Seed Starting Basics Presentation, December 12

with *Terri Kelly*, Master Gardener

Why Start Seeds Indoors?

- Get a head start on your garden – Starting seeds indoors allows you to gain a few precious weeks of growing time to beat the summer heat
- Allows young, tender plants to grow in a stable, controlled environment
- While some nursery starter plants are grown nicely, others may be of poor quality and don't thrive once they're home
- A much wider range of plant varieties is available as seeds
- Saves money
- Plant when it makes the most sense for you
- Share/trade extra seeds and plants with friends
- Plus, planting your own seeds is fun...*you'll enjoy watching them grow!*

Research & Planning

- Decide what you want to grow and **Make a Seed List**
- Use the internet to research **Tips & Troubleshooting** on your selected plants
- Develop a **Seed-starting Schedule** ahead of time as a guideline to know when to start your seeds
- Determine if the seeds you want to plant can be directly sown outdoors or whether you can get a *jump start by starting them indoors*
- It is helpful to **Plot out your Garden Beds and/or Containers** so you have an idea of how many transplants you will need to grow
    - Depending on your success and the percentage of germination for the seeds sown, you might want to double the number of seeds to plant
    - You can always share any extra transplants with friends

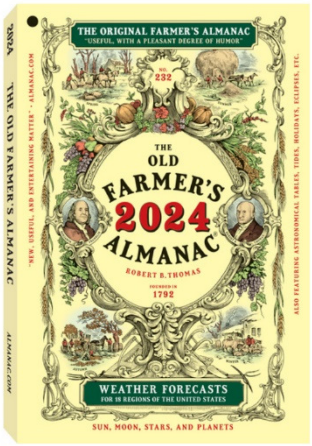
Refer to a Planting Calendar for your area, such as the *Old Farmer's Almanac*
https://www.almanac.com/gardening/planting-calendar/zipcode/85395

For Fall (Cold Hardy) Plants

- When is the first frost for your area? *Typically Dec. 16th*
- Based on end of Summer Temperatures, most Fall seeds can be directly sown outdoors, such as Beets, Broccoli, Carrots, Chives, Kale, Lettuce, Spinach, and Turnips

For Spring Plants

- Calculate when the last frost is for your area? *March 1*
- How long will the seeds take to propagate before hardening them off and transplanting them outdoors?
- Always refer to your seed packets for instructions



- Just remember that there isn't a hard-and-fast rule about what you can start indoors and outdoors; it varies by your experience, personal preference, location, and the plant itself

In the case of the **Seed Starting Challenge, the herbs you will be starting need to be as mature as possible for the March 30th Plant Sale--you're starting them in mid-December.

--The key to a successful garden is planning--

Typical Seed Starting Supplies

- Seedling tray with cells, drip tray, and clear cover
- Seed starting soil mix or peat-type pods/discs
- Face mask (optional)
- Supplemental LED grow lights (w/ timer optional)
- Heat mat (optional)
- Spray bottle "mister"
- Plant labels and marker
- Seeds
- Watering can with rain nozzle (optional)
- Balanced water-soluble fertilizer
- Journal (optional)

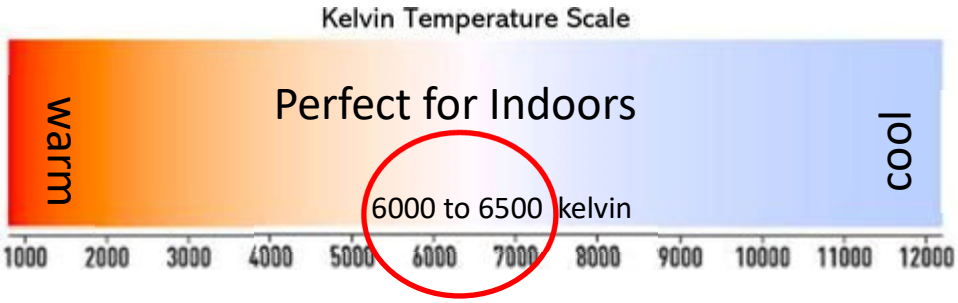
10 Steps to Seed Starting

Step 1: Light – Light – Light

- In order to grow healthy seedlings, you will need a bright window that gets as much direct sunlight as possible—typically a south-facing window
- However, seedlings need at least 12 to 16 hours of light each day, so ***supplemental lighting*** will be needed 99% of the time using Fluorescent or LED bulbs
- Full-spectrum bulbs provide a balance of cool and warm light that represents natural sun light; full-spectrum lighting is the best for growing plants
- Set-up a shelving system or build a DIY Grow Light station on a budget
  - Refer to *The Rusted Garden* on how to build an inexpensive seed starting box

