

Vegetable Care & Management

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Considerations for Site Selection Process

- Soil or Site Characteristics
 - Drainage (Water & Air)
 - Droughtiness (proximity to water)
 - Space
 - Hours of Sun
 - Wildlife Damage Potential
 - Proximity to Black Walnut

New Site Preparation

- If turf, need to kill it
 - Glyphosate Plastic Tillage
- Soil test
- Add organic amendments
- Remove obstacles (call Diggers Hotline!)
- Consider wildlife abatement practices

Soil Sampling

- Gives you the pH, Organic Matter, and phosphorus & potassium content.
- Good idea to do when working in a new area, or planting certain types of plants that need specific soil conditions.



Fall or early spring activities

- pH amendments (lime to increase, sulfur to decrease)
- Organic amendments
- Leaves (not walnut), straw, hay, etc..

Compost/Fertilizers

■ **Composts**

- Better in spring than fall
- Can be more shallowly incorporated than the organic amendments

■ **Synthetic Fertilizers**

- P and K can be dug in almost any time
- Nitrogen fertilizers need to be timed more closely to plant need OR be slow-release.

Fertilizer Options

Type	Nutrient		
	N	P ₂ O ₅	K ₂ O
	-----%-----		
blood meal	13.0	1.5	0.6
bone meal	2.2	27.0	0
tree leaves	0.7	0.1	0.8
greensand	0	1.4	6.3
Compost	0.2	0.4	0.3
Miracle Gro	15	30	15
General Turf Fertilizer	27	0	4
Winterizer Turf Fertilizer	24	0	21
Urea	46	0	0

All said, what fertilizer and how much?

- #1. Adjust pH
- #2. Add Organic Matter, this usually takes care of all micronutrient needs.
- #3. Add P & K containing fertilizers if needed, most gardens that use organic fertilizers do not need these two.
- #4. Add nitrogen as needed.

Nitrogen needs of veggies

- Highest need crops are sweet corn and potatoes (1.2 lbs turf fert/100 sq ft or $\frac{3}{4}$ lb urea/100 sq ft)
- Next set is crucifers, leafy greens, onions, etc... (half to $\frac{2}{3}$ of above)
- Rates assume no organic Nitrogen.
- Vine crops and tomatoes are next in line (probably don't need any additions if organic, $\frac{1}{3}$ of high rate otherwise)
- Root crops and legumes probably shouldn't have any Nitrogen added.

Vegetable Selection Criteria

- Site Characteristics Space!
- Species traits
 - Hardiness Days to Maturity
- Cultivar characters
 - Disease Resistance
 - Aesthetics (flavor, color, shape, nutrients)
 - Growth habit (size, height, sturdiness)
- Management practices
 - Trellising Timing Seeds or Plants

Generalized Groups

- Perennial Vegetables
- Root Crops
- Legumes
- Bulb Crops (Alliums)
- Unique – i.e. their own management needs – include sweet corn, sweet potato, potato, garlic, and probably others.
- Salad Crops
- Greens
- Cucurbits
- Cole Crops
- Solanaceous

A key for our area: Cool vs. Warm, as it dictates planting date and harvest

- Cabbage (crucifer)
Family
- Most lettuces
- Nearly all root crops
- Peas
- Onions
- Beans
- Sweet Corn
- Sweet Potatoes
- Tomato Family, with peppers the most sensitive to cool.
- Basil
- In-between: Potato, edamame,
- Key is soil temperature at planting / transplant

Easiest ones to grow include:

- Green Beans
- Wax Beans
- Lettuces
- Kohlrabi
- Kale/collards
- Radishes/turnips
- Tomatoes
- Beets
- Onions
- Squashes
- Broccoli
- But, any of them can have issues.

Tomatoes *Lycopersicon esculentum*

- Most common American vegetable in home gardens
- Well over 500 cultivars available. Select carefully, or have some experiments.
- Early Varieties
- Main Crop types
- Paste/Salsa types
- 'Cherry' types
- Heirloom cultivars
- Size of plant now a big decision point, especially if raising in containers.



Determinate vs. Indeterminate

- Determinate
 - 3 to 4 ft tall
 - Plant ends in flower bud and most flowers form within a short period.
- Indeterminate
 - 7 to 15 ft tall
 - Plant "never ends", remains vegetative
 - Forms flowers in leaf axils
 - Cherry and pear tomatoes
- 1 plant can produce 10-50 lb fruit/season
- Also Semi-determinate



Tomato Culture



- Self fertile, wind-pollinated flowers.
- Starts seeds indoors 4-6 weeks before last frost
- Plant transplants 18-24 inches apart in rows 3-4 feet apart
- Night temperature critical: 60 - 70°F
- Temps < 50 will cause blossom abortion, poor fruit set & cat-facing
- Don't overfertilize with N - causes lack of flowering and fruit ripening.
- Stake/Trellis for better disease mgmt., but delays ripening a bit.

