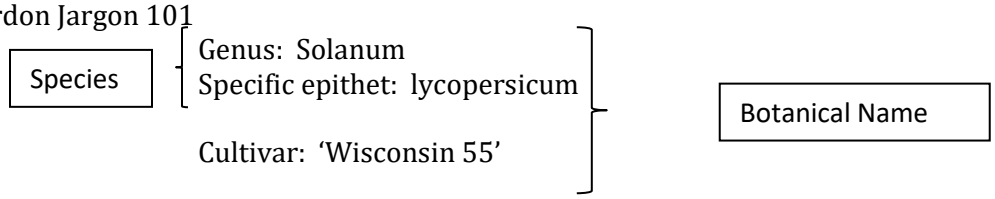
Early Spring Gardens: Seed Starting and Soil Preparation

- **Our Growing Season (Zones 3b-4b)**
  - Average last Spring Frost, May 17-30 (add 7 days earlier)
  - Average Fall killing frost, September 13-26 (add 7 days later)
  - Growing Season Days, about 124 days (was 110)

- **Definitions**
  - Gardon Jargon 101



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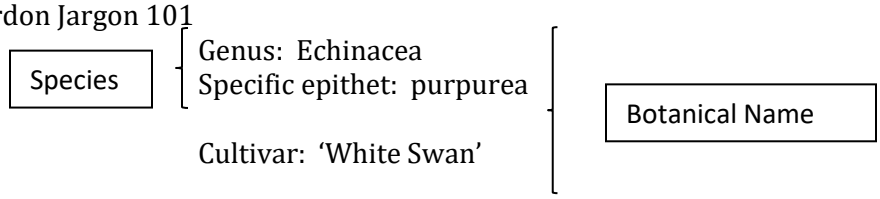


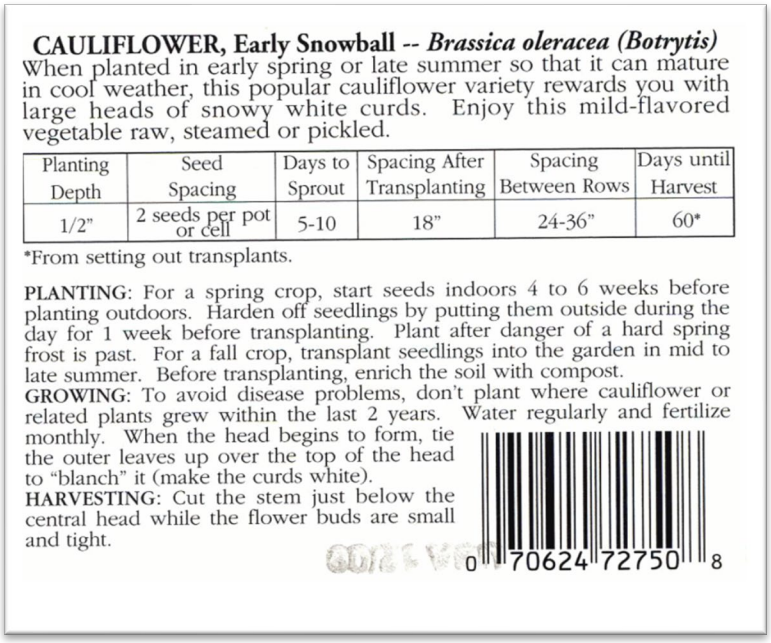
  - Cultivar: A cultivated variety is one that has reproducible attributes distinct from another. Cultivar names are contained within single quote marks.
  - Open pollinated: varieties that result from natural forms of pollination, usually less expensive than hybrids; will be exactly like their parents (maybe). Heirlooms are open-pollinated and antique (around for more than 50 years or so). Use these if you intend to save seeds for future years
  - Hybrid: also known as F1 plant – first generation when a breeder selects two pure lines and cross-pollinates them. F1 plants will not come true and will not be replicas of the parents. Usually have vigorous growth, greater uniformity and increased disease resistance.
  - Organic: The term "Certified Organic" has a distinct legal meaning and can only be used for seed by growers who are in compliance with all the rules specified by the USDA's National Organic Program.
  - Pelleted and Primed: Pelleted seeds are enclosed in a round pellet made from simple clay or other inert material to bulk them up. This process makes very small seeds like lettuce, carrots, and onions easier to sow. Pelleted seeds can also be primed which means it goes through a hydration treatment to bring the seeds to the brink of germination, and then dried for storage. Primed seeds break dormancy and germinate quickly when sown.
  - Scarification & Stratification: Seeds that will need **scarification**: Nasturtium, Morning Glories, Moon Flowers, and flowers or perennial seeds that are large Scarification is a process to physically alter the seed coat to allow moisture to penetrate. How? Cut the seed coat with a knife or pin, rub between two pieces of sand paper, larger seeds can be cracked with a hammer, or for smaller seeds use a hot water treatment.
    Seeds needing **stratification**: False sunflower, Hardy hibiscus, Catmint, Evening primrose, Perennial sweet pea,Lupine Rudbeckia (black eyed susan), and many native wildflowers.

