



Photo Nancy Knauss Penn State Extension

Starting Vegetable Seeds Indoors

Charles County Maryland
Master Gardeners

UNIVERSITY OF
MARYLAND
EXTENSION



GROW IT · EAT IT

A MASTER GARDENER PROGRAM

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mail:
U.S. Department of Agriculture
Office of the Assistant Secretary for Civil Rights
1400 Independence Avenue, SW
Washington, D.C. 20250-9410; or

fax:
(833) 256-1665 or (202) 690-7442;

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program.intake@usda.gov.

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**Charles County Master Gardeners
GROW IT EAT IT Education Project Team:**

Tina Bailem, Michelle Chenault, Beth Grem, Lori Guido, Kathy Jenkins, Meg MacDonald, Kay Redman, Terry Thir

**UMD Home Horticulture Educator/MG
Coordinator - Julia Rycyna**

Welcome

- The mission of the University of Maryland Extension Grow It Eat It (GIEI) Program is to promote backyard and community food production.
- Master Gardeners teach classes and workshops, develop demonstration gardens, and educate Marylanders on how to produce their own affordable and healthy food using sustainable gardening practices in their homes, communities, and school gardens.

<https://go.umd.edu/giei>

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What do seeds need?

Water

Without water, seeds will remain dormant. The amount of water is critical; too much causes seeds to rot, and too little causes embryos to die.



Image: Univ Of Georgia Extension

Oxygen

Seeds respire - consume oxygen and release carbon dioxide, more as germination proceeds. Seed-starting media needs to drain well enough to meet this need for oxygen.

Temperature

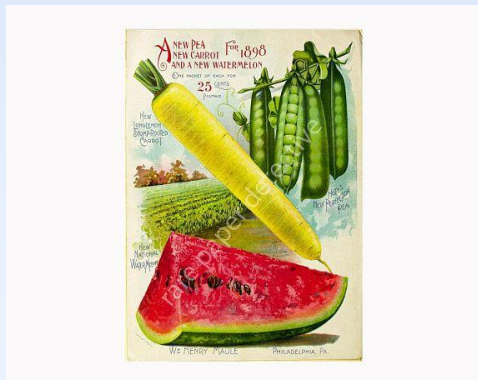
Temperature affects the number of seeds that germinate as well as how fast the seeds germinate.

Light

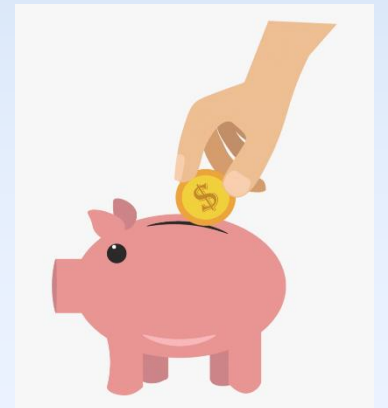
Some seeds require light to germinate, while others require darkness. Some seeds have no preference at all.

Why Start Vegetable Plants from Seeds?

- More varieties to choose from - - no need to plant only what's available in retail stores
- Gives you control over germination conditions - lessens risk of pests, diseases, cold wet weather (can cause seed rot)
- Earlier harvest than direct seeding (for crops that could be done either way)



Saves you money -- this may take a few years since there are first-year set-up costs



Direct Seed or Transplant...?

Best to Direct seed

Root vegetables: beets, radish, turnips, carrots - transplanting can damage roots

Legumes: peas, beans - Advantage in speed is negligible

Optional - start seedlings or direct seed

-Cucumbers, summer squash, okra, kale, leafy greens: lettuce, spinach, chard, Asian greens, melon

Start Seeds for transplants

- Plants that have a long period from seed to harvest must be started indoors and transplanted outside as seedlings.

- **Must** be started for transplanting:

- Fruiting vegetables: tomatoes, eggplant, peppers,
- Brassicas: cabbage, broccoli, cauliflower, Brussel sprouts, collards

Growing medium

POTTING SOIL VERSUS SEED STARTING MIX

Seed Starting Mix

- usually composed of vermiculite and peat, without any true soil. Coconut coir is also used because of environmental concerns with using peat moss.
- sterile, lightweight and free from weed seeds, with a texture and porosity especially suited to germinating seeds

Potting Soil

- Can contain organic material -compost, sticks, sometimes soil. Read the label
- Denser with larger particles - good for plants but not for delicate seeds

Proper Moisture of growing medium is important - too wet and seeds can rot; too dry and they won't germinate

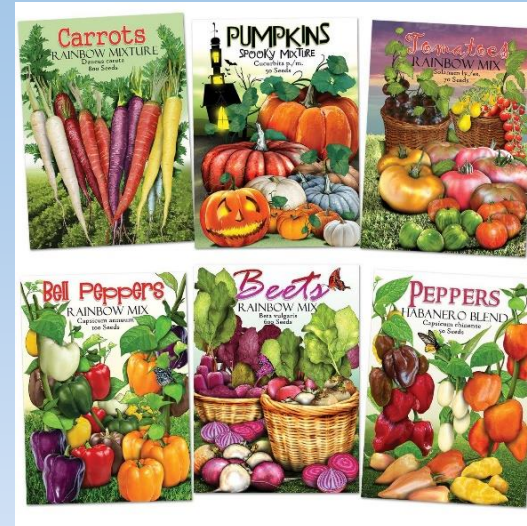
Like a wrung-out sponge



How to Read a Seed Packet

Full Sun or Part Shade?

