



Photo Nancy Knauss Penn State Extension

Starting Vegetable Seeds - Indoors and Out

Charles County Maryland
Master Gardeners

UNIVERSITY OF
MARYLAND
EXTENSION



GROW IT · EAT IT

A MASTER GARDENER PROGRAM



AND JUSTICE FOR ALL

In accordance with Federal law and U.S. Department of Agriculture (USDA) civil rights regulations and policies, this institution is prohibited from discriminating on the basis of race, color, national origin, sex, age, disability, and reprisal or retaliation for prior civil rights activity. (Not all prohibited bases apply to all programs.)

Program information may be made available in languages other than English. Persons with disabilities who require alternative means of communication for program information (e.g., Braille, large print, audiotape, and American Sign Language) should contact the responsible State or local Agency that administers the program or USDA's TARGET Center at (202) 720-2600 (voice and TTY) or contact USDA through the Federal Relay Service at (800) 877-8339.

To file a program discrimination complaint, a complainant should complete a Form AD-3027, USDA Program Discrimination Complaint Form, which can be obtained online, at www.usda.gov/sites/default/files/documents/usda-program-discrimination-complaint-form.pdf, from any USDA office, by calling (866) 632-9992, or by writing a letter addressed to USDA. The letter must contain the complainant's name, address, telephone number, and a written description of the alleged discriminatory action in sufficient detail to inform the Assistant Secretary for Civil Rights (ASCR) about the nature and date of an alleged civil rights violation. The completed AD-3027 form or letter must be submitted to USDA by:

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;

email:
program.intake@usda.gov.

This institution is an equal opportunity provider.

Conforme a la ley federal y las políticas y regulaciones de derechos civiles del Departamento de Agricultura de los Estados Unidos (USDA), esta institución tiene prohibido discriminar por motivos de raza, color, origen nacional, sexo, edad, discapacidad, venganza o represalia por actividades realizadas en el pasado relacionadas con los derechos civiles (no todos los principios de prohibición aplican a todos los programas).

La información del programa puede estar disponible en otros idiomas además del inglés. Las personas con discapacidades que requieran medios de comunicación alternativos para obtener información sobre el programa (por ejemplo, Braille, letra agrandada, grabación de audio y lenguaje de señas americano) deben comunicarse con la agencia estatal o local responsable que administra el programa o con el TARGET Center del USDA al (202) 720-2600 (voz y TTY) o comunicarse con el USDA a través del Servicio Federal de Transmisión de Información al (800) 877-8339.

Para presentar una queja por discriminación en el programa, el reclamante debe completar un formulario AD-3027, Formulario de queja por discriminación del programa del USDA, que se puede obtener en línea, en www.usda.gov/sites/default/files/documents/usda-program-discrimination-complaint-form.pdf, en cualquier oficina del USDA, llamando al (866) 632-9992, o escribiendo una carta dirigida al USDA. La carta debe contener el nombre, la dirección y el número de teléfono del reclamante, y una descripción escrita de la supuesta acción discriminatoria con suficiente detalle para informar al Subsecretario de Derechos Civiles (ASCR, por sus siglas en inglés) sobre la naturaleza y la fecha de la presunta violación de los derechos civiles. La carta o el formulario AD-3027 completado debe enviarse al USDA por medio de:

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

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

correo electrónico:
program.intake@usda.gov.

Esta institución ofrece igualdad de oportunidades.

University programs, activities, and facilities are available to all without regard to race, color, sex, gender identity or expression, sexual orientation, marital status, age, national origin, political affiliation, physical or mental disability, religion, protected veteran status, genetic information, personal appearance, or any other legally protected class.

UNIVERSITY OF
MARYLAND
EXTENSION

MASTER
GARDENER 



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

- Tina Bailem**
- Michelle Chenault**
- Beth Grem**
- Lori Guido**
- Kathy Jenkins**
- Meg MacDonald**
- Terry Thir**

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>

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

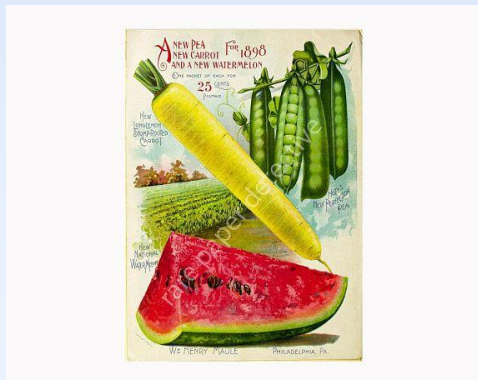
Temperature affects the number of seeds that germinate as well as how fast the seeds germinate.

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
- 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

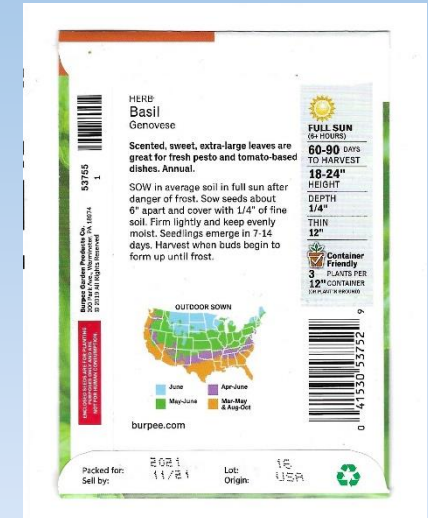
Full Sun or Part Shade?

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.

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.



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 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

2024 -Year of the HEIRLOOM TOMATO!