Stratification is exposing a seed to moisture and specific temperatures (usually a cold period) in order to encourage germination
    - Treated/untreated: Use primarily for commercial seeds, treated seeds are generally coated with a fungicide to protect germinating seeds from pathogens when planted in fields.

- **Reading Catalogs**
    - **Maturity –** means days to harvest. It indicates time to harvest from average day of planting see (or transplanting indoor-started seedlings) in a "typical" home garden.
    - **Abbreviations –** each catalog uses different codes – some common ones….
        - AAS – All American Selection
        - VFN – resistance to Verticillium wilt of tomatoes and eggplants, Fusarium fungus of tomatoes and others, and Nematodes – microscopic soil worms that bother especially tomatoes, peppers, and eggplants
    - Legend – each catalog uses a different legend to identify growing conditions, annuals/biennials/perennials/organic/deer resistance…etc.
    - Common name vs. botanical name vs. cultivar, days to harvest (veggies), days to bloom (flower), Tomato: disease resistance key, determinate vs. indeterminate, package contents or seedlings

- **Seeds vs. Transplants**
    - Many varieties grow well from seed sown directly into the garden (ex. Radishes, lettuce, cucumber)
    - Those with a longer period to harvest benefit from starting plants weeks before planting or buying transplants (tomatoes, peppers)
    - Seed starting needs to begin weeks prior to last frost date in spring

- **Indoor Seed starting** – generally 6-8 weeks before last frost (here 1st week in April is 8 weeks); see seed package for details



CAULIFLOWER, Early Snowball -- ***Brassica oleracea (Botrytis)***

When planted in early spring or late summer so that it can mature in cool weather, this popular cauliflower variety rewards you with large heads of snowy white curds. Enjoy this mild-flavored vegetable raw, steamed or pickled.

Planting Depth	Seed Spacing	Days to Sprout	Spacing After Transplanting	Spacing Between Rows	Days until Harvest
1/2"	2 seeds per pot or cell	5-10	18"	24-36"	60*

*From setting out transplants.

PLANTING: For a spring crop, start seeds indoors 4 to 6 weeks before planting outdoors. Harden off seedlings by putting them outside during the day for 1 week before transplanting. Plant after danger of a hard spring frost is past. For a fall crop, transplant seedlings into the garden in mid to late summer. Before transplanting, enrich the soil with compost.

GROWING: To avoid disease problems, don't plant where cauliflower or related plants grew within the last 2 years. Water regularly and fertilize monthly. When the head begins to form, tie the outer leaves up over the top of the head to "blanch" it (make the curds white).

HARVESTING: Cut the stem just below the central head while the flower buds are small and tight.

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- **Planning for the next season**
  - Seed longevity Chart: https://fedcoseeds.com/seeds/seed_saving.htm
  - Do a sprout test
  - Soil Test: https://uwlab.soils.wisc.edu/soil-samples/lawn-garden
  - Prep any new beds
  - Observing and Recording: 2018 – adequate moisture, early warming, no late spring frosts, spotted leaf virus and early blight hit many tomatoes; Take note of what worked in your garden well, what did not

- **Storage Life of Flower & Vegetable Seeds**
  - Long-lived (5+ years): Beets, broccoli, brussels sprouts, cauliflower, cabbage, cilantro, cucumber, lavender, lettuce, melons, mustard, oregano, peppers, radish, sunflower, tomato, turnip
  - Medium-lived (up to 5 years): basil, beans, calendula, carrot, celery, chard, dianthus, dill, eggplant, forget-me-not, lupine, marigold, nasturtium, parsley, peas, pumpkin, sage, snapdragon, squash, sweet pea, thyme, zinnia
  - Short-lived (1-2 years): alyssum, aster, blanketflower, coleus, corn, cosmos, delphinium, leek, onion, pansy, parsnip, phlox, spinach, strawflower