- Most vegetables need full sun, which means 6 to 8 hours of sun, if grown for leaves or roots;
- Vegetables grown for fruit, like tomatoes and peppers do best with at least 10.
- ***NOTE - Light requirements shown on seed packets are for OUTDOOR growth. There are different light requirements for growing seeds under grow lights.***



When should you plant the seed?
Check the map on the package. It shows when it is safe to plant outside. If you plant too early, the seeds will not grow well.

How to Read a Seed Packet - Cont.



How many days until maturity?

Will you have enough time to grow this plant from seed? The packet will tell you how long it takes until you can harvest the vegetables.

How should you plant the seed?

The packet tells you how deep to plant the seeds and how to thin out the plants when they are seedlings. (Thinning out means you pull out some of the seedlings that are crowded by others.)

The packet will also tell you the best soil conditions for good growing results.

Keep in mind that root vegetables like carrots and radishes will struggle to grow in clay soil. Maybe a container would be a better choice for these.

Popular Vegetable Crops for Beginners



- Herbs
- Lettuces
- Leafy greens
- Bush beans
- Peppers
- Tomatoes
- Cucumber
- Summer squash

LJEmerick

2025 -Year of the HERBS

- *This year in the Master Gardener Grow It Eat It program, we are celebrating all things herbs!*

Herbs are obtained from the leaves of herbaceous (non-woody) plants. They are used for savory purposes in cooking and some have medicinal value.



Spices are obtained from roots, flowers, fruits, seeds, or bark of woody or herbaceous plants. Spices often are more potent and stronger flavored than herbs

Some plants are both herbs and spices. The leaves of *Coriandrum sativum* are the source of cilantro (herb) while coriander (spice) is from the plant's seeds. Dill is another example. The seeds are a spice while dill weed is an herb derived from the plant's stems and leaves.

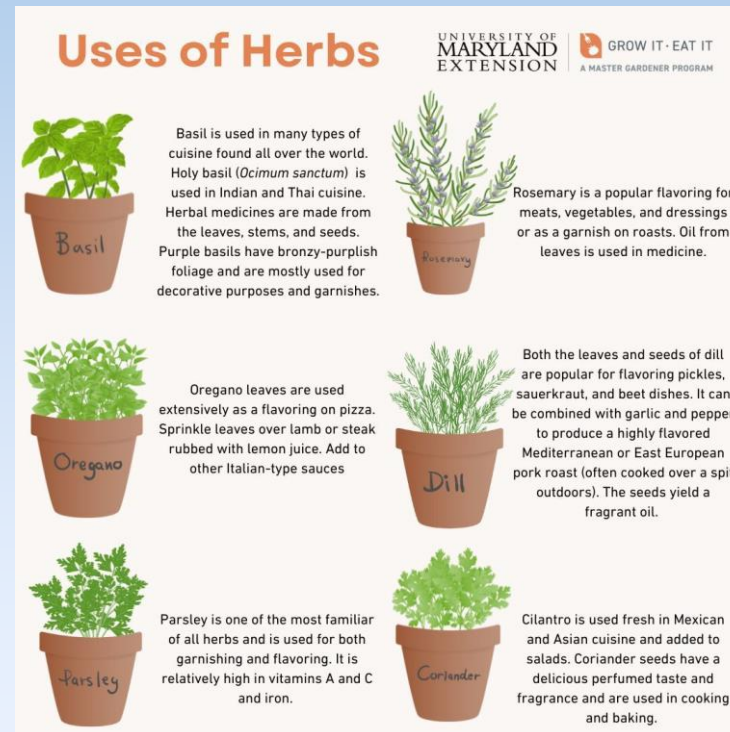
2025 -Year of the HERBS

Herb types

Herbs can be classified as annuals, biennials, and perennials.

Annuals: bloom one season and then die - anise, basil, chervil, coriander, and dill

Biennials: live for two seasons, blooming the second season only - caraway and parsley



Perennials: overwinter and bloom each season once they become established - chives, fennel, lovage, marjoram, mint, tarragon, thyme, and occasionally rosemary (depending on winter severity)

2025 -Year of the HERBS

Starting Herb Seeds



Basil, parsley, sage, marjoram, and many other herbs can be started indoors and planted outside after the danger of frost has passed.

Sow anise, borage, coriander (cilantro), dill, and fennel directly in the garden since they do not transplant well.

Fine seeds, such as marjoram or thyme will spread more evenly if you mix them with sand before planting

Other Indoor Seed-starting Materials



Containers - Almost any clean container may be used for seed starting provided it allows for good drainage and is at least 2" deep

Saucer or tray under seedlings to contain and capture water

Heat or germination mat - useful but not necessary if seeds are kept warm

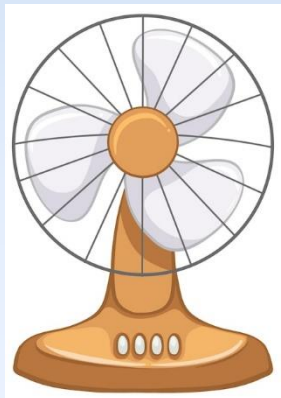
Marker - waterproof

Spray bottle

Timer - for lights

Oscillating fan - to keep air moving once seedlings are growing

Plant labels - waterproof



What do seedlings look like as they grow?



