

This informational packet was provided by Alison O'Connor, Larimer County Extension, as a courtesy to the Estes Valley Community Garden (EVCG) and its Gardeners, following Ms. O'Connor's presentation on April 5, 2016 at the Estes Park Senior Center.

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Thank you.

Estes Valley Community Garden Board

Starting Your Garden from Seed

The Science of Germination and Culture of Seedlings



Alison O'Connor
Larimer County Extension
csuhort.blogspot.com

Advantages of Starting Your Own Seed

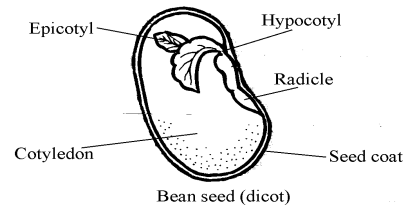
- Better and earlier results
- Guarantee the provenance of your plants
- Greater variety
- Less expensive?

What we'll cover today:

- The biology of seeds
- Anatomy of a Seed Packet
- Seed Starting Equipment and Supplies
- When to Start Your Seeds
- How To Start Your Seeds
- Seedling Culture
- Terminology to know
- Things that can go wrong
- Storing seed year-to-year

What is a Seed?

- A tiny dormant self-contained storage unit in a suspended state of development



Planning Tools

- Rough sketch of your vegetable garden and its dimensions
- Calendar
- Knowledge of when to plant (based on your location) for days to harvest
- Your notes from previous years about what did well...and what did not

The Secret of Seed Catalogs

- Everything sounds awesome...but not everything will grow in Estes Park
- Everything will look perfect—they have professional photographers
- It's easy to go overboard and buy too much
 - Remember the size of your garden!
- Keep your selections to 80 days to harvest or less!

10 Easiest Seeds to Grow

1. Beans
2. Cucumbers
3. Radish
4. Pumpkins
5. Cosmos
6. Peas
7. Lettuce
8. Squash
9. Sunflowers
10. Zinnias

Determinate

- Patio Tomato (small, bush type)
- Fruit tends to come on at one time (canning)

Indeterminate

- Much larger plants
- Flower and produce throughout the season

Open Pollinated

- Plants pollinated by insects, wind, animals
- Retain diverse, strong genetic heritage
- CAN reproduce true to seed
- CAN spontaneously cross pollinate

Heirloom, Heritage

- Varieties growing reliably for at least 50 years
– not disease resistant
- Reproduce true to parentage

Hybrid

- Produced by crossing parent plants naturally or artificially
- Create desired characteristics in offspring (i.e. disease resistance)
- Do not reproduce true to seed

Treated or Inoculated

- Legumes (peas, beans) and corn can be treated with fungicide to prevent rot
- Legumes may be inoculated with rhizobia to encourage N-fixation
- There are certified organic seeds that have been treated

Genetically Modified

- Altered at the gene level to produce characteristics such as sterility or pest resistance
- These crops are not available to home gardeners
- They are limited to just large scale agriculture
- “No GMOs” = marketing gimmick
- If truly concerned, then buy USDA certified organic seed

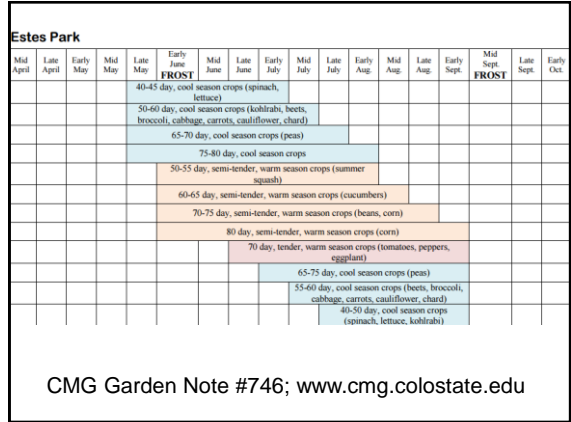
When Do I Start Planting My Seedlings in the Garden?

- Seed Starting Rule #1: Don't Plant too Early!
- WHEN is governed by the last frost date for the area (for the summer garden)
- OR ambient soil temperature (for the spring garden)
- Consult your seed packets and catalogs for planting out dates and count backwards

Last Average Frost Date for Estes Park

		Spring Frost Probability			Fall Frost Probability		
		90%	50%	10%	10%	50%	90%
Estes Park	32" threshold	May 27	June 9	June 21	Sept 3	Sept 14	Sept 25
	28" threshold	May 5	May 21	June 6	Sept 10	Sept 21	Oct 1
	24" threshold	Apr 18	May 8	May 27	Sept 18	Oct 4	Oct 19

- Unless you're using season-extension techniques, plan on your season lasting from mid-June to mid-September (~90-100 days)
- But you can grow lots of cool season veggies on the front or back end of the season
- Or use raised beds or containers to increase the length of the growing season

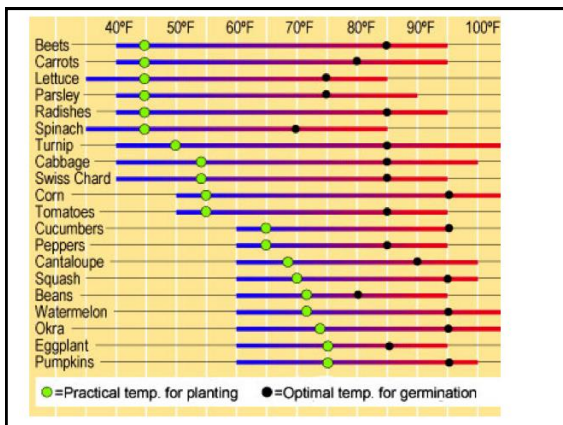


Planting the Spring Garden

- Planting based on soil temp for seed germination
- Soil temp 40-60 degrees
- Ambient air temp
- Can thrive in less sun
- Leafy crops tend to be "sweeter" with cooler weather
- Require crop protection when temps drop

