SPRING INTO SEEDS

Sprouting a Successful Spring Garden

University of California
Agriculture and Natural Resources

UCCE Master Gardener Program
Monterey and Santa Cruz Counties

CLASS OVERVIEW

- Seeds!
- Spring Garden Planning
- Seed Storage
- Sowing Techniques
- Pricking-Out Technique
- Sowing Mix
- Light
- Seedling Diseases & Pests
- Hardening Off
- Transplanting
- Hands-On Exercise

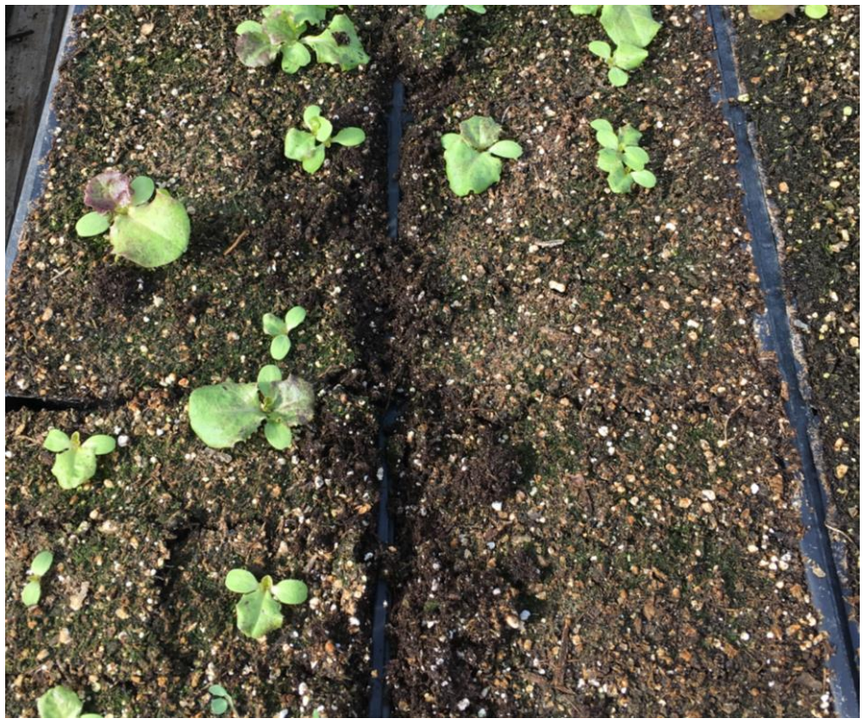
“At my ripe old age of 66, I never get over the wonder of these tiny packages of DNA - some so tiny I have to pick them up with sharp tweezers - that will grow into robust plants with pounds of luscious tomatoes.”

- Debby

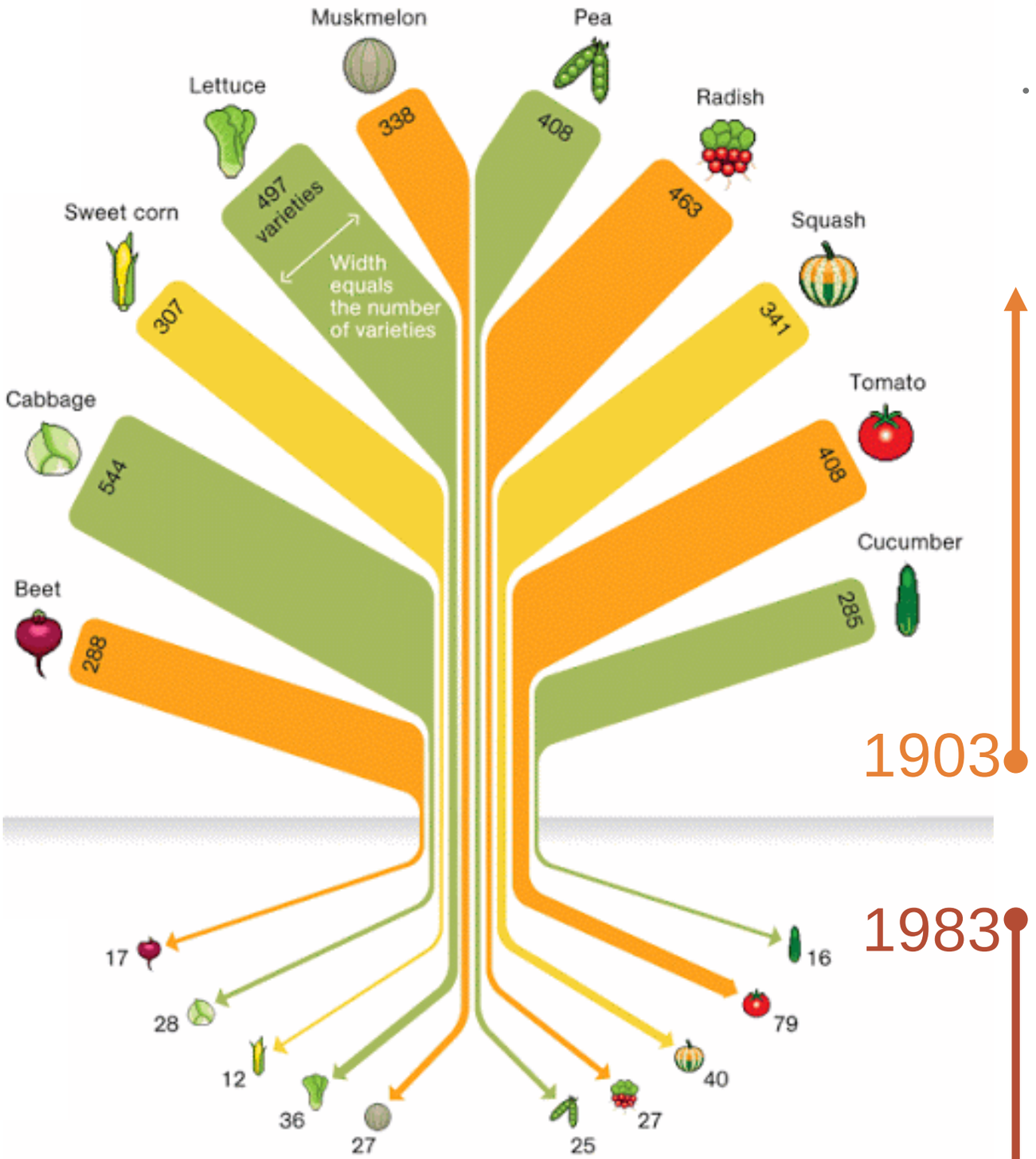
SEEDS!

Seed Stories
Why Sow Seeds?
Types of Seeds
Anatomy of a Seed

SEED STORIES, REFLECTIONS, CHALLENGES



1903: commercially available seeds



1983: the number of those varieties found in National Seed Labaratory.

JOHN TOMANIO, NGM STAFF. FOOD ICONS: QUICKHONEY
SOURCE: RURAL ADVANCEMENT FOUNDATION INTERNATIONAL

WHY SOW SEEDS?

- ✓ **Stewardship & Preservation:**
  - ⊙ **Of cultural heritage**
  - ⊙ **Of Genetic Diversity**
    - Supports resilience in times of environmental change
    - Diversification of crops reduces the chance of catastrophic loss due to pests or environmental conditions

➢ **What are some other reasons to sow seeds?**

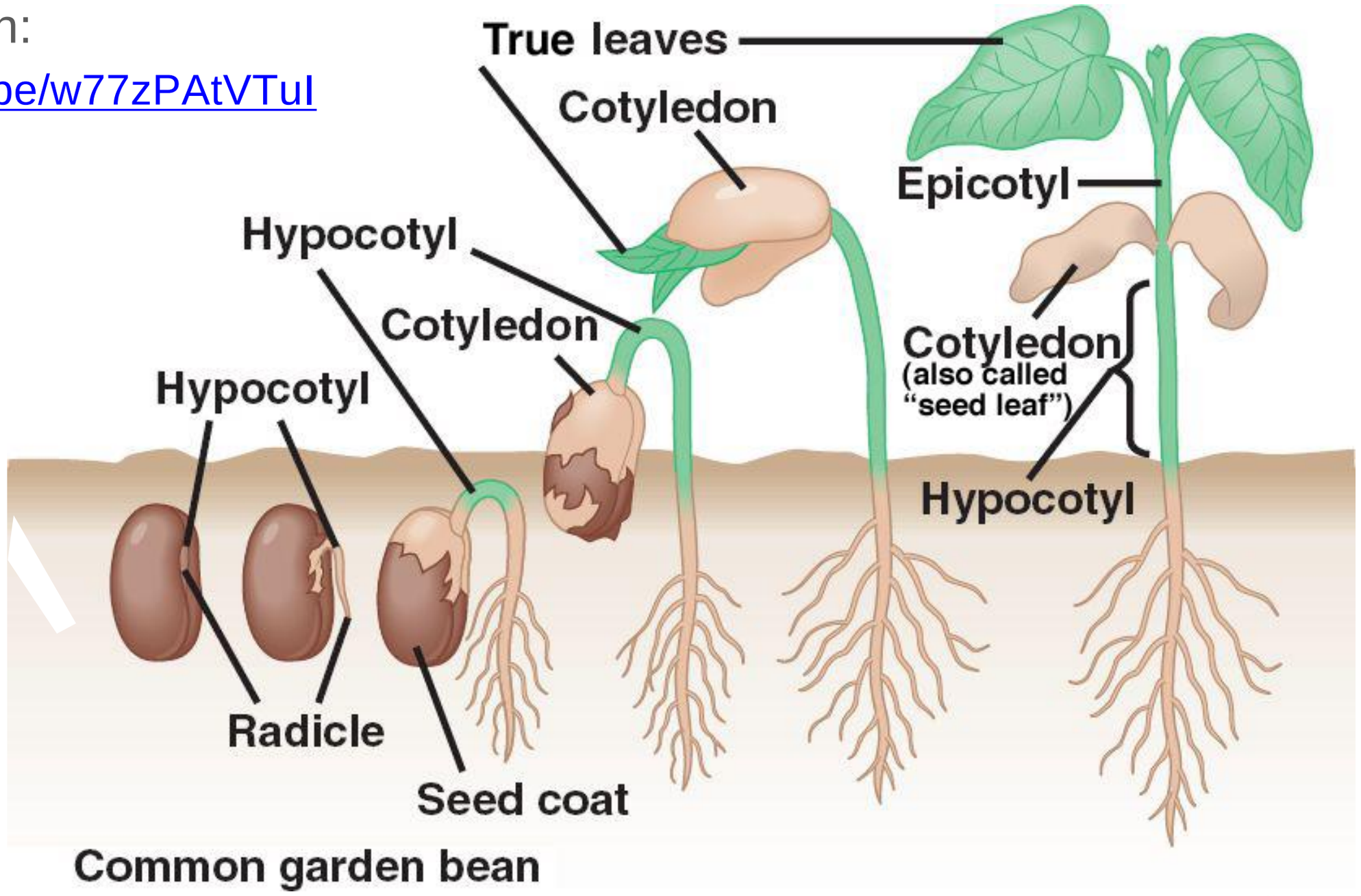
https://inhabitat.com/

WHY SOW SEEDS?

- ✓ Cost effective
- ✓ Reduces the chance of introducing soil-borne disease/pests from store bought transplants
- ✓ Diversify your options for what to grow in your garden
- ✓ Experiment with new varieties and taste explorations
- ✓ Satisfaction, gratification & deeper connection to growing process.
- ✓ Lifelong learning
- ✓ Other ideas?