Seeds Planted Jan 7th



After two weeks Jan 21st



After one week Jan 14th



After three weeks Jan 28th

BREAK
10 Minutes

Seed Starting - Light Requirements

Credit: Illinois Extension

- Providing the right Intensity, Duration and Spectrum of light is essential for starting seeds indoors.
 - Interior windows will not grow good seedlings. Not enough light hours (Intensity or Duration).
 - Modern window coatings can inhibit growth (Spectrum). The results are weak and leggy seedlings.
- Fluorescent or LED shop lights are perfect for seed starting. A grow light isn't required.
- Intensity (or brightness) is measured in Lumens. Choose a shop light with a minimum 2000 Lumens.
- Light reduces quickly as distance increases. Keep lights 2-3" above seedlings.
- Seedlings need 14-16 hours of light to grow. They also need 8 hours of darkness to rest.

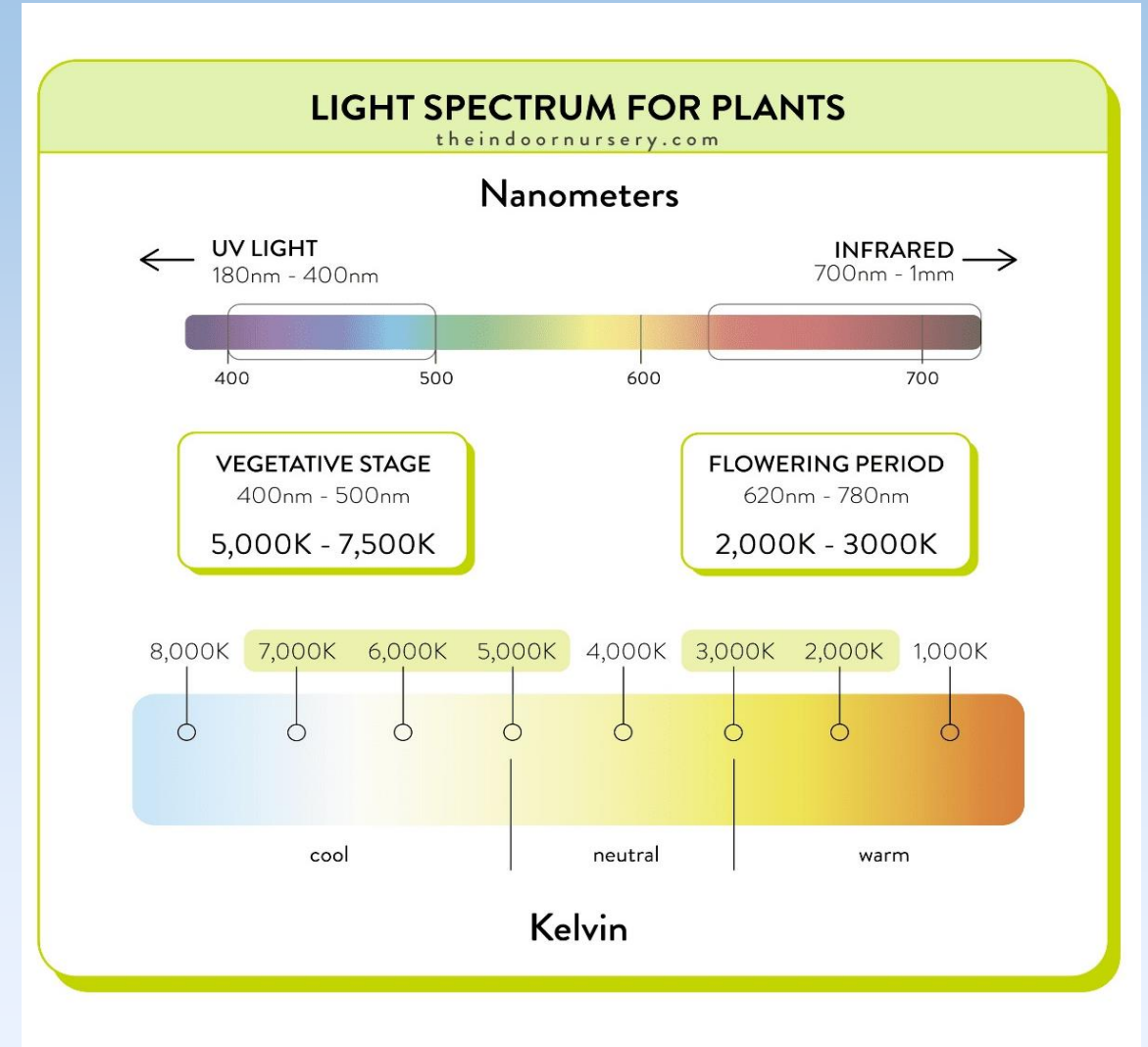
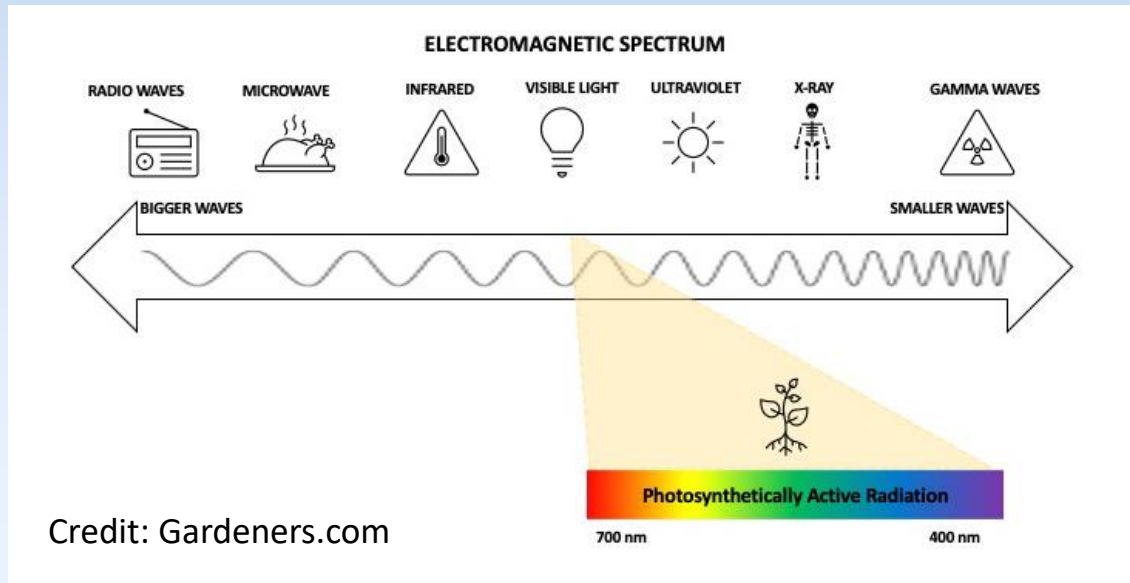


