How to Make Your Own Kratky Hydroponics System

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Virginia Cooperative Extension
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DIY ✓

Sustainable ✓

Small-space friendly ✓

A step-by-step guide for building a low-cost system for year-round indoor growing/food production

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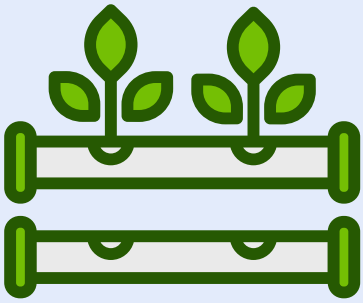
How to Make Your Own Hydroponics System

Who this guide is for

- Small farmers
- Hobbyists
- Home vegetable producers



What you will learn

In this guide, you will learn everything you need to build your own DIY Kratky hydroponics system through a step-by-step process using readily available materials. This guide will also provide recommendations for using your new DIY hydroponic system.

VSU's hydroponics expert

Josh earned a B.S. in Marine Science from Coastal Carolina and a M.S. in Aquaculture/Aquatic Sciences from Kentucky State University. Currently Josh serves as the Indoor Agriculture Extension Associate where he oversees aquaponic, hydroponic, and aquaculture systems within controlled environments (greenhouse, indoor).

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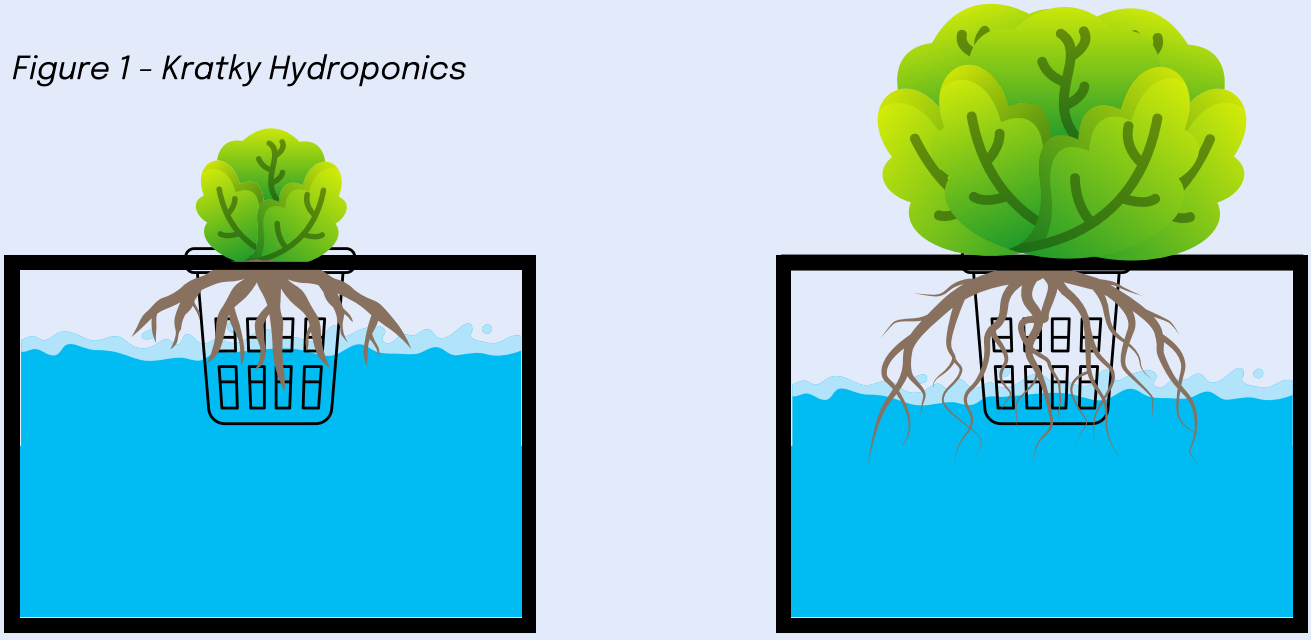
The Kratky Method of Hydroponics

The Kratky hydroponics method is a non-circulating technique that uses passive aeration to grow plants suspended over a water nutrient solution.

With this method, young plants start with their roots fully submerged in a basin of nutrient-rich water. As the plants grow and absorb this nutrient-rich water, their roots are gradually exposed to air (passive aeration) in the space created by water absorption.

This allows a grower to maintain optimal plant growth while minimizing electrical inputs like air and water pumps.

