



WSU EXTENSION  
**Cowlitz County**

# How to start seeds and keep them healthy until transplant

Alice Slusher



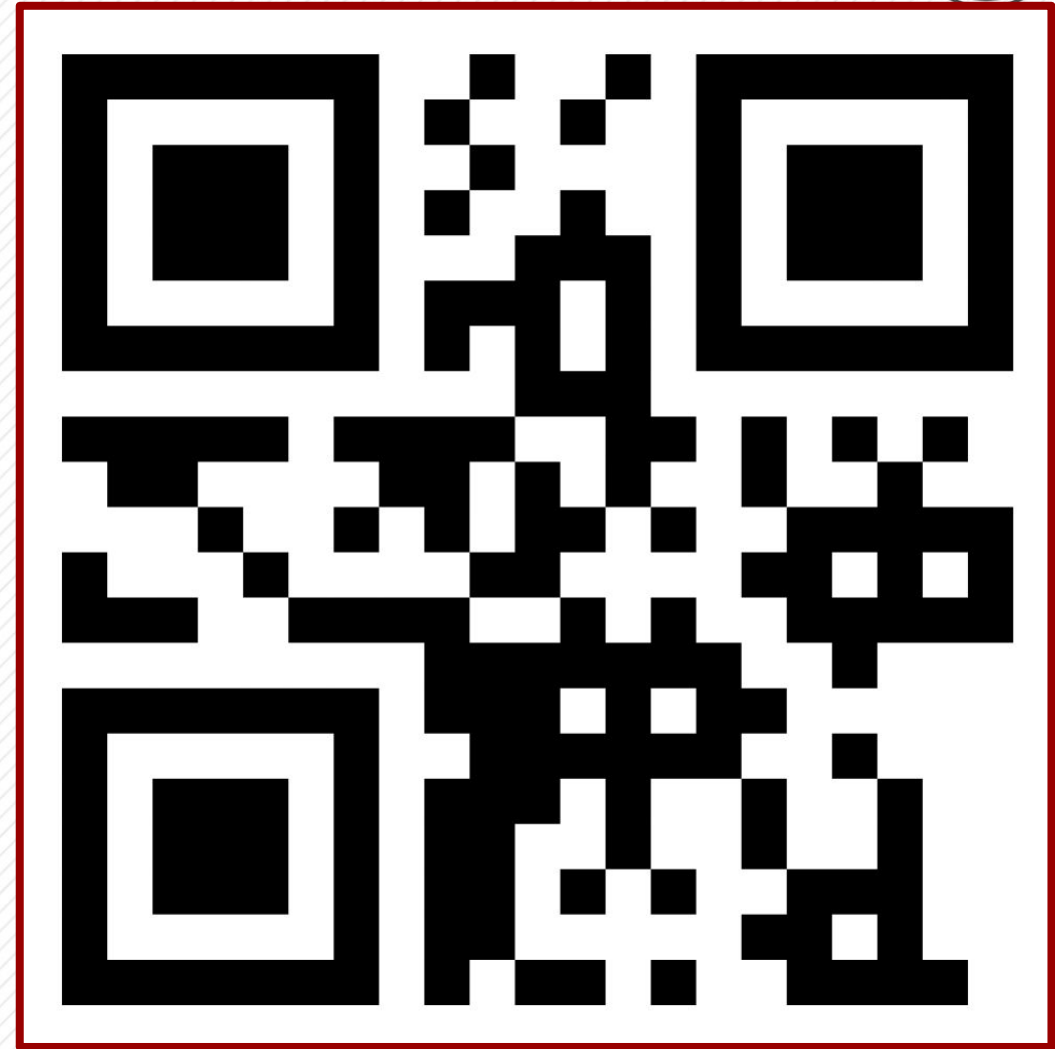


# How to Become a Master Gardener



**WSU Extension  
Master Gardener  
Program:**

**VOLUNTEERS  
MAKE IT  
HAPPEN!**





# MASTER GARDENER 187 PLANT SALE

Saturday, May 11  
8 am - 3 pm

Cowlitz County Fairgrounds  
Longview WA



Master Gardener Society  
Of Cowlitz County  
501(c)(3) Nonprofit



[cowlitzcomg.com](http://cowlitzcomg.com)

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UPCOMING WORKSHOPS



HAVE A GARDENING PROBLEM? ASK A MASTER GARDENER!



VEGETABLE GARDENING



FRUITS

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LANDSCAPE GARDENING



MONTH-BY-MONTH GARDEN TIPS



LAWNS/TURF/PASTURE



COMPOSTING





## VIDEO WORKSHOP

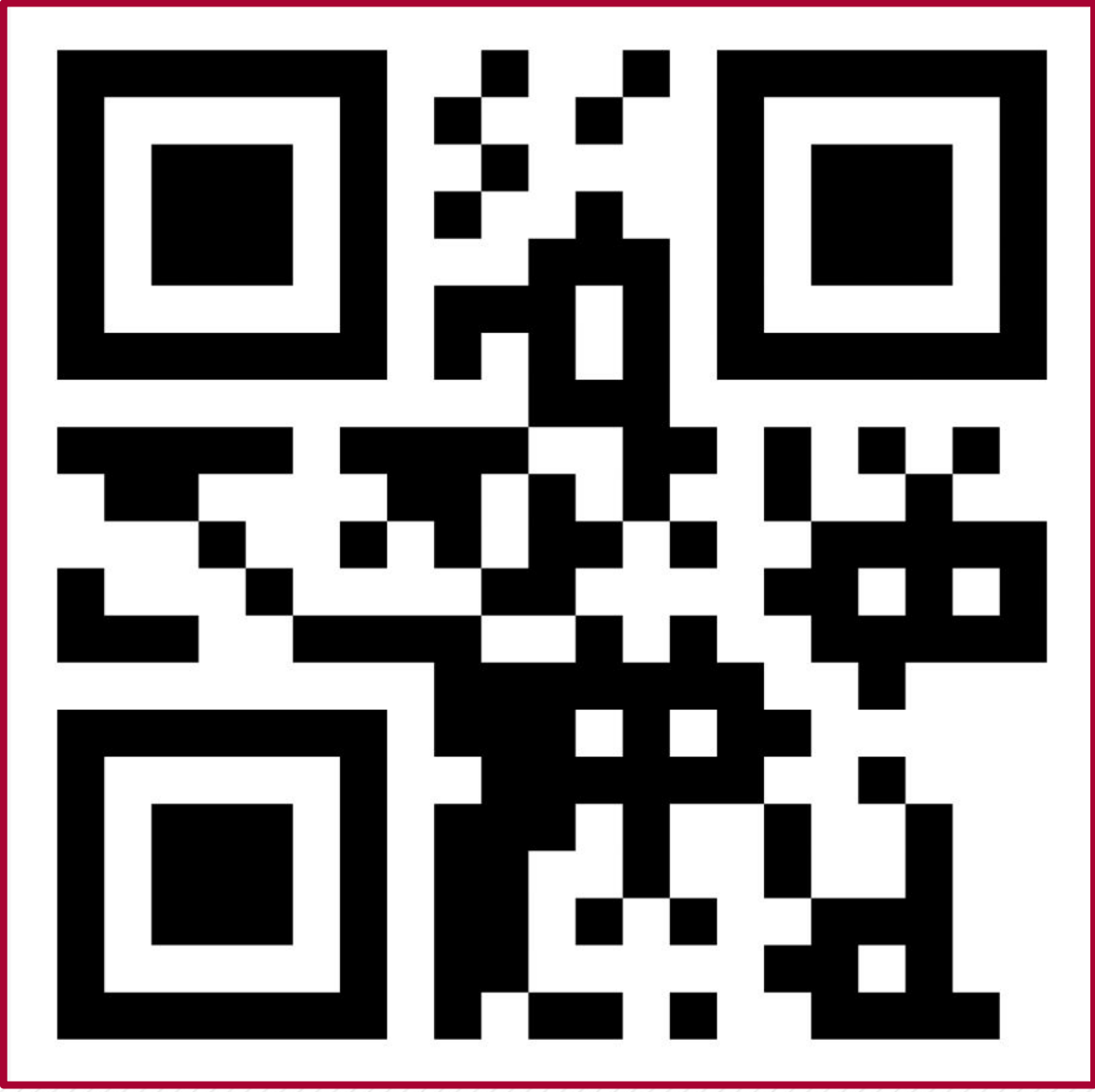
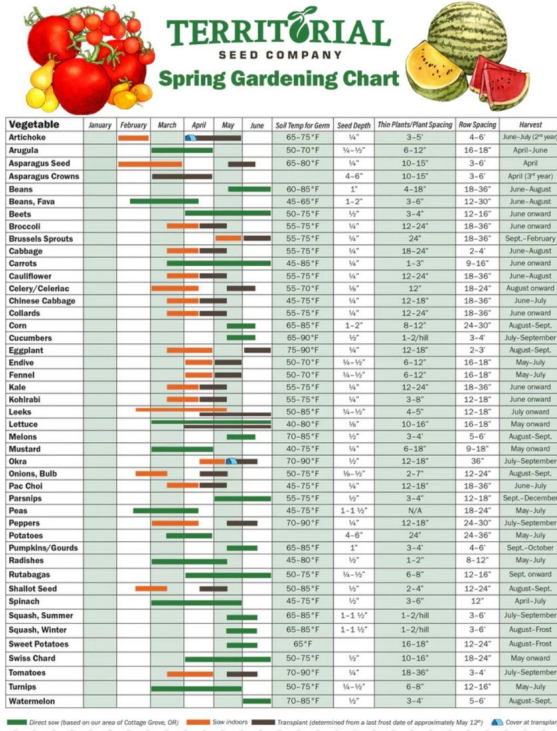
Presentation slides (updated 2-8-22)