Image: Univ Of FL IFAS

When selecting seeds, know your Tomato Terminology

- Hybrid vs. heirloom - Heirloom tomatoes are older, open-pollinated cultivars grown for unique qualities and for seed saving
- Hybrid tomatoes are a cross between different cultivars, developed to get the best qualities of each parent. Seeds saved will not grow true.

Determinate vs. Indeterminate - Determinate tomatoes grow to a certain height and then stop; they set fruit within a short period of time.

Indeterminate tomatoes grow and produce throughout the season

Resistance codes:

V = Verticillium Wilt

F = Fusarium Wilt

FF = Fusarium Wilt race 1 and 2

N = Nematode

T = Tobacco Mosaic Virus

A = Alternaria (Early Blight)

TSW = Tomato Spotted Wilt

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
Plant labels - waterproof

Marker - waterproof

Spray bottle

Timer - for lights

Oscillating fan - to keep air moving once seedlings are growing



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

Seed Starting - Light Requirements

- 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. An expensive "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.

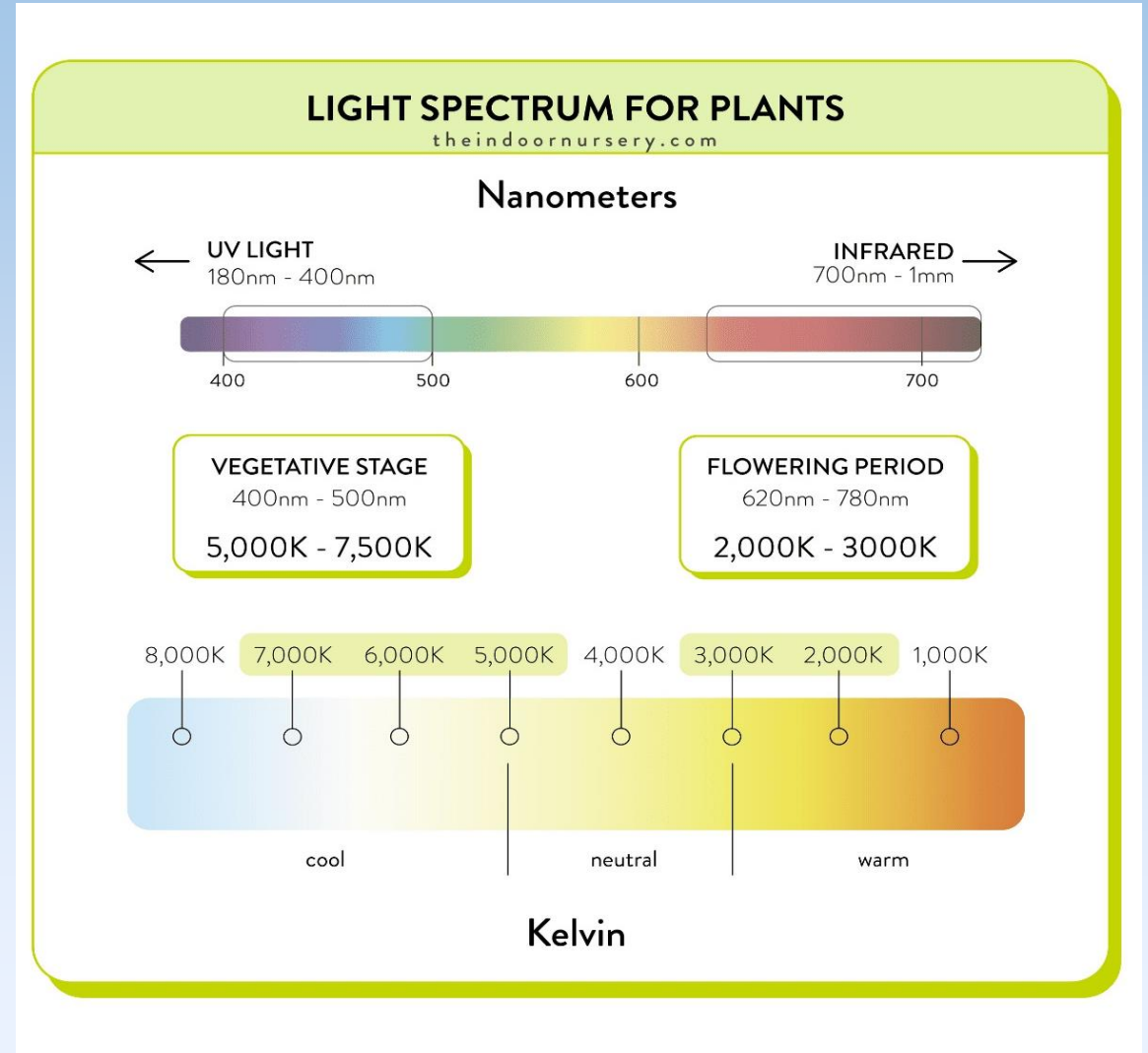
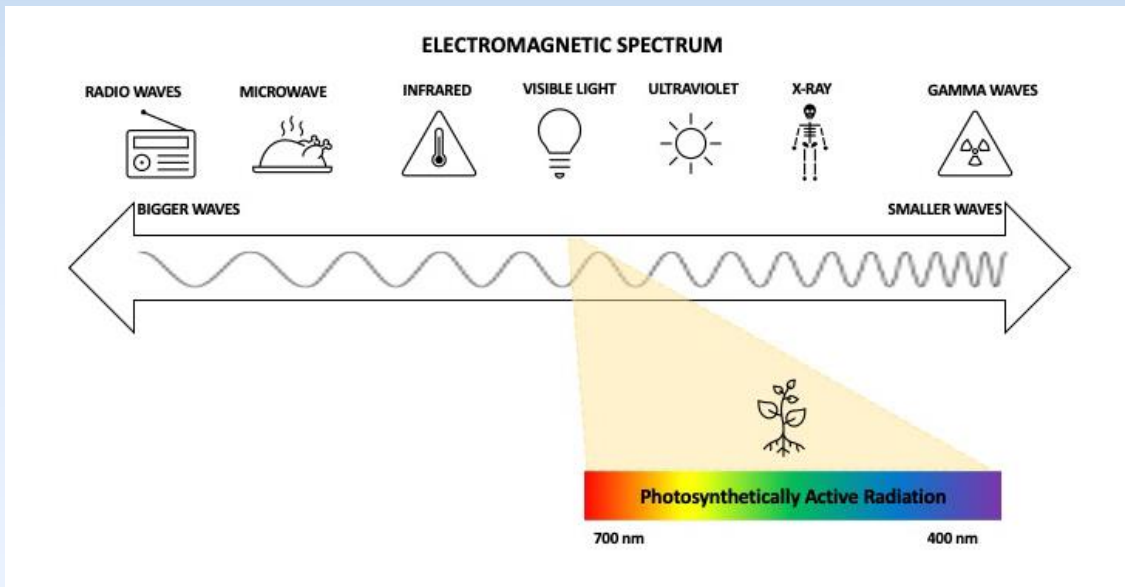