Figure 1 - Kratky Hydroponics



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How to Make Your Own Hydroponics System

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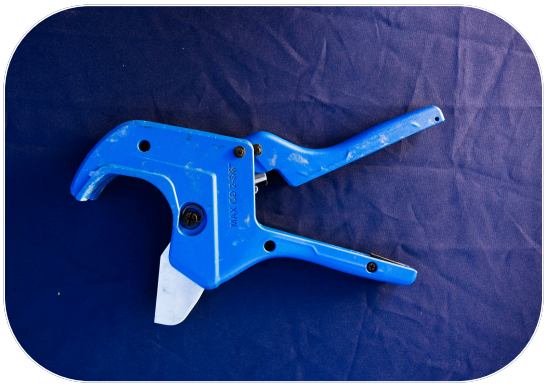
What You'll Need

14-gal HDPE plastic tote with fitted lid

measuring tape

sharpie

safety goggles



PVC cutters

power drill with 2" hole saw

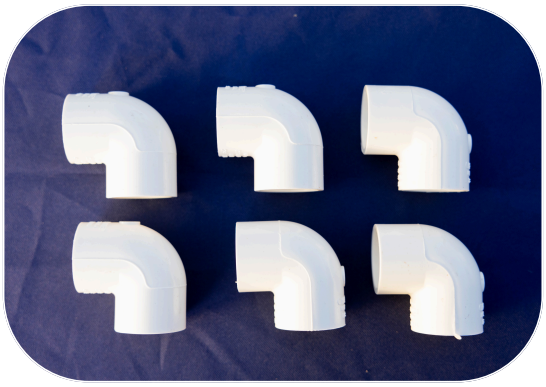
3/16" drill bit

What You'll Need

(15) 2" net pots

zip ties

(2) 3/4" PVC tee slip fitting



(6) 3/4" PVC 90deg elbow slip fitting

5 - 6' 3/4" airline tubing

air stone (3/16" inlet)

checkvalve (3/16" inlet)

air pump

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What You'll Need

Other materials

- (2x) 3/4" PVC 30" pieces*
- (1) 3/4" PVC 25" piece
- (4) 3/4" PVC 7 1/4" pieces
- (4) 3/4" PVC 3" pieces

Total of 126" of PVC pipe (single 10' and single 2 1/2' sticks of PVC pipe)

*If you want a taller light rack, use pieces longer than 30".

Helpful hints

- You can find these materials at your local hardware store
- Raw materials should cost less than $60.00.
- Tools and additional supplies like nutrients, lights and light timer, etc., can cost between $250 - $500.

