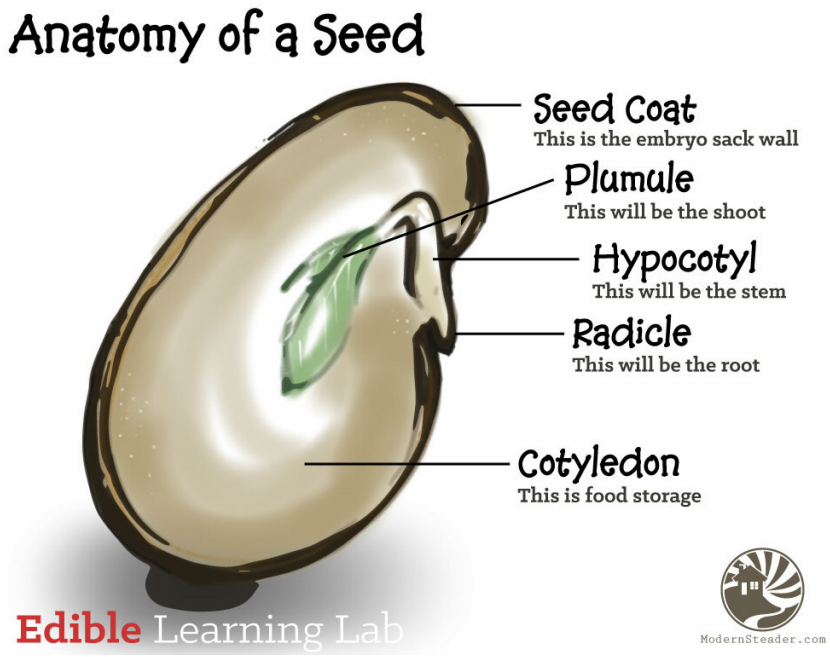
Seeds are spaceships for baby plants

- €
- €
- €
- €



What Seeds Need to Grow:

- €
- €
- €
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- €

Media (Soil)

- Sterile mix prevents pathogens
- Potting Mixes with fertilizers can be detrimental to germinating seeds
- Seed Starting Mix is lighter & less likely to compact

Water

- Seeds imbibe water- radicle emerges
- Pre-soak some seeds (beets, carrots, parsley, parsnips, spinach, peas)
- Pre-sprout some seeds (peas, corn, spinach)

Oxygen

- Germinating seeds respire in the dark!
- Oxygen also provides air spaces for roots to grow!

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Get the soil wet before you plant!

Ideally Soil is made of:
5% organic Matter, 45% minerals, 25% Water, 25% Air

Heat / Temperature

- Soil temperature is usually 5 degrees less than air temp
- Bottom heat is best
- Use Soil Thermometers

Seed Germination Conditions

Cool Soil:

- **35 F minimum :**

Lettuce, Onion, Spinach

- **40 F minimum:**

Peas, Parsley, Chard, Beets, Radish, Carrots, Turnip, Cabbage, Cauliflower

Warm Soil:

- **50 F minimum:**

Corn, Tomato

- **60 F minimum:**

Eggplant, Pepper, Cucumber, Melon, Squash

Seed Germination Conditions

- For most crops, seed germination is optimum between 75 and 95 F
- Most crops will not germinate at above 95 F
- Cool soil loving crops will not germinate over 85 F

Light

- Most seeds don't require light to germinate
- Supplemental Light is often needed
- High Spectrum Light is best
- Ideally adjustable height
- Daylight lowers quality of seedlings
- Light Timers: 8-10 hrs a day
- Germinated seeds need light

Container Options:

- € Plug Trays & Pots
- € Peat Pots
- € Jiffy Pots
- € Soil Blocks

Sanitation is important for reusing containers

- Sterilize your trays and pots
- Wash thoroughly with warm soapy solution, chlorine / water solution

Damping off:

- Caused by soil borne fungi
- Common is soil is too wet or too cold

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Management

- Use sterile potting media & clean pots
- Use bottom heat for indoor pots
- Do not plant seeds outdoors until the soil has warmed to the appropriate level

Types of Seeds:
Hybrids:

- First generation offspring of two distant and distinct parental lines of the same species
- Fail to breed true in the second year
- Have to be re-purchased every year
- Can require higher inputs to get higher yields

Open Pollinated Seeds:

- Traditional varieties which have been grown and selected for their desirable traits for millennia
- Seeds are easily saved from year to year
- Adapt to local ecosystems

Selecting Varieties

- Taste
- Appearance
- Pest & disease resist
- Days to maturity
- Storage
- Vigor
- Performance / Yield
- Standability
- Planting Date
- Ease of harvest
- Time to harvest
- Frost resist. & hardiness
- Day length
- Ease of cleaning
- Convenience
- Ease of preparation
- Adaptability
- Nutrition
- Marketability

Seed Sources:

- € Johnny's seeds:http://www.johnnyseeds.com
- € Seed Savers http://www.seedsavers.org
- € High Mowing Seeds http://www.highmowingseeds.com
- € Fedco http://www.fedcoseeds.com

Planting Schedule:
Resources:

- Seed Packets
- Books
- Johnny's Seed Starting Calculator http://www.johnnyseeds.com/e-PDGSeedStart.aspx??source=HomeSeedCalc0111

Seed Starting Calendar from MN Extension website:
http://www.extension.umn.edu/distribution/horticulture/m1245.html

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Suggestion: Keep records from year to year and create your own!