- **Check List for Early Seed Starting**
  1. Plan what will be grown in next season
  2. If starting from seed, order early and/or check your seed supply for viability with a sprout test
  3. Gather necessary supplies and prepare space
  4. Create a calendar/tracker: Plant Name, Seed Source, Date Planted, Germination Date, Transplant Date, Notes

- **Planting Timeline**
  - Indoors:
    - 8 Weeks before last frost –cabbage, broccoli, eggplant, lettuce, peppers
    - 6 weeks before last frost – perennial flowers, tomatoes, watermelon
    - 3-4 weeks before last frost – cucumbers, squash, pumpkins, muskmelon
  - Outdoors:
    - 2-3 weeks before last frost-lettuce, sweet peas, radishes, carrots, beets, potatoes, peas, onions
    - 2-3 weeks after last frost – basil, cutting flowers, corn, cucumbers, pumpkins, squash
    - 3-4 weeks after last frost – all varieties of beans

- **Supplies:** Soilless mix for seed germination (is finer than regular soil mix), Planting containers, Identification markers, Warm area (70-80^{o} F) or warming mat, Soil Thermometer, Transplanting materials: mix, containers

- **Recipe for Seed Starting Mix (**Source: UW Extension Master Gardener Manual)
  - 1 part perlite
  - 1 part peat

- 1 part sterile potting soil

- Mix together and moisten slightly. Place mix in an aluminum baking pan or other heat resistant container. Bake at 250^{o} until soil temperature reaches 180^{o} for ½ hours (the length of time to reach this temperature depends on volume and moisture content.) Remove pan and allow to cool before using.

- **Steps for Starting Seeds**
  1. Choose the right container, wash in hot soapy water or 10% bleach/90% water solution
  2. Use soil mix for starting seeds
  3. Temperature ~65-75^{o}, 12-16 hours/day of light, artificial light <6 inches above plant
  4. Keep air moving to stave off fungal diseases
  5. Soil should be constantly moist, cover seeds during germination with a light plastic wrap and remove once they sprout
  6. First leaves are not leaves by cotyledons – next ones are "true leaves"
  7. Move to regular soil mix and larger pots as plants grow after true leaves emerge

- **Sowing Seeds**
  - Check package for directions
  - General rule – plant seed four times as deep as its width
  - Mark each pack with tag (plant type & date)
  - Some seeds need light to germinate – cover with a thin layer of mix or sand
  - Plants needing darkness can be covered with dark plastic or several layers of newspaper
  - If using older seeds, plant two or more seeds per cell and once they have developed true leaves, cut all but the healthiest with a scissors

- **Presprouting Saves Time (also a Sprout Test)**
  1. Spread out a double layer of damp paper towels, evenly space seeds about 1 inch apart
  2. Roll up towels without disturbing the seeds, put a rubber band around each roll
  3. Enclose one or more rolls in a plastic bag, close loosely-germinating seeds need air
  4. Set bag in warm place, note date on calendar or bag, check daily.
  5. Plant sprouted seeds in individual containers or directly in garden. Handle seedlings with care so you don't break delicate roots and stems.
     (This is also the method for testing seed germination rates.)
     Source: *Gardener to Gardener, Seed-Starting Primer & Almanac*

- **Location :** A windowsill is not a good location – can be cold at night and hot during day, Our northern sunlight is weak so an artificial light source will provide better success, Most seeds need consistently warm soil, avoid drafty areas

- **Light:** Standard fixtures with two "cool white" fluorescent tubes per fixture give plants adequate light and are inexpensive, Hang light from chains to ease raising them as plants grow, Keep lights no more than 4" above the tops of seedlings, as close as 2" is ideal, 12-16 hours daily, plants need some dark period to develop properly (use a timer)

- **Bottom Heat:** Providing a constant heat source from underneath can be beneficial, Seeds started indoors germinate sooner and produce healthier roots when potting mix is warm and bottom heat

can prevent “damping off”, Remove bottom heat once seedling have emerged

- **Watering and fertilizing,** Keep potting mix moist while seeds are germinating, a spray bottle can be used, Seedlings draw energy for germination from nutrients stored in the seed so they don’t need fertilizer until they have several sets of true leaves, Once they have leaves, will benefit from a weak all-purpose water-soluble fertilizer at ¼ strength once a week. Water the rest of the week with plain water
- **Outdoor Seed Starting** – an alternative called “winter sowing”.
  Use plastic containers, needs drain holes on bottom and slits for air/water on top, Seeds that are cool weather or perennials do well, Can set outside in winter/early spring and the seeds will germinate when appropriate, Need to pull top on warm days and water when needed
  Websites to learn how:
  http://wintersown.org/
  http://getbusygardening.com/winter-sowing-seeds/
  http://www.agardenforthehouse.com/2012/11/winter-sowing-101-6/