Handout

Common Garden Problems

Short video demonstration for starting seeds

build a simple grow light stand (PCV)





# What you'll learn today

- Seed Germination--what seeds need
- When to plant
- Organic vs non-organic seeds
- Seed starting mix
- Planting the seeds
- Watering your plants
- Feeding your seedlings
- Lighting choices
- Up-potting
- Troubleshooting common problems



# Choosing what to grow

- **Grow what your family loves**
- **START SMALL!!**

## 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 an extended harvest.
- To direct sow or transplant?
- (impacts when the space is available in the garden)

**Bush Bean Castandel**

Days to Harvest: Approx. 53 days

Days to Germinate: 5 - 10 days

Sow Seeds: 4 inches apart, 1 inch deep

Sun/Shade: Full sun

Mild Winters: April - June

Cold Winters: May - June

French-bred especially for kitchen gardeners, Castandel beans keep their juicy texture and sweet flavor longer on the plants, leaving you more time to pick them before they become tough or fibrous. In France, Castandel is nicknamed "The Weekend Bean" because this fine variety allows you more time and leisure between pickings. These versatile plants produce bountiful harvests of succulent beans for fresh garden to table eating. Perfect for garden beds, patio containers or tidy small space gardens.

AND USE

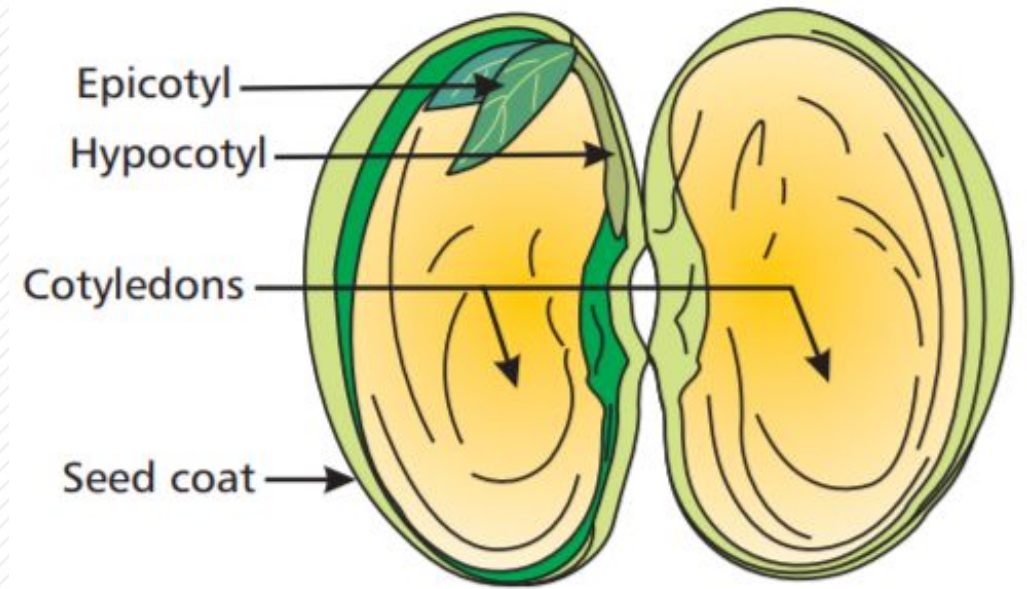
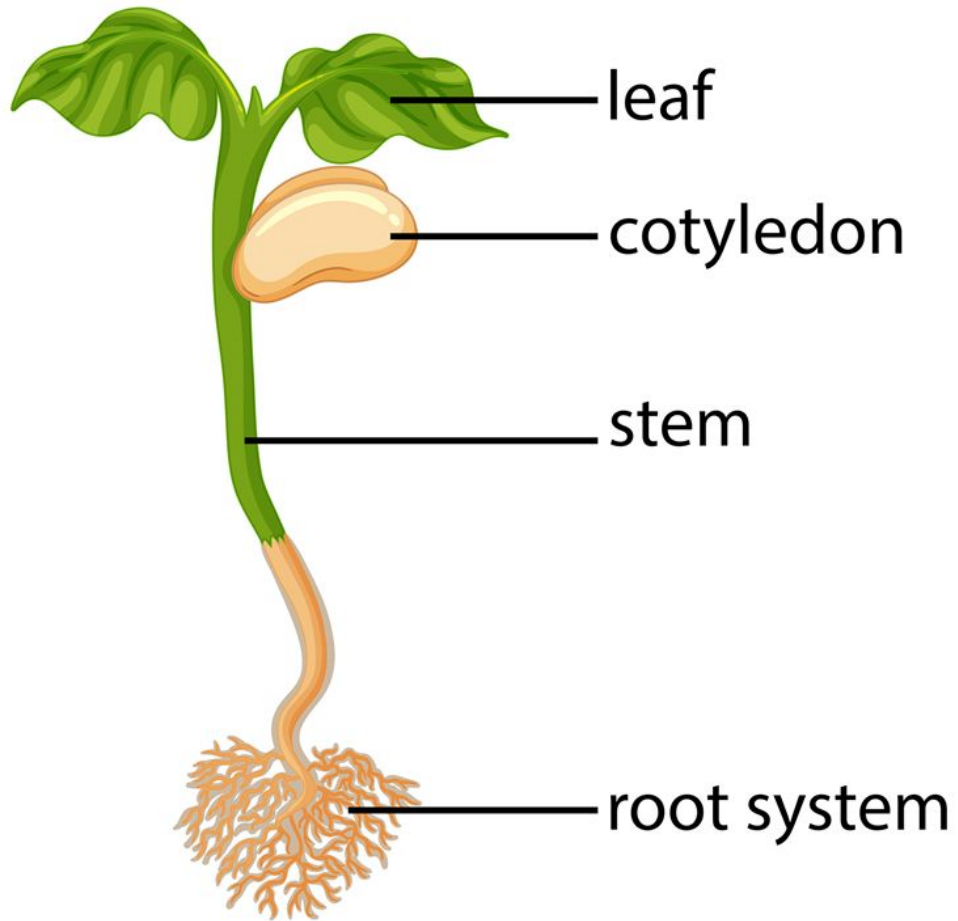
fine-flavored beans while bearing young and slender more beans you more the plants e. Steam, sauté em quickly just r-crisp and ser fully enjoy their flavor.

\*Renee's Garden\* 888.880.7228 • reneegarden.com



# Seed germination

## Anatomy of a Bean Seedling



The seed is the embryo of the new plant  
Contains everything it needs to make a new  
plant.