Grow Lights

- There is a whole science behind Grow Lights, so do your research before buying
- Germination requires very bright light, typically 5000+ lumens and 5000+ kelvin



- Since most LED bulbs do not reach the 5000 lumen value, you'll need to keep the light about 2-inches above the seedlings, adjusting as the plant grows.
- You can add multiple lights to increase the lumen value
- Once your seeds have fully germinated, you can start to back off on the hours of light needed each week to 14, then 12, then 10 hours

--There is a whole science behind Grow Lights--

NOTES: 'Kelvin temperature' is the metric used to describe the visual color that a light emits. As you can see in the chart, 'warmer' light temperatures that have a red color have a lower Kelvin rating. On the other end of the spectrum are 'cooler' temperature lights which have a blue color and higher Kelvin rating.

Different temperatures of light have different impacts on plants. Generally, higher temperatures (blue) light encourages photosynthesis which leads to bushy plants that don't feel inclined to elongate and reach for more light. This is great if you want to grow in a compact space.

Lower temperature (red) light reduces photosynthesis and signals to plants that that it's time to flower and produce fruit. Plants put under a red light will also be more inclined to stretch and grow taller, as opposed to growing bushier and more compact.

The perfect temperature for germination is 6000–6500 Kelvin that mimics planting a seed outdoors in the sunshine.

Step 2: Choosing the right container

- You can start seeds in almost any small container *as long as it allows drainage*, but the easiest and most efficient choice is a <u>seedling tray with cells</u>
- Other options include egg cartons, plastic cups, recycled yogurt containers, toilet paper rolls, or DIY newspaper seed starting pots

***Check out videos online to learn more about the "Double Cup Method."*

- **Cell Size:** Your decision on what cell size to use may be based on whether you plan to up-pot seedlings (transplanting to a larger pot), how sturdy the seedlings are, or whether you'll use larger cells to overseed or to avoid disturbing plants when they are ready to be transplanted outdoors
- **Drip Tray:** You will need a drip tray to water your seedling containers from the bottom (recommended) or to catch draining water
- **Clear Cover:** You'll need a clear cover, which is essential for keeping in moisture and heat while your seeds germinate

--There are so many options for containers--

Invest in a Seed Starting Kit

Or build your own...

Step 3: Prepare your seed starting soil

- Seed-starting mix is a soil-less medium for starting seeds. It is light and airy so it doesn't compress the delicate roots of baby seedlings
- Option: Purchase seed starting pods or discs

Fiber Soil Discs

- Create your own DIY seed starting mix that is relatively inexpensive, and ensures that the mix is clean
- Typical seed starting mix is made up of three simple ingredients that you can store indefinitely: Peat Moss, Perlite, and Vermiculite

Recipe for Seed Starting Soil:
1 Part Coco Coir (a substitute for peat moss)
1 Part Perlite
1 Part Vermiculite
Add a Handful of Worm Castings (optional)

Question: ***Why can't I just use Potting Soil?***

- You'll likely have more success starting seeds in a soil-less medium
- Potting soil is heavier and composed of compost, manure, earth soil as well as peat moss and some vermiculite
- The issue is that most bagged potting soil:
  - May be infused with different amounts of fertilizer which can burn your seedlings if they are sensitive, preventing them from even getting started
  - They may also hold too much clay, which can create too much moisture
  - They might have large chunks of organic debris such as bark which hinders the seed from making contact with the growing medium
  - They will most likely contain fungi or bacteria that will cause issues such as 'damping off' which kill the growing seedling

Should You Sterilize Your Seed Starting Soil?

- Even newly purchased bags marked sterile are 99% likely to carry "fungus gnat eggs" *...you'll want to avoid gnats when starting seeds indoors*
- Using soil from your garden or re-use potting soil can introduce disease to your young and vulnerable seedlings
- Bake in the over or use boiling water in a bucket to sterilize; let the soil cool

Filling Your Containers

- Before filling your containers, place the soil in a clean bucket or large bowl, sprinkle with tepid water, and mix to moisten it evenly
- Dampen the mix to the consistency of a wrung-out sponge; slightly damp, but not soaking wet; this also helps later to wick-up water from the tray bottom
- Fill your containers with pre-moistened seed starting mix to within 1/2-inch of the top of the container; press gently or tap to remove any air pockets
- Or you can try using the Rusted Garden's "**Thumb Pack**" method; then add another layer of soil to the top before sowing

**One of the most <u>important</u> things you can do is ensure that your seed starting mix is sterile. However, it is an extra step you may not want to deal with.

