Why a Vegetable Garden

- Satisfaction
- Outdoor exercise
- Homegrown, great flavor
- Sharing
- High quality nutrition
- Less processed foods
- Food budget savings
Garden Soil

- Organic matter keeps the soil loose and healthy
- It acts like a “sponge” to hold water, fresh air, and plant food
- Add compost, rotted manure or fertilizer in the fall
- Disturb the soil as little as possible to keep the beneficial fungus and natural soil structure intact
Healthy Soils, Healthy Plants
Healthy People

Cultural practices that help maintain fertile soil:

- Soil testing
- Crop rotation
- Growing cover crops
- Manure as a valuable nutrient source
- Composting
- Applying supplemental fertilizers

Maintaining Soil Fertility:

- Cultural practices that support the development of healthy, vigorous root systems result in efficient use of available nutrients
Soil Testing

- Getting a soil test will help you determine deficiencies

- U of MN Soil Testing Lab
  soiltest.cfans.umn.edu

- Never good to add amendments without knowing what the soil lacks

- **Quality** of your test results depends largely on the **quality** of your sample

- Soil samples may be collected whenever soil conditions permit

- If your garden has large areas which differ in fertility, take one sample from each area
Soil Testing

- Use a garden trowel (#2) or sampling tube (#1)
- Scrape away or discard any surface mat of grass or litter
- Place the soil sample in a clean bucket
- Repeat sampling in several random locations within the chosen area.
- Mix soil well to make one sample
- For the regular test cost is $17.00
- Interpretation of your soil sample results contact Yard & Garden Desk 952-443-1426
When is Soil Ready

• Soil can be worked when it is thawed, relatively dry and warm enough for the seeds to germinate
• Soil temperature plays an important role in the order of your plantings
• [http://wcroc.cfans.umn.edu/](http://wcroc.cfans.umn.edu/)
• Kale, peas, radishes, lettuce, potatoes and spinach - less than 50 degrees F
• Carrots, beets, swiss chard and parsnips need soil temperatures to be above 60 degrees F
Crop Rotations

- Crop rotation is deciding which crop to plant where from one year to the next
- Rotation will help manage soil fertility and help avoid or reduce problems with soilborne diseases and insects
- Each crop has different nutrient requirements, and will affect soil balance differently

For Example

Problem: If you plant sweet corn in the same spot year after year, that area will run low on nitrogen and phosphorus

Solution: Change the location of sweet corn each year. You'll be able to renew the plot where it grew the preceding year, so your soil won't be out of balance
Crop Rotations

• Leafy/fruiting crops use up nitrogen quickly such as lettuce, cabbage, and tomatoes
• Root vegetables are light feeders
• Peas, beans, and other legumes add nitrogen to the soil but need lots of phosphorus

• Maintain balance of soil nutrients by not planting the same category of crop (root, legume, and leafy/fruiting) successively in the same place
• It’s best to follow nitrogen-fixing legumes such as peas or beans with nitrogen-loving leaf or fruiting crops such as lettuce or tomatoes
• Follow the heavy feeding crops with light-feeding root crops
Growing Cover Crops

- Cover crops are sown thickly to form a living mulch
- Keep weeds in check
- Mow the plants down if they flower, to prevent them from self-seeding and becoming weeds themselves
- Turned into the soil to provide organic matter and nutrients
- Include vetch, clover, beans, peas, annual ryegrass, oats, rapeseed, winter wheat, winter rye and buckwheat

- Plant in the early season: turn it under and plant warm-season vegetables
- Or, after early-maturing vegetables have been harvested, plant a cover crop
- Turn in the dead plant material after a killing frost in late fall
Growing Cover Crops

- Many plants in the legume family, such as peas, beans, vetch and clover, grow in cooperation with soil-dwelling bacteria
- These bacteria live in nodules on the roots of legumes
- They take nitrogen gas from the air and convert it to a form plants can use
- The legume dies and its roots begin to decompose, nitrogen in the nodules becomes available to other plants
Don’t Sow Seeds too Thick

- “Less is more”
- Problem - empty a whole packet of seeds in a small space
- Develop tall, weak stems that never recover
- Most vegetable seeds need proper spacing
- Directions on package
- Mix with sand or coffee grounds to space them out
- Sow by hand
Sowing Seeds