Seedlings grown under insufficient light will often become 'leggy' (etiolated).



Seed Starting - Light Spectrum

- Seedlings need the correct light spectrum to grow.
- Light Color Temperature is measured in Kelvins (K). Lights with white/blue Color Temperature of 5000K and greater are optimal to grow strong leaves, roots and stems.



Seed Starting - Light Color Temperature

- Visual Color Temperatures for Plants
 - White/Blue (cool) 5000K or greater
 - Vegetative Growth
 - Red (warm) 2000-3000K
 - Flowering and Fruiting



Credit: Baseboardsbydesign.com

Seed Starting - Light Requirements Summary

Light Spectrum and Intensity of Light - Bottom line

- Choose Shop lights with a Kelvin (K) value of 5000K or greater and a Lumen value greater than 2000.
- Keep lights 2-3" above seedlings. Run lights 14-16 hours a day.



Seed Starting - Caring For Seedlings

Watering

Wait until the top of your growing medium is nearly dry before watering. Bottom water to prevent over saturation and avoid getting water on leaves.

The goal is to keep the root systems supplied with water and oxygen



Seedlings Damping Off

Credit Univ Of Utah extension

Damping Off

Damping-off is the rotting of seeds in the soil and destruction of newly emerged seedlings by fungi.

Typical symptoms of damping-off are rotting stems at or near the soil line and root decay

To Prevent Damping Off, use sterilized pots or trays with good drainage and use clean, new potting soil to prevent damping off.

Seed Starting - Caring For Seedlings

Fungus Gnats

Fungus gnats are tiny, black flies that are often around indoor plants. They are annoying, but do no harm

The larvae breed in moist soil and feed on fungi in the soil. Letting soil dry out will kill the larvae

Monitor and catch adult gnats with yellow paper sticky traps

Another option is to drench soil using *Bacillus thuringiensis* var. *israelensis* (Bti), a naturally occurring bacterium found in soils.



Fertilizing

If your seed starting mix doesn't contain fertilizer, apply a half strength liquid fertilizer to seedlings once true leaves have formed.

Fertilize weekly until hardening off your seedlings.

Seed Starting - Caring For Seedlings

Thinning seedlings

Gardeners often sow more seeds than are desired as a precaution

Seedlings need to be thinned, so the remaining plants have enough space between them to grow and develop properly. The spacing information can often be found on the seed packet.

Crowded plants are at risk for death from competition for water, light, and nutrients.

Weak or unwanted seedlings should be snipped off with scissors or pinched off at the media level. Don't pull seedlings out, as you can disturb roots of neighboring plants



Photo Univ of GA Extension

Ventilation

Use a small fan to toughen up your seedlings and to increase air flow

Hardening Off your Transplants

- Hardening off is the process of exposing seedlings gradually to outdoor conditions
- Begin hardening off transplants 1-2 weeks prior to setting out plants in your garden.
- An easy way to harden seedlings is to place them outside in a protected spot on warm days, bringing them in at night



Do not put tender seedlings outdoors on windy days or when temperatures are below 45° F