DEVELOPMENTAL STAGES: SEED TO SEEDLING

Time-lapse Video
Kidney Bean:
https://youtu.be/w77zPAtVTuI

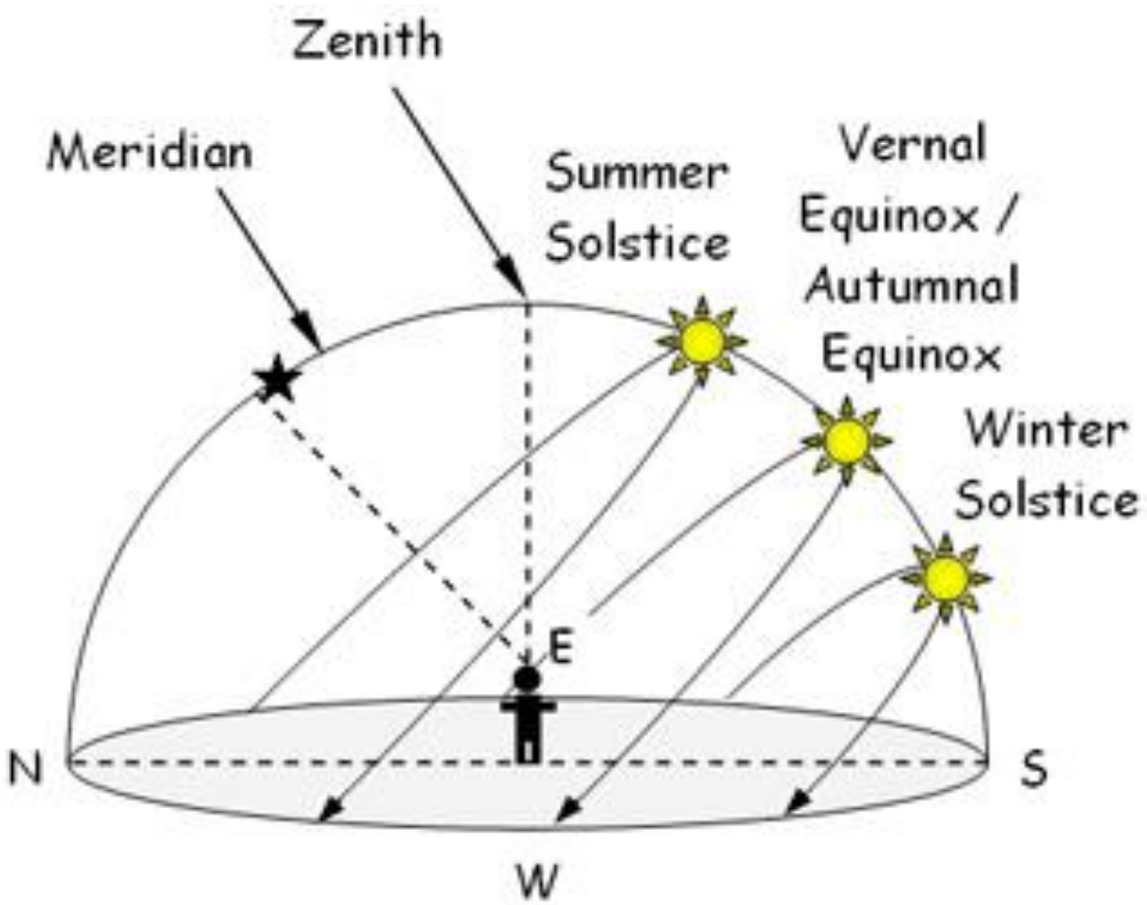


Source:

www.thegreenmachine.com

SPRING GARDEN PLANNING

Spring Environment
Seeds for the Spring
Planning & Timing the Spring Garden:
WHAT to sow, HOW to time the Sowing



Position of the Sun during Equinoxes and Solstices at the Northern Hemisphere
(North-south direction reverses for southern hemisphere)

mydarksky.org

CONTEXT

ENVIRONMENTAL PATTERNS OF SPRING

- Spring equinox (equality of day and night) is around Mar. 21st. Sun is exactly above the equator.
- Day length gets longer
- Sun's angle increases

An important result from longer day light and higher angle is that soil temperatures begin to increase.

- The last spring frost.

- Veggies
  - Solanums: peppers, tomatoes, eggplants, tomatillos
  - Lettuce
  - Alliums: Leeks, chives, onions
  - Brassicas: Broccoli, spring cabbage, kale
  - Fennel
  - Chard
  - Artichokes
  - Summer Squash
  - Basil

PLANNING & TIMING

WHAT to sow in spring?

- **What are some good spring/warm season veggie crops?**
- **Others?**

- Flowers
  - Strawflower
  - Scabiosa
  - Statice
  - Stock
  - Zinnias
  - Nigella
  - Cosmos
  - Tithonia
  - Asters
  - Sunflowers

PLANNING & TIMING

WHAT to sow?

- What are some good spring/warm season flower crops?
- Others?

Organic Pepper, Sweet Cal Wonder *(1 oz)*

SNV5100

★★★★★ *(1)*

$12.99

1 Add to Cart

Add to Wishlist

Organic Pepper, Sweet Marconi Red *(1 oz)*

SNV5178

$12.99

1 Add to Cart

Add to Wishlist

Organic Pepper, Sweet Golden Cal Wonder *(1 oz)*

SNV5210

$19.99

1 Add to Cart

Add to Wishlist

Organic Pepper, Hot Jalapeño Early *(1 oz)*

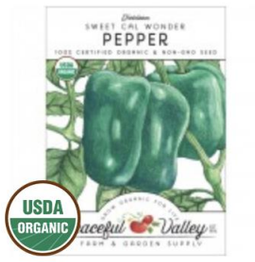
SNV5211

$12.99

1 Add to Cart

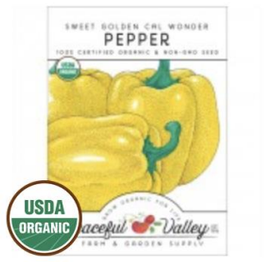
Add to Wishlist

Organic Pepper, Hot New Mexico Joe



Organic Pepper, Sweet Cal Wonder

Organic Pepper, Hot Cayenne Slim



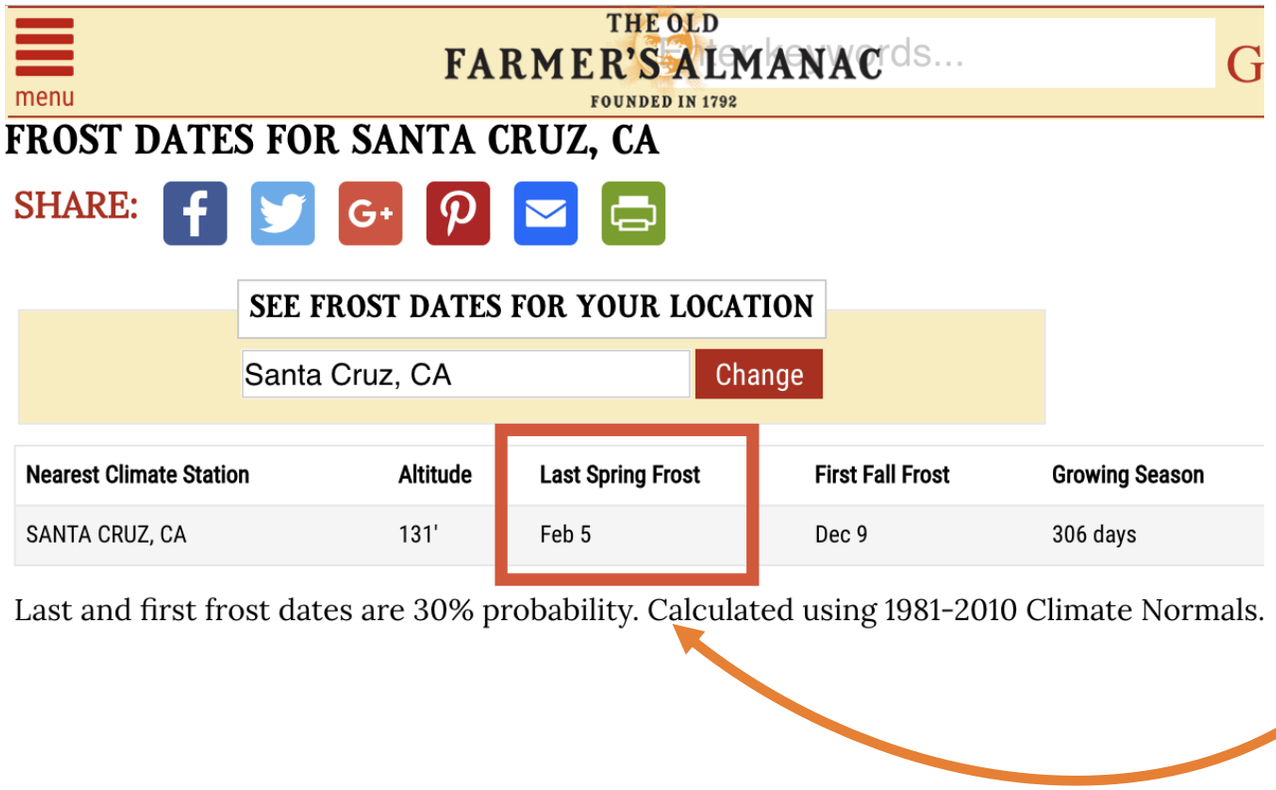
Organic Pepper, Sweet Golden Cal Wonder

PLANNING & TIMING

WHAT to sow in the spring?

- **Which crops and varieties do you want to grow?**
  - **Seed Catalogs**
  - **What have you had success with in the past? Do you have seed packets you saved from the past?**
- **Make a Wish List**
  - **Check what seeds you have**
  - **Determine what you need to buy or swap**

PLANNING & TIMING



Last frost date information:
https://www.almanac.com/gardening/frostdates

When to start the sowings?

First Step: determine the last frost date for your area?

- Santa Cruz (Altitude 131'), Feb. 5th
- Monterey (Altitude 383'), Jan. 20th

Two ways of planning:

- Online Planning Tool
- Handout

Seed-Starting Date Calculator

Enter spring frost-free date (include year):

Date mm/dd/yyyy 02/05/2019 ENTER

Type in the last frost date for your area or the date you want to plant.

CROP	NUMBER OF WEEKS TO START SEEDS BEFORE SETTING-OUT DATE	When to start inside		SAFE TIME TO SET OUT PLANTS (RELATIVE TO FROST-FREE DATE)	Setting-out date	
		FROM	TO		FROM	TO
Artichoke	8	19-Oct		on frost-free date	14-Dec	
Basil	6	9-Nov		1 week after	21-Dec	
Beets*	4 to 6	19-Oct	2-Nov	2 weeks before	30-Nov	
Broccoli	4 to 6	19-Oct	2-Nov	2 weeks before	30-Nov	
Cabbage	4 to 6	5-Oct	16-Nov	4 weeks before	16-Nov	14-Dec
Cauliflower	4 to 6	19-Oct	16-Nov	2 weeks before	30-Nov	14-Dec
Celery & celeriac	10 to 12	28-Sep	12-Oct	1 week after	21-Dec	
Collards	4 to 6	5-Oct	19-Oct	4 weeks before	16-Nov	
Corn salad/mache	4 to 6	21-Sep	26-Oct	3 to 6 weeks before	2-Nov	23-Nov
Corn*	2 to 4	16-Nov	14-Dec	0 to 2 weeks after	14-Dec	28-Dec
Cucumber	3 to 4	23-Nov	7-Dec	1 to 2 weeks after	21-Dec	28-Dec

ONLINE TOOL:

http://www.johnnyseeds.com/growers-library/seed-planting-schedule-calculator.html

PLANNING & TIMING

When to start the sowings?