Energy is stored in the cotyledons--like a  
backpack full of food.



# Seed germination



- **Seed coats absorb water and swell and soften. Germination process is triggered.**
- **Embryo starts to wake up and use proteins stored within seed to produce energy.**
- **This will trigger the emergence of the root.**



# What do seeds need to germinate?

- Proper soil temperature
- Proper soil moisture
- Air/oxygen
- Light
- Seed contact with soil



# Proper soil temperature

- Seeds have minimum-maximum temperature range for germination.
- Any temp above or below that range will damage the seed or cause it to go dormant.
- Look at the seed pack or chart for the best germination temperature for the fastest germination.

Table 4 (continued). Seeding recommendations for common vegetable crops grown in Washington (adapted from Kumar et al. 2009, 3-4).

Vegetable	Seeding			Germination		Growth		
	Depth to Plant (inch)	Distance Between Plants (inch)	Distance Between Rows (inch)	Number of Days to Germinate	Optimum Soil Temperature Range (°F)	Base Air Temperature (°F)	Weeks to Grow to Transplant Size	Days to Maturity
Garlic	2	4-6	12-24	6-10	35-50	30	DS	90-150
Horseradish	4	12-24	24-48	10-20	45-75	40	DS	140-160
Jerusalem Artichoke (Sunchoke)	4	12-18	36-48	10-20	65-90	50	DS	110-150
Kale	¼-½	8-12	18-24	3-10	60-90	40	5-6	55-80
Kohlrabi	¼-½	8	18-24	3-10	50-80	40	6-8	60-70
Leek	¼-½	4-6	18-24	7-12	45-90	35	10-12	80-90
Lettuce, Head	⅙-¼	12-14	18-24	4-10	40-80	40	4-6	55-80
Lettuce, Leaf	⅙-¼	2-4	4-6	7-10	50-80	40	4-6	45-60
Pepper	¼-½	18-24	12-24	10-20	65-95	50	6-8	60-80
Tomato	¼-½	18-36	36-48	6-14	70-85	51	5-6	55-90

Home Vegetable Gardening in Washington

<https://s3.wp.wsu.edu/uploads/sites/2073/2014/09/Home-Vegetable-Gardening-in-Washington.pdf> Pages 10-11



# Soil Moisture

- **Not too wet, not too dry**
- **What's usually the best?**
- **Water that's about as moist as a wrung out sponge.**





# Oxygen

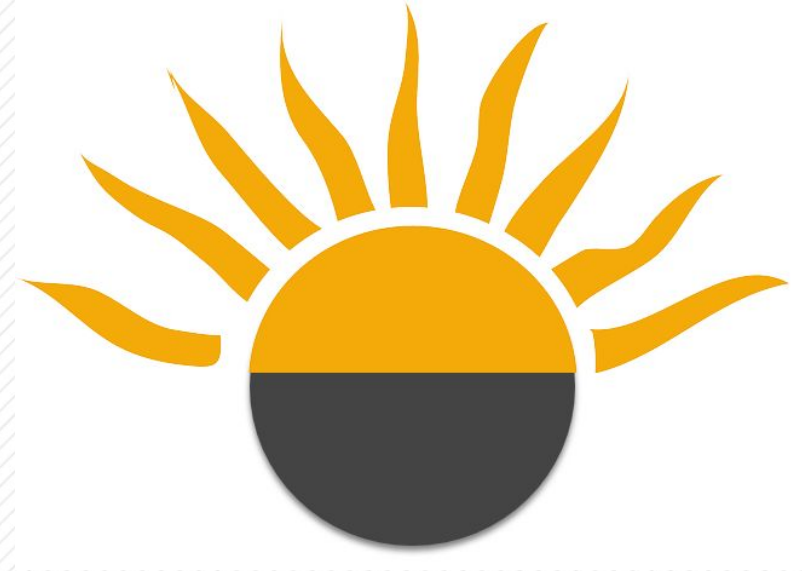
- **Seeds need oxygen to start the chemical processes to start germination**
  - Too much water displaces the oxygen
  - Too much water = no germination
- **Use seed start mix, not garden soil or purchased potting soil**





# Light

- Seedlings need light to grow
- Most seeds **DON'T** need light to **GERMINATE**
- In fact, they germinate better in the dark!





# Seed to soil contact

- **Seed must have good contact with the soil for three reasons**
  - **The initial root needs to have a place to form an anchor for the seedling.**
  - **The root needs access to soil moisture to continue the germination process.**
  - **The seed coat needs to absorb water from the soil to continue the process.**





# Timing considerations--what does it mean?

- **When to start seeds**
- **Days to germination**
- **Days to maturity**



# When to start your seeds

- Need more information:
  - Last frost date-May 15 (however, here in Cowlitz Co., we should aim for 1st week of June to transplant.
  - Seed packet information-- "sow 8 weeks before last frost date"
  - Work backward from June 1-Start seeds on April 1
- Probably safer to start seeds 6 weeks before the last frost date, and plan on getting them transplanted outdoors 2 weeks later.
- Extending growing season techniques
- High elevation considerations

# When to start your seeds



Enter spring frost-free date (include year):



mm/dd/yyyy

Date

06/01/2024

ENTER

**Because of late frosts and cold soil temps, delay transplanting indoor grown seedlings outdoors until the first week of June!**

Try Johnny Seeds Seed Starting calculator:

<https://www.johnnyseeds.com/growers-library/seed-planting-schedule-calculator.html>

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
Corn*	2 to 4	4-May	1-Jun	0 to 2 weeks after	1-Jun	15-Jun
Cucumber	3 to 4	11-May	25-May	1 to 2 weeks after	8-Jun	15-Jun
Eggplant	8 to 10	6-Apr	27-Apr	2 to 3 weeks after	15-Jun	22-Jun
Kale	4 to 6	23-Mar	6-Apr	4 weeks before	4-May	
Peppers	8	20-Apr		2 weeks after	15-Jun	
Pumpkins	3 to 4	18-May	25-May	2 weeks after	15-Jun	
Squash	3 to 4	18-May	25-May	2 weeks after	15-Jun	
Swiss Chard	4 to 6	6-Apr	20-Apr	2 weeks before	18-May	
Tomatoes	6 to 8	13-Apr	4-May	1 to 2 weeks after	8-Jun	15-Jun
Watermelon	3 to 4	18-May	25-May	2 weeks after	15-Jun	



# Can you start them earlier?

**Yes, but it's risky!**

- **Artificial indoor environment probably not enough.**
- **Larger plant needs more light, larger pot, more fertility.**
- **You can plant it earlier than the expected frost date, but many precautions must be taken.**



# Days to germination

What influences how long it will take for germination?

- Soil temperature
- Amount of moisture
- Depth of seeds sown
- Light
- Age or quality of seed



# Germination information for selected plants

Plant	Approximate time to seed before last frost date (weeks)	Time seeds need to germinate (days)	Temperature (F)	Light/dark requirement
Broccoli	8	5 to 10	70	Either
Cabbage	8	5 to 10	70	Either
Cauliflower	8	5 to 10	70	Either
<b>Cucumber</b>	4 or less	5 to 10	85	Either
Eggplant	8	5 to 10	70	Either
Lettuce	8	5 to 10	70	Light
<b>Muskmelon</b>	4 or less	5 to 10	85	Either
Pepper	8	5 to 10	80	Either
<b>Squash</b>	4 or less	5 to 10	85	Either
Tomato	6	5 to 10	80	Either
Watermelon	6	5 to 10	70	Either



# Days to maturity

- Helps you to determine when you can expect to harvest your crop
- Read the seed packet labeling
  - Suggest direct sow in garden or starting indoors?
    - Direct sow: clock starts ticking the day you sow the seeds
    - Indoors: Clock starts ticking when you transplant to your garden
  - For indoor sown plants" Harvest = 8 weeks from sowing to transplant plus "days to maturity."
- Example--tomatoes--sow seeds March 15, transplant May 15, "75 days to maturity"= harvest on August 1.