The Rusted Garden YouTube site recommends using boiling water to sterilize your soil...other methods include baking it in the oven. Add soil to a baking pan (3 to 4 inches deep), cover with foil, and bake at 200°F for 30 minutes or when the soil temperature reaches 180 degrees. Anything higher than that can produce toxins. Let cool. Keep covered to remain sterile.

If you plan to add worm castings to your seed starting mix, make sure the sterilized soil has completely cooled down first.

Step 4: Sow your seeds

- Some seeds may require a period of pre-chilling (in the refrigerator) or soaking; some need complete darkness while others require light to germinate. Do your research and refer to your seed packets
- If the seeds are tiny, like Thyme or Oregano, sprinkle just a few of them over the soil depending on your cell size; if they're larger, like pumpkin, or nasturtium seeds, you can push 2 seeds into the soil in each cell (one is a backup in case one doesn't germinate). Typically 3 to 5 seeds per cell is sufficient
- ***A good rule of thumb*** is to plant the seed to the same depth as its thickness. For example, lettuce seeds need only a tiny sprinkling of soil to cover them but a nasturtium should be covered with about 1/4" of soil
- Cover the seeds with soil, press down gently so the seed makes contact with the soil, and mist the soil surface with water
- Alternatively, you could pre-sprout your seeds and actually SEE the seeds germinate before planting in containers. Search *Pre-sprouting Seeds*

--Don't forget to Label containers with the seed variety and sowing date—

**Try Pre-sprouting Seeds by germinating seeds using a damp paper towel in baggies.

TIP: If you have seeds that are several years old, pre-sprouting is a good way to check if they are still viable. Even if only half sprout, it is better than throwing out older seed packets.

- **Keep your seeds warm and humid.** The hardest part of starting seeds indoors is providing the optimal temperature, light, and humidity levels for them to germinate and sprout into seedlings
- Cover the containers with a humidity dome or clear plastic to keep in moisture
- Most seeds need <u>soil temperatures</u> of 65°F to 70°F to germinate
    - If needed, place the trays in a warm, draft free location near a heat source, on top of a refrigerator, or use a seedling heat mat
    - You will usually need to water more frequently when using heating mats
    - In our climate, a Heat Mat is optional. Once your seeds have germinated, you can remove the heat mat
- Turn the lights on about 4 to 5 days after sowing to ensure any newly germinated seeds have an immediate light source. (16 hour per day to start)
- Germination varies, so refer to your seed packet. For example, Basil can take 5 to 10 days; Chives 7 to 14 days; Italian Parsley 14 to 30 days...
- Some seedlings may need to come out of the seed starting kit earlier than others, so plan to sow similar seed germination types together

Step 5: Keep soil moist but not soggy

- A spray bottle/mister is perfect for keeping the soil damp but not soggy while you wait for your plants to germinate and also while the seedlings are tiny
- Check your seed trays daily for germination, mist with water if the soil surface has dried out, and wait for seeds to emerge from the soil

TIP: Dark color is a good indicator of wet soil; water when soil turns light brown

- It is recommended that you water your seedlings from the bottom if using plastic cells. Even water gently dispersed from a watering can could flatten your seedlings. An alternative is to use a turkey baster if watering from the top
- Just fill the solid tray underneath your containers with an inch or two of water, which will be absorbed by the soil, keeping the seedlings safe from floods
- Once the soil is dark in color, it has soaked up all the water needed. Make sure to dump out any excess water. You don't want seedling trays sitting in water
- Suggest you fill a large watering can or bottle with tap water and let it sit for a few hours to a day to warm to room temperature; chlorine will also dissipate