- Use online tools to support your planning process
- Recommend: Johnny's Seeds "Seed Starting Date Calculator"

PLANNING & TIMING

When to start the sowings?

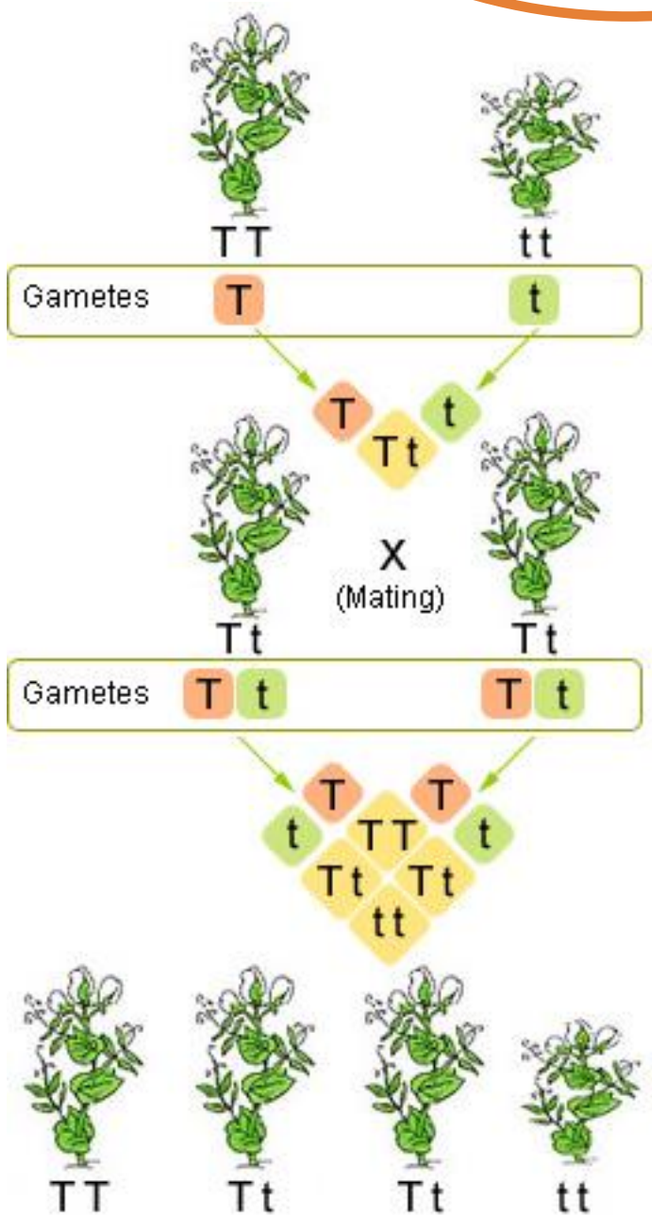
HANDOUT:

Delise's Guide Seed Planting Guide for the Monterey Bay Area:

The chart includes:

- Warm and cool season crops
- Flowers and Veggies
- Recommended months to start from seed

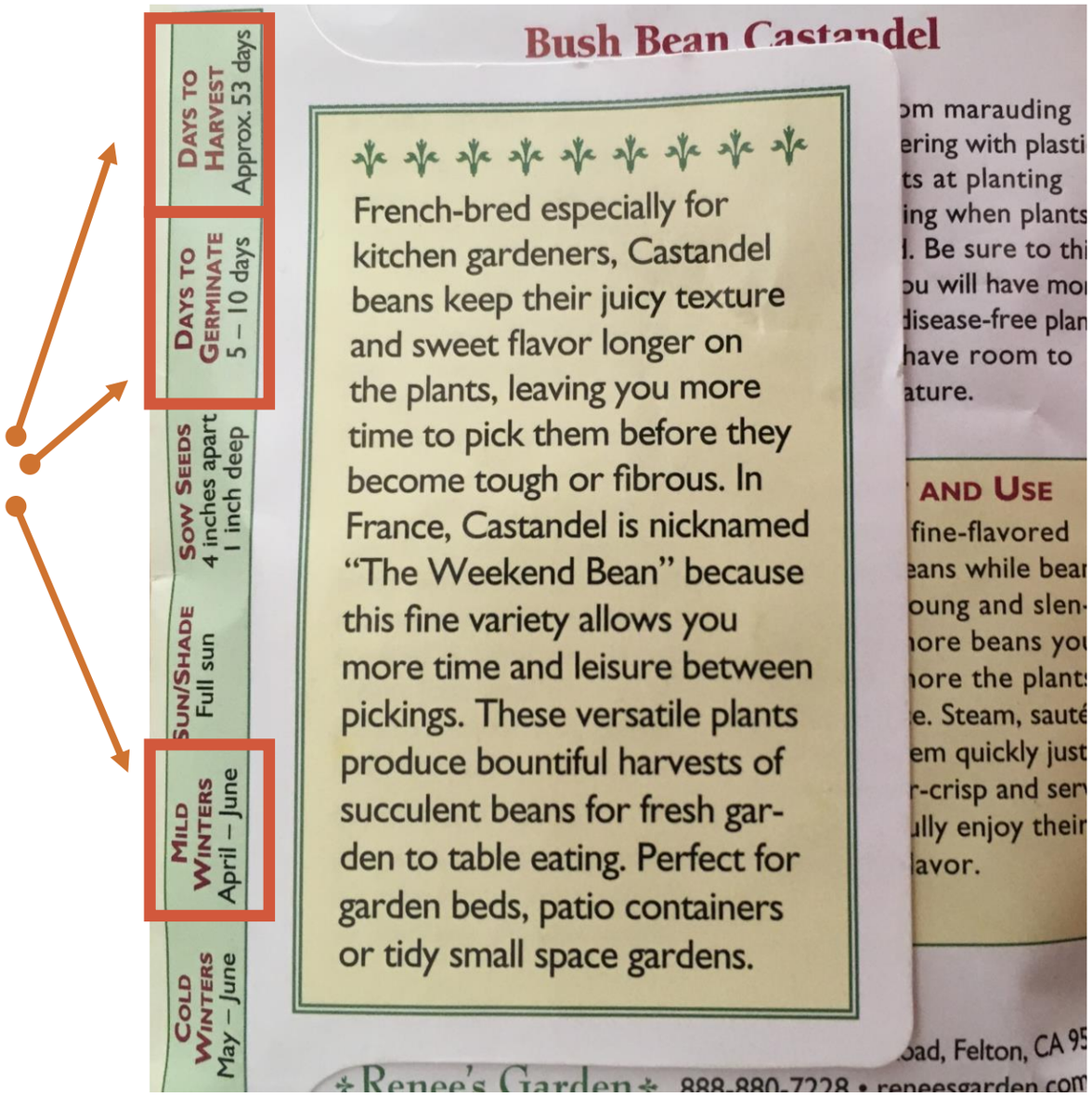
Vegetable Planting guide from seed in the Monterey Bay Area								
	Sow/plant in ground	Start indoors	days to germination	Planting distance in inches	approximate days to harvest /Maturity	Months to start from seed for fall /winter	Months to start from seed for spring /summer	Season
Vegies								
Arugula	X		7 to 14	2	40	Sept - May	n/a	Cool Season
Beets	X		7 to 10	3	55	Aug - Sept	Mar-June	Cool Season
Bok choi family	X	X	7 to 10	6	45	Aug - Oct	Feb-May	Cool Season
Broccoli	X	X	7 to 10	16	63	July - Aug	Mar-June	Cool Season
Brussels sprouts	X	X	7 to 10	24	95	July - Aug	Mar-Apr	Cool Season
Cabbage	X	X	7 to 10	24	65	July - Aug	Feb-Apr	Cool Season
Carrots	X		10 to 20	2	70	July - Aug	Mar-June	Cool Season
Cauliflower		X	7 to 10	20	60	July - Aug	Mar-Apr	Cool Season
Chard	X	X	7 to 10	15	50	Feb - Sept	Feb - Sept	Cool Season
Collards		X	7 to 10	12	55	Aug - Sept	Feb - May	Cool Season
Endive	X	X	7 to 14	15	80	Aug - Sept	Mar-May	Cool Season
Fennel, bulbing		X	14 to 21	12	90	July - Aug	Mar-Apr	Cool Season
Kale	X	X	7 to 10	10	25	Aug - Sept	Feb-May	Cool Season
Leek	X	X	14 to 21	6	110	July - Aug	Feb-Apr	Cool Season
Lettuce	X	X	7 to 14	14	58	Sept - Apr	Feb-June	Cool Season
Mache	X		14 to 28	5	90	Sept - Feb	n/a	Cool Season
Mustard	X	X	7 to 14	15	38	Feb - Sept	n/a	Cool Season
Onion - bulbing	X	X	7 to 10	5	95	Sept - Oct	Feb - Mar	Cool Season
Peas	X	X	7 to 10	2	60	July - Aug	Mar-May	Cool Season
Radishes	X		5 to 7	3	28	Aug-Oct	Feb-June	Cool Season
Rutabega	X		10 to 14	3	87	Aug-Sept	Mar-Apr	Cool Season
Onion - Scallions / green onion	X	X	10 to 20	3	65	Aug - Sept	Feb-June	Cool Season
Spinach	X	X	5 to 10	8	39	Aug - Sept	Feb-May	Cool Season
Stir fry greens	X		7 to 10	1	45	Feb - Sept	Feb - Sept	Cool Season
Turnips	X		7 to 9	5	45	Aug - May	n/a	Cool Season
Artichoke		X	14 to 21	48	170	n/a	Jan/Feb	Warm Season

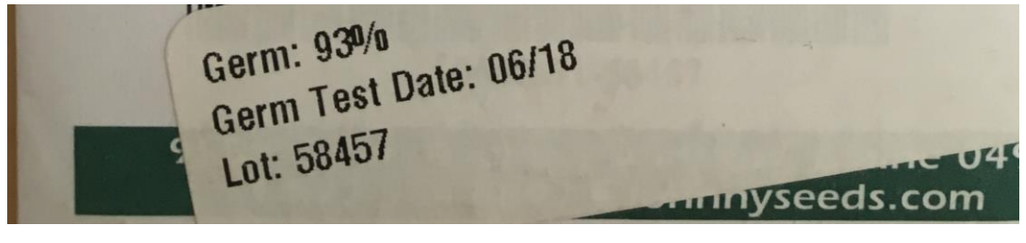


TYPES OF SEEDS

- **"OP" OPEN POLLINATED SEEDS:** Pollinate is done by insects, wind, animals, or other natural processes. The next generation of seeds will be true to type if the pollen does not mix with seeds of the same species. If you are new to saving seeds start with open pollinated seed sources.
- **"F1" HYBRID SEEDS:** Is the result of a controlled method of cross between to different species or varieties. The next generation of seeds will not produce plants identical to the parent source. What does this mean for saving seeds?
- **GMOs:** Genes from one source are integrated into the genes of an unrelated plant. GMO seeds are not available to home gardeners. The current focus is on large scale agriculture currently.