# Sow seeds inside or outside

Look at the seed packet or good chart

Crop	Jan			Feb			Mar			Apr			May			Jun			Jul			Aug			Sep			Oct			Nov			Dec		
	Beginning	Middle	End	Beginning	Middle	End	Beginning	Middle	End	Beginning	Middle	End	Beginning	Middle	End	Beginning	Middle	End	Beginning	Middle	End	Beginning	Middle	End	Beginning	Middle	End	Beginning	Middle	End	Beginning	Middle	End	Beginning	Middle	End
Fennel (Finocchio)									↘																											
Garlic																																				
Kale																																				
Kohlrabi																																				
Leek, Summer																																				
Leek, Winter																																				
Lettuce, Summer																																				
Lettuce, Winter																																				
Squash, Winter																																				
Tomatillo																																				
Tomato																																				
Turnip																																				

•	Direct Seed	■	Seedling growth	*	Harvest begins in 3rd year
↘	Seed Transplant	■	Field growth	**	Harvest begins in 2nd year
×	Transplant	■	Harvest		





# Organic vs non-organic seed

Organic seeds grow according to specific industry guidelines.  
Non-organic seeds don't.

- Yes. if you're selling organic produce
- Organically grown seed is more resilient because they don't rely on chemical support to become healthy and strong.
  - It can take a long time to get seeds from a plant. if they can get through it without pesticides, herbicides, chemical fertilizers, they will be resilient.
  - Best traits passed on.
- Supporting companies that have sustainability practices
- GMO vs non-GMO Marketing gimmick. Seed companies don't sell GMO to public.



# Keep records--SO important!

- Handwritten
- Download and print
  - On Sutton Place
  - My Frugal Home
- Day One Journal
  - Android
  - Apple, iPhone, Mac
  - Territorial Seeds Garden Planner
  - Take photos!



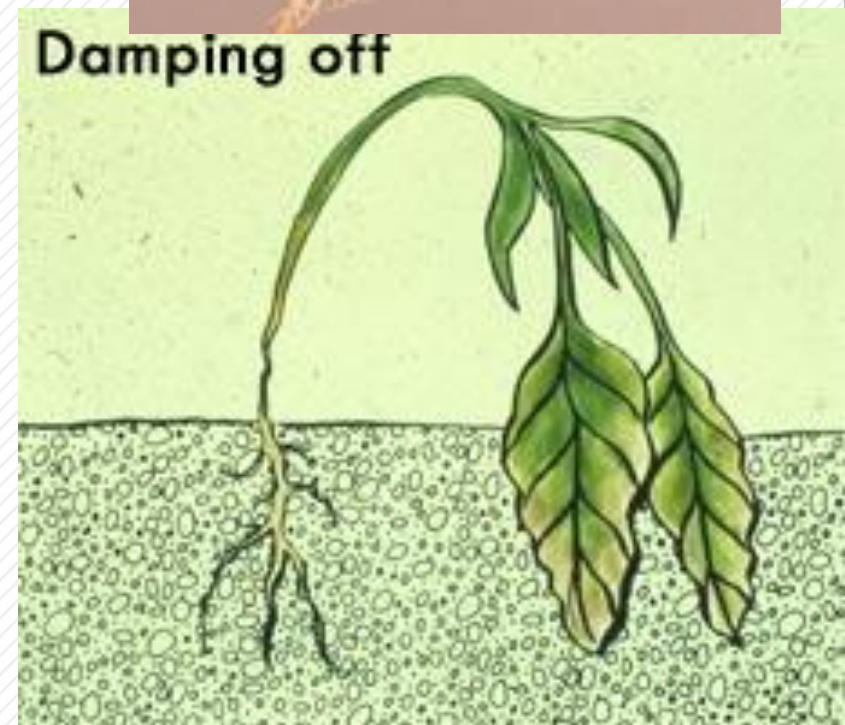


# Keys to healthy plant starts

- **Sterilize all used pots.**
- **Wash posts with soap/hot water to remove soil.**
- **Soak in a bath of 1 part bleach 9 parts water for 10 minutes.**
- **Use NEW potting mix to fill trays.**
- **Clean all tools.**

# Start with sterile seed-start mix

- Sterile mix is light, fluffy, dries out easily.
  - But it allows roots to grow.
  - Lots of oxygen
- Sterile mix helps prevent “damping off.”
  - Pathogens from water, hands dirty pots
  - Cold, damp conditions
  - Poor air circulation



# Preparing sterile seed start mix

- Dump a 12 Qt bag into a 5 gallon bucket.
- Add about ½ gallon hot tap water.
  - (or ½ to ⅔ cup water per 2 cups mix--this will be adequate for one 3.5 inch pot.)
- Mix well with hands. Mix should hold together and feel like a wrung out sponge.
- Fill the 3.5 inch pots to the very top.
- You can also make your own mix:
  - 2 part peat moss
  - one part vermiculite or perlite
- [Using peat pellets](#) and 20% worm castings



# Containers



New or CLEAN used pots!

- Rinse all debris off the pots
- Sanitize: 9 parts water, 1 part bleach- Soak for 10 minutes



# Thrifty idea



<https://youtu.be/K9nxKzO74jg?si=W0FnV9RaWpZB56nL>

*Remember to make holes in the bottom for drainage and remove the "lid" as soon as the first seedlings appear.*



# Planting the seeds

- How many seeds?
  - **1 ½ inch cell- 1-2 seeds, but thin to 1 per cell after germination**
  - 3.5 inch pot 2-3 seeds per pot
  - Place desired seeds on top of soil, gently brush over them to cover shallowly, or sprinkle prepared soil on top to cover seeds.
- Take another pot and use the bottom of it to tamp down the soil until soil level is about ½ inch from the top of the pot.
- Check to make sure the seeds are covered.





# Next...

- Plant as many pots as you'd like.
- Gently cover with plastic to retain moisture.
- Check every day--shake or tap off moisture condensation onto seeds--if you pre-moistened the soil, you may not have to water until sometime after germination when the cover is removed.
- You may have to spray the top of the soil to make sure your seed is in good contact with the soil. If it looks dry, spray.
- Monitor to make sure the soil doesn't dry out--the seeds are on top!



# And then: Germination

- Check every day. Flip over the plastic .  
\*Remove plastic after plants pop up.\*
- When your seeds germinate, you'll see the stem, then the "seed leaves," followed by the "true leaves"
- You'll need to continue keeping your seedlings warm (55-60°F night temperature and 65-70°F day).



**True  
leaves**



True leaves

Seed leaves



# And then...

- They need light. \*16-18 hours of it. 2-3 INCHES above the seedlings! (fluorescent)\*
- They need air circulation from the time you remove the cover--
- Get a \*clip-on fan-gentle, low setting, directed across the top of the pots at soil level.\*
- Keep on 24/7 until transplanted outdoors.



Click image to open expanded view



Comfort Zone 6 INCH - 2 Speed Tilt, Whisper Quiet Operation C 5.5 Foot Cord and Steel Safety

[Visit the Comfort Zone Store](#)

★★★★★ 3,461 ratings

Best Deal

List Price: ~~\$16.99~~

Price: **\$14.99** ✓prime & FREE Returns

You Save: **\$2.00** (12%)

May be available at a lower price from other sellers, p  
Prime shipping.