Pruning/Tipping

- Tipping needs to be done on indeterminate types, after have good amount of fruit set and into August somewhere.
- Pruning up can help with disease mgmt., fruit quality, and possibly earlier ripening. But, not if done incorrectly, then get sunscald & physiological issues



Peppers & Eggplants

- Start seed indoors 6-8 weeks before the last frost
- Harden off transplants before setting out.
- Plant 18-24 inches apart in the row.
- Very warm season
 - Grow best 70-80°F day & 65-70°F night.
 - Permanently stunted if exposed to less than 40!
- Peppers don't ripen properly if less than 56 deg. Fahrenheit
- Containerize, use plastic to help manage temperature, cover earlier than others, make sure in full sun.....
- Want more heat... use more N, dry the plants out, keep them hot.
- Harvest eggplant on time, or get bitter & degrade fast.



Potato Culture



- Tubers can be planted whole or cut - if cut, let suberize (dry) for at least 24 hours before planting.
- Like 50 degree soil temp.
- Well-drained soil
- Low pH
- Skin set occurs after vines die, i.e. harvest early and don't store well.

Bean Culture



- Plant beans after the last expected frost in warm soil, 50°F.
- Soak seed for an hour before planting to enhance germination.
- May need inoculum in new gardens.
- Plant seed 1 to 2 inches deep.
- Well-drained soils.
- Replant mid-summer for fall crop.
- Little or no nitrogen fertilizer required.
- Pole beans will require staking or some form of support.

Pea Culture



- Plant early in well-drained soils, as susceptible to root and seedling rot fungi.
- Soak seeds for 1 hour prior to planting to speed germination.
- Space 1-2 inches apart in the row.
- Support with a trellis or twine.
- Not very productive, edible pod types increase yield per foot of row, though.

Crucifer Culture



- Start seeds indoors 6-8 weeks before the last frost.
- Slowly acclimate transplants before setting outside permanently.
- Sow seed directly for fall crops 10-12 weeks before killing frost.
- Watch types - leafy vs. head cabbages; head vs. sprouting vs. Romanesco broccolis; color of cauliflower (purple is actually a broccoli).

A few tricks with crucifers

- Tie leaves over cauliflower to prevent discoloration.
- Cauliflower more likely to not form heads - temperature variation, excess heat or drought, too cold.
- Too much nitrogen, not enough boron, other issues can create quality issues.



Broccoli can yield as much with secondary shoots as main head, depending on cultivar, when started, growing season, etc....



Carrot Pigments



Anthocyanin



Xanthophyll



Beta carotene



Lycopene

Carrot Culture

- Sow $\frac{1}{4}$ inch deep in loose soil free of debris & rocks.
- Thin to 1-3 inches apart in the row.
- Well-drained soil.
- Replant mid-summer for extra sweet fall carrots.
- May get some plants that flower, due to temperature or a stress event.
- Can overwinter in soil if mulch well. Parsnips much sweeter if overwinter in soil and much hardier than carrots.



Root crop generalities

- Most germinate fairly slowly, except crucifer types.
- Susceptible to soil insects & critters.
- Biennials, so capture lots of energy, but can bolt.
- Short season types lend well to interplanting or succession crops - radish, turnip, beets, some carrots.
- Long season (rutabaga, parsnip, celeriac, scorzonera) need space and time to perform best.
- Too much nitrogen is only good if you really like beet or turnip greens! Otherwise, get very little root and very poor quality.



Onion Culture



- Plant seeds, sets, or transplants.
 - Sets may flower if summer is cool.
- Can plant salad types in succession, but must plant bulb types early and keep them weed free, well-watered, and with moderate nitrogen.
- Long-day vs. short-day is very critical. We need to plant long-day onions, or won't form bulbs well, if at all.

Vine crop Culture

- Seed at $\frac{1}{2}$ to 1 inch depth, 5 ft centers. Plant when soil temps closer to 60, usually mid to late May.
- Don't transplant well, but can start in mid or larger size pots. Necessary for longer day RM's.
- Need insect pollinators or hand pollination - most beneficial on longer day winter squashes.
- Powdery mildew resistance as a selection factor, trellis to get better airflow.
- Only allow 1-2 fruits to develop per plant of larger types.
- Good fertility, but not too much nitrogen = more p.m., fewer and later flowers.



- Bitter cucumbers due mostly to either heat or cold, but may not quit after starting.
- Proper maturity before picking a bit tricky with melons, needed for winter squash to store.