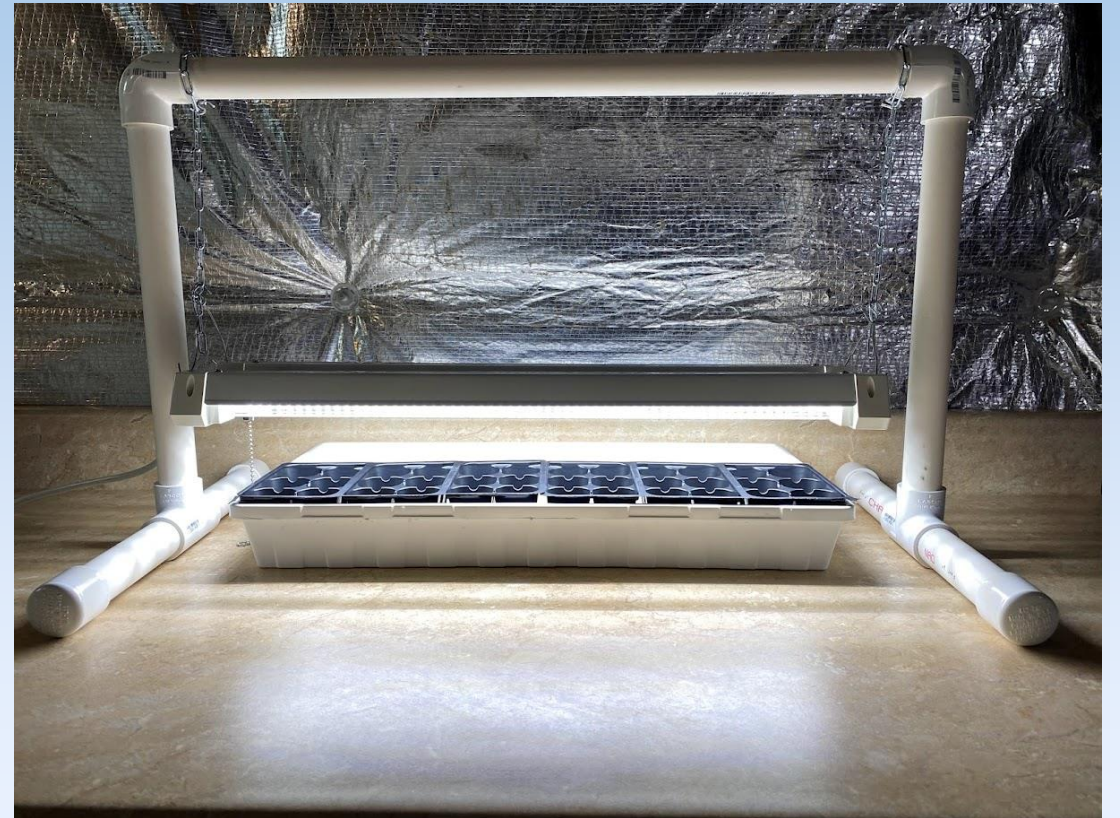
Seed Starting - Build a PVC Light Stand

- Materials
 - One 10' length of 1" PVC pipe
 - Two 1" T connectors
 - Two 1" elbows
 - Four 1" end caps
 - One 4' light fixture
 - Chain and S hooks for hanging light fixture
 - PVC cutter or hacksaw for making cuts
 - Mark the PVC at correct length before cutting!



Seed Starting - Build a Mini PVC Light Stand

- Materials
 - One 10' length of 1" PVC pipe
 - Two 1" T connectors
 - Two 1" elbows
 - Four 1" end caps
 - One 2' light fixture
 - Chain and S hooks for hanging light fixture
 - PVC cutter or hacksaw for making cuts
 - Mark PVC at correct Length before cutting!



Starting Vegetable Seeds - Indoors

• QUESTIONS?

UME Resources

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go.umd.edu/hgic



go.umd.edu/askextension



go.umd.edu/mglocalprograms



marylandgrows.umd.edu

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Resources

-  [Charles County Master Gardener's Grow It Eat It webpage](#)
-  [Vegetable Planting Calendar | University of Maryland Extension \(umd.edu\)](#)
-  [Starting Plants From Seed for the Home Gardener | UGA Cooperative Extension](#)
-  [Food gardening with the CC Master Gardeners and the University of Maryland Extension](#)
-  [Germination Requirements for Annuals and Vegetables | Horticulture and Home Pest News \(iastate.edu\)](#)
-  [Care of Herbs and Starting Herbs from Seed | University of Maryland Extension](#)
-  [Disease Resistant Vegetable Varieties | Cornell Vegetables](#)
-  [Herb Gardening for Beginners | Extension | West Virginia University](#)
-  [UMDHGIC - YouTube](#)
-  [Poor Germination of Vegetable Seeds | University of Maryland Extension \(umd.edu\)](#)

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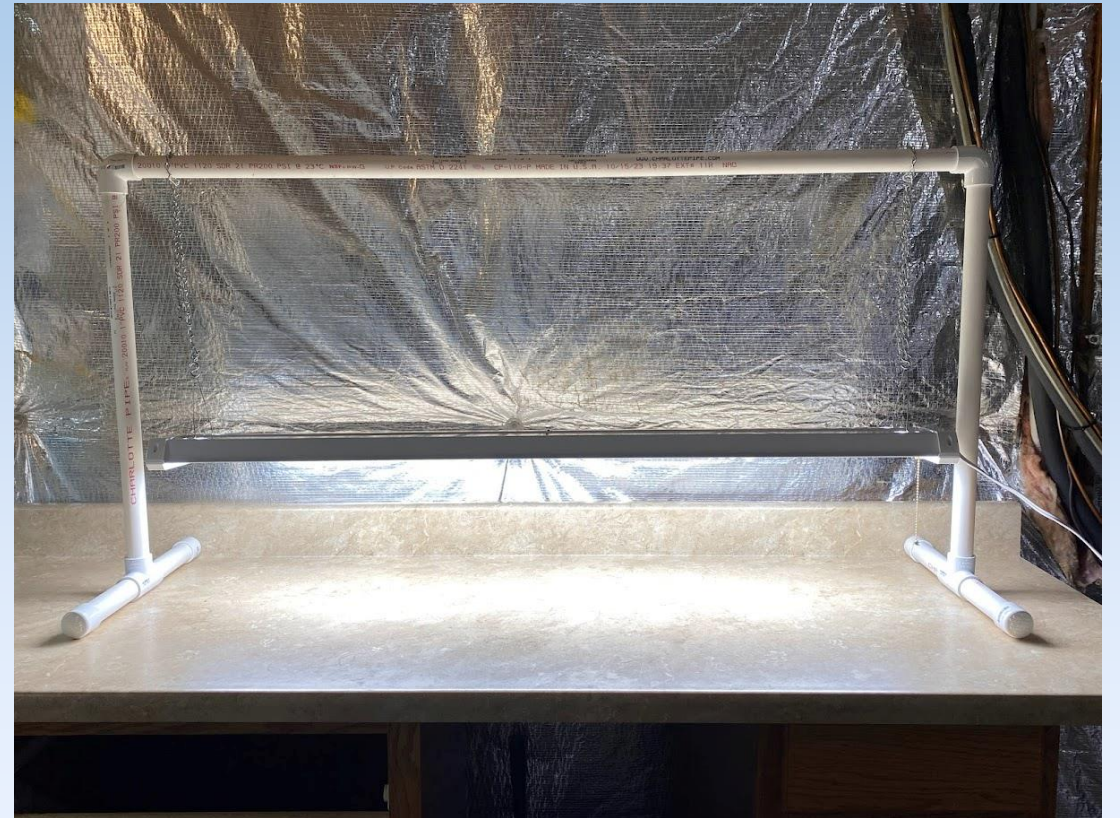
**Resources -
Lamp stand materials and instructions**