Size: **Single Pack**

2 Pack  
\$24.99  
✓prime

**Single Pack**  
\$14.99  
✓prime

**Color** Black

**Brand** Comfort Zone

**Item Dimensions** 17.5 x 17.8 x 19.3 inches

**LxWxH**

**Material** Other



# Keys to healthy plant starts

- **Indoors:** Use a heating pad under trays to warm soil to 70-80°F for indoor plant germination. **REMOVE FROM HEAT** when seedlings have germinated!
- **Outdoors:** Wait until garden soil has reached optimal temperature for germination before planting warm summer veggie transplants outdoors (usually >50 degrees)



# Keys to healthy plant starts

- Heating pads



- 1-Pack 3"\*20"  
\$9.99  
✓prime
- 1-Pack 10"\*20"  
\$12.99  
✓prime
- 1-Pack 20"\*20"  
\$23.99  
✓prime
- 1-Pack 48"\*20"  
\$33.99  
✓prime
- 2-Pack 10"\*20"  
\$20.99  
✓prime



# Keys to healthy plant starts: watering

- Water to keep it moist but not soggy. Use pots with drainage holes. I prefer to water from below. Find that sweet spot—\*more plants are killed from overwatering!\*
- Too much water promotes leggy growth--not good for the plant's strength
- Too much water can rob plants of oxygen



# Keys to healthy plant starts: watering

- Better to let it get nearly dry before watering again--your plant will tell you.
- Keep hoses and water heads off the floor.
- Use clean WARM WATER (68 – 77 F).
- **\*When to water? Watch for ONE SEEDLING beginning to wilt--then it's time to water.\***
- Use your built in hydrometer—your finger. Is the soil moist? Add more if necessary.
- Or “weigh” your pots. If they are light, water may be needed





# Bottom Watering

- Place pots on tray, pour about 1 inch warm water into tray
- \*Water should wick up into the seed mix within an hour. Drain off any remaining water after an hour.\*



<https://simplifygardening.com/water-plants-from-the-bottom/>

# Top Watering

- Water at the base of the plant to avoid getting water on the leaves.
- Use your built in hydrometer—your finger. Is the soil moist? Add more if necessary.
- Avoid overhead watering on delicate seedlings.





# Under-watering

- You can't look at the soil and see that it's too wet - let your plants show you those signs:
  - Foliage starts to droop or become limp
  - Foliage turns pale
  - Seedlings lack vigor



Master Seed Starting  
<https://organicgardeningacademy.com/courses/741699/lectures/14063673>



# Over-watering

- **\*Symptoms of too much and too little water are often very similar.\***
- **Seedlings that lack water:**
  - Can be limp
  - Lack vigor
  - Foliage turns yellow
  - Foliage will look dry





# To fertilize or not to fertilize?

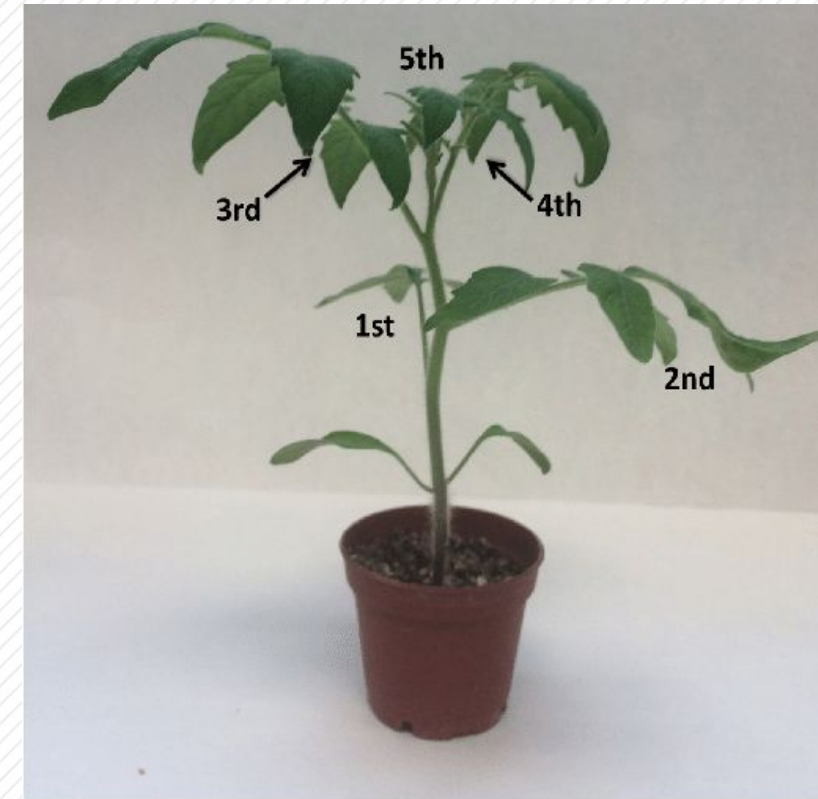
- Your goal for indoor plant starts is to have a compact, healthy plant to transplant in 6-8 weeks.
- Plants don't need extra nutrition support from germination until they have their first set of true leaves
- Some people have great success by not fertilizing until transplant.
- Too much fertilizer promotes vigorous but lanky growth. Plant isn't strong--fragile stems.



# Keys to healthy plant starts-nutrition

**\*When seedling has 2 sets of true leaves--about 3-4 weeks\***

- If your seedling is in a tiny container, repot it into a larger container with a good quality potting soil.
- If your seedling is in a 4-inch pot with seed start mix you can use a very dilute liquid fertilizer. **Do NOT use granular fertilizer.**
- E.g., diluted fish emulsion or ¼ strength Miracle Gro
- If you need to water again during the week, use lukewarm water only.



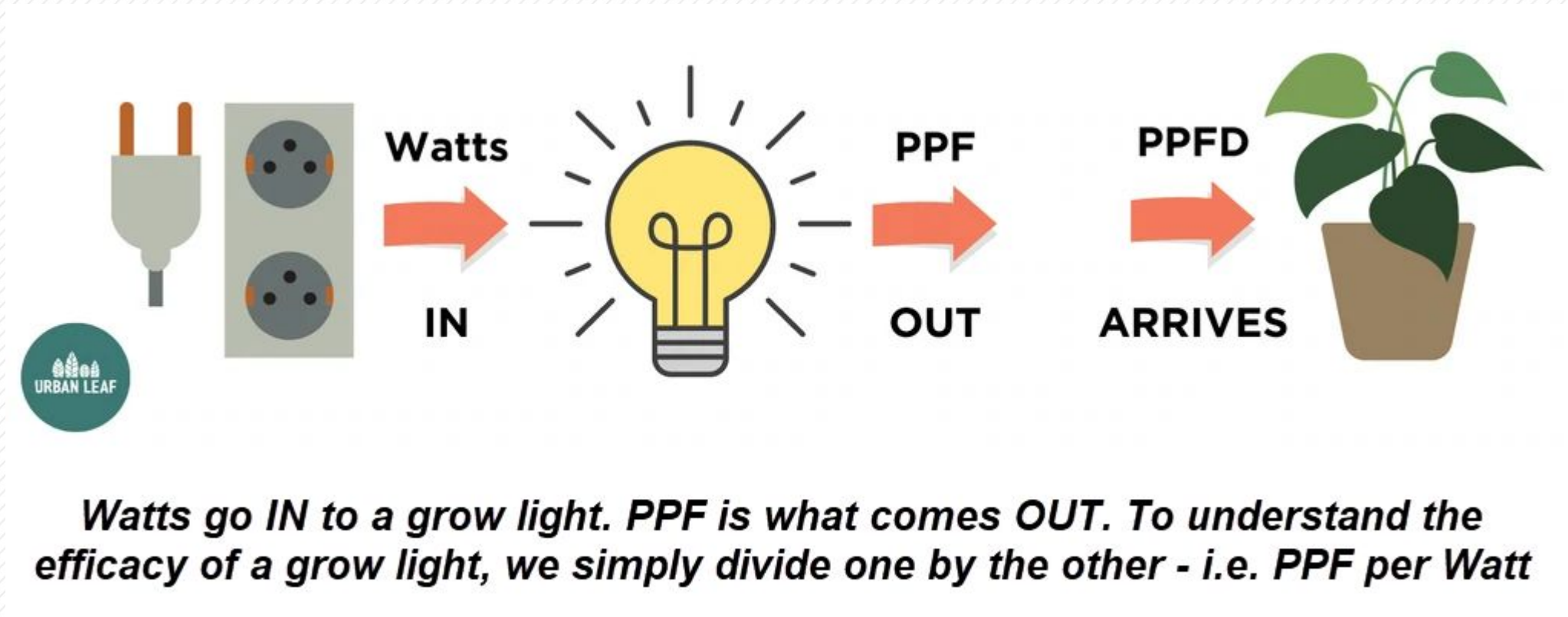


# Keys to healthy plant starts-light

- Start lighting 2 days before expected germination
- Provide **16-18 HOURS OF LIGHT** from a fluorescent or LED grow light
- A combination of cool white and natural daylight (full spectrum) tubes provides good light for plants—
- **Fluorescent bulb must be 2 inches above the TOP OF THE SEEDLINGS—NO MORE THAN 2-3 INCHES ABOVE SEEDLINGS at all times.**
- **Distance varies with LEDs**



# Keys to healthy plant starts-light



We are interested in how much “photosynthetically active radiation” a a plant receives.