Source: http://mrgaia.com/blog/seed-saving/

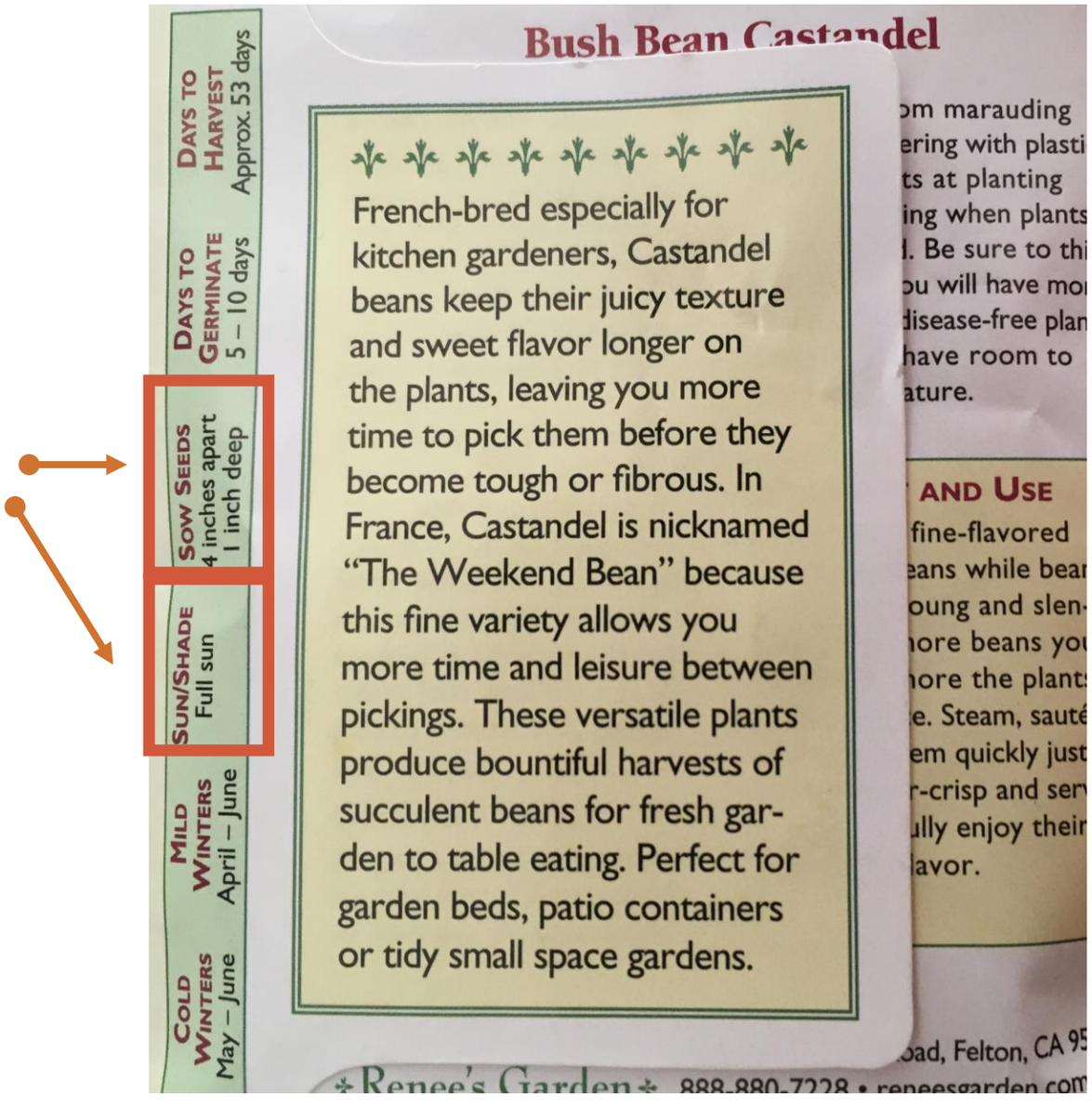


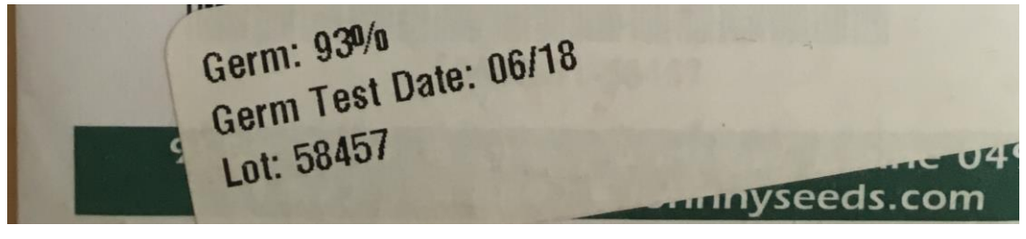


READING SEED PACKS

HOW to time the sowings?
Seed packs are a great resource

- **Recommended time of year to plant**
- **Germination rate (you can track if the sowing is working)**
- **Days to Maturity (harvest date)**
  Do you want to plant successions? Successions are multiple plantings spread out over time to create and extended harvest.
- **To direct sow or transplant?**
  (impacts when the space is available in the garden)





READING SEED PACKS

WHERE to place them in the garden?
Seed packs are a great resource

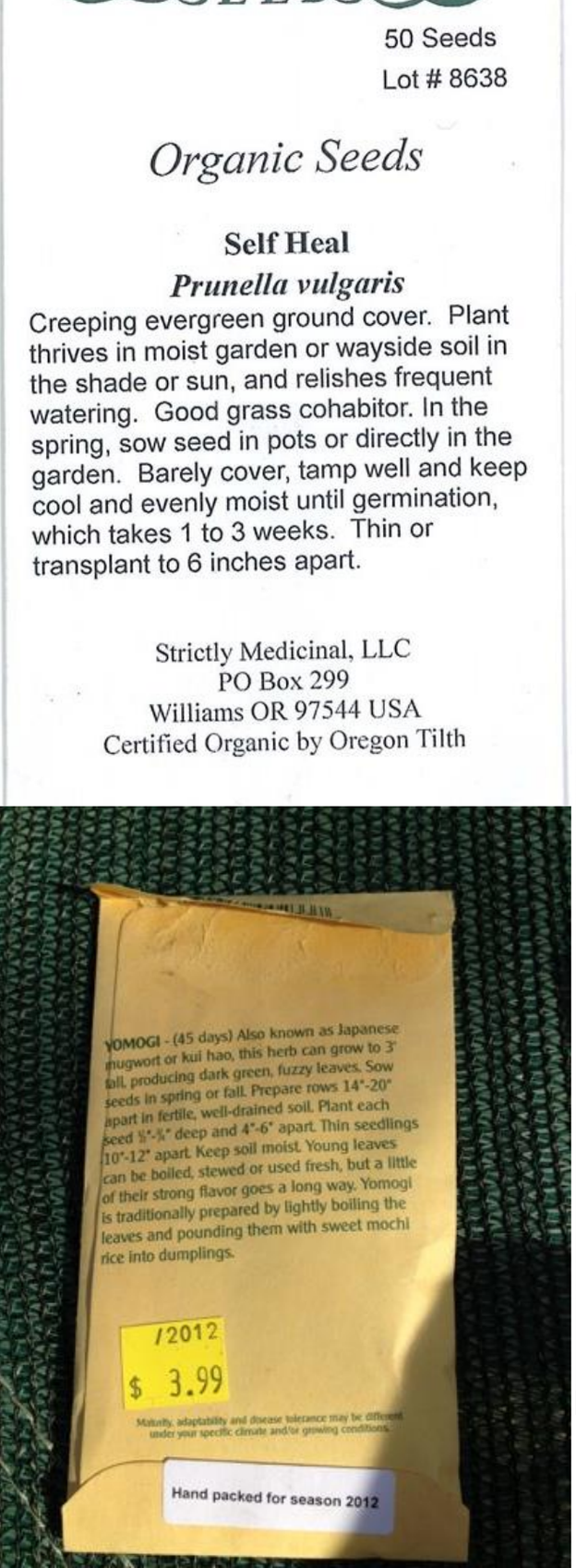
- **Sun/Shade Garden Conditions**
  GENERAL GUIDELINES FOR SUN EXPOSURE:
  Full Sun: 6 + hours
  Part Sun: 4-5 hours of Sun
  Part Shade: 2-3 hours of Sun
  Full Shade: less than 1 hour of Sun

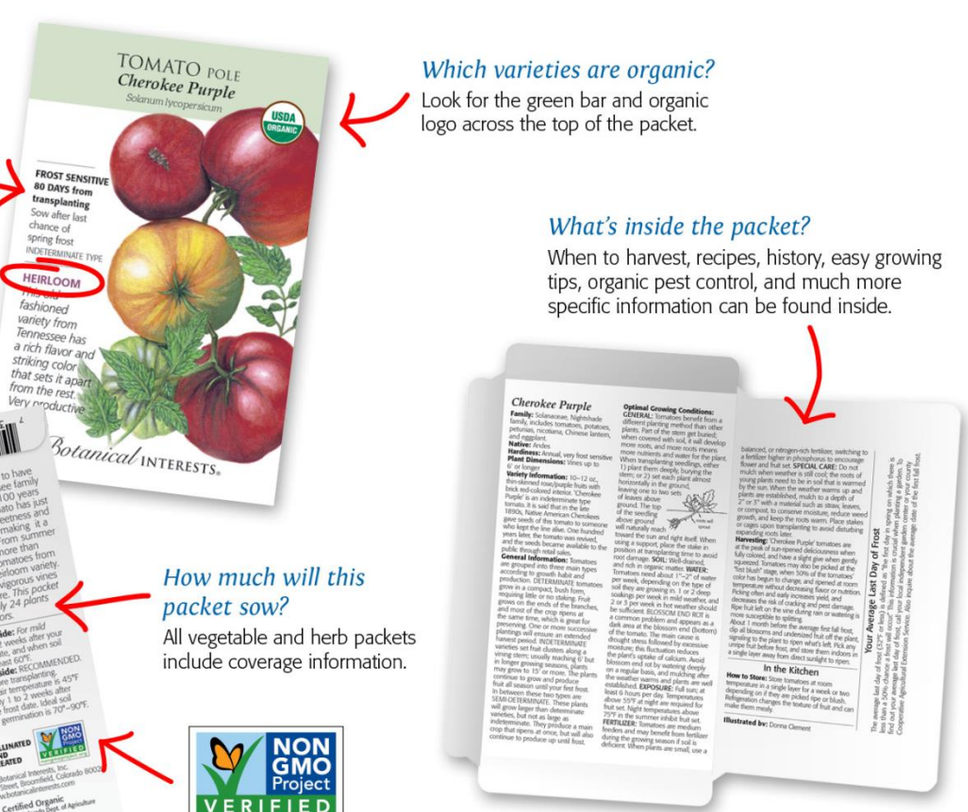
- **Spacing (in the garden)**
  How many do you need or can you plant?
  How much space do they need?

- **Planting: Remember to rotate the planting of crops to improve plant health and support healthy soils.**
  Example: Plant brassicas (N loving) after legume (Nitrogen Fixing) crops.

READING SEED PACKS

Not all seed packets are created equal





When do I sow?

The front of the packet gives a quick answer, while the instructions on the back are more specific.

Which varieties are organic?

Look for the green bar and organic logo across the top of the packet.

Which varieties are natives and heirlooms?

Natives and heirloom varieties are color-coded right on the front of the packet.

What's inside the packet?

When to harvest, recipes, history, easy growing tips, organic pest control, and much more specific information can be found inside.