Inadequate Light



Seed Starting - Light Spectrum

- Seedlings need the correct light spectrum to grow.
- Light Color Temperature is measured in Kelvins (K). Seedlings need a light that is rated at 5000K or greater.
- 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



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.
- The goal is to keep the root systems supplied with water and oxygen.
- If containers are too wet, damping-off fungi can quickly kill seedlings.
- Wet conditions can also promote fungus gnats.
 - Use yellow sticky traps to control adult fungus gnats.

• Ventilation

- Use a small fan to toughen up your seedlings.

• 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.

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

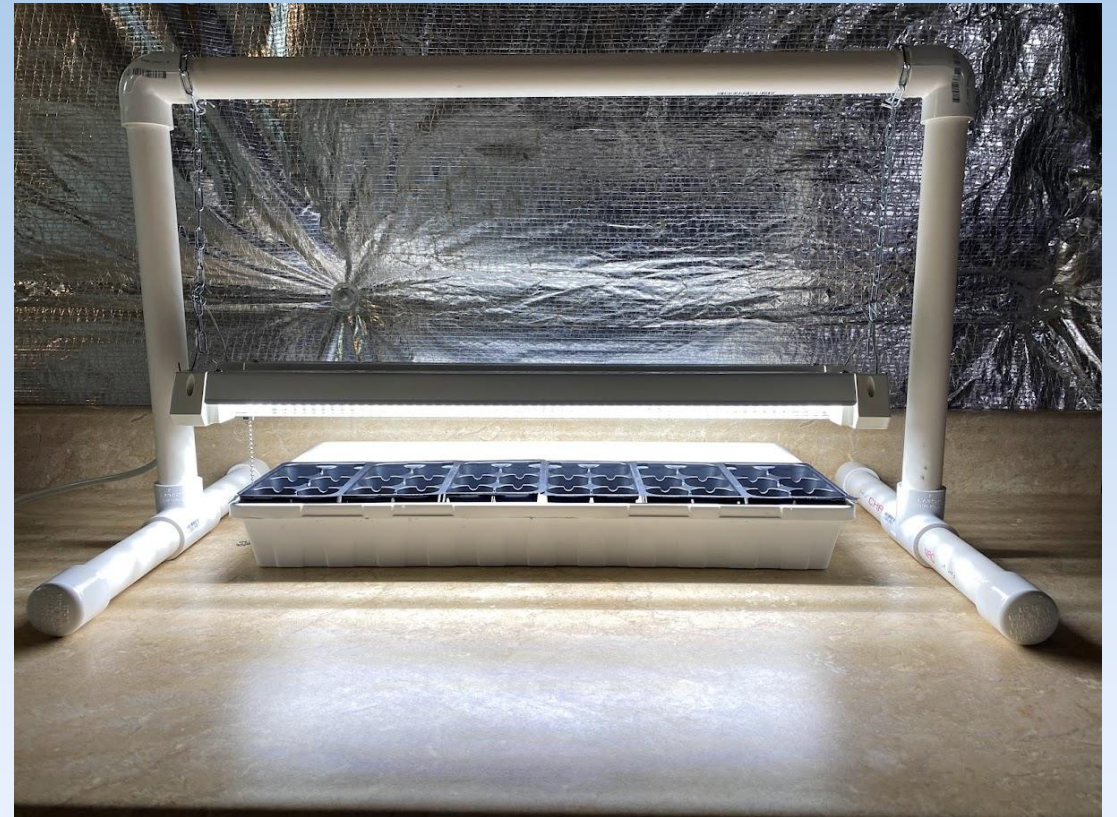
Seed Starting - Build a PVC Light Stand

- 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?

BREAK
10 Minutes

Winter Sowing

Growing vegetable & herb
seeds in containers outdoors



What is and why Winter Sowing?

