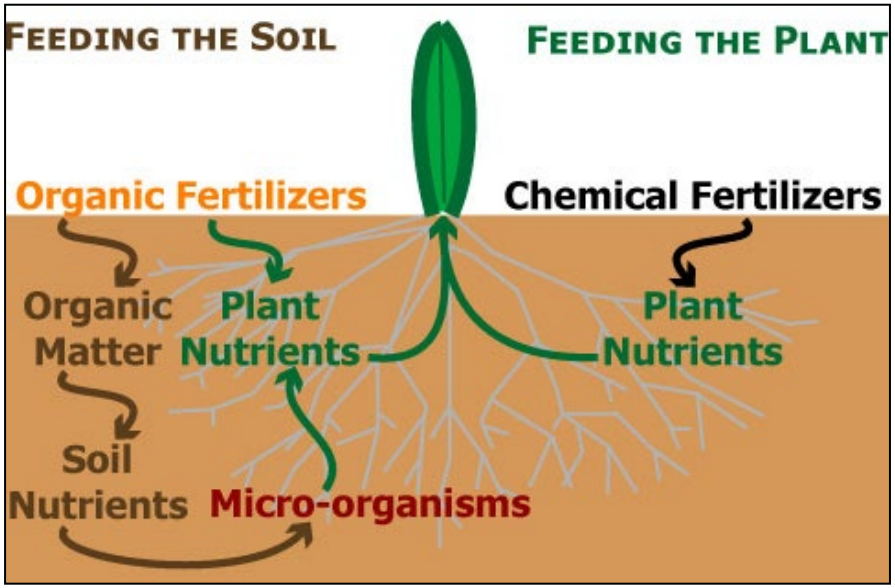
Fertilizer Calculations: How much am I putting on?

- Recommendation from "10 Steps": 2lbs 16 N-20 P_2O_5-0 K_2O/100ft^2
- (2lbs 16 N-20P_2O_5 P_2O_5-0 K_2O) x (.2lbs P_2O_5/1lb 16 N-20P_2O_5 P_2O_5-0 K_2O) = .4lbs P_2O_5
- .4lbs P_2O_5 x (0.43lbs Phosphorus/ 1lb P_2O_5) = .172lbs Phosphorus/ 100ft^2

- *recommendation from MG manual: 2lbs/1000ft^2

“Organic” Fertilizers

- Homemade Compost
- By-products (feather, hoof, horn, bone, blood, fish, etc.)
- Alfalfa Meal
- Green Manure
- Manures and guanos
- Seaweed



Organic Fertilizer Nutrient Content

Manure Type (Dry	% N	% P_2O_5	% K_2O
Chicken Manure	2.0-4.5	4.6-6.0	1.2-2.4
Steer Manure	0.6-2.5	0.9-1.6	2.4-3.6
Dairy Manure	0.6-2.1	0.7-1.1	2.4-3.6
Avg Home Compost	1.5	1.3	1.36
Bone meal	3	15	0
Fish Emulsion	5	2	2

Food Safety in the Home Garden

- Raw manures can contain pathogenic E. coli
- It is recommended to add raw manures 120 days prior to harvest
- Plant parts in contact with the soil pose greater risk
- To avoid these issues, manure can be composted before application
  - OMRI requires 15 days at 131-179F
  - Parasite eggs die at 104F
  - E. coli, Salmonella, and Listeria were not found after 3 days @ 131F
  - Weed seeds lose viability after 42 days (composted)
- Commercial producers must also conform to these guidelines

No Till vs Till

- Tillage Pros:
- Prepares a clean, fluffy seedbed
- Kills weeds
- Helps garden soil warm up
- Tillage Cons:
- Disturbs soil structure
  - Affects water retention
  - Air pockets
  - Erosion
  - Crusting
- Disturbs Biology