- For small seeds make a planting furrow with tip of hoe
- Water furrow prior to sowing
- Tap the open envelope as you move down the row
- Cover the seed with moist soil and tamp with back end of steel-toothed rake
- Important - seed to soil contact
- No need for any further watering
Drip Irrigation
Early Vegetables: Radish

- Are about the closest thing to instant gratification you can get in the garden
- Plant in early spring—grow best in cool weather
- Grow as a fall crop sowing seed around August 10th
- Proper watering can make the difference between good production and poor production
- Radishes can be pulled any time they reach a usable size. They may get pithy and develop a strong taste if they are left in the ground too long or dry soil
Radish

- Flea beetles chew small, round holes in leaves. They can spread disease and destroy the crop, especially when the plants are very young.

Varieties:

- Cherry Belle-1949 AAS Winner
- Early Scarlet Globe
- Champion
- White Icicle-mild flavor
Early Vegetables: Peas

- Season for pea growing is short - sow in the ground early
- Require about sixty days of growth before harvest
- Will stop growing once temperatures get above 85°
- Peas produced in hot weather have poor quality

- Young pea plants can withstand light frosts, and will grow at any temperature above 40° F
- Optimum temperatures for growth are between 55° F and 65° F.
- Once they flower and set a crop, frost can be damaging
- Watch the forecast for late spring frost and cover the plants if necessary
Peas

- Powdery mildew, a foliar disease common in hot weather, can be a problem for peas
- Leaves and pods can become covered in a whitish mold
- Choose resistant varieties, and start peas early to avoid hot weather
Onions

- Don’t sow onion seeds early in the season
- Safe to set out onion sets or transplants before the last frost date
- Onions grown in MN generally are long-day types that require 14 or more hours of daylight to form bulbs

- Transplants can tolerate light frosts
- Plant when temperatures reach 50°F
- Plant about 2” deep and 3-4” apart
- Onions can also be planted from sets
- Plant them as soon as possible in the spring

Varieties:
- Candy, Sweet Sandwich, Patterson
Onions

- Onions require a good supply of nitrogen.
- Too much nitrogen results in late maturity, large necks that are difficult to cure, soft bulbs, green flesh, and poor storage quality.
- Side dress fertilizer after root systems are well-developed once or twice during the growing season with urea at a rate of 1 pound per 25 feet of row.
- Onions are shallow-rooted and require constant moisture. Proper watering will enhance good production.
- Stop watering when bulbs have reached full size and tops have fallen.
Early Vegetables: Spinach

- Popeye's favorite vegetable has 20 calories per serving, plus it's packed with fiber along with vitamins and minerals
- Plant as soon as soil can be worked early
- Spinach likes to bolt with warm weather
- For a fall crop, sow 2 1/2 months before fall frost date
- Thin spinach to 2-4 inches apart

Recommended Variety: Tyee

- Spinach and some lettuce varieties can produce new leaves, especially if individual leaves are harvested at the "baby" stage, so multiple harvests are possible
Early Vegetables: Carrots

- Sow seeds when soil temperature is above 60°F
- For a continuous supply of carrots, put in 2-3 plantings spaced three weeks apart
- Till soil to soften and aerate the ground in order to grow long and straight carrots
- 10-14 days to germinate; one week later, seed leaves emerge
- Gently mulch to retain moisture – this will speed germination

- Soil should be well drained and loose to prevent forking and stunting of the root growth
Carrots

Varieties:
- Scarlet Nantes and Chantenay-favorites
- Sugarsnax 54
- Early Yaya
- Nelson

- Carrots prefer a sandy loam soil. Heavy soils cause the carrots to mature slower and the roots will end up unattractive.
- Once plants are 1” tall, thin 3” apart.
Tomatoes

• Heat-loving vegetables that require long, frost-free season and full sun

Two types of tomatoes:

1. Determinate or bush-type: generally do not need pruning, staking, or trellising. Plants stop growing and fruit ripens within a certain time period

2. Indeterminate, or climbing: will need some type of support, such as cages, stakes, or trellises. Should be pruned for best results
Planting Tomatoes

- If you grow your own-sow seed indoors around April 15th

- When plants are about 5 inches tall, start hardening them off so that they will adapt well when transplanted outdoors

**To harden off:**
- Reduce watering
- Place plants outside where they will receive a couple of hours of sunlight and are protected from wind
- Gradually expose them to more sunlight over the next week or two, bringing them indoors if night temperatures approach freezing
Planting Tomatoes