# About lighting

- **Cheap-shop lights: Cool, white tubes (40 watts) produce light in the blue and yellow-green and are okay for greens & veggie transplants**
- **Or buy two bulbs--5000-5600K and 6500K**
  - can produce healthy, stocky salad greens and vegetable transplants.





# About lighting

- More \$\$ full-spectrum fluorescent tubes (“grow lights”) produce a balance of warm (red) and cool (blue) light.
  - Thicker stems, better leaf growth, flower production.
- Seedlings don’t really need red (warm) light.
- LEDs: Cheap  expensive
  - Experiment with distance from plant-start at 6 inches above the seedling--move closer or farther away



# About lighting

Grow-light  
bulbs



iPower GLT5XX4 Head Start T5 54W  
6400K Fluorescent 4' Grow Light System  
\$54

**Barrina 2FT T8 Grow Light, 144W  
(6 x 24W, 800W Equivalent)**



Limited time deal

-20% \$55.99 (\$9.33 / Count)

List Price: \$69.99

Size: 2FT

2FT  
\$55.99  
(\$9.33 / Count)  
prime

4FT  
\$79.99  
(\$13.33 / Count)  
prime

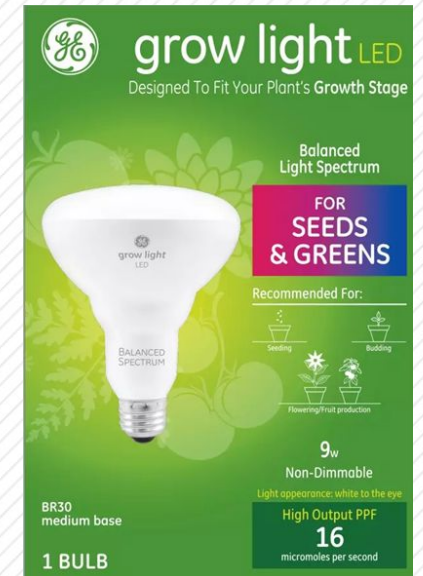


Good prices on  
this LED

<https://www.amazon.com/Barrina-Equivalent-Bright-Spectrum-Sunlight/dp/B082ZL1O63>



SANSI  
Grow Light  
Bulb Full  
Spectrum  
10W Grow  
Lamp



Good LED Choices

~ \$10, 6 inches from top of seedlings



Model	Balanced Seeds & Greens		
	PPF	Low Light Plants (leafy greens, herbs)	High light plants (tomatoes, cucumbers, peppers)
BR30	16	9 in. above plant; space additional lamps 15 in. apart. 18 hours per day	6 in. above plant; space additional lamps 9 in. apart. 18 hours per day

# About lighting

- **Reflective walls** increase your PAR ratings by 20-35%
  - Flat white paint is inexpensive and easy to clean, light reflectivity around 80%
  - Styrofoam very cheap and durable, 60-70% light reflectivity
  - Mylar is cheap and has a **90-95% reflectivity.**

○ Aluminum



insulation board





# Lamp spacing

- The closer you can get your lights to the plants *without burning them*, the better.
  - 16-18 hours a day
  - For **fluorescent lights**, 2-3 inches above the plants,



<https://extension.umd.edu/resource/care-vegetable-seedlings>



# Lamp spacing

- For LEDs--start with manufacturer's recommendations, and monitor your plants. Or use the chart below as a guide.
- Too little light--leggy plants stretching/bending for the light
- Too much light--bleached out, yellow, pale leaves, that may stop growing, leaves may wither and fall from plant
- Solution--1.) shorter duration of light, or 2.) more distance from light
- TAKE NOTES!

9-10 watt LED

BR30	16	9 in. above plant; space additional lamps 15 in. apart. 18 hours per day	6 in. above plant; space additional lamps 9 in. apart. 18 hours per day
------	----	--	---

LED wattage	Distance from top of plant
200-399	12-20"
400-599	20-27"
600-799	30-38"
800-999	32-42"
1,000+	36-46"

SOURCE:

<https://www.greenhousetoday.com/how-far-a-way-should-led-grow-lights-be-from-plants/>

# Too much light



# Not enough light

# ★ Optimum lighting ★





# Lamp spacing

Clever idea: DIY PVC tube light stand--Inexpensive and it works!

[Instructions](#)

If these are fluorescent lights, are they the correct distance above the top of the seedlings?

How about if they are LEDs?

What do you think about the plants at the edges? Are they getting enough light?



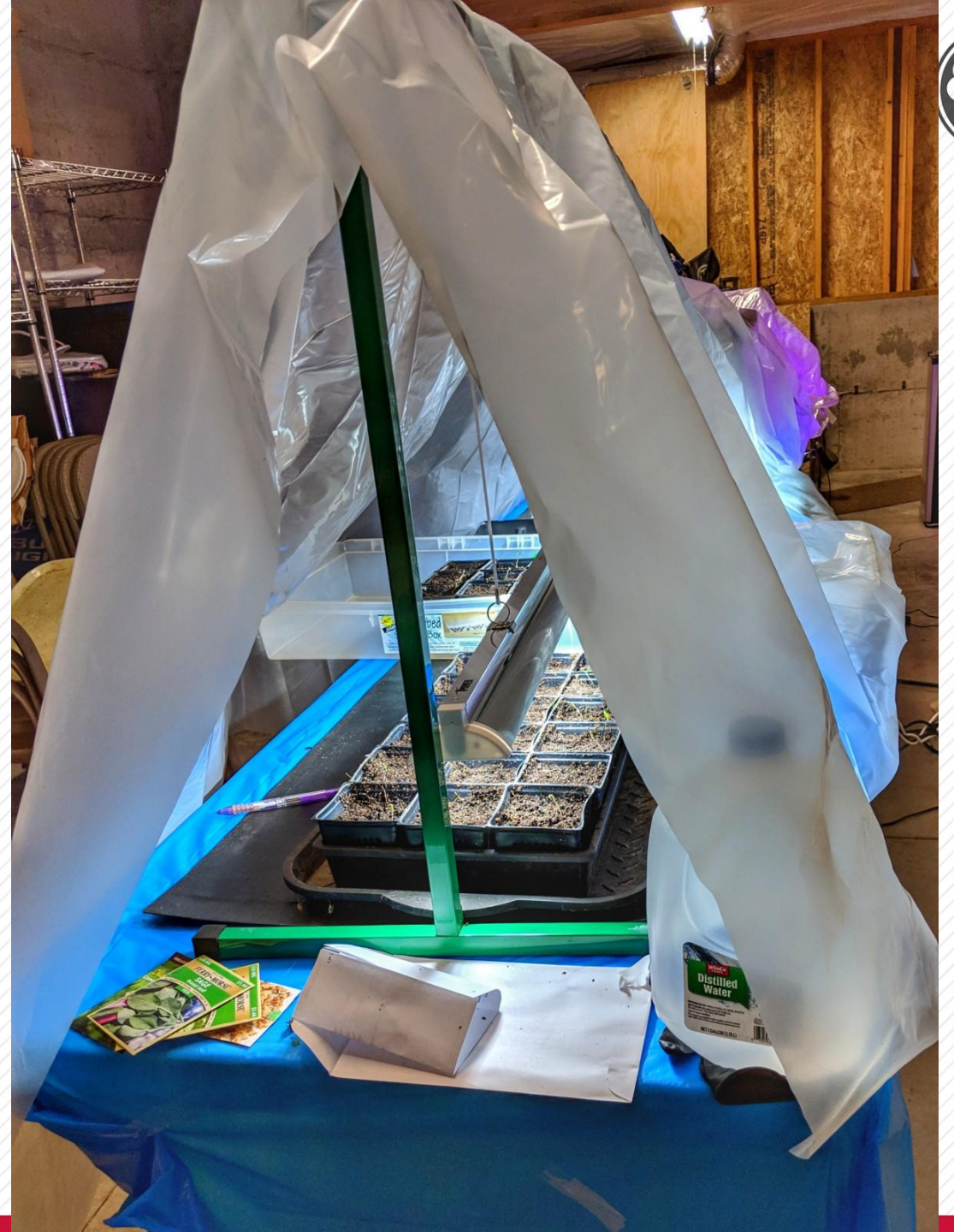


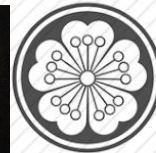
# Keys to healthy plant starts-Air flow

- Help to prevent fungal disease
  - "Damping Off"
- Discourages fungus gnats



Clip-on fan at one end to keep air circulating to help prevent damp rot (fungal disease).