- A propagation method used throughout the winter where temperate climate seeds are sown into vented containers and placed outdoors to foster naturally timed, high percentage germination of climate-tolerant seedlings.
- In other words: An incredibly easy way to grow seedlings. In the middle of winter, plant seeds in a container with a hole in the top, holes in the bottom for drainage and wait for them to sprout.
- Winter sowing was introduced in 2000 by Trudi Davidoff on GardenWeb.com



Getting Ready

- Containers
- Potting Mix
- Tape for Sealing/Labeling
- Popsicle stick/label
- Marker for Labeling
- Scissors, sharp knife or drill
- Seeds
- Water



Containers

- Variety to choose
- Translucent - not opaque
- Deep enough for 3 inches of soil



Winter Sowing - 10 Easy Steps

1. Collect and wash containers
2. Cut drain holes in bottom
3. Additional container prep
4. Prepare labels
5. Add water to potting soil & mix
6. Plant seeds
7. Seal Container
8. Care of jugs and containers
9. Open in spring on warm days
10. Transplant seedlings



Planting Your Seeds

- Plant only one type of seed at a time
- Mark your containers—inside and out
- Mix tiny seeds with coarse sand or vermiculite and sprinkle on top of mixture
- Larger seeds—follow instructions on packet for depth



Methods of Planting



Placing seeds versus hunk of seeds

Care of Jug and Containers

- Do not put caps on jugs
- Place in protected area safe from pets, wild animals, strong winds but be sure they are exposed to the elements
- Place in direct sun (most veggies)
- Monitor dampness. Add water only if soil dries out
- Resist the urge to meddle with Mother Nature



When To Sow: February - March

Cold Weather Vegetables

Kale

Carrots

Parsnip

Broccoli

Spinach

Turnips

Garlic

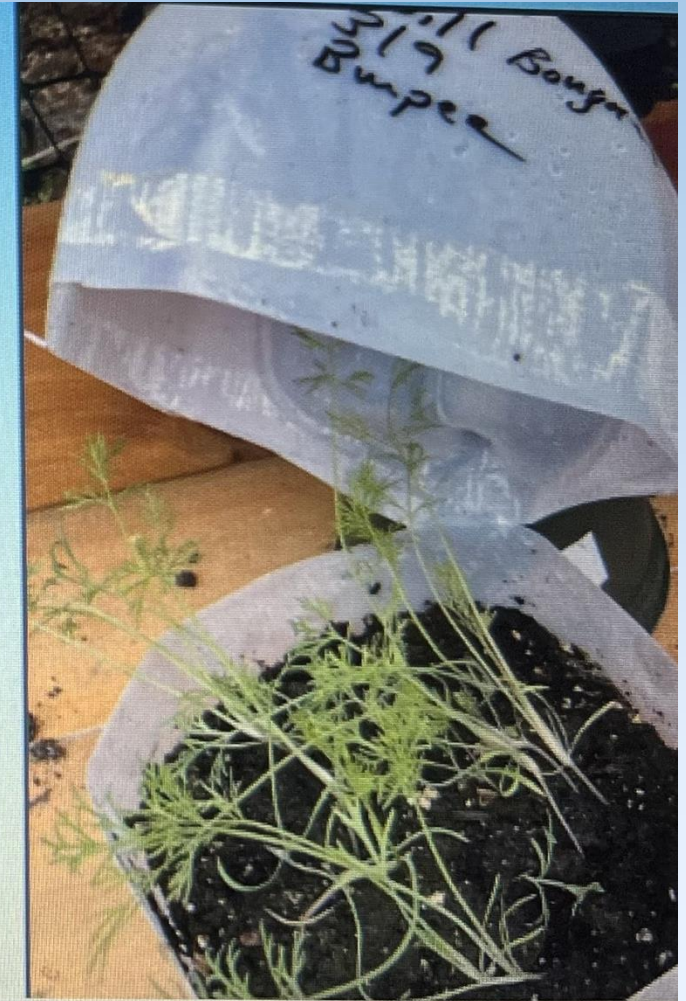
Beets

Onions



Late February – March -- Herbs

- . Parsley
- . Dill
- . Cilantro
- . Lavender
- . Rosemary
- . Sage
- . Thyme
- . Basil



Mid-March to April

Heat lovers



- . Tomatoes
- . Peppers
- . Eggplant
- . Okra
- . Squash
- . Pumpkins
- . Watermelon
- . Cucumbers



Spring

Seeds have germinated - Now What?

- Open container during the day after 1-2 sets of true leaves appear
- Make sure young seedlings are getting enough water and enough air flow
- Unexpected warm spell after germination - open container and move into the shade.
 - Direct sun and/or heat can harm tiny seedlings
- Unexpected cold spell after germination if temperature drops below freezing.
 - You may temporarily need to add a sheet, blanket or row cover.