Tillage

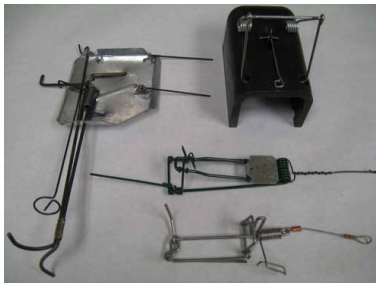
- Mechanical tillage used if:
  - Heavy compaction
  - Avoid when wet or soil will become compacted
  - Rototill when soil is not so wet that it doesn't stick to your shoes
  - Use the opportunity to incorporate organic matter
- Low and no-till techniques
  - Cut plants at soil line (don't yank out)
  - Use a broad fork to alleviate compaction (but doesn't invert soil) and add incorporate OM
  - Use mulches to fight erosion

Protecting your garden

Fencing

- Deer: 6 foot minimum
  - Double-fencing can work for short fences
- Javelina: 2.5-3ft/electric
- Gophers: Hardware cloth around garden (below ground)
  - Traps

Be sure to understand you local zoning restrictions



Seeds

- Direct sow or start?
- Pelleted Seeds?
  - Easier to see/handle, shorter lifespan
- Disease resistance code?
- How much to buy? Rule of thumb: 1 packet plants a 10-30ft row (see MG manual)
- When to sow? Time so that plants are ready by last frost
- Hybrid or open-pollenated?
- Storage: dry and cool (room temp or cooler) is best in mason jars or zip lock bags

Hybrids

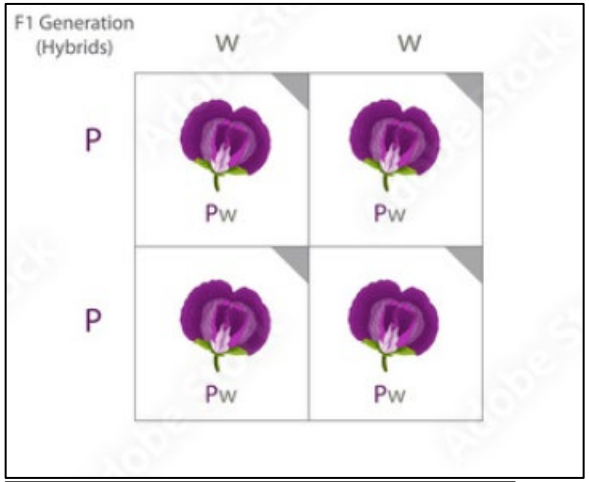
- F1 (Filial 1)
- Not GMO

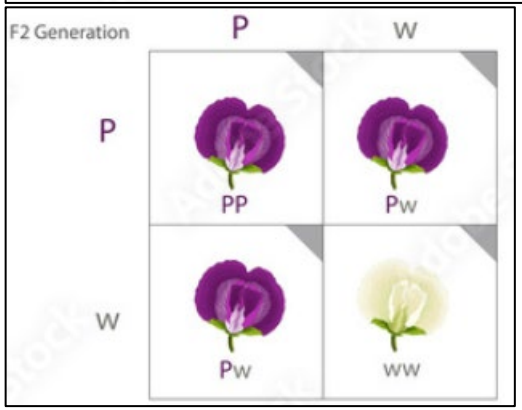
Benefits

- Cross-breeding of carefully chosen parent plants (de-tasseling corn)
- “Hybrid vigor” results in stronger, better producing plants
  - Higher seedling survival rate
- Disease-resistant

Drawbacks

- Can’t save seed due to “unstable genetics”
- Won’t be true to type
- Mix of characters of the “grandparents”





Open-Pollenated & Heirloom

- “Stable genetics”
- Seeds will be true to type if you can isolate the plants, so they aren’t cross-pollenated with other varieties
- Not as uniform as hybrids
- Selected for only a few characteristics
  - e.g. Size between individual plants could be different
- Self-pollenated species are most uniform
- Heirloom is non-commercially available variety
  - Often is at least 50 years old
  - Often have local, familial, historical significance
- Lack disease resistance
- Possibly better flavor

Seeds vs. Transplants

- Many crops can be direct seeded and thinned
- Most gardeners use transplants for their tomatoes, peppers, and eggplant.
- Warm season crops should only be direct seeded when soils reach 70 degrees F.
- Tap-rooted plants do not transplant well (spinach, arugula, carrots, beets, parsnips,…)
- Cole crops (cabbage, Brussels sprouts, kale) perform well as transplants
- Seeded leeks and onions are often grown as transplants