Summer Squash Cultivars

■ Zucchini

- Aristocrat
- Spineless Beauty
- Roly Poly

■ Straightneck

- Butterstick
- Gold Bar
- Sunray
- Saffron

■ Crookneck

- Horn of Plenty
- Pic-n-Pic
- Early Golden Crookneck

■ Scallop or Patty Pan

- Scallopini
- Butter Scallop
- Peter Pan



Winter Squash Cultivar Selection



- **Acorn (*C. pepo*)**
Green or gold & deeply ribbed.
 - Cream of the Crop
 - Ebony Sweet Acorn
 - Table Ace
 - Table Queen
- **Buttercup (*C. maxima*)**
Medium-dark green splotched with grey.
 - Autumn Cup
- **Don't Forget Pumpkins!**
- **Butternut (*C. moschata*)**
Orange flesh, tan skin, bulbous base.
 - Autumn Glow
 - Early Butternut
 - Waltham
- **Delicata (*C. pepo*)**
 - Cornell's Bush Delicata
- **Hubbard (*C. maxima*)**
Medium, blue-gray with bumpy skin.
 - Blue Hubbard
- **Kabocha (*C. maxima*)**
 - Ambercup
 - Sweet Mama
- **Spaghetti (*C. maxima*)**
Oval with golden yellow skin.
 - Pasta Hybrid
 - Vegetable Spaghetti
- **Turk's Turban (*C. maxima*)**
Green, turban-shaped, striped with red, white, & orange.

Sweet Corn Culture



- Seed

Warm season

Soil 70 - 85°F

Planting pattern critical for proper pollination - "think square"

4 rows minimum

Be careful about different types and field corn - cross pollination will not yield desired results.

Other Management Aspects

- Plant at appropriate depth – small seeded need to be more shallow, but pay attention to moisture.
- Transplant acclimated (hardened off) plants near same depth as they were, except tomatoes – trench them in to get maximum root system.
- Thin to appropriate density, or plant in
- wide rows, rather than single rows.
- Row width can vary, but need space.
- Air flow, travel, light, pest management.



Watering

- One to 1.5 inches water per week during growing season. Highest needs are when in full growth mode and/or fruiting.
- One inch of water on one square foot of garden equals 0.6 gallons. I.e. 60 gallons per 100 square foot garden.
- Water the soil not the plants, if at all possible.
- If watering methods get leaves wet, try to water early in morning to minimize extra disease risk.

Major Pests of Vegetables

- Tomato Fungal Leaf Diseases
- Slugs
- Corn Seed Maggot / Cabbage Maggot
- Mammals
- Cabbage Caterpillar Trio
- Colorado Potato Beetle
- Cucumber Beetle / Squash Vine Borer/Squash Bug

Approaches to Pest Management

- **Mechanical**
- **Cultural**
- **Biological**
- **Chemical**



Not all are appropriate for every pest!

Installing a cutworm guard made from a paper grocery bag at planting time



Tin cans work too





Colorado Potato Beetle

- Adults lay eggs on underside of leaves
- Yellow / orange
- 20-40 eggs/mass

Crucifer Insect Pest Complex

Key Pests - Lepidoptera

Diamond back moth



Imported cabbage worm



Cabbage looper



Sporadic Pests

Cabbage maggot



Flea beetle



Cabbage aphid



Cucumber Beetles: Damage & a disease



Squash bug, *Anasa tristis*

Occurrence

- Adults are large black bugs which aggregate on plants
- Round eggs are laid in neat rows
- Nymphs are white/grey

Damage

- Phytotoxic saliva causes wilting
- Cucurbit yellow vine decline
 - Hubbard and winter squash more severely affected



Squash Vine Borer

Watchful Eye & A good butterfly net.
Monitoring for eggs, scraping them
away.

Wrap plant bases with aluminum foil.
Apply carbaryl or endosulfan to bases
of plants when chicory is blooming.
Sharp, thin needles or nails to skewer
established caterpillars.



Diseases of Vegetables

- Tomato leaf spots = Early blight & Septoria leaf spot.
- Powdery mildew on cucurbits.
- Root rots / seedling blights on seedlings.
- Physiological problems – sunscald, blossom end rot, catfacing – on tomatoes.

Septoria Leaf Spot

- Rotation at least 2-3 years
- Remove and destroy infected plant debris
- Mulch (plastic preferred)
- Stake and don't over crowd plants
- Avoid overhead irrigation
- Irrigate in the morning
- Apply Fungicide if warranted
- Chlorothalonil, Copper compounds if organic
 - Good coverage esp. on lower leaves
 - Apply at least weekly when weather is favorable



Almost Diseases of Vegetables

Blossom End Rot

- Management

- Add calcium as needed

- Bone meal or lime

- Egg shells

- Water plants consistently. Most common in containerized plants.



Diseases of Vegetables

Powdery Mildew

- Control
 - Plant resistant varieties
 - DO NOT crowd cucurbit plants
 - Apply fungicides for control
 - Sulfur compounds
 - 1.5 Tsp. baking soda + 3 Tsp. horticultural oil in 1 gal water. Whole milk is also an option.
 - Applications every 7-14 days

Resources

- All kinds of Extension vegetable management publications, start at <https://learningstore.extension.wisc.edu/collections/vegetables-c81>
- Single topic publications are also found at: <https://pddc.wisc.edu/fact-sheet-listing-all/>
- <https://marinette.extension.wisc.edu/> under the horticulture link for area specific resources, as well as Growing Tomatoes in Containers publication.

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