- Purchase healthy non-spindly transplants
- At the nursery: pull plant out of the pack and look at roots
- Transplant outdoors in a sunny area after danger of frost has passed and soil has warmed
- Tomatoes can be transplanted so that some of the stem is placed below the soil line
- Space determinant tomatoes 24 inches apart
- Indeterminate types no closer than 3 feet
Plastic Mulch for Tomatoes
Plastic Mulch Advantages

Advantages
• Increased soil temperature
• Reduced soil compaction
• Reduced fertilizer leaching
• Reduced drowning of crops
• Reduced evaporation
• Cleaner product
• Root pruning eliminated
• Reduced weed problems
• Earlier crops
• Increased growth

Disadvantages
• Costly to remove
• Greater initial costs
• Increased moisture management
• Increased soil erosion between plastic
• Increased weeds in plastic holes close to crop
Red Plastic Mulch for Tomatoes

- Increased yields up to 20% in tomatoes
- Similar to black and white plastic mulch-warms the soil, prevents erosion, and retains moisture.
- Ability to reflect certain red shades of light back into the plant, accelerating fruit production and increasing yield
- Far-red light wavelengths from the plastic bounce back up to tomato plants, the phytochromes tell the tomato fruit to grow more and faster

For best results …

- Allow several feet of the red showing on either side of the plant or row
- Use determinate tomato plants-their smaller size means they may maximize the amount of light reflected from the plastic
Indeterminant Tomatoes

1. For the first month or so, all of the sugar produced is directed towards new leaf growth. During this stage, indeterminant tomatoes grow very rapidly, doubling their size every 12 to 15 days.

2. Eventually, the plants make more sugar than it can use, which signals the plant to make new branches and to flower. If unsupported the increasing weight of fruit and multiple branches forces the plant to lie on the ground.

3. A vigorous indeterminate tomato plant can easily cover a 4- by 4-foot area.

4. By season's end, it will be an unsightly, disease-wracked tangled mess.
Pruning Tomatoes

- Best accomplished by ensuring each leaf has plenty of room and is supported off the ground.
- When growth is extremely dense, many leaves are forced into permanent shade, reducing the amount of sugar they produce.
- More stems = more but smaller fruit.
- A pruned and staked plant will produce larger fruit two to three weeks earlier than a prostrate one.

Encourage a strong main stem by removing all suckers below the first flower cluster.
Supported Indeterminant Tomato
Tomato Disease

- Early blight is one of the most common occurring disease in Minnesota
- Causes leaf spot and when severe enough, leaves will drop

Note the 'target' appearance of concentric rings
Blossom-End Rot in Tomatoes

- Is a physiological disorder, not a disease
- Appears as blackened, leathery spots on the fruit bottoms
- Caused by calcium deficiency, usually induced by uneven soil moisture
- Use mulches to conserve moisture
- When needed give plants adequate water
- Tomato plants need about 1.5” of water a week during fruiting
Tomato Sunburn

- Fruit is susceptible to sunburn
- Fruit develop white patches if there is not enough leaf surface to cover fruit and protect them from sunlight exposure during hot, dry weather
What about Grafted Tomatoes?

- **Grafting** is taking the top (scion) of any tomato variety seedling and attaching to a specialized hybrid rootstock grown specifically for its vigor and disease resistance.
- Grafted tomatoes bring together excellent production and disease resistance.
- “We’ve seen a yield boost of 30 to 50 percent,” Johnny’s Selected Seeds.
Suggested Tomato Varieties

- For our area grow varieties that will mature in 85 days or less
- Select varieties that have the VFNT designation-have resistance to 4 common tomato diseases
- Grape tomatoes—often sweeter than standard tomatoes—eating quality of these varieties hard to beat

**Heirloom varieties**

- They are grown for a variety of reasons, but mostly for their taste, which is widely perceived to be better than modern tomatoes
- Have a shorter shelf life and are less disease resistant than most commercial tomatoes.
- Brandywine, an Amish heirloom since 1885, is legendary for its rich flavor
Thank you for Attending

Steven R. Poppe
University of Minnesota
West Central Research and Outreach Center
Horticulture Scientist
poppesr@morris.umn.edu
320-589-1711
http://wcroc.cfans.umn.edu