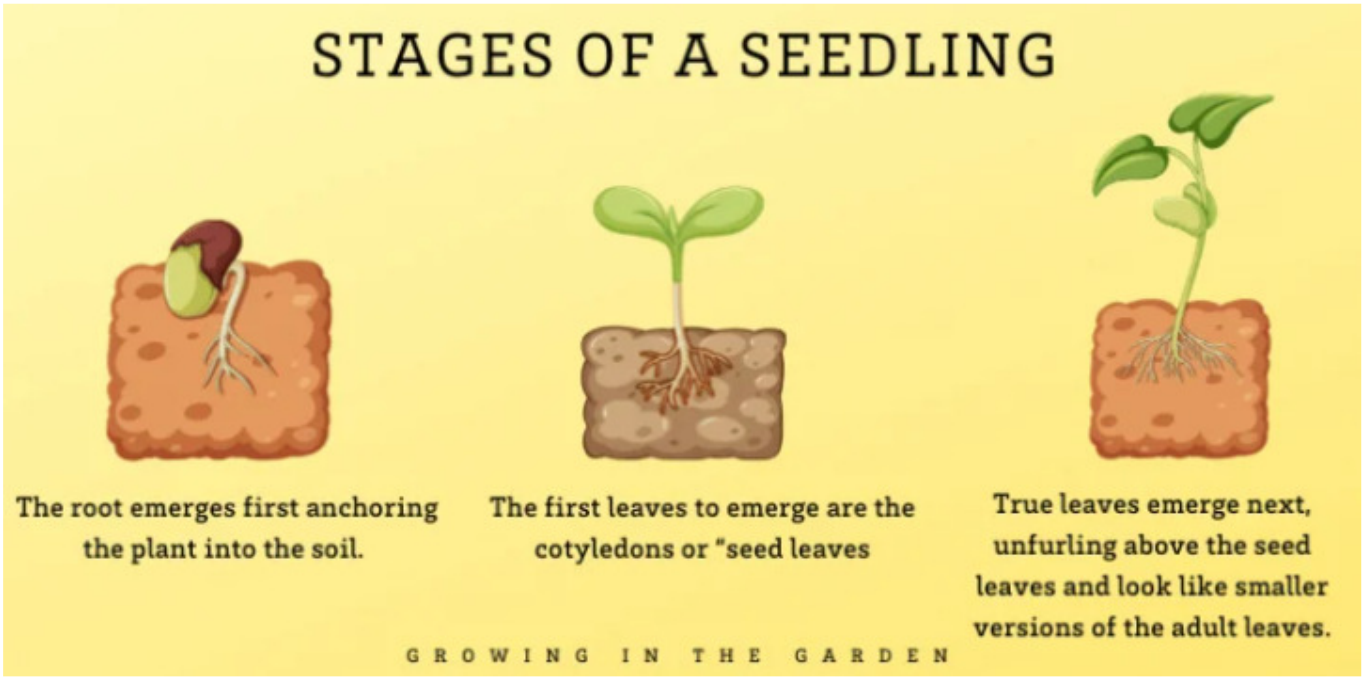
--Seedlings aren't much for cold showers!--

- Germination is the most important time when using your grow lights

TIP: If your LED Grow Light has a Red setting; do not use during germination

- Once 50% of the seeds have sprouted, remove the humidity dome; keeping LED grow lights within 2-inches of the tops of seedlings
- Start to reduce the grow light hours to 14, then 12, then 10 after the first week

**Remember, lower temperature (red) light reduces photosynthesis and signals to plants that that it's time to flower and produce fruit. Plants put under a red light will also be more inclined to stretch and grow taller, as opposed to growing bushier and more compact. Stick with 6000–6500K (Bright White) light during germination.



Step 6: Fertilizing

- When seeds first sprout, they are able to survive on nutrients found within the seed's internal tissue (called endosperm); this food source doesn't last long
- Since most seed starting mixes do not contain any nutrients, you'll need to start adding fertilizer to your watering routine
- Once the second set of leaves form, also referred to as the plants "true leaves" it is time to begin fertilizing your seedlings
- Begin a fertilizing regimen using 1/4-strength, organic liquid fertilizer each time you water. Suggestions include liquid fish fertilizer, kelp/seaweed, or worm casting tea. Each brand is different; so follow the instructions on the label

TIP: You cannot over fertilize when using Kelp/Seaweed

Seed Starting Challenge: For those of you participating in the Seed Starting Challenge, you'll be using AgroThrive Organic General Purpose Fertilizer [N(3)-P(2)-K(2)]