# What next? Up-potting

**Transplant into a larger pot when seedlings are 4-5 inches tall and have 2 pair of true leaves.**



# What next? Up-potting

- Plastic cups with holes punched in their bottoms work well.
- Partially fill with moistened **POTTING SOIL** (not seed start mix)



18 oz Red Plastic Cups



[https://youtu.be/ed8OR49Bj4k?si=OdIoNVuBv\\_JE7RIT](https://youtu.be/ed8OR49Bj4k?si=OdIoNVuBv_JE7RIT)

*Cut a v-shaped opening in the side of the cup near the bottom. Place the larger cup in the transparent cup. Water from the bottom--water will wick up through the soil. When the water is touching the **BOTTOM** of the cup, it doesn't need water. Let the soil dry out a bit between watering--the soil should be moist, not soggy.*





# What next? Up-potting

- **Lift seedlings by the root ball using a spoon or plant tag for support if necessary.**
  - **Never hold the seedling by its stem, as you may crush it, or harm the growing tip.**
- **If you feel the need to steady the plant from above, lightly hold the plant by a leaf.**

# What next? Up-potting

- For TOMATOES ONLY—PINCH OFF all the leaves except the newest 2-4 leaves, BURY THE STEM and roots UP TO THE TWO LEAVES







# Stronger, bushier plant

- Gently brushing the tops of your transplants with your hand or wooden stick will help control their height and increase stockiness.
- Pinching tomato seedlings back to  $\frac{1}{4}$  inch above where the leaves emerge when they are 4 to 6 inches tall to force new growth.
- Works for any tomato plant. This does not affect fruit set.
- Plants can be pinched again as soon as new growth grows 2 to 3 inches, if necessary.





# Troubleshooting-No Germination

**If your seeds aren't germinating, some reasons include:**

- **Seeds are potentially too old.**
- **Seeds are planted too deep.**
- **Soil is: too wet, too dry, too heavy, or compacted**
- **Soil was out of preferred germination range.**
- **Seeds may have needed special treatment.**
- **Seeds were poor or inferior quality.**

# Troubleshooting-Damping off

## Prevention:

- Use lightweight, sterile soil. Garden soil is likely to contain the pathogen which causes damping off.
- Start with clean equipment and containers.
- Remove the humidity dome or cover as soon as seeds have germinated to prevent humidity around the tender sprouts.
- Provide good - and constant - air circulation.



Damping off.

*Photos: Michelle Grabowski, UMN Extension*





# Troubleshooting-Leggy Seedling

If seedlings grow leggy, stretched and thin; it can be caused by:

- Humidity dome or cover
- Weak light volume
- Excessive fertilization
- Over watering
- Overcrowding





# Troubleshooting-Leggy Seedling

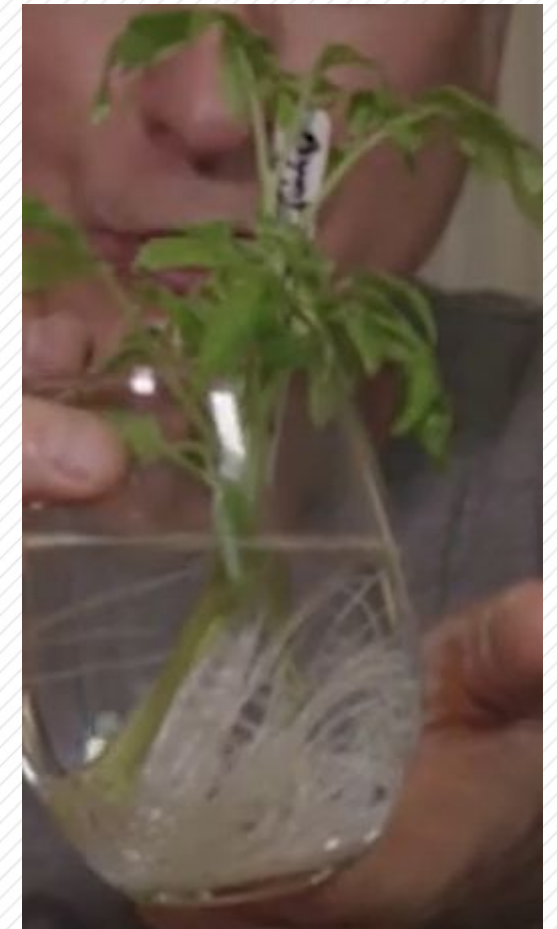
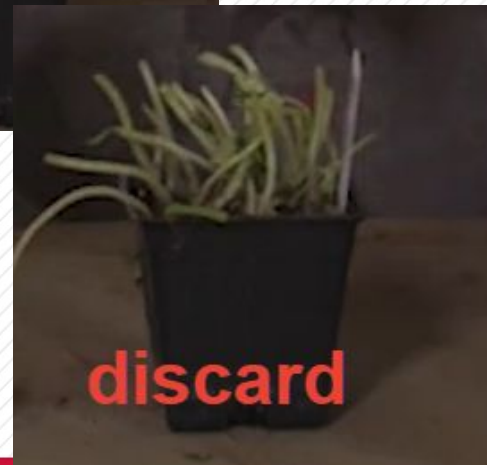


*Seedlings suffering from limited light and too much water.  
Photo: Chris Barth*



# Troubleshooting-Leggy Seedling

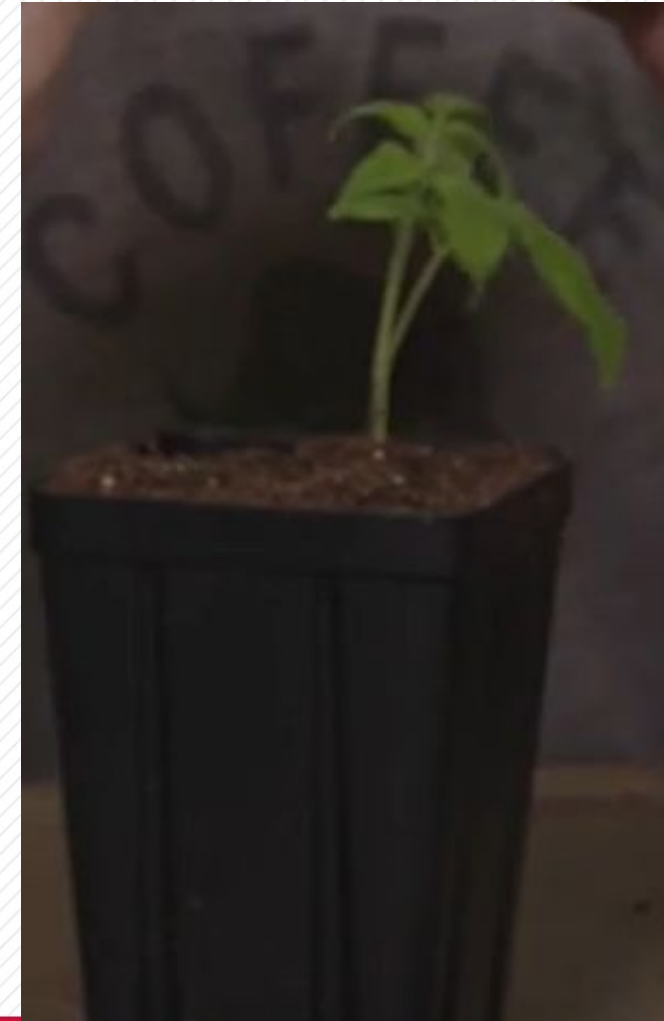
- **Snip ' Dip—Cut them in half! Snip the top of the leggy seedling, discard the stems and roots**
- **Root cuttings in water—roots in one week!**