Transplanting Seedlings – After Frost

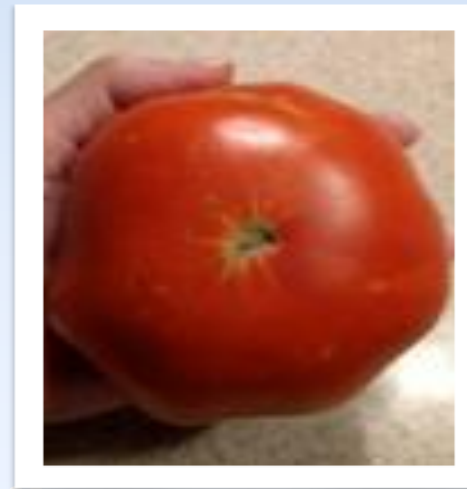
- Open containers to acclimate 2-3 days before transplanting
- Transplant after seeds sprout at least two true leaves
- Pull individual plants apart gently
Roots are very fragile!
- Use sharp knife to cut hunk 'o seeds brownie-style
- You can pot up or direct plant
- Water thoroughly as any other transplant



A tale of winter sowing - CCMG Marlene Smith

TESTIMONIAL

- 3/3/2021 Winter sowed Beefsteak seeds in milk jug
- 3/20/2021 Seeds germinated
- 4/1/2021 Opened and caught that distinctive whiff of tomato foliage
- 4/12/2021 Seedlings transplanted into raised beds.
- 7/15/2021 - harvested first tomatoes with a good bush weight 11.8 oz
- 7/23/2021 - tomatoes fully ripened



Winter Sowing Challenges

- Humidity levels - can get too high, can cause damping off (open container to dry out)
- Things can be missed if not checked periodically
- Unpredictable weather
- Pests and Critters - may damage or destroy containers



Photo Tina Webster UME MG Washington Co

Benefits of Winter Sowing -- Your Choice

- Okay, gardeners, this is the best part! Why winter sow? What are the benefits of winter sowing?
 - It's crazy EASY!
 - Get a head start on spring growing
 - It takes up no space indoors.
 - There are no grow lights.
 - No heat mats.
 - The plants don't have to be hardened off.
- **Mother Nature does all the work!**

Winter Sowing

Questions?

UME Resources

UNIVERSITY OF
MARYLAND
EXTENSION



go.umd.edu/hgic



go.umd.edu/askextension



go.umd.edu/mglocalprograms



marylandgrows.umd.edu

UNIVERSITY OF
MARYLAND
EXTENSION



GROW IT · EAT IT

A MASTER GARDENER PROGRAM

go.umd.edu/giei

University programs, activities, and facilities are available to all without regard to race, color, sex, gender identity or expression, sexual orientation, marital status, age, national origin, political affiliation, physical or mental disability, religion, protected veteran status, genetic information, personal appearance, or any other legally protected class.

UNIVERSITY OF
MARYLAND
EXTENSION

MASTER
GARDENER 

UNIVERSITY OF
MARYLAND
EXTENSION



ASK A MASTER GARDENER
PLANT CLINIC

A MASTER GARDENER PROGRAM

UNIVERSITY OF
MARYLAND
EXTENSION



POLLINATORS

A MASTER GARDENER PROGRAM

UNIVERSITY OF
MARYLAND
EXTENSION



GROW IT • EAT IT

A MASTER GARDENER PROGRAM

UNIVERSITY OF
MARYLAND
EXTENSION



COMPOSTING

A MASTER GARDENER PROGRAM

UNIVERSITY OF
MARYLAND
EXTENSION



BAY-WISE

A MASTER GARDENER PROGRAM

UNIVERSITY OF
MARYLAND
EXTENSION



NATIVE PLANTS

A MASTER GARDENER PROGRAM

UNIVERSITY OF
MARYLAND
EXTENSION

MASTER
GARDENER 

This program was brought to you by
University of Maryland Extension
Master Gardener Program
Charles County

Please help us improve our programming!

Take our brief survey at

<https://go.umd.edu/MGprograms24>



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 \(iastate.edu\)](#)
-  [All the Dirt on Winter Sowing - YouTube](#)
-  [Disease Resistant Vegetable Varieties | Cornell Vegetables](#)
-  [UMDHGIC - YouTube](#)

UNIVERSITY OF
MARYLAND
EXTENSION

MASTER
GARDENER 

Photo Credits unless otherwise labelled are from the University of Maryland Extension or by CC Master Gardeners.

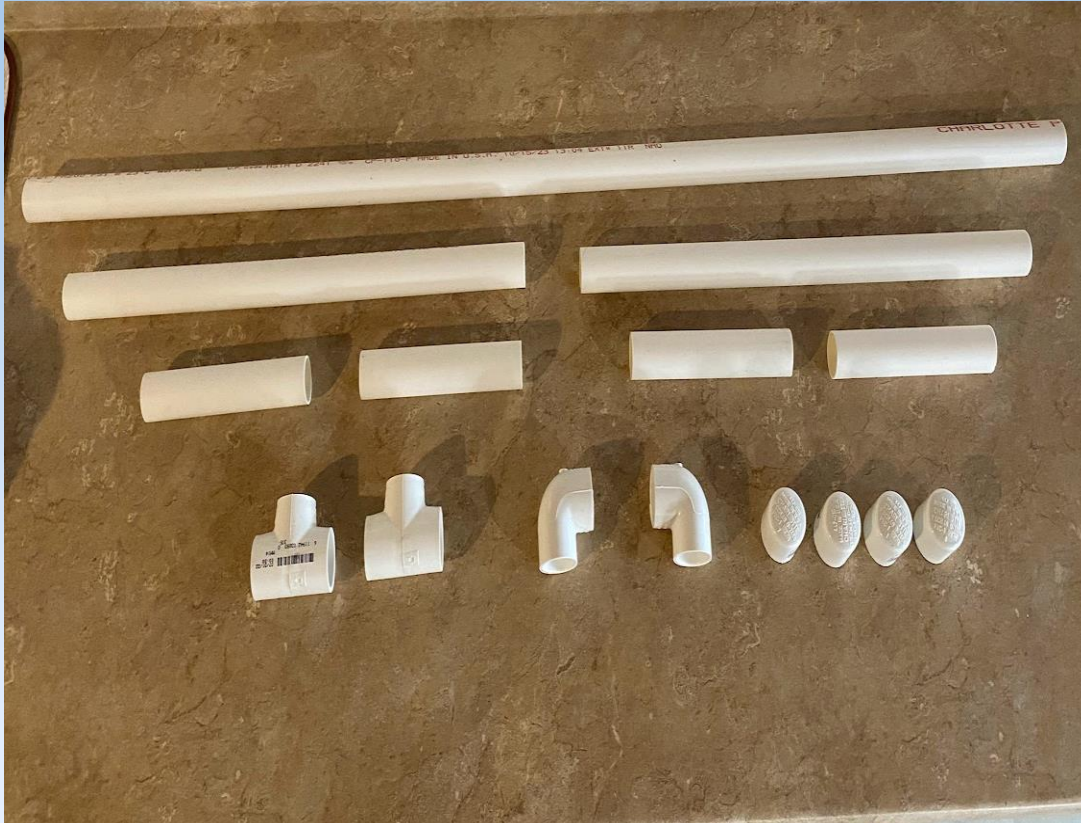
Resources - Lamp stand materials and instructions