How to Build Your System

Before you get started

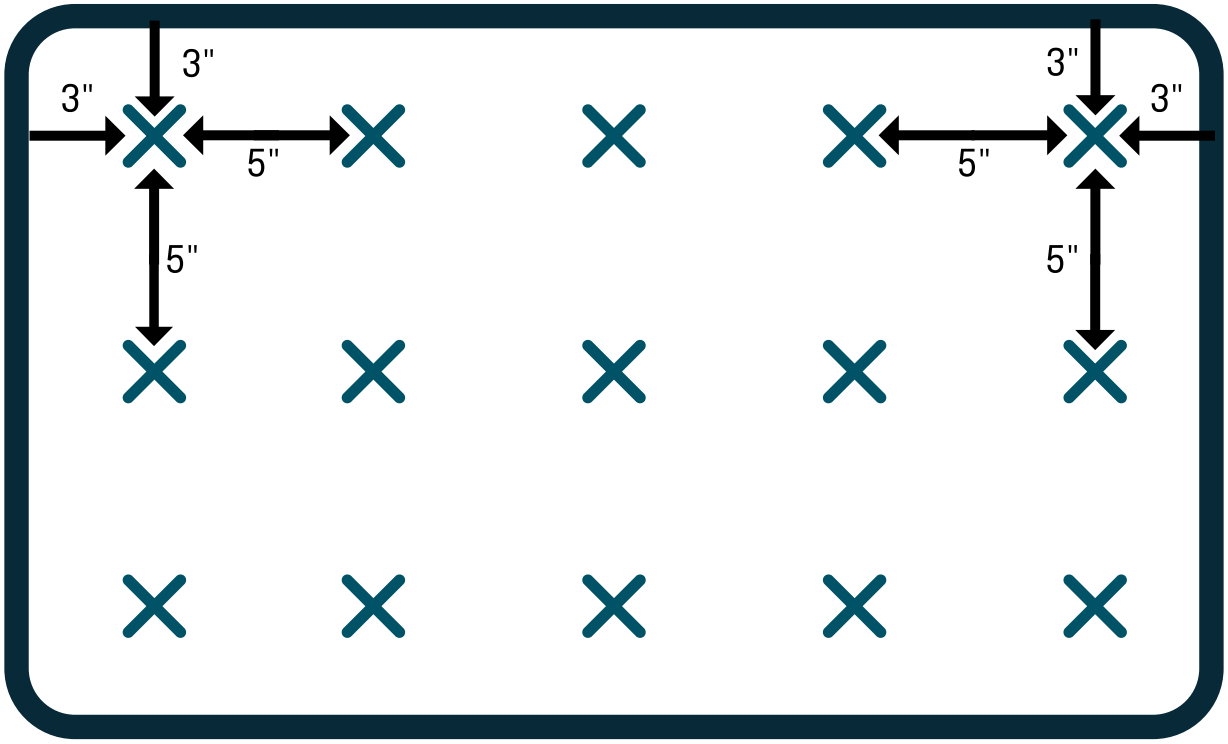
Safety Check

Wear personal protective equipment like safety goggles and gloves

How to Build Your System

Step 1 - Marking plant placements

Place your bin on a flat, sturdy surface. Using your measuring tape and sharpie, begin by marking where you will place your plant holes in the lid. This is where you will drill. Make sure your holes are evenly spaced across the lid.

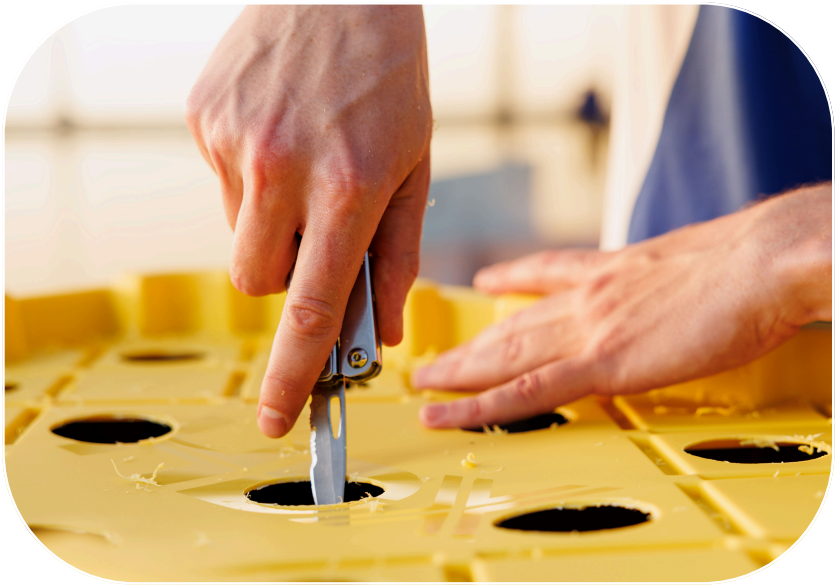


We recommend placing no more than 15 holes in this size tote.

How to Build Your System

Step 2 - Drilling holes for plants

Use a drill fitted with a hole saw bit to carefully cut holes for your plants where you made your marks.



Use a blade or sandpaper
to smooth the edges of the holes. Be careful not to remove too much plastic, as your net pots may no longer fit.

How to Build Your System

Step 3- Marking airline hole

Next, mark the location for your airline hole using a sharpie. The hole should align with the lip of the lid, and no more than 2“ from the top of the lid to prevent water leakage.

Step 4 - Drilling airline hole

Fit your drill with the 3/4" drill bit. Drill into the lid where you marked it in step 3 to ceate the airline hole in the lid. This will provide a crucial connection for aeration.

How to Build Your System

Step 5 - Mark light rack PVC

Measure and mark the PVC for your light rack, using the sizes listed on page 3. Ensure precision for a stable and even support structure.

Step 6 - Cut light rack PVC

Use PVC cutters to make clean, accurate cuts along the marked lines for your light rack.

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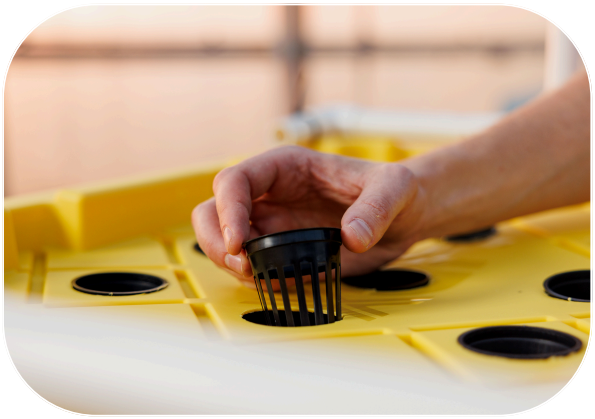
Step 7 - Placing net pots, airline and check valve



Fit your net pots into the holes in your lid.