Instructions for Lamp Stand

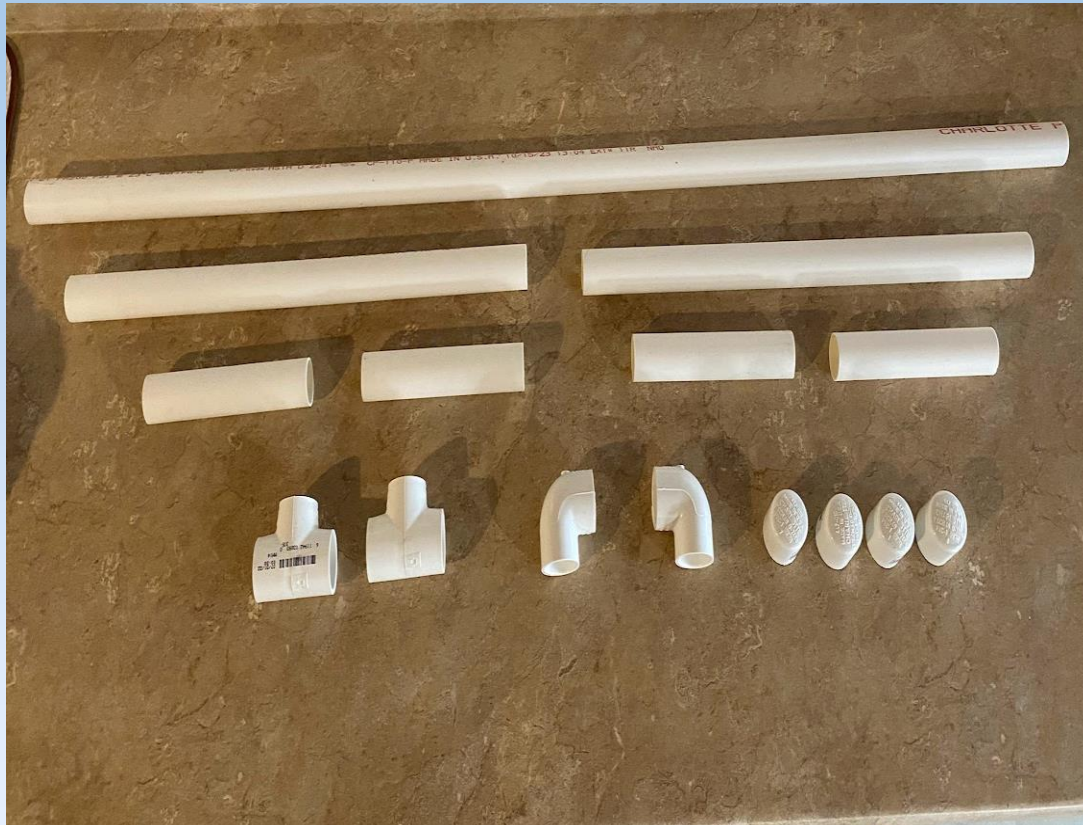
Size: 4' light fixture

Seed Starting - Build a PVC Light Stand

- Materials
 - One 10' length of 1" PVC pipe
 - Two 1" T connectors
 - Two 1" elbows
 - Four 1" end caps
 - One 4' light fixture
 - Chain and S hooks for hanging light fixture
 - PVC cutter or hacksaw for making cuts
 - Mark the PVC at correct length before cutting!