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!

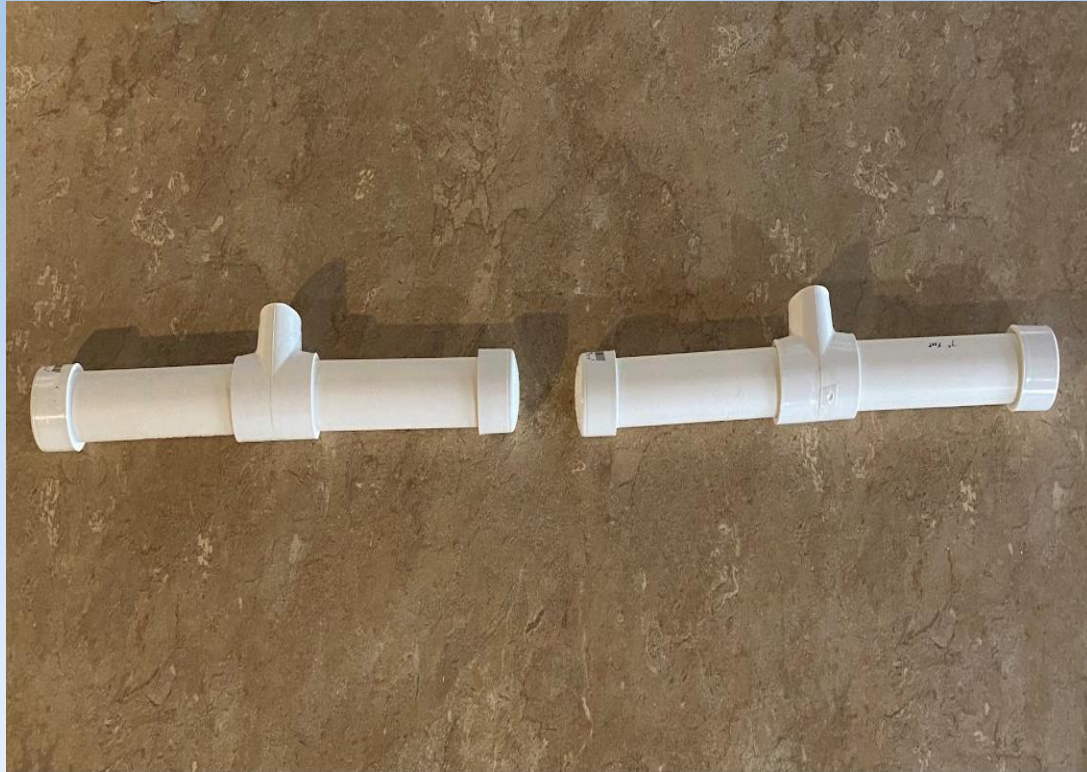


Seed Starting - Build a PVC Light Stand



- 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

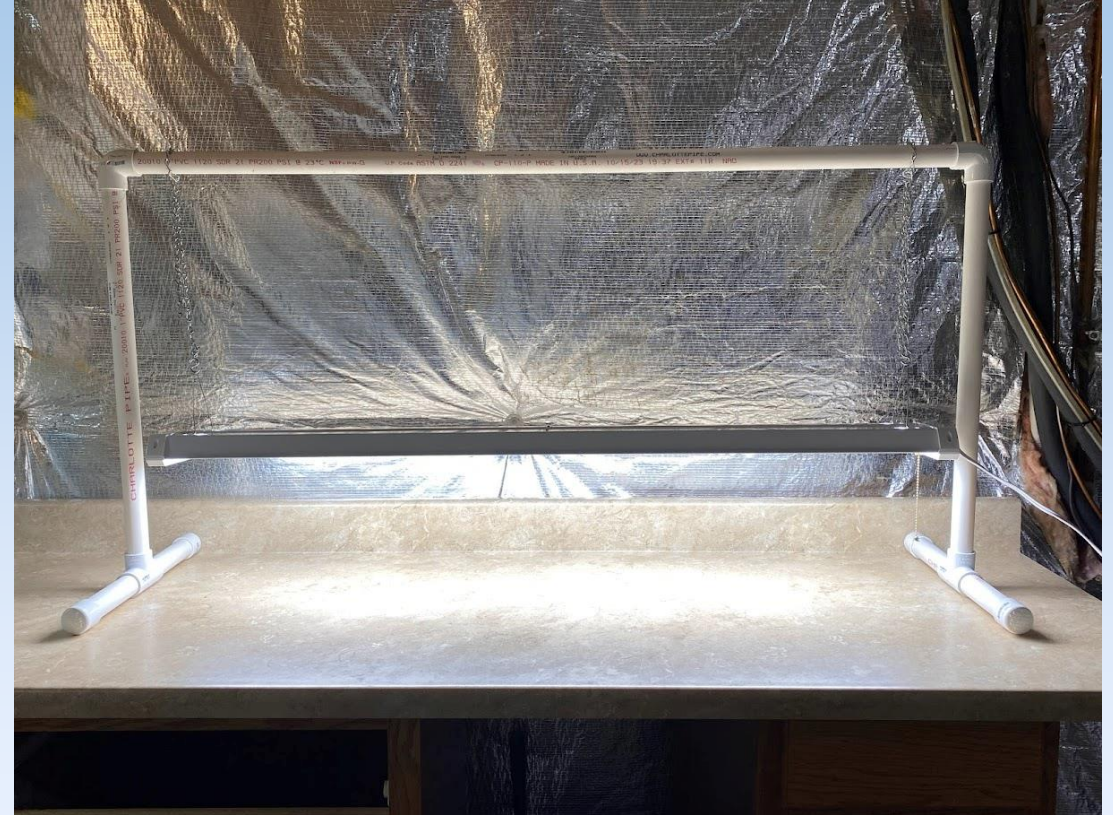