How do I plant this variety?

The plant tag on the back includes the important sowing information, including seed depth, seed/row spacing, and when/how to thin. It also shows a seedling illustration for reference while your plant is growing.

How much will this packet sow?

All vegetable and herb packets include coverage information.

Are these seeds Non-GMO?

Yes! We completed the rigorous seed testing to place the Non-GMO Project Verified logo on the back of every seed packet.

SEED STORAGE

Best Practices for Packages
Home Germination Test
Seed Saving Brown Bag Information

STORING SEED PACKS

- Store any left over seed packs in
  - Cool
  - Dry
  - Dark
  - Secure, No pests
    - Rodents
    - Weevils, etc.
- Can use an old shoe box to organize, or another container such as glass jar or ziplock bag
- At the end of the year take out any packs that are getting to old

Johnny's Seed Viability Guide

Vegetables	
Type	**Average Storage Life in Years Under Favorable Storage Conditions**
Artichoke & Cardoon	1–4
Arugula	6
Asian Greens	3
Asparagus	3–4
Beans	2–4
Beets	2–5
Broccoli	3–5
Brussels Sprouts	3–5
Cabbage	3–5
Cabbage, Chinese	3–5
Carrots	3–4
Cauliflower	4–5
Celery & Celeriac	3–5
Chicory	4–5
Collards	3–5
Corn, Sweet	1–3
Cress	5
Cucumber	3–6
Dandelion	1–2
Eggplant	4–5
Endive	5
Fennel	3–4
Kale	3–5
Kohlrabi	3–5
Leeks	2–3
Lentil	1–2
Lettuce	1–6
Melon	3–6
Mustard	4
Okra	2–3
Onions	1–2
Parsnip	1–3
Peas	2–4
Peppers	2–5
Pumpkins	4–6
Purslane	3–5
Radish	4–5
Rutabaga	3–5
Salsify	1–2
Soybean	3–5
Spinach	1–5
Squash & Gourds	3–6
Swiss Chard	2–5
Tomato	3–7
Turnip	4–5
Watermelon	4–5

SEED VIABILITY

- How long to those crops stay viable if stored well?
  - Johhny's Select Seeds: Seed Viability Chart

TEST GERMINATION

- **An easy way to test if seeds are still viable.**
  - Use a burlap bag or a paper towel as a base
  - Lay seeds out on 1/2 of the base.
  - Cover the seeds with the other half of the base.
  - Water the surface so that is moist all the way through on the bottom and top.
  - Store test in warm area
  - Keep the surface of the bag or paper towel moist

Too much water can cause the seeds to rot

Too little air circulation increase risk of mold developing.

SOWING MIX

Observations from exercise

Properties of a good sowing mix

SOWING MIX INGREDIENTS

- **Demo Materials**
- **What do you want in a sowing mix?**
  Sowing Mix – light weight materials that allow for good drainage and air circulation.
  - **Coco Peat (Coir), Peat Moss:** Aeration (holds air) + drainage (lack of compaction, porous, allows water through), and some water holding. Different sizes.
  - **Perlite (lighter):** Aeration, drainage (lack of compaction), and some water holding. Different sizes.
  - **Pumice (heavier):** Aeration and drainage.
  - **Sand:** can be an alternative to Perlite or Vermiculite. Supports good drainage but does not hold water and does not have nutrients.
  - **Vermiculite:** Excellent water holding (3-4x weight) attracts plant important nutrients – K, Mg, P

Note: Nutrient availability is typically where purchased sowing mixes fall short. Consider mixing in 1/3 organic compost .

SOWING MIX RISK

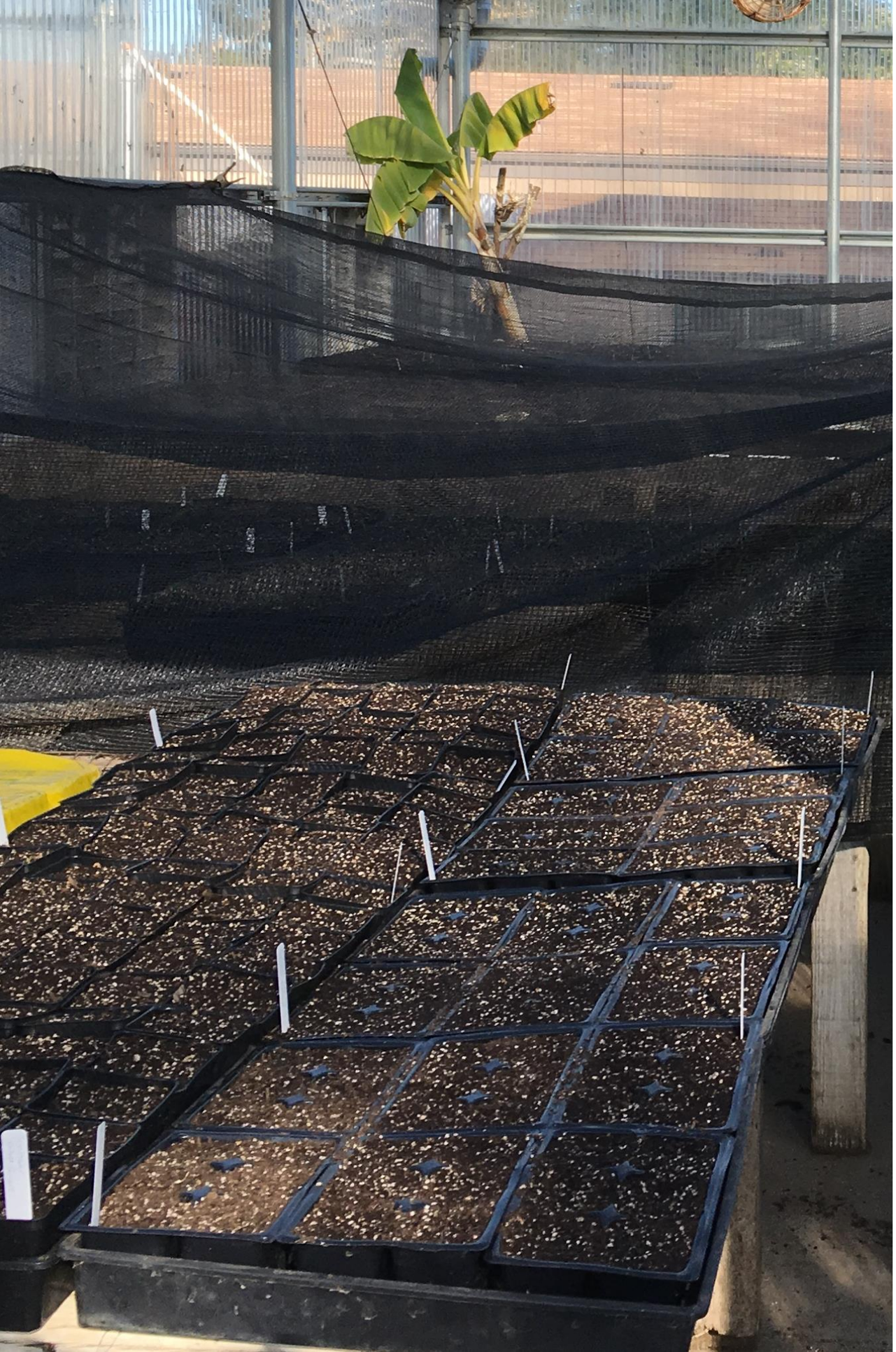
- **Sterile, soilless mix?**
  Peat, coco coir, perlite vermiculite
  - Less risk of damping off disease
  - Expensive
  - No nutrients

- **Organic mix?**
  Peat or coir, compost, rice hulls, perlite, vermiculite
  - **May introduce disease**
  - **Contains some nutrition**

- **Lazy gardener solution?**
  bagged potting soil
  - **Quick and easy**
  - **May be too “heavy” for tender seedlings**

SOWING TECHNIQUE

Sowing Techniques
Watering
Soil Temperature



DIRECT VS. CONTAINER

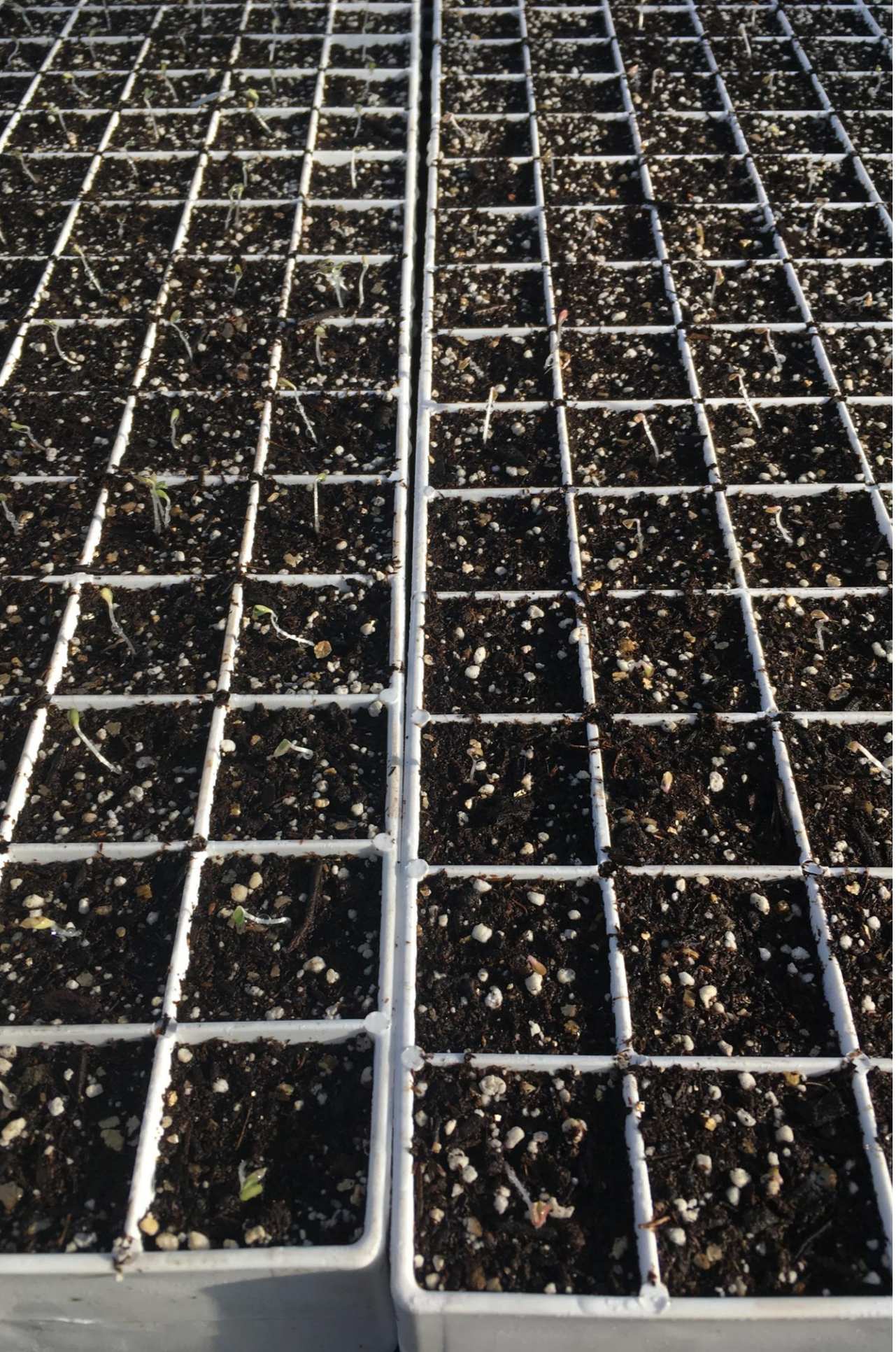
- Know your seed & how it grows — *Seed packs are a great resource*
- When to <u>direct</u> sow:
  - Densely planted crops (cutting lettuce, spinach)
  - Root crops/tap roots (carrots, beets, radishes, poppies) do better with out root disturbance.
- Advantages of growing transplants (in containers):
  - Season extension
  - Maximize the amount of veggies grown in a given area.
  - Minimize pest damage at a vulnerable stage

CONTAINERS

- Sanitizing
  - If the container is being reused or repurposed it is a good idea to wash the container in diluted bleach.
    1part bleach: 9 parts water.
  - This will help to reduce the chances of a disease damaging seedlings.