- **Examples of Seeds for Winter Sow Method**
  - Annuals: alyssum, calendula, nicotiana, rudbeckia
  - Perennials: echinacea, grasses, heuchera, malva, nepeta, poppy, salvia, yarrow
  - Herbs: chamomile, chives, dill, hyssop, marjoram, oregano, parsley, sage, thyme
  - Veggies: beets, broccoli, cabbage, chard, carrots, kohlrabi, lettuce, onions, radish
  - Wildflowers, bushes, trees, vines, fruits – anything that grows in a temperate climate. (note: some trees and shrubs may require a dormancy over a year to germinate)

- **Spring Soil & Site Preparation**
  - Remove debris, weeds, kill any turf
  - Prepare beds by tilling, adding organic matter
  - Fertilize just before planting and throughout the season as indicated for the crop
  - Add structures needed for pest control and plant supports

- **Hardening Off Tips** *(from Norma Rossel, Johnny’s Selected Seeds*)
  - Harden off gradually, so that seedlings become accustomed to strong sunlight, cool nights and less-frequent watering over a 7-10 day period.
  - On a mild day, start with 2-3 hours of sun in a sheltered location. Protect from strong sun, wind, hard rain and cool temperatures.
  - Increase exposure to sunlight a few additional hours at a time and gradually reduce frequency of watering, but do not allow seedlings to wilt. Avoid fertilizing.
  - Keep an eye on the weather and listen to the low temperature prediction
  - Know the relative hardiness of various crops.
  - After transplanting to the garden, use a weak fertilizer solution to get transplants growing again and to help avoid transplant shock. Be sure to water plants after hardening them off.

- **Hardy, half-hardy, tender plants**
  - Hardy plants, can be hardened off when the outside temperature is consistently above 40° F. Half-Hardy plants may be hardened off at 45° F.
  - The terms "hardy" and "tender" relate to whether a crop can withstand frost. Hardy plants can, tender crops can't and half-hardy ones may be able to take brief, light frosts.

- Use soil thermometer and soil chart for most accuracy

Recommended Minimum Temperatures		
Hardy	40° F.	Broccoli, Brussels sprouts, kohlrabi, cabbage, onions, leeks, parsley
Half-Hardy	45° F.	Celery, Chinese cabbage, lettuce, endive
Tender	50° F.	Squash, pumpkin, sweet corn
	60° F.	Cucumber, muskmelon
	65° F.	Basil, tomatoes, peppers

- **Planting**
    - Plant when conditions are right for the plant. Check soil temperature and last frost date charts.
    - Using phenology – plant veggies when lilac is in full bloom
    - Another option – moon phases; check the Farmer's Almanac or www.gardeningbythemoon.com

- **Seed Saving Tips**
    - Can save money, always have seeds for hard to find varieties, regional adaptation, consistent quality, joy of learning, explore heirloom varieties, influence crop traits
    - Know your seed-saving goals
    - Always choose open-pollinated varieties. The easiest crops to save seed are from self-pollinating crops (peas, beans, tomatoes and peppers). Cross-pollinating plants (squash, corn, carrots, beets, cucumbers, melons) must receive pollen from other plants of the same variety to produce viable, true-to-type seed. Go to Seed Savers Exchange's Planting and Seed Saving Instructions http://www.seedsavers.org/

- **Resources- UW-Extension Bulletins**
    - A1653 "Vegetable cultivars and planting guide for Wisconsin gardens"
    - XHT1210 "Using Crop Rotation in the Home Vegetable Garden"
    - A2727 "Harvesting vegetables from the home garden"
    - All can be downloaded free at the http://learningstore.uwex.edu
    - University of Minnesota – "Starting seeds indoors" https://extension.umn.edu/planting-and-growing-guides/starting-seeds-indoors
    - Seed Savers Exchange: www.seedsavers.org
    - *Gardener to Gardener, Seed-Starting Primer & Almanac*, edited by Vicki Mattern, © 2002, Rodale, Inc.

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