Assemble top to sides

Seed Starting - Build a PVC Light Stand



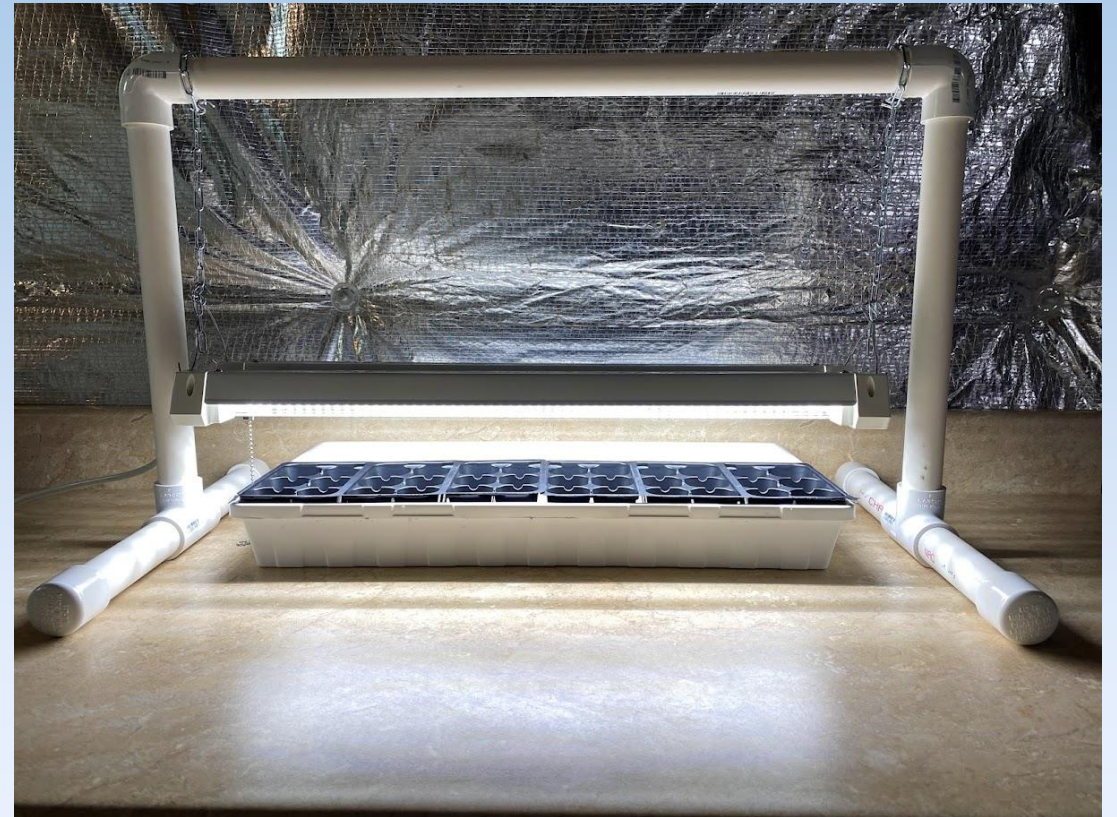
Hook chain with S hook to top.



Hang Shop Light

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!