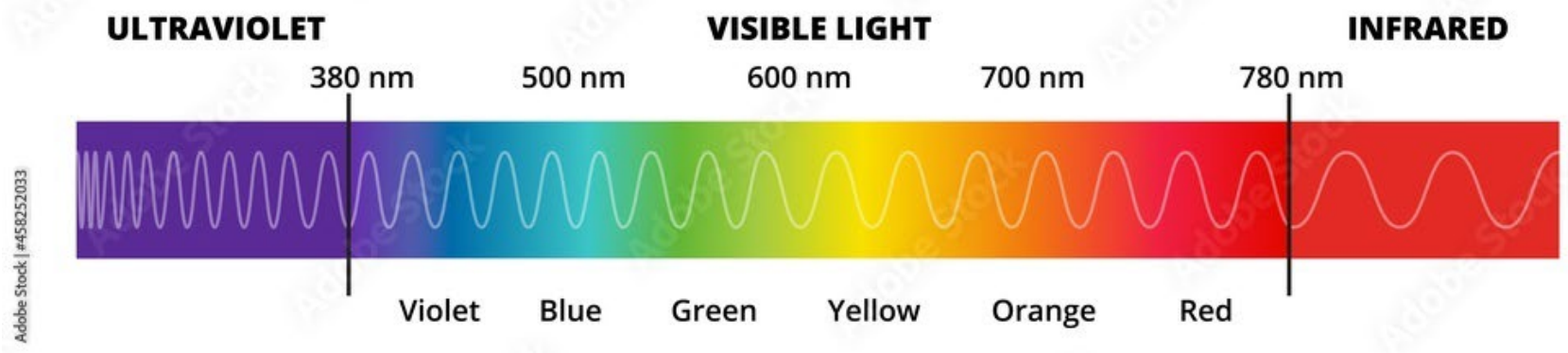
Veggie	Seed	Transplant	Other
Beans	x		
Beets	x		
Carrots	x		
Swiss Chard	x		
Cucumbers	x	x	
Eggplant		x	
Garlic			bulbs
Lettuce	x (mostly)	x	
Onions			Sets/bulbs
Peas	x		
Peppers	x	x	
Potatoes			Seed tubers
Pumpkins	x	x	
Radish	x		
Spinach	x (mostly)	x	
Squash	x (mostly)	x	
Tomato	x (mostly)	x	

Growing Your Own Transplants

- Soil: use a potting mix (peat moss, coir, vermiculite, perlite)
  - Sterile
- Germination temp: 65-75F
  - May need to heat greenhouse or use heat mat
- Light: After germination
  - Can start with shop light
  - 16 hours/day
  - Light distance above plants: 4-6”

Lighting

- Plants without significant light become “leggy”/etiolated
- LED shop lights tend to have one end of spectrum or other
  - Cool/blue (400-450nm)-encourages vegetative growth
  - Warm/yellow-orange (625-675nm)-encourages blooming/fruiting
- Full spectrum/white or balanced light is good for plants at any stage



Acclimation and Hardening

Once established, seedlings can be put in an area that is cooler, with some air movement (fan?)

- 55-60F at night (Do not expose warm season transplants to temps below 55F)
- 65-70 during the day
- Transplant seedlings if they aren't growing in their own container

Hardening: set transplants in a shady, protected outdoor location a week or so before planting

- Gives the plants a few days of gradual acclimation to:
  - Full sun
  - Wind
  - Cool nights (cold frame)

Planting

- Use a thermometer to measure soil temperature
- Staggered (succession) plantings can ensure an extended harvest
- Plant on a day with moderate temperature in late afternoon (cloudy is good)
- It may be worth protecting your transplants with row cover or physical barrier
- String line assists straight planting
- Use a hoe to create furrows
  - Narrow=handle
  - Broad=blade corner

Plant Spacing

- Plants will compete for light, water, and nutrients
- Plan with the mature plant size in mind – if you don’t know, look at seed catalogs for spacing info
- In home gardens, you can usually plant more densely than in production settings
- Use toilet paper to see more easily
- When direct seeding, thin as early as possible to ensure highest quality crop
- See seed packet for recommendation
- Vertical growing allows for denser plantings
- Utilize four dimensions – 3D space and time