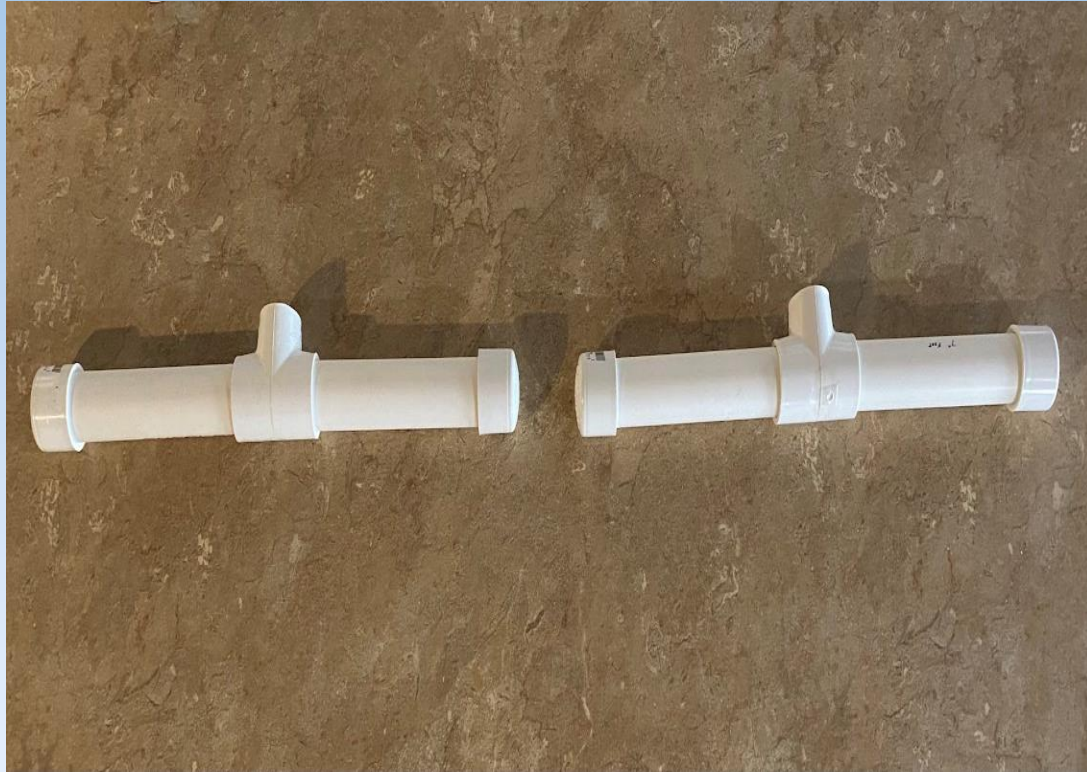
Seed Starting - Build a PVC Light Stand



- Top: 50"
- Sides: 21" (two)
- Feet: 7" (four)

- 1" tee (two), 1" elbow (two),
1" end caps (four)

Seed Starting - Build a PVC Light Stand



Assemble feet with 2 tees and 4 end caps



Insert sides into tee.

Seed Starting - Build a PVC Light Stand



Put elbows on top piece



Assemble top to sides

Seed Starting - Build a PVC Light Stand



Hook chain with S hook to top.