DIY CONTAINERS

- Upcycle and Recycle



FILLING CONTAINERS

- **Check Soil Moisture**
  - The sowing mix should be moist: not wet, nor dry. If it is dry add moisture a little bit at a time before filling the trays.
- **Fill Container**
  - Remove air pockets by dropping or tamping the soil in the container.
  - Fill soil to the top of the container. It will settle after watering the seeds in. A consistent level reduces watering variations later.
- **Label Container**
  - Name and sowing date

SEED DEPTH & DIBBLING

- Take a look at the seed to figure out the sowing depth.
- The depth should be 2x the width or circumference of the seed
- Dibbling is the process of making depressions in the soil. Make the depth appropriate for the size of that seed. Tools for dibbling include:
  - Fingers
  - Chop sticks
  - Pencil
- Place the seed in the center of the dibble.

COVER SEEDS

Covering seeds is an art. The goal is to create good seed to soil contact.

- **Create an even distribution of sowing medium or vermiculite to fill in the dibbles.**
- **When using a sifter to cover a tray it is good to start with the edges and the center will take care of itself.**
- **Think like a seed:**
  - **The deeper the seed is sown and the more soil piled on top the harder the seed has to work to break through the soil.**

Note: a few seed types do not need to be covered (ex. Snapdragons) Check package

SPECIAL NEEDS SEED

Most vegetables don't need special treatment

- **Stratification – Put seeds in damp paper towel or vermiculite in plastic bag – leave in refrigerator for a period of time, then plant**
  - Spinach, milkweed, Echinacea, some flowers, some perennials
- **Scarification – scratch, nick or sand seed coat.**
  - Morning glory, lupine hard seed coat
- **Soaking overnight – Soak seed overnight in water**
  - corn, sweet peas, chard
- **Light to germinate - a few seed types do not need to be covered**
  - ~Lettuce, snapdragons, impatiens, lobilia, poppies

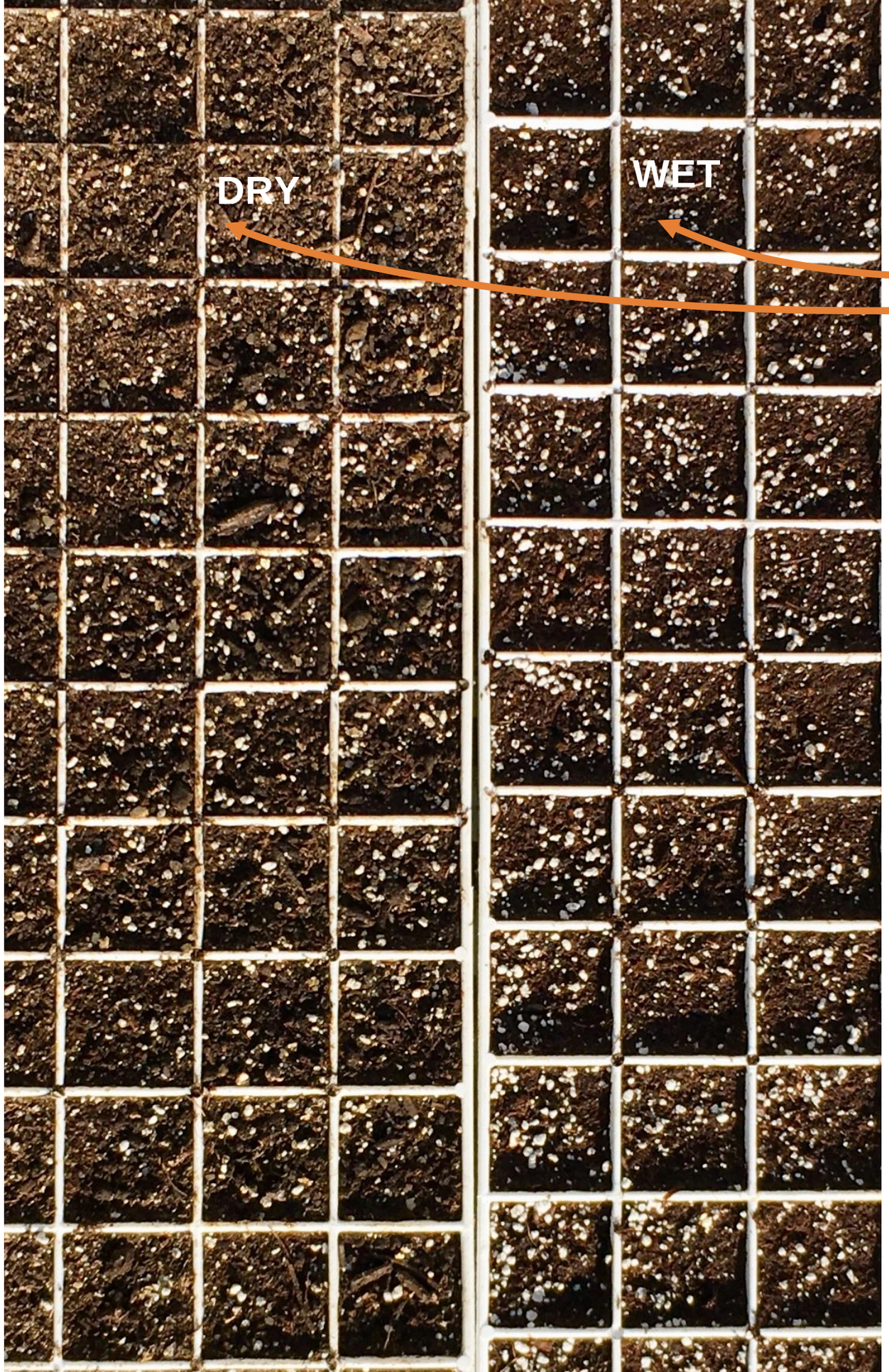
Always Check Seed Package

Stage 3

WATERING IS ESSENTIAL

- **The seed needs water in order to germinate and to grow healthy roots. BUT, too much water creates the perfect condition for fungal diseases to develop.**
- **Watering needs change as the seed develops into a seedling.**

LIFE STAGE	GOAL (See Exceptions below)	WHEN TO WATER	DEPTH & FREQUENCY
(1) Newly Sown / Not Yet Germinated	Even wet soil surface to reach the depth of the seed and allow the seeds to absorb/imbibe water, break dormancy, and germinate.	25 - 50% of the surface is Dry	Water to an even, shallow saturation and more frequently. *(1-3x a day depending on weather & soil mix)*
(2) Emergence and first cotyledons:	Initially, water just enough to reach the emerging roots of the young seedling as metabolism is slowing down. Then gradually increase water depth to encourage deeper root growth	75% Surface is dry *And depends on plant family*	*Depends on plant family* General Rule: water more deeply and less frequently, aim to water deeply early in the day *(1-2x a day depending on weather)*
(3) Mature with True Leaves	True leaves indicate a more developed root system. Water to the bottom of the tray to reach roots at the bottom.	100% Surface is Dry AND Speedlings ½" is dried down	*Depends on plant family* General Rule: even less delivery but watering more deeply each time *(1-2x a day depending on weather)*



WATERING IS ESSENTIAL

Surface dry down examples.

Watering needs vary based on seed type:

- <u>Alliums & lettuce</u> need plenty of moisture and less dry down. Dry Down:
  - A visual clue is that lighter soil tends to be dryer.
  - Weather & temperature impact dry down. Beware of these variables when estimating dry down times.
- <u>Solanums</u> need more dry down
- <u>Larger seeds</u> take up more water therefore more likely to rot. To reduce the chances of rotting, allow for more soil dry down.
  - Ex. Squash, Beans, Cucumbers

WATERING IS ESSENTIAL

Water Delivery method is important.

- **The goal is even and gentle distribution of water — like a peaceful spring shower.**
- **There are a variety of watering cans and hose attachments available at a range of sizes, materials, and costs.**
- **Rose heads can easily get clogged – look for can where you can replace the rose head if needed.**
- **Examples:**
  Haws
  Behrens

https://www.toonpool.com/cartoons/April%20Shower_1016

SOIL TEMPERATURE

- **Temperature of the soil is important for optimum and timely germination.**
- **Some seeds like cooler temperatures wile others thrive in warmer soil temperatures.**
- **Cooler soil Temps:**
  - Lettuce germinates best in temperature ***below*** 70°F. Higher temperatures can cause thermodormancy (above 77°F), which inhibits the germination of the seed.

SOIL TEMPERATURE

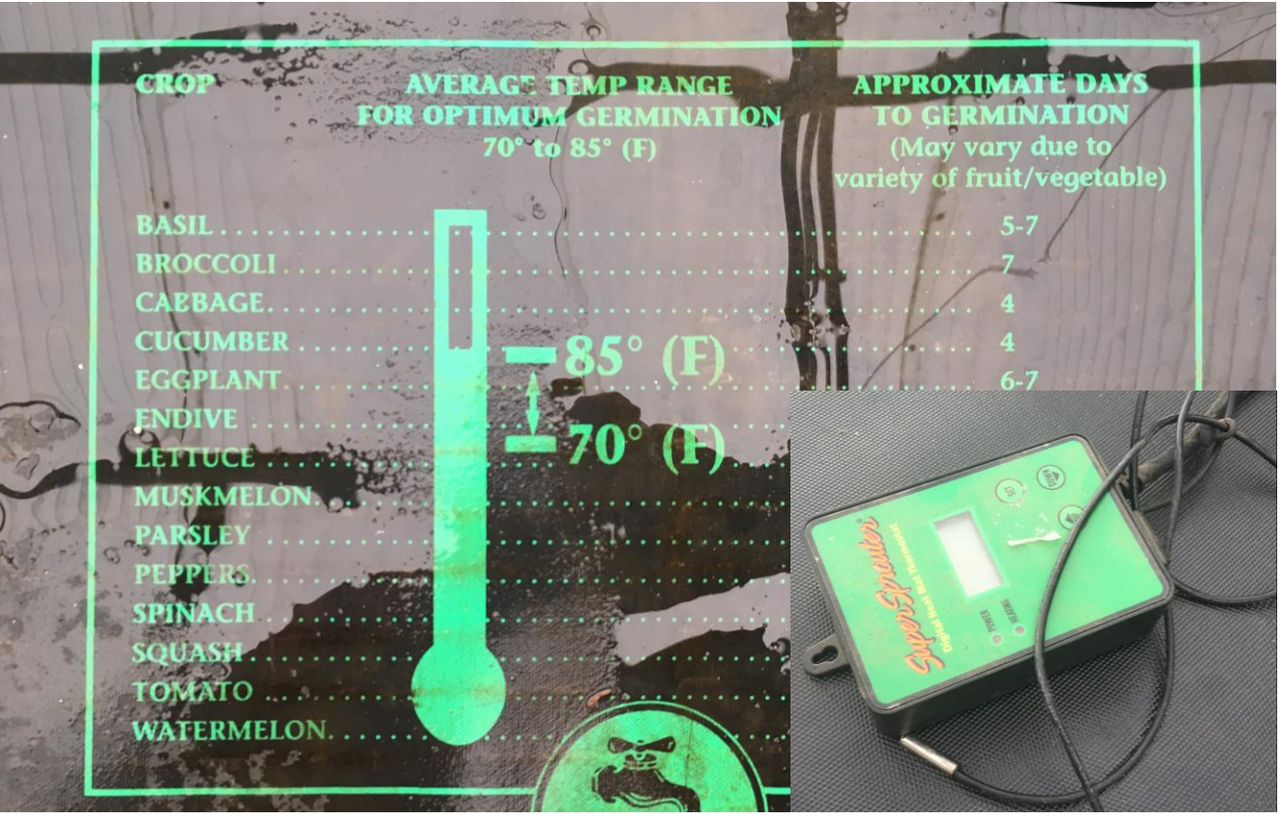
- **Warmer soil temperatures: Solanums such as tomatoes, peppers, eggplants, as well as basil, parsley, and cucumbers, germinate best in warmer soils.**