Seeding Depth

- Read seed packet
- Rule o’ thumb: place seed at a depth 4x the diameter of the seed
- Small seeds e.g. carrots and lettuce: cover with ¼ to ½” of soil
- Large seeds e.g. corn, beans, and peas: cover 1-2” of soil
- Sandy soils can be planted deeper
- Tamp with hoe

Irrigation of New Plantings

- Pre-water individual transplants
- Pre-water planting area
- Water in after planting
  - Small root systems; water relatively shallow and frequently

Irrigation of Established Plantings

- Water enough to keep soil moist, not soggy in the root zone
- Observe plant and soil
- Don’t allow plants to become stressed
- Don’t waterlog (restricts air)
- As plants grow (and it gets hotter), irrigation “sets” should become longer
- Monitor containers closely

Mulching

- Holds moisture
- Keeps weeds down
- Regulates soil temperature
- Keeps vegetables cleaner/less soil contact
- Careful about incorporation of wood
- Organic mulching: wait until soils have warmed (75F) as organic mulches slows soil warming
- Materials: leaves, straw, woodchips, cardboard, newspaper, plastic, etc.…
- Plastic mulch will warm soils, encouraging growth and allowing earlier planting
- Don’t mulch directly on seedlings

Planting Times

- **Cool Season Crops** – generally root crops and/or leafy green crops – some have dual planting seasons
  - “Shoulder Crops”

- **Warm Season Crops** – plant beans, squash, tomatoes, peppers, eggplant, cucumbers, etc. after soil has warmed (mid-May in Prescott and late April/early May in VV).

- Corn and potatoes can be planted early spring with frost protection.

Spring/Fall Frosts in Prescott

Spring Freeze Probabilities Prescott 1922-2022

Earliest	90%	80%	70%	60%	50%	40%	30%	20%	10%	Latest
11-Apr	24-Apr	30-Apr	05-May	09-May	12-May	18-May	21-May	26-May	01-Jun	17-Jun

Fall Freeze Probabilities Prescott 1922-2022

Earliest	10%	20%	30%	40%	50%	60%	70%	80%	90%	Latest
23-Aug	23-Sep	01-Oct	06-Oct	09-Oct	13-Oct	16-Oct	20-Oct	25-Oct	01-Nov	15-Nov

Average Growing Season: 153 days

Spring/Fall Frosts in Verde Valley

Spring Freeze Probabilities Tuzigoot 1922-2022

Earliest	90%	80%	70%	60%	50%	40%	30%	20%	10%	Latest
10-Feb	11-Mar	16-Mar	22-Mar	27-Mar	01-Apr	07-Apr	13-Apr	21-Apr	27-Apr	14-May

Fall Freeze Probabilities Tuzigoot 1922-2022

Earliest	10%	20%	30%	40%	50%	60%	70%	80%	90%	Latest
	26-Oct	18-Oct	04-Nov	06-Nov	09-Nov	13-Nov	15-Nov	18-Nov	23-Nov	07-Dec

Average Growing Season: 221 days

Cool Season Veggies

- First and last crops to plant in the garden years
- Grow best when average temps are between 55 and 75
- Tolerate/ improve with slight frost when mature
- Higher value per pound/ft^2 than warm season
- Vegetative edibles:
  - Roots (beets, carrots, parsnip, radish, turnip)
  - stems (asparagus)
  - leaves (cabbage, celery {petioles}, lettuce, onions, spinach)
  - immature flowers (broccoli, cauliflower)
- Warm weather often impairs quality
- Often grown directly from seed
- Many will bolt if temps rise

Beets

- Planting time: 2-3 weeks before the last frost
- Planting: Soak seeds prior to planting/ Plant seeds .5” deep/Thin to 6” apart to allow root growth/Rows 15” apart; 40F soil temp
- Popular varieties: Detroit Dark Red, Red Ace, Early Wonder
- Fertilizer needs: Side dress N 6 wks after emergence; black spots indicate boron deficiency
- Water needs: keep water supply consistent to avoid splitting
- Harvest: 60-80 days from seedlings
- Other: Taste best when exposed to a few weeks of frosts/cold. Keep weeds out. Sandy soils preferred