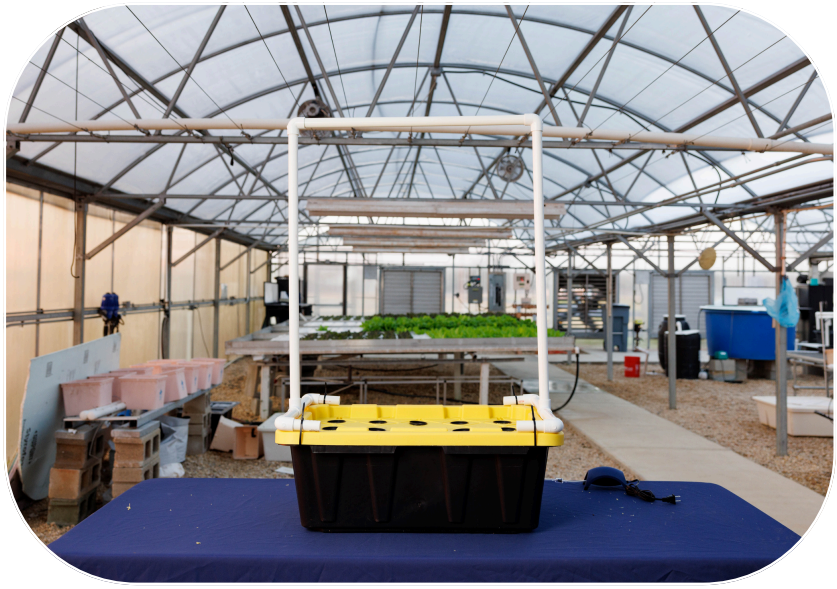
Feed your airline pipe through the tote and connect your air stone to the end of the tubing.

Connect your check valve.

How to Build Your System

Step 8 - Light rack assembly

Assemble your light rack by securely connecting the PVC pieces together. Zip ties should only attach to the lid.



Now, you will have essential support for your grow lights.

Learn More About Hydroponics

Salanova bibb lettuce after four weeks of growth

Want to watch the step by step guide?

Check out our instructional video by scanning the QR code with your smartphone or visit:
https://shorturl.at/zNRWX

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Other materials to consider

Grow lights*

- LED lights are best
- Adjustable dimmer built-in light pulleys are useful
- Select only grow lights that have a PAR map with a description (see example, below). These are higher-quality lights.

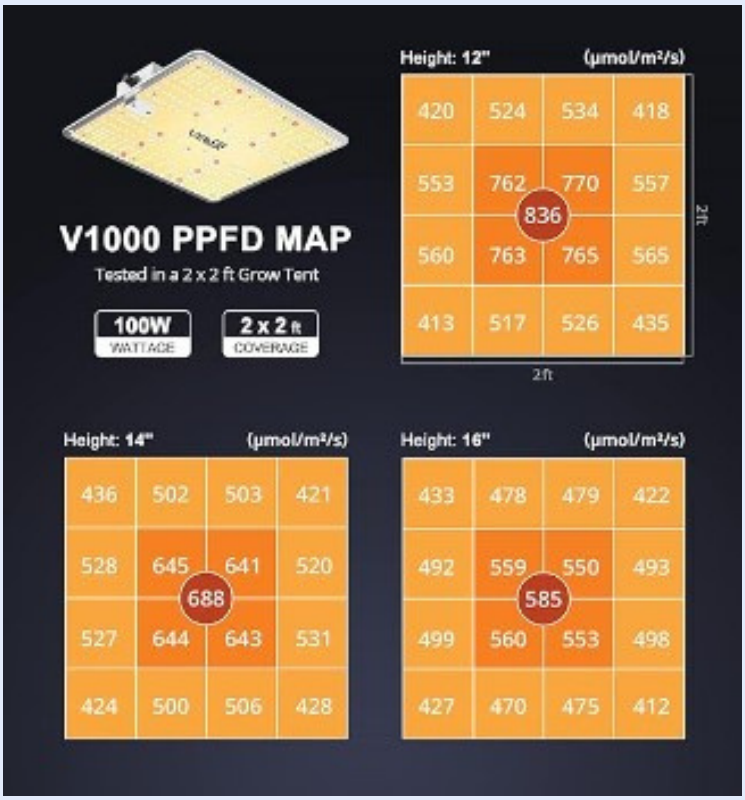

Image courtesy of ViparSpectra

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Other materials to consider

Hydroponic nutrients*

- Premixed liquid fertilizer is easier and less complicated but is more expensive than dry powder fertilizer
- Needs will vary depending on type of plant growing in your system

pH/EC meter*

- You can use pH test strips for a cheap rough estimate of pH
- Use trusted sources for meters
- Cheaper does not always mean better!
- Consider storage and calibration