Planting the Summer Garden

- Requires warmer soil (>65 degrees) and warm ambient air temps
- Minimum of 6 hours of full sun
- Seeds can be started indoors or outside based on seed packet recommendations
- Timing based on the variety and the specifications on the seed packet



Planting Chart

- Here's where journaling becomes relevant
- Weather events
- What worked this year; what did not
- Specific varieties
- Save these notes year-to-year and also your planting plans
- Talk to fellow gardeners

Seed Trays

- Find what works for you
- Must have drainage holes! Seed trays should never sit in standing water
- Can purchase covers or use other materials

Self Watering Systems

- Not completely reliable, so you will still need to monitor the substrate moisture levels
- Could use if you're out of town for a few days

Peat Pellets

- Good for "finicky" transplinters, such as squash, cucumbers, corn
- Expensive
- Take up more space

Soil Blocks

- Creates your own seedling "mold"
- Labor intensive
- Eliminates the need to purchase peat pots or containers
- Spacing is important so roots don't cross blocks

Reuse and Recycle

- Containers must be clean and sterilized
- Soapy water, 10% bleach solution
- Plastic is best
- Air dry
- Citrox
- Greenshield

Heating Mat

- An expensive investment, but worth the expense if you're a serious gardener
- Buy a thermostat, or you will potentially cook your seedlings
- Keep at 70-75 degrees F
- Range in price (depending on size): \$20-100
- Thermostat: ~\$20

Germination Medium

- Never use garden soil or potting soil
 - Garden soil carries insects and diseases and is too dense for tiny seedlings to push their way through
 - Potting soil generally too dense as well
 - Too much water retention
- Purchase a seed starting medium
 - Fine texture
 - Lightweight
 - Drains well
 - May be difficult to moisten
 - May contain peat moss, coir, perlite, vermiculite or fertilizer

Planting the Seeds

- Fill cells with moistened medium
- Gently tamp—do not pack down
- Gently sprinkle/place seeds on top
- Gently sprinkle with ¼" medium or vermiculite
- Gently tap the tray to ensure seed to soil contact
- Spritz with water
- Label with the plant name and date
- Keep the seed packet in your records

Moisture

- Spritz lightly after planting
- Dome or plastic application to create a terrarium effect
- Monitor soil moisture as the seeds sprout

Light requirement

- 12-16 hours per day for seedlings
- Without supplemental light, success will be limited
- Fluorescent lights are inexpensive and work as well as "grow lights"
 - Two cool white fluorescent bulbs
 - Keep them 2-4" above the seedlings (so the plants don't stretch)
 - Install a timer so the lights are only on for 12-16 hours a day
 - The seedlings need darkness to develop properly

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Watering

- Your biggest challenge
- More water does not make seeds grow or germinate any faster
- Mist
- Water from below for uniform watering and to keep seeds in place

Fertilization

- Begin fertilizing when true leaves emerge
- Apply via irrigation (fertigation)
- Use any complete fertilizer (example: 10-10-10)—follow the label on the fertilizer label for mixing instructions
- Do not mix in a stronger concentration!
- When plants are young, consider a ¼ rate and increase as plants grow larger

Strengthening Seedlings

- Use a fan in the area to increase air flow to prevent disease problems and increase seedling strength
- Air flow mitigates potential moisture problems
- Touch

Thigmomorphogenesis

- Thigmo: touching; Genesis: change
- Can occur from wind, water spray, snow load or rubbing other plants
- Results in stocky, sturdy plants—your goal

What Can Go Wrong?

- Poor germination
- Mold on medium surface
- Yellowing leaves
- Leggy plants
- Leaf discolorations
- Discolored roots
- Seedling death

Damping Off

- A seedling disease
- Young seedlings without many leaves or a large root system are most susceptible
- Caused by fungi *Rhizoctonia* sp. or water mold *Pythium* sp.
- Signs of damping off:
 - Seedlings fail to emerge from the media
 - Cotyledons are soft, water-soaked and mushy
 - Seedling stems are thin and thread-like
 - Young leaves wilt and turn gray or brown
 - May have white, webby mold present

Prevention of Damping Off

- Clean and sanitize seed trays and equipment
- Use clean, sterile soilless media
- Wash your hands
- The disease favors cool, wet conditions—monitor media moisture and heat mat temperatures
- Low light, overwatering, high salts from over fertilizing are all associated with increased damping off

Review: Success Tips for Seed Starting

- Use clean dry seed that are good varietal choices for your location
- Chart planting, journal results
- Use clean, sterile, well drained containers
- Use sterile soilless medium
- Provide adequate moisture, light, warmth
- Provide good circulation
- Harden off before transplanting



<http://www.ext.colostate.edu/>

The Colorado Master Gardener Program

Contact a CMG Volunteer about your yard and garden question
Search online yard and garden publications



<http://www.cmg.colostate.edu/index.shtml>

<http://www.ext.colostate.edu/ptlk/index.html>



Colorado Gardening for Everyone
Advice and Observations from your CSU Extension Horticulture Agents and Specialists

CO-Horts

<http://csuhort.blogspot.com>