How to Plant:
Easy to direct seed outside:

- **Root Crops:** Carrots, Beets, Radishes, Rutabagas, Turnips
- **Greens:** Lettuces, Spinach, Chard, Kale,
- **Legumes:** Beans & Peas
- **Cucurbits:** Squash, Pumpkins, Zucchini, Melons
- Scallions, Garlic (Cloves)
- Sweet Corn

Ideal to start as transplants:

- **Nightshades:** Tomatoes, Peppers, Eggplants, Tomatillos, Ground Cherries,
- **Brassicas:** Broccoli, Cauliflower, Brussel Sprouts,
- **Alliums:** Onions, Shallots,

Where to Start Seeds:
Consider:

- Day/ Night temperatures
- Least air temperature fluctuation
- Some place that can get a little messy
- Good airflow

Windowsills are not good places to start seeds!

Planting:

- Wet Soil
- Add to containers
- Poke holes for seeds
- Seed planting depth varies
- Check seed packet
- Usually 2 times seed size

3 options for covering seeds:

- Cover with Soil
- Cover with Towels
- Uncovered

Dome lids:

- Micro environment
- Helps retain moisture & uniform temperature
- Remove domes once seedlings are up and established

Watering!

- Watering new seeds: Mist or from the bottom is best
- Use a finger test
- Make sure your trays have good drainage

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Labels are our friend

- Plastic or wooden
- Keep track of varieties
- Use permanent marker
- Date with planting date
- May want additional records in a garden journal

Common reasons for poor seed germination:

- Improper soil temperature
- Soil too dry
- Seeds planted too deep
- Seeds washed away
- Damping-off disease (fungus)

When to transplant / pot up:

- Once seedlings have true leaves
- Once seedlings start to have roots growing out of their drainage holes
- Before they get root bound in small containers

Potting up:

- Wash hands
- Fill new container with moist soil
- Gently remove seedlings from tray
- Place seedling in hole gently
- Lightly water

Before you transplant outside: Hardening off

- Helps acclimate plants to less than ideal conditions prior to transplant to avoid transplant shock
- Put seedlings outside or on a porch/ patio/ cold frame for a few hours each day
- "Harden" plants by growing outdoors for about a week

Winter Sowing: Great for most crops less than ideal for Nightshade crops: Tomato, Peppers, Eggplants, Tomatillos, Ground Cherries because they like to be more mature before you transplant.
www.wintersown.org

When to Plant Outside:

Earliest April / May:

- ☐ Peas
- ☐ Onions
- ☐ Leeks
- ☐ Spinach
- ☐ Lettuce
- ☐ Radishes

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Starting Seeds ` Minnesota State Horticultural Society

Direct Seed in May:

Roots:
- ☐ Carrots
- ☐ Beets
- ☐ Parsnips
- ☐ Potatoes
- ☐ Turnips
- ☐ Rutabaga

Greens:
- ☐ Chard
- ☐ Kale
- ☐ Collards
- ☐ Arugula
- ☐ Asian Greens
- ☐ Cabbage

Veggies:
- ☐ Broccoli
- ☐ Brussels Sprouts
- ☐ Cauliflower
- ☐ Kohlrabi
- ☐ Beans
- ☐ Sweet Corn

Direct Seed in June:
- ☐ Cucumbers
- ☐ Pumpkins
- ☐ Squash
- ☐ Melon

Direct Seed in October:
- ☐ Garlic

Start Inside in March Transplant outside in Late May/ June:
- ☐ Eggplant
- ☐ Peppers
- ☐ Tomatoes
- ☐ Sweet Potatoes

Start inside in April Transplant outside in Late May/ June:
- ☐ Ground Cherries
- ☐ Okra
- ☐ Tomatillos

Last time to plant:
July:
- Root Crops: Carrots, Beets
- Vegetables: Broccoli, Cabbage, Cauliflower

August:

Fast crops: Radishes, Lettuce / Salad Mixes, Spinach

Transplanting Outside:
- Plant at about the same depth as in pot
- Remove from the container
- Water
- Avoid hot sunny, windy days

Protecting young seedlings outside:
- € Cloches
- € Wall O Water
- € Row Cover

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- € Low Tunnels
- € Cold Frames
- € Raised Beds

Seed Saving:

Annuals: Corn, Beans, Peas, Tomatoes, Peppers = seed saving in year 1
Biennials: Cabbage, Cauliflower, Onions, Beets = seed saving in year 2

Seed Saving Strategies:

- Grow 1 variety of each crop
- Grow 2 varieties that pollinate at different times (alter planting dates)
- Protect seed producing buds / plants from cross pollination
- Grow different species of the same genus- less likely to cross
- Seeds must be mature to save
- Some seeds may be saved from vegetables you eat
- Mold and birds biggest enemies of seed savers
- Some seeds can be saved just by striping out the seeds of the fruit or pod
- Others require fermentation
- Keep saved seeds dry

Resource: Seed to Seed by Suzanne Ashworth
http://www.seedsavers.org/Education/Seed-Saving-Resources/

Easiest Crops to Start with:

- Potatoes
- Peas
- Beans
- Herbs
- Flowers
- Squash
- Corn
- Lettuce

Seed Life (in years)

Crop	No special Storage	Cool / Dry Conditions	Crop	No Special Storage	Cool / Dry Conditions
Beans	2-3	4-6	Leeks	1	2-4
Beets	2	3-4	Lettuce	1-2	3-4
Broccoli	2	4-5	Onion	1	2-4
Cabbage	2	4-5	Peas	1-2	4-6
Cantaloupe	3-4	6-10	Pepper	1-2	3-5

Carrot	1-2	3-5	Pumpkin	1-2	3-5
Corn	1-2	4-6	Radish	2	3-5
Cucumber	3	5-7	Spinach	1-2	3-4
Eggplant	1-2	3-5	Tomato	2-3	5-8
Kale	2	4-5	Watermelon	2-3	4-6

Germination Test with wet paper towel