Carrots

- Planting time: 2-3 weeks before last frost
- Planting: .25” deep/ thin when plants have 3-4 true leaves 2-3” apart/rows 15” apart
- Popular varieties: Many…
- Fertilizer needs: Nitrogen 6 weeks after emergence
- Water needs: Water evenly to avoid splitting, sprinklers will encourage forking of root
- Harvest: 70-100 days from seedlings
- Other: Taste best when mature before the heat of summer

(Swiss) Chard

- Planting time: near last frost-free day for area
- Planting: 6” apart/ 12” between rows
- Popular varieties: Bright lights, Lucullus
- Fertilizer needs: Apply nitrogen 4 weeks after transplant or thinning
- Water needs: keep water consistent to avoid tough, slow leaf development
- Harvest: When leaves reach full size or anytime
- Other: Taste best when mature before the heat of summer. Harvest leaves when they reach full size

Garlic

- Planting time: Mid-September-early November
- Plant spacing: 4” between plants, 8” between rows. If density is too high, bulb size may suffer
- Popular varieties: California Early or Late (softneck)
- Fertilizer needs: Compost/complete before planting, N in April and again in May
- Water needs: Water 12” deep. Stop watering when leaves yellow.
- Harvest: when the tops begin to yellow or start to fall over, but before they are completely dry. Place the entire plant in a shady warm spot to dry for 1-2 weeks. Garlic skins should be papery and the roots dry
- Other: Break bulbs into individual cloves, pointed end up. Bulb growth/yield low if planted in spring. During the fall/winter, root system develops with tops growing rapidly in spring. Cut off flowers to direct energy to bulbs

Lettuce

- Planting time: 2-3 weeks before the last frost. Temps above 80 reduce germination
- Plant spacing: Transplant or seed at .25-.5” deep, 8-12” between plants, 15” rows
- Popular varieties: Iceberg (crisphead), Buttercrunch (butterhead), Italian blonde (Romaine), Oakleaf (leaf)
- Fertilizer needs: Side-dress N at thinning or 4 wks after transplanting
- Water needs: consistent-fluctuations cause tough leaves and “off” flavors
- Harvest: Almost anytime during growth
- Other: Thin when plants have 3-4 true leaves. Thinned plants can be planted elsewhere or eaten. Grows best when temps stay below 75F (high temps cause bitter flavors). Can handle temps around 32

Onions

- Planting time: Transplants or sets (baby bulbs) in April; seeds in late March/early April or mid/late August (over-winter)
- Plant spacing: Seed .25-.5” deep, (thin to) 3-4” apart, 12” rows. Greens can be planted closer and used as thinned
- Popular varieties: Evergreen White Bunching (green onion), Walla Walla (bulb), Crystal White Wax (pickling)
- Fertilizer needs: Besides at planting, side dress in May and June and not after July.
- Water needs: Close to field capacity, 12” deep. Drought stress decreases yield. Stop watering when tops fall.
- Harvest: Green: 50 days from seeding; Bulb: 110 (tops will fall), allow bulbs to cure for 1-2 weeks until skin papery
- Other: High density plantings can reduce bulb size if water/nutrients are insufficient. Store between 32-40F.

Peas

- Planting time: Frost tolerant; temps below 80 are best for germination and growth/ Plant in early spring and again in mid August/September
- Plant spacing: .5 to 1” deep, 1-2” apart, rows 18”
- Popular varieties: Early Frosty (Garden), Sugar Daddy (Snap), Most (Dry)
- Fertilizer needs: Only at planting; peas fix N
- Water needs: Water regularly, allowing soils to dry to 50% and then back to field capacity
- Other: Succession plant garden peas (every 14-21 days) until April. Trellis taller varieties.
- Harvest: 60-70 days to mature and then every 5-7 days after flowering

Radish

- Planting time: Cool/ From seed (always recommended) plant 2-3 weeks before the last frost and/or in early fall (September)/ when soils reach 40F. Can succession plant every 10days
- Plant spacing: .5” deep, 1-2” between plants, 11” between rows
- Popular varieties: Champion, Daikon Long White, Easter Egg
- Fertilizer needs: Avoid stress during growth. Side dress N 3-4 weeks after emergence to encourage rapid plant growth
- Water needs: Avoid stress during growth as fluctuations cause root cracking, slow leaf development, premature flowering, low yields, and poor flavor
- Harvest: 25-45 days from seedlings, depending on variety
- Other: Hot temps cause bitterness, hot flavors and root “hollowness”. Amend heavy/clay soils with Compost