--Nitrogen (N), Phosphorus (P), and Potassium (K) are primary macronutrients--

**Think – Up (N), Down (P), and All Around (K) to help you remember

Step 7: Thinning

- Thinning involves selecting the strongest plants and removing the extra
- Suggest that you allow 2 seeds to sprout per cell or container that are not too close together
- Remove any extra plants so these seedlings can grow strong and healthy
- The easiest way to do this and with the least amount of root disturbance is to snip the unwanted seedlings at the soil line
- You can also try to transplant the extras into separate pots, but you risk damaging the roots and stunting growth –*Some plants are hardier than others*
- This is another reason why some gardeners like to pre-sprout seeds; planting only those seeds that sprout …No thinning required

--Never pull (yank) seedlings out of the container--

Demonstrating the Separation Method—*Gently...*

Step 8: Up-potting to a larger container

- Some seedlings will outgrow their tray cells and need to be transplanted to a larger containers so they can continue to grow at a healthy pace
- Once the roots fill the container, it is time to repot the seedlings
- Water the seedlings well before transplanting. This will help contain the soil around the roots and reduce transplant shock
- Use a good quality potting mix and pre-moisten before filling your containers part way so the root ball sits 1/2-inch below the rim of the new container to accommodate watering
- Remove the seedling gently from its original container by squeezing the sides of the tray cells and inverting; try not to mangle the roots or pull from the stem
- Gently center the seedling in the new container, fill in the sides with potting mix, and tamp it in lightly until you have filled the gaps
- Label your container and return the plant to your lighting station
- Water the repotted transplant well, and then allow the soil surface to dry out before watering again

**Exception: If you are transplanting tomatoes, try to bury as much of the stem as you can. Unlike other plants, tomatoes will grow extra roots along the portion of the stem below the soil that helps the plant thrive.

Step 9: Harden off

- Several weeks before transplanting your seedlings to the garden, begin to harden off your seedlings to adapt to outdoor conditions
- Allow at least a week to harden off seedlings before transplanting to the garden. Depending on the weather, sometimes two weeks are necessary
- Place your plants outdoors in a protected spot for a few hours on the first day, such as on a patio table under an umbrella to shade them from the sun
- Gradually increase the amount of time that the seedlings spend outside by a couple of hours each day to allow the plants to adjust depending on weather
- Alter the shade or move the seedlings to a location that receives morning or evening sun, so they are exposed to a little more sun each day
- Even filtered sunlight and light breezes can deplete your plants' moisture, so check on them frequently and give them enough water, so they do not wilt
- You want your plant's energy to be focused on establishing roots and growing rather than surviving once they are transplanted outdoors

--Hardening off is an important step to reduce plant stress--

Step 10: Transplant seedlings

- Once your seedlings are hardened off, they are ready to be moved to their permanent growing location in containers or the garden
- Choose a cloudy day with no wind and transplant in the early evening to give your plants time to adjust without the additional challenge of the sun
- Make the hole a little wider than your container, but about the same depth
- Center the plant in the hole, pull the soil in from the sides, and firm it in lightly
- Use a watering can to deliver a gentle shower of water at the base of the plant
- You may see some wilting the first day, but plants should quickly perk up
- Water frequently until the seedlings become established and begin to grow
- Let the soil dry slightly between watering
- Once the seedlings become established, add mulch to help hold in soil moisture; keep the mulch a few inches away from the stems of your seedlings
- Monitor temperatures carefully; unexpected temperature dips are rare but do happen, and you may need to cover some plants to protect them

--Pamper your newly planted seedlings until they become established--

Summary

Good Seed Starting Practices

- Practice good sanitation – Keep planting materials and tools clean
- Choose a growing medium formulated specifically for starting seedlings
- Make sure your seed starting containers have drainage holes
- Moisten the soil before you sow your seeds – Use tepid water (68°–77°F)
- Consider pre-sprouting seeds or using a Kelp booster to speed up germination
- Press seeds firmly into the soil – Seed to soil contact is critical for germination
- Water-in gently using a mister and from the bottom – Avoid washing away seeds
- Keep soil consistently moist, but not oversaturated
- Use a humidity dome, plastic wrap or other cover to maintain moisture and warmth
- Provide supplemental lighting indoors – Window light alone is not sufficient
- Maintain optimal soil temperature for germination – Use a heat mat if necessary
- Consider purchasing a soil thermometer to ensure optimal temperatures (65°–70°F)
- Some seeds will germinate unevenly, despite being in the same tray – Be patient
- Remove tray covering as soon as seeds have germinated – Avoid dampening off
- Fertilize lightly at first, allowing soil to moderately dry between waterings
- Don’t let seedlings become rootbound – Up pot to a larger container
- Harden-off to acclimate your seedlings to outdoor conditions before transplanting