# Troubleshooting-Leggy Seedling

- Transplant 2 weeks after Snip 'n Dip







# Troubleshooting-Stunted Growth

- **Nutrient Deficiency**
- **Excess Salt Content**
  - **Can occur if using coconut coir harvested near ocean**
  - **Run water through soil medium for 15-20 minutes**
- **Excess light- growth will stop**
  - **Also dried, discolored leaves**
  - **More distance between lights and plants**
  - **Timers to adjust light**



# Troubleshooting-Discolored foliage

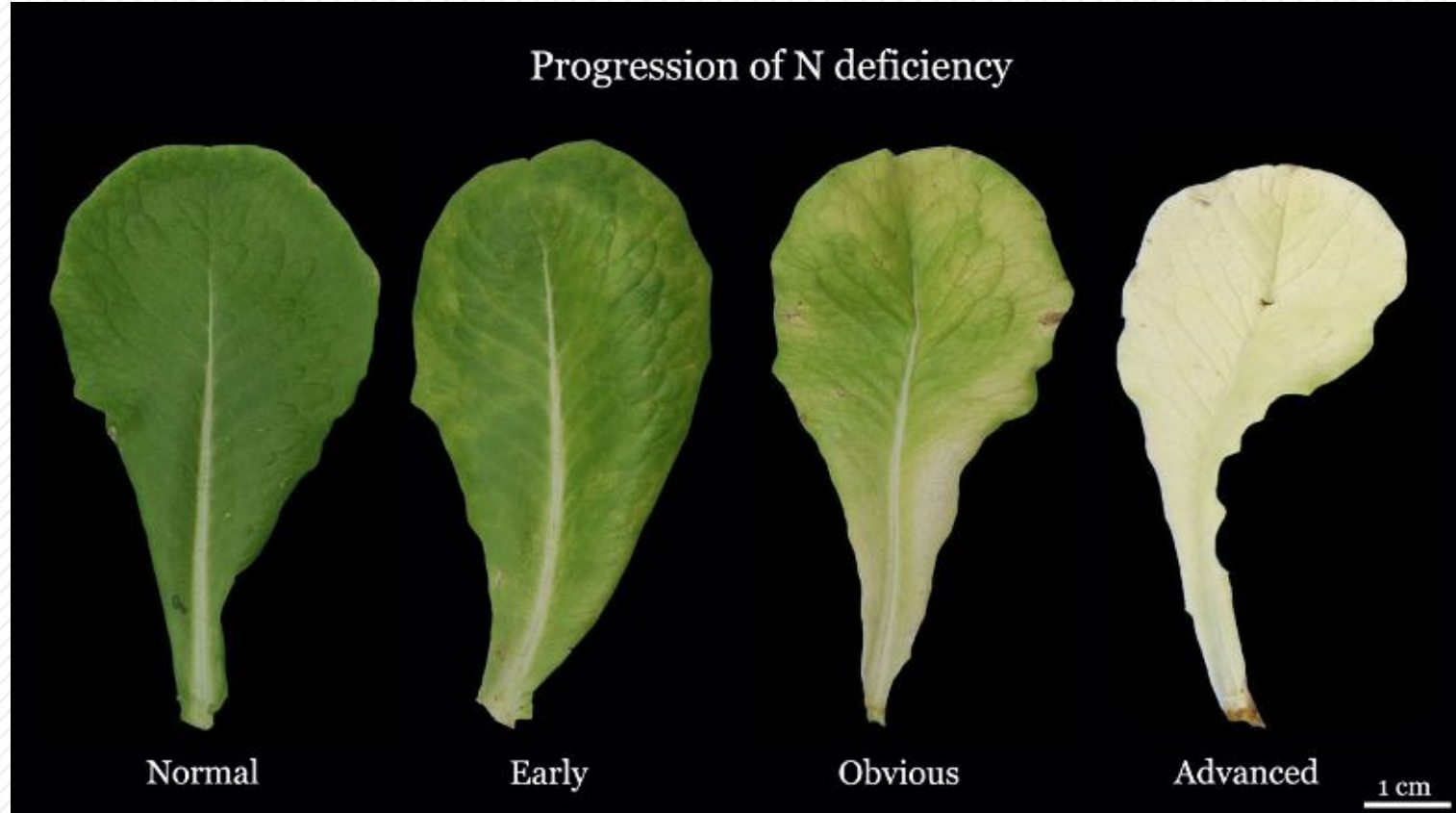
- Nutrient deficiency-
- Yellow—low nitrogen, soil too dry or too wet.
- Red underside of leaves, phosphorus deficiency— Give seedling mild fertilizer with higher middle number **NPK**





# Troubleshooting-Discolored foliage

- **Nutrient deficiency-**
- **Yellow—low nitrogen, soil too dry or too wet.**





# Troubleshooting-Discolored foliage

- Bleached white or tan—light is too intense, especially if top leaves are bleached.
- \* Improper soil moisture »  
Excess light—adjust lighting time and distance
- Excess heat can also cause pale leaves—greater separation from lights





# Troubleshooting-Wilting

- Transplant shock — root disturbance
- Be careful when transplanting — they'll recover within 48 hours





# Troubleshooting Hardening off

- Sun is **POWERFUL**
- Leaves will look bleached.
- Dappled sunlight for 20, 40, 60 minutes on successive days, gradually increasing over the period of about a week.



# Troubleshooting Brown leaf tips

- **FERTILIZER BURN!!**
- **Apply fertilizer at  $\frac{1}{2}$  or  $\frac{1}{4}$  strength**
- **Stop fertilizing, flush pot with water.**
- **Within a week, new foliage should look good.**





# Troubleshooting Insect pests

## Fungus gnats

- Usually don't damage seedlings
- Ease off on watering - don't allow the soil surface to remain wet.
- Buy yellow sticky traps, or make your own using yellow index cards coated with Vaseline (much safer for beneficial insects)





# Questions?



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WSU EXTENSION  
Cowlitz County



For information about becoming a **WSU Extension Master Gardener in Cowlitz Co.**, contact Gary Fredricks, [garyf@wsu.edu](mailto:garyf@wsu.edu), 360-577-3014 ext. 3



**WASHINGTON STATE**  
UNIVERSITY



<http://mastergardener.wsu.edu/>



# Resources

- ❑ Growing Tomatoes [http://extension.oregonstate.edu/mg/metro/sites/default/files/growing\\_tomatoes.pdf](http://extension.oregonstate.edu/mg/metro/sites/default/files/growing_tomatoes.pdf)
- ❑ [The ultimate resource for gardening in Washington](http://gardening.wsu.edu/): Gardening in Washington State  
<http://gardening.wsu.edu/>
- ❑ Growing Your Own: A Practical Guide to Gardening <https://extension.oregonstate.edu/pub/em-9027>
- ❑ [Home Vegetable Gardening In Washington](https://s3.wp.wsu.edu/uploads/sites/2071/2014/04/Home-Vegetable-Gardening-in-WA-EM057E.pdf) (Fantastic resource)  
<https://s3.wp.wsu.edu/uploads/sites/2071/2014/04/Home-Vegetable-Gardening-in-WA-EM057E.pdf>
- ❑ Planting and Harvest Schedule-Oregon Tilth:  
[https://tilth.org/app/uploads/2015/02/OT\\_PHCalendar\\_Archive.pdf](https://tilth.org/app/uploads/2015/02/OT_PHCalendar_Archive.pdf)
- ❑ DIY PVC Light Stand <http://extension.umd.edu/growit/food-gardening-101/pvc-light-stand>
- ❑ [Growing Tomatoes Guide: from seed to garden planting](#)
- ❑ Build a light stand from PVC pipe <https://www.instructables.com/Grow-Light-Stand/>