  Examples:

  - Eggplants 80-90 F
  - Peppers: 70-95 F
  - Tomatoes: 75-90 F

- **Heat/Warmer Soils:**

  - Improves germination rate
  - Shortens the days to germination/seedling emergence



SOIL TEMPERATURE

- **Heating mats and thermostat work well.**
  - Heating Mat: prices vary by size ($20-$80)
  - Thermostat - $40
- **Other options include:**
  - Build it your self projects
  - Electric Heating Cable ($40) in soil under cool frame or enclosed, insulated box
- **Other methods?**

LIGHT

Lighting issues: “Leggy Seedlings”

Natural Light

Artificial Light

theseedcollection.com

microgardener.com

‘LEGGY’ SEEDLINGS

- **What are leggy seedlings?**
  They are seedlings that have stretched too tall and become weak. White stems can indicate a lack of light.
- **What causes this?**
- **How can you prevent it?**
  - Rotate and flip trays around to help keep light exposure as even as possible
  - Change location as needed.
  - Make sure they are getting:
    - The right amount of water
    - Growing in soil with enough nutrients
    - Growing in a good temperature – if it is too hot this can also cause stretching

NATURAL LIGHT

(C) Seeding trays in a brightly lit window: Reusable tray $12-16, Disposable tray ($5)

You want an even distribution of light throughout the day to create a uniform condition for the seeds to grow.

Recommend rotating trays if an area is always in the shade

C

A

B

NATURAL LIGHT

Bright even sunlight with home greenhouse systems

- **(A) Tiered shelving with a plastic cover**
- **(B) DIY Project customized for your space and needs**

ARTIFICIAL LIGHTS

- **Grow lights can be a good option if you do not have an even source of sunlight throughout the day.**
  - LEDs give off little heat, energy efficient, last a long time.
  - Leave them on for about 16 hours/ per day.
  - Can use a programmable light timers
- **Tabletop Sunlight Garden ($170)**
- **DIY tiered shelving unit with lights (cost of components from hardware store + your time)**

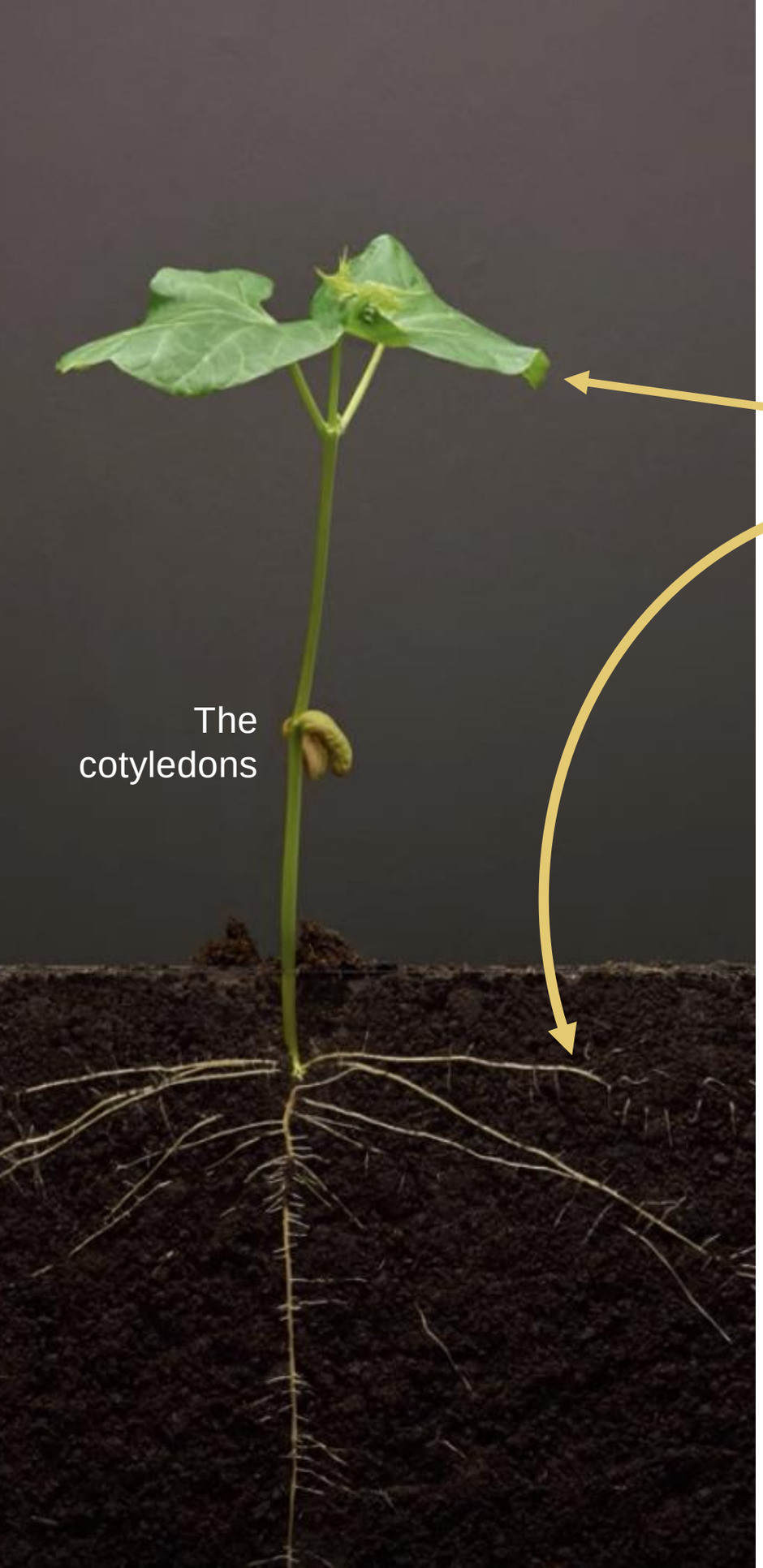
PRICKING-OUT TECHNIQUE

What is this?
Why do you use it?
How do you use it?

PRICKING-OUT

Pricking-out is a technique used to move young seedlings into bigger containers to help produce healthy plants.

- **Benefits of Pricking-Out:**
  - Reduces resources needed (e.g. heating mats)
  - More plants in less space
  - Alleviates space limitations
- **Challenges**
  - It is a stressful process for the seedling
- **Ideal Environment for Pricking-Out:**
  - Cool time of the day and/or shady area
  - Low wind



PRICKING OUT DEMO

Best Practices

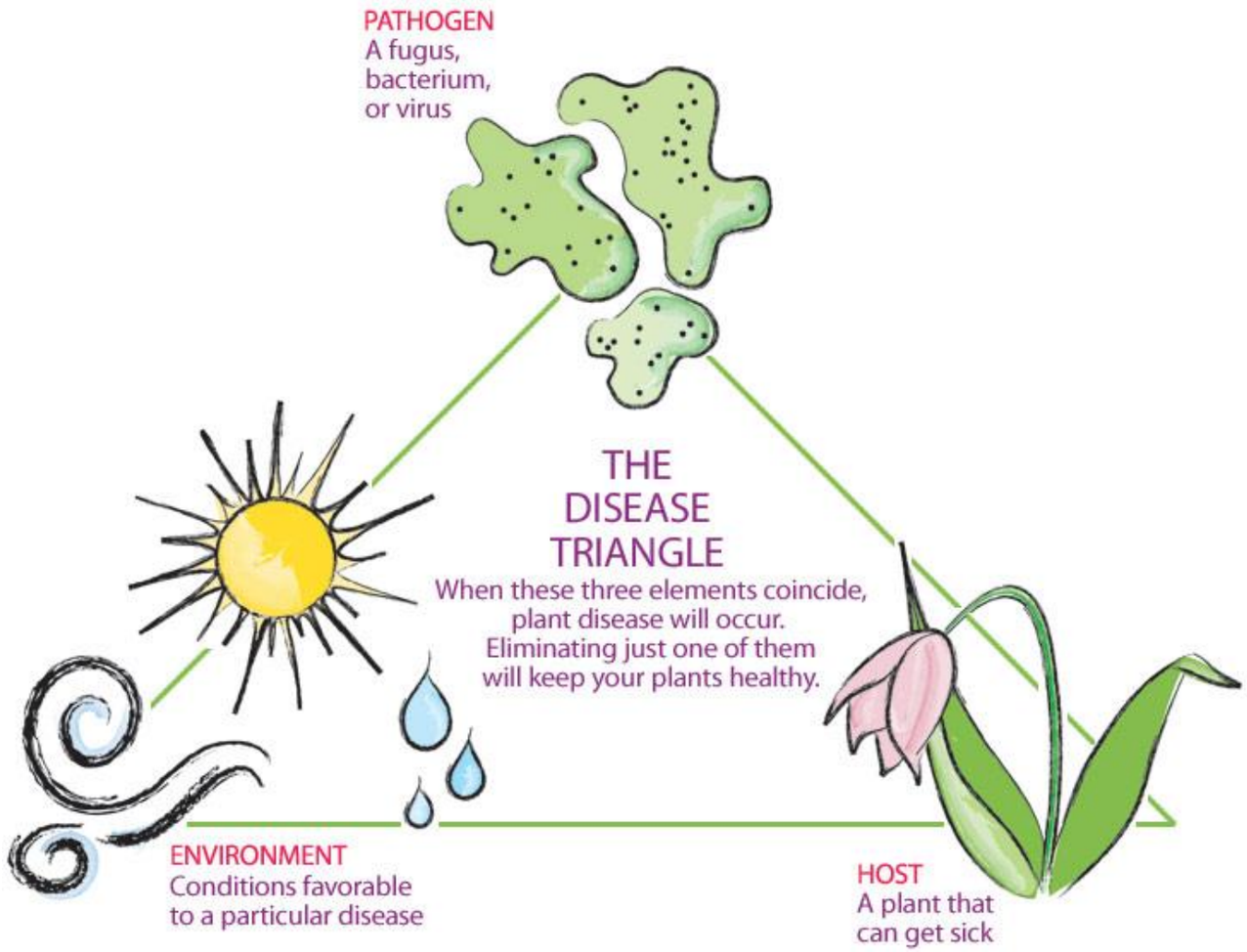
- Look for a set of true leaves. This typically correlates with roots starting to branch.
- The soil moisture in the flat should be on the dry side so the seedling separate easily. “think the roots apart”
- Hold the seedling by the cotyledons or true leaves, not the stem.
- Minimize the time the roots are exposed to the air.
- Moist soil where the seedlings will be potting.
- After pricking out keep in a low light (no direct sun) condition for 1-3 days.