Light timer*

- Three prong outlet is ideal for most lights
- A standard plug-in mechanical timer is sufficient in most scenarios

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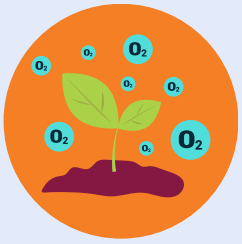
Other materials to consider

Air Pump*



- You will also need to purchase airline tubing and an airstone that will fit your air pump (3/16” is typical for most aquarium air pumps)
- A 10-gal aquarium air pump will likely be sufficient for any tubs smaller than 30 gal

Seed starting supplies

- Rockwool, coco coir, regular potting soil, or even media (such as hydroton) can be used to start seeds
- Likely will need a germination tray/kit
- A cool/dark area is ideal for seed germination. Once germinated, move the seeds under light under ready for transplantation

Harvesting/cleaning supplies

- Harvesting shears or scissors
- A 5-gal bucket for draining and filling your system
- Isopropyl alcohol or hydrogen peroxide as cleaning agents for your system

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Other materials to consider

Measuring cups

- 10-50 mL measuring containers with increments of 1 or 5 mL will likely be sufficient for measuring nutrients for your system
- If using powder nutrients, then a measuring scale may be useful

Examples of options for items noted with an *

- pH/EC Meter - Vivosun, Bluelab, Hanna, YSI, Milwaukee, Oakton
- Lights - MARS Hydro, Viparspectra, Vivosun, Spiderfarmer
- Hydroponic Nutrients - General Hydroponics, Foxfarm, Vivosun, Natural Hyroponics
- Light timer - GE Mechanical 1-plug timer, Bn-link Indoor 24-hr Mechanical outlet timer
- Air pump - Tetra, Active Aqua, Marina, Aqueon

Trade names in this publication are used solely for the purpose of providing specific information. Such use herein is not a guarantee or warranty of the products named and does not signify that they are approved to the exclusion of others. Mention of a proprietary product does not constitute and endorsement, nor does it imply lack of efficacy of similar products not mentioned.

Learn More About Hydroponics

Recommended reading and resources

Kratky, B.A. 2009. Three non-circulating hydroponic methods for growing lettuce. Proceedings of the International Symposium on Soilless Culture and Hydroponics. Acta. Hort. 843:65-72. https://www.ctahr.hawaii.edu/hawaii/downloads/three_non-circulating_hydroponic_methods_for_growing_lettuce.pdf

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Learn More About Hydroponics

Recommended reading and resources

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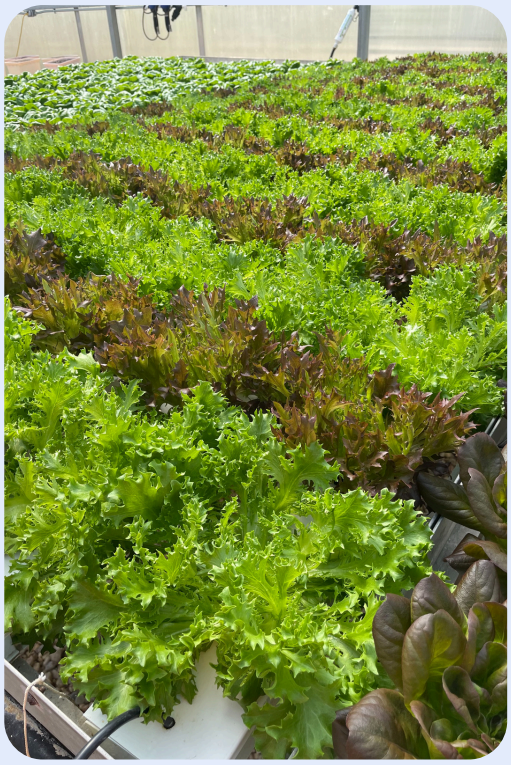
How to Make Your Own Hydroponics System

Learn how to build your own Kratky hydroponics system for easy, at-home food production.



hydroponic lettuce in VSU's Demonstration Greenhouse

VSU's College of Agriculture Aquaculture/Indoor Ag Program and Cooperative Extension Unit work to provide