Spinach

- Crop Season/planting time: Cool/ grown from seed or transplant. Seeds can be planted when soils reach 40F/ 3-4 weeks before the last frost (air temps above 80 reduce seed germination). Plant early maturing varieties in fall, 2 months before anticipated maturity (1-2 weeks after first fall frost).
- Plant spacing: .5” deep, 3” between plants, 12” between rows. Thin stands to 3” when plants have 3-4 leaves. Thinned plants can be transplanted or eaten
- Popular varieties: Melody, Teton, Olympia
- Fertilizer needs: Side dress N after transplanting/thinning
- Water needs: Water consistently as fluctuations cause tough leaves, slow development, and off-flavors
- Harvest: Leaves can be picked any time. Pick oldest to youngest, preferably before flower stalks form
- Other: Spinach grows best under 75F (and can tolerate temps around 32F

Warm Season Veggies

- Require long, hot days, warm soils
- Perform best when avg temps are between 65 and 95F
- Intolerant of prolonged freezing temps
- Inefficient producer; only fruit consumed
- Classified as:
  - Tender: killed by frost, but tolerate cold above freezing
    - Snap beans, dry beans, summer squash, sweet corn, tomato
  - Warm-loving: killed by frost and won't tolerate cold (plant 2 weeks after "Tenders"
    - Cucumber, melons, winter squash, pumkin, okra, lima beans, eggplant, pepper, tomatillos, sweet potato

Beans (Bush and Pole)

- Crop Season: Warm (Plant from seed one week before the last frost date)
- Plant: 1” deep; 3-6” apart; 18-24” between rows; 60F soil temp
- Popular varieties: Kentucky Wonder(pole), Contender (bush)
- Fertilizer needs: compost or a small amount of all-purpose at planting. Beans do not require much
- Water needs: keep well-watered (75% FC) throughout the season, though not over-watered
- Harvest: 60 to 100 days
- Other: Pole beans will continue to flower throughout the season and require trellising

Cucumbers

- Crop Season/planting time: Warm (65F soil temp)
- Planting: 1” deep/ 4-6 seeds every 15”/ rows 4’ apart; thin when plants have 2 true leaves to 2 per 15”
- Popular varieties: Marketmore, Armenian, Mexican Gurkin, Pickling
- Fertilizer needs: Incorporate compost/complete fertilizer before planting; Nitrogen after plants develop runners and again before plants start to flower
- Water needs: Deeply and infrequently, avoiding water stress (which can affect fruit quality)
- Harvest: 5 to 7 days after flowering; do not let fruits get too large (reduced flavor)
- Other: Can be grown well from seed or transplant (when plants have 2-3 true leaves)

Eggplant

- Crop Season/planting time: Warm/ plant after last frost
- Planting: Allow 8-9 weeks to grow transplant (at 75F) and install when plants have 6-9 leaves at 24” x 24”
- Popular varieties: Black Beauty/Bell/Magic
- Fertilizer needs: Avoid over-fertilization, which favors vegetative growth and not fruiting/flowering; side dress with N 4 to 8 weeks after planting
- Water needs: Deep and infrequent
- Harvest: When fruits are 6-8” long and have a glossy sheen. Use shears and wear gloves
- Other: Eggplant is not suitable for canning but can be frozen; tough skins are due to hot days (>90F) or cold nights (<55F). Plants grow poorly in cool soils.