SEEDLING DISEASES & PESTS

Home garden starts v.s. nursery starts

Pathogens/ Diseases

Pests



GROWING PRACTICES

- **Your best defense for controlling disease in a greenhouse is creating the proper environment for plants to thrive while limiting the conditions for disease proliferation.**
- **Techniques for reducing disease and pathogens:**
  - Well timed water application with wet to dry swings
  - Good ventilation
  - Remove or treat problems as soon as you notice them.

GROWING PRACTICES

Pests:

- **Aphids - Common problem, especially on solanum crops. Treat with SaferSoap (needs direct contact with Aphids)**
- **Leaf Miner - remove leafs and do not compost.**

Pathogens/ Disease:

- **Damping off: a group of fungal diseases that damage the young stems and roots. Too much water and cold temperatures increase the risk of development. Isolate plants & sterilize containers.**
  - RootShield® Home & Garden helps to reduce chances of developing dampening off. Biological fungicide

http://www.tomatodirt.com/damping-off.html

GROWING PRACTICES

Pests:

- **Snails and Slugs – Most active at night a hungry snail can take down several 6 packs of seedlings in an evening. Solution: hand pick, barrier or bait, Sluggo is approved for organic use**

- **Birds – a flock of sparrows will destroy a planting in a morning. Solution: bird netting**

http://www.tomatodirt.com/damping-off.html

HARDENING -OFF

Why hardening-off is important

Fertility treatments

HARDENING OFF

- **Is a technique to reduce the chances of transplant shock.**
- **Seedlings with a good root knit and 2+ sets of true leaves are placed outside in a semi-protected area.**
  - Protect/cover the transplants at night if rats in the area.
- **Transplants in the hardening-off area for a minimum of 72 hours.**
- **During this period the cell walls thicken and the plant builds up carbohydrate reserves. Both of these help to create a more resilient transplant.**

SUPPLEMENTAL FERTILITY

- **The hardening off time period is a good time to <u>start</u> a fertility (NPK) treatment**
  - N (Nitrogen) is a major part of chlorophyll + photosynthesis
  - P (Phosphorus) for healthy root systems
  - K (Potassium) supports over all growth and reproduction (immune booster).
- **Favor fertilizers that are high in phosphorus. Too much nitrogen can burn the roots.**
  - Example: AgroThrive LF is 2.5 (N) 2.5 (P), 1.5 (K). AgroThive is made from plant proteins, fish, and other food industry wastes.

TRANSPLANT

Ideal Timing
Best Practices
Fertility Treatment

https://www.groworganic.com/organic-gardening/

IDEAL TIMING

- **Look for a fully developed root knit.**
  - The transplant comes out of the container easily
  - The roots have knit together the sowing medium and it stays together.
  - The roots should not be root bound or encircled at the bottom. If so, loosen the roots by gentle massaging before planting.
- **Looking for at least 2 sets of true leaves**

TRANSPLANTING PRACTICES

- **Spacing — can impact the form of the mature plants and can minimize disease pressure. Check seed pack for recommendations.**
- **Time of Day — minimize the time roots are exposed to the air and direct sun.**
- **Depth — general rule is to just cover the top of the root knit.**
  - Solanums can be deeper. They have adventitious roots — the stem under the soil will stimulate root growth.
  - Lettuce/greens plant top of root ball just above the surface to reduce root rot.
- **Fertilize the day of planting and 7-10 days later.**
- **Remove any flowers**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RESOURCES

RESOURCES

- **Growing Guides**
  - Cornell University (home gardener) http://www.gardening.cornell.edu/homegardening/sceneb771.html
  - CA Garden Web UCANR http://cagardenweb.ucanr.edu/Vegetables/
  - CASFS (small farm) https://casfs.ucsc.edu/news-events/news/grower-guides.html
- **Seed Viability Charts**
  - High Mowing: https://www.highmowingseeds.com/blog/seed-viability-chart/
  - Johnny's Seeds: https://www.johnnyseeds.com/on/demandware.static/-/Library-Sites-JSSSharedLibrary/default/dw913ac4d0/assets/information/seed-storage-guide.pdf

RESOURCES

➢ Seeding Planning Tools

- Seed Starting Date Calculator: https://www.johnnyseeds.com/growers-library/seed-planting-schedule-calculator.html
- Target Harvest Calendar: https://www.johnnyseeds.com/growers-library/online-tools-calculators.html

➢ Seed Sources – see handout

- Renee's Seeds (Felton)
- Johnny's Select Seed
- High Mowing Organic Seeds
- The Heirloom Seed Store
- Seed Saver Exchange
- Grow Organic (Peaceful Valley)
- Native Seed Search

SAVING SEED

- A whole other topic
- Stay informed of future Master Gardener classes

- **Seed Saving Reading**
  - https://www.seedsavers.org/site/pdf/Seed%20Saving%20Guide_2017.pdf
  - https://www.seedsavers.org/saving-seeds-for-beginners
  - http://smallfarms.cornell.edu/2014/04/07/four-easy-seeds-to-save-this-season/

KEEP IN TOUCH

- Mailing List
- Class Materials
- Upcoming Classes

Help Us Improve!

Our follow-up survey provides the tools we need to improve the quality of our program.

***Please respond** to the short survey you will receive in a few weeks.*

University of California
Agriculture and Natural Resources

UCCE Master Gardener Program
Monterey and Santa Cruz Counties

Raffle!

Enter the raffle to win the Sun Blaster 48 inch grow light with lamp and fixture.

Raffle tickets $1 each or 6 for $5

All proceeds go to the UC Master Gardeners of Monterey and Santa Cruz Counties

University of California
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UCCE Master Gardener Program
Monterey and Santa Cruz Counties

HANDS ON EXERCISE

Create four groups
Each team will have a facilitator

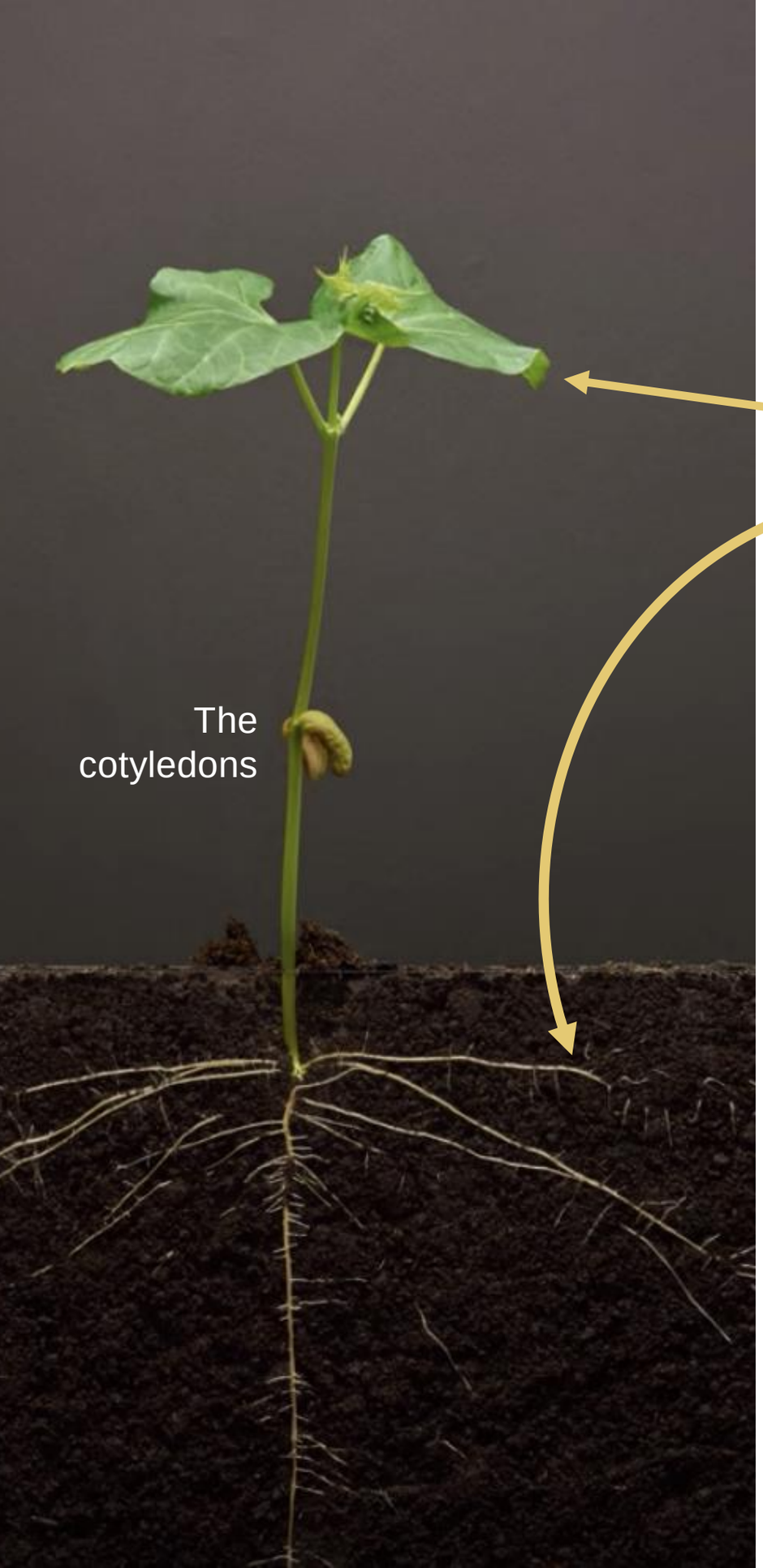
- Master gardeners, split up evenly in 4 corners of the room
- Students, count off by 4 and remember your number
- Move to your numbered corner
- follow your master gardener to the greenhouse

HANDS ON EXERCISE

Sow Seeds

Prick out sprouted seedlings

- **Fill Containers**
  - One 6-pack with sterile mix
  - One 2” pot with home made mix
  - While Filling make observations about the Sowing mix — moisture, textures, colors, materials
- **Sow Seeds into 6-pack**
  - Dibble & Cover
  - Use the seed as a guide to determine the Planting Depth (2x the width or circumference of the seed)
- **Prick Out Seedling into 3” pots**
  - *Think* the seedlings apart
  - Hold the seedling by the true leaves/cotyledons
  - General rule is to just cover the top of the root knit.



PRICKING OUT REFRESHER

Best Practices

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- The soil moisture in the flat should be on the dry side so the seedling separate easily. “think the roots apart”
- Hold the seedling by the cotyledons or true leaves, not the stem.
- Minimize the time the roots are exposed to the air.
- Moist soil where the seedlings will be potting.
- After pricking out keep in a low light (no direct sun) condition for 1-3 days.

NEXT STEPS

Happy Sowing!

- Deeply and gently water in the 6 pack and the 2” Pot when you get home.
- The pricked-out plant should be kept out of direct sun for 1-3 days to reduce stress. Then you can move it to an area with more light.
- Take solanum seed packet home and prepare for successful sowing!