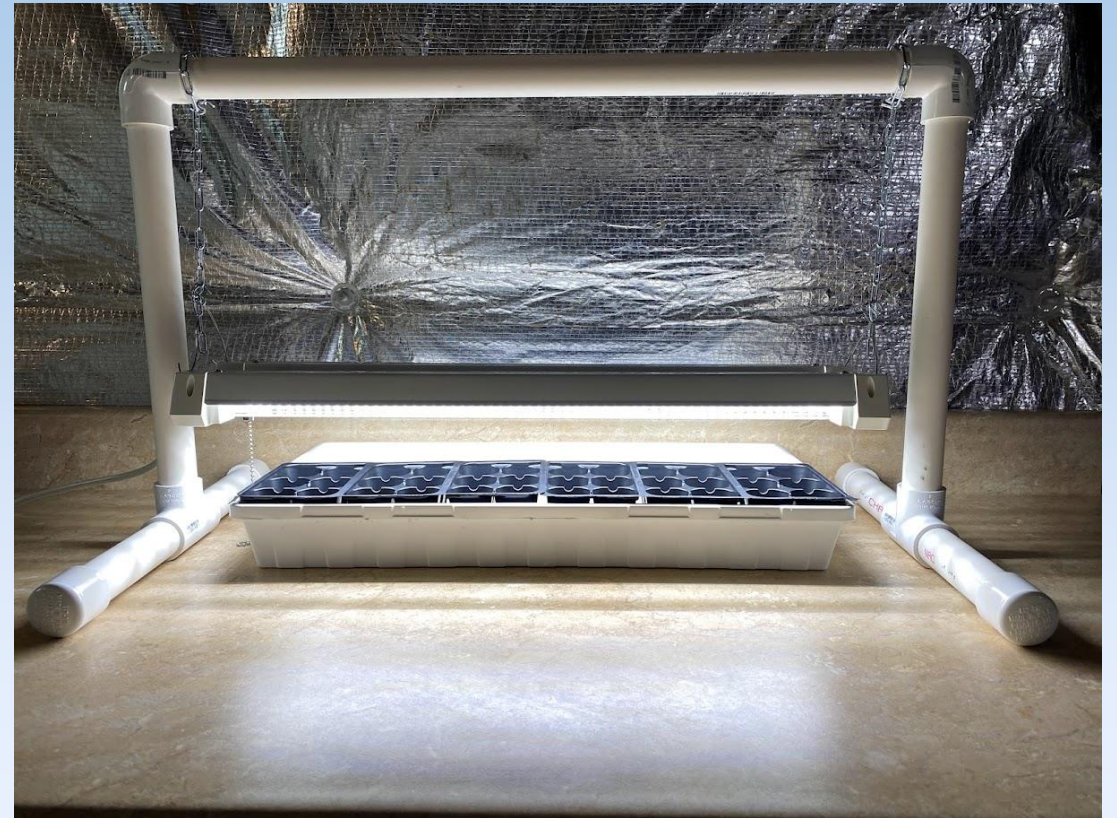


Hang Shop Light

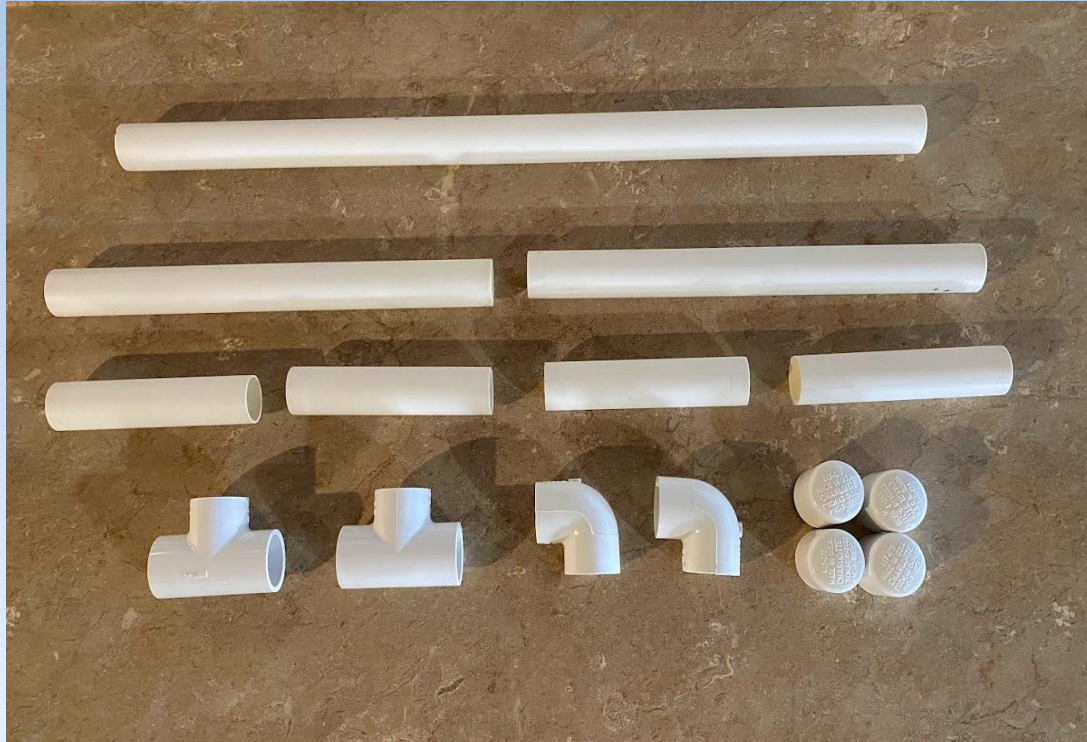
Instructions for Lamp Stand
Size: Mini 2' light fixture

Seed Starting - Build a Mini PVC Light Stand

- Materials
 - One 10' length of 1" PVC pipe
 - Two 1" T connectors
 - Two 1" elbows
 - Four 1" end caps
 - One 2' light fixture
 - Chain and S hooks for hanging light fixture
 - PVC cutter or hacksaw for making cuts
 - Mark PVC at correct Length before cutting!



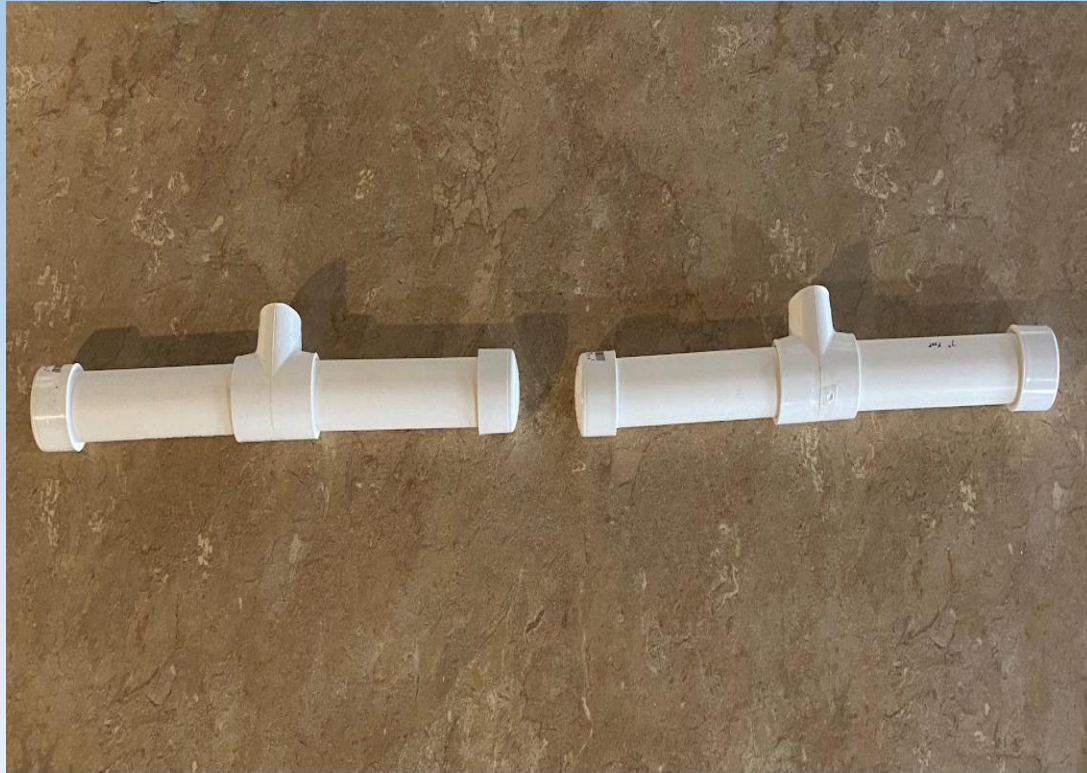
Seed Starting - Build a Mini PVC Light Stand



- Top: 25"
- Sides: 13 1/2" (two)
- Feet: 7" (four)

- 1" tee (two), 1" elbow (two),
1" end caps (four)

Seed Starting - Build a PVC Light Stand



Assemble feet with 2 tees and 4 end caps



Insert sides into tee.

Seed Starting - Build a PVC Light Stand



Put elbows on top piece



Assemble top to sides

Seed Starting - Build a PVC Light Stand



Hook chain with S hook to top.



Hang Shop Light