Peppers

- Crop Season/planting time: Warm/ plant seeds directly 10-14 days before last frost. Use row cover if planting transplants before last frost or wait until soils are above 60F.
- Plant spacing: 4-6 seeds .5” deep, 18” apart in rows 21” apart. Thin when plants have 2 true leaves.
- Popular varieties: Sweet (Ace), Hot (Anaheim)
- Fertilizer needs: Do not over-fertilize. Side dress with N 4 and 8 weeks after transplanting
- Water needs: Deep and infrequent. Irregular watering can cause poor fruit set and blossom end rot
- Harvest: 35-45 days from flowering or 120 days from seed (depending on variety). At the end of season harvest all fruit
- Other: Plant into black plastic mulch for earlier maturity. Remove any flowers/fruits before transplanting. Peppers grow poorly in heavy, wet soils

Potatoes

- Crop Season/planting time: Plant seed pieces 14-21 days before last frost date
- Plant spacing: 4-6” deep/ 10-12” apart in row
- Popular varieties: Butte (Russet), Yukon Gold (Smooth), Red Pontiac (Colored)
- Fertilizer needs: Nitrogen at pre-plant and side dress 6 weeks post-emergence
- Water needs: Steady and consistent at least 12” deep
- Other: Plant in black plastic mulch for earlier maturity. If buying seed tubers, purchase certified to reduce disease pressure. Seed tubers should weigh 2oz and have at least one “eye”. Sandy soil preferred.
- Harvest: As soon as new tubers grow. Check size by digging in. Consume new potatoes quickly. Storage potatoes need 2-3 weeks of curing and stored at 45F

Pumpkin

- Crop Season/planting time: Warm/ Transplants should be planted w/3-4 mature leaves & well-developed roots once soils are 65F or frost danger has passed
- Plant spacing: 4-6 seeds 1-2” deep, 4’ apart. Once seedlings have true leaves, thin to 2 plants per spot. Transplants 2-3’ in row, 4-6’ between rows
- Popular varieties: Autumn Gold (large), Baby bear (small), Lumina (white, medium), Big Max (200lbs…)
- Fertilizer needs: Side dress with N when plants develop runners
- Water needs: Deeply and infrequently, reduce water as fruits ripen
- Other: Store out of freezing temps. Sandy soils preferredHarvest: 45-55 days post-flowering (fully colored, hard rind, and vine begins to die). Harvest with stem attached

Squash

- Crop Season/planting time: Warm/ plant when soils are 65F (after last spring frost)
- Plant spacing: Plant 4-6 seeds 1-2” deep and 4’ apart in rows that are 4-6’ apart. Thin to 2 plants once they have 2 true leaves
- Popular varieties: Most varieties of yellow, zucchini, crookneck and patty pan (summer), as well as butternut, acorn, etc. (winter)
- Fertilizer needs: Use a complete at pre-planting and side dress with N after runners develop
- Water needs: Deeply and infrequently
- Harvest: Summer take 35 to 45 days to begin flowering and should be harvested a week after flowering. Winter takes 45 55 days to mature(fully colored, vines die-back, hard rind) from flowering
- Other: Mostly grown from seed. Black, plastic mulches promote earlier maturity. Summer squash quality diminishe

Tomato

- Crop Season/planting time: Warm/ Transplants are recommended and take 6-8 wks to grow. Plant when soils are 60F/frost has passed
- Plant spacing: Transplants 2’ apart in rows that are 2-3’ apart
- Popular varieties: Based on: Maturity (early, mid, or late), Fruit size (cherry, medium, or large), plant size (determinant, semi-determinant, indeterminant
- Fertilizer needs: Do not over fertilize, which causes excess veg growth. Side dress N at 4- and 8-weeks post transplant (flowering)
- Water needs: Deeply, infrequently. Irregular watering causes blossom end rot
- Harvest: When fruits are colored but still firm. Gather all remaining tomatoes before first frost and store at 55F
- Other: Benefit from trellising (especially indeterminant)

Space Saving Techniques

- Timing: maximum use of available growing season
  - 3 crops (cool spring, warm summer, cool fall)
  - Requires a close rotation of crops
- Trellising and staking allow for vertical growth
  - Tomato, squash, grapes, squash, cucumber, pole beans
- Efficient Spacing
  - Improved varieties are more efficient per ft2
  - Bush varieties
- Succession Planting at intervals to produce a continual supply
- Intercropping fast maturing crops between slow
  - Radishes, lettuce, spinach between tomatoes, peppers

Season Extenders

- Cold frames – good for winter greens and hardening transplants
- Low Tunnels are made from ½” PVC, conduit or wire hoops with plastic or floating row cover
- Hoop houses work well for season extension, but need to be opened-up in the heat of summer
- Walls of Water – for early planting of warm season crops

Floating Row Cover (AKA Reemay, frost cloth)

- Synthetic fabric
- Season extender-temp increase & frost protection
- Protecting crops from small animals, especially insects
- Air, water, and sunlight can penetrate
- Available in different weights:
  - Light: “insect barrier”, 95% light transmit, 2F frost protection
  - Med: 85% light transmit, 4-6F frost protect
  - Heavy: 50% light transmit, 8F frost/temp protect
- Best used with drip irrigation

Crop Rotation

- Crops in the same family can be:
  - Susceptible to the same pests and diseases
  - Have similar nutrient requirements
- Can rotate families
- Use cover crops/green manures
- Leave parts fallow
  - Less desirable due to problems with erosion, weeds, and reduced water infiltration

Common Plant Families

- Apiaceae=Celery, Carrot, Parsley
- Asparagaceae= Agave, Yucca, Asparagus, Spider Plant
- Asteraceae= Sunflower
- Brassicaceae= Mustards, Brassica oleracea
- Ericaceae= Manzanita, Rhododendron, Blueberry, Cranberry
- Fabaceae= Locust, Mesquite, Beans, Peas
- Poaceae= Grasses
- Solanaceae= Tomatoes, Potatoes, Eggplant, Nightshades
- Rosaceae= Apples, Cherry, Photinia,

Recordkeeping

- Crop rotation is critical to garden success because pathogens can build up in areas where certain plant families are grown (especially the Nightshade Family)
- Keep records of crop (and variety name) planted during each growing season
- Take photos to create a visual record
- Record improvements, major changes, high or low temperatures, etc.
- Consider having an indoor/outdoor thermometer and rain gauge (contribute to rainlog.org)

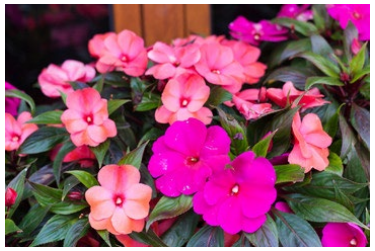
Annuals

- AKA-Bedding plants
- Landscaping
- Can grow from seed (some re-seed)
- Can buy in cells (Sold in units called flats)or single pots
- 4-6 plants per cell

Annuals (3500-6000’) Exposure

- Most need at least 4 to 6 hours per day
- Yavapai County-approved shade species include:
  - Calendula
  - Bachelor Button/Corn Flower (Centaurea cyanus)
  - Sweet William (Dianthus spp.)
  - Impatiens (Impatiens walleriana)
  - Lantana (Lantana camara)
  - Sweet Allysum (Lobularia maritima)
  - Petunia
  - Mealycup Sage (Salvia farinacea)
  - Pansy (Viola x wittrokiana)




Annual Hardiness Classifications

Hardy- grown for color in cool/cold seasons

- pansies

Half-hardy- can tolerate light frosts in spring

- Decline in summer heat, but may bloom again in fall
- Allysum, Dianthus

Tender- cannot tolerate freezing temps

- Zinnia, Impatiens

Culture

Soils

- Soil should be well-drained
- Amend clays and sand with organic matter
- pH of 6 to 6.5 is ideal (may benefit from sulfur)

Weeds

- Weed by hand, avoid pre-emergent herbicide

Care

- As flowers fade, remove to encourage early flowering

Bulbs

Resources

10 Steps to a Successful Vegetable Garden
https://extension.arizona.edu/sites/extension.arizona.edu/files/pubs/az1435-2015.pdf

Yavapai County Vegetable Planting Dates
https://extension.arizona.edu/sites/extension.arizona.edu/files/attachment/yavapaicountyvegetableplantingdates.pdf

Yavapai County Edibles Webpage
https://extension.arizona.edu/yavapai-edibles

Vegetable Crops “A to Z”
https://extension.arizona.edu/sites/extension.arizona.edu/files/attachment/Vegetables_0.pdf

Utah State University Fruit, Vegetable, and Herb Growing Guides
https://extension.usu.edu/yardandgarden/fruits-vegetables-herbs