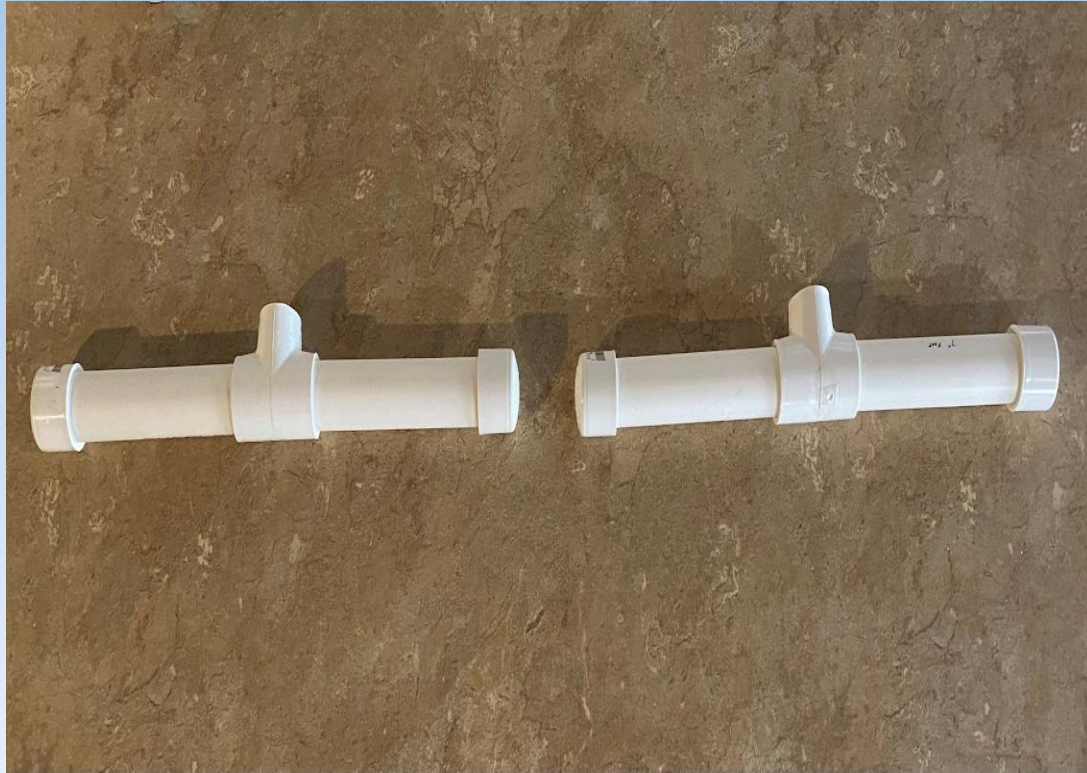


Seed Starting - Build a Mini PVC Light Stand



- Top: 25"
- Sides: 13 1/2" (two)
- Feet: 7" (four)
- 1" tee (two), 1" elbow (two), 1" end caps (four)

Seed Starting - Build a Mini PVC Light Stand



Assemble feet with 2 tees and 4 end caps



Insert sides into tee.

Seed Starting - Build a Mini PVC Light Stand



Put elbows on top piece

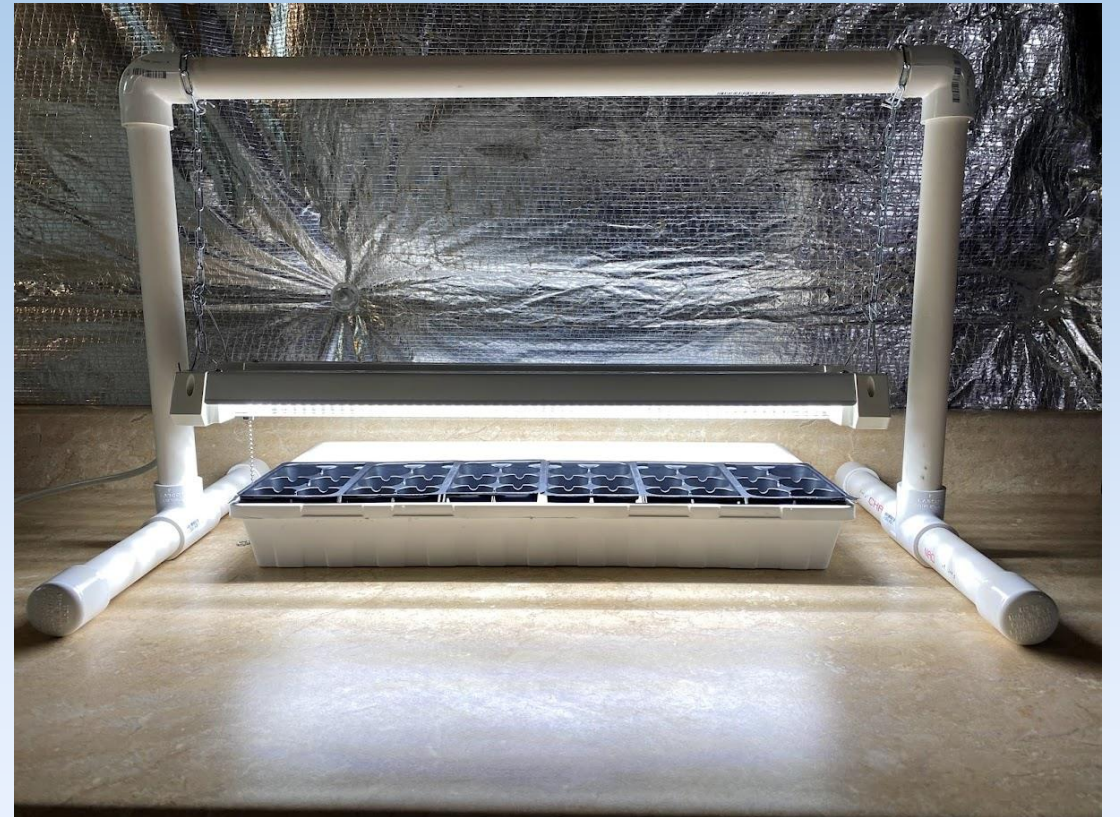


Assemble top to sides

Seed Starting - Build a Mini PVC Light Stand



Hook chain with S hook to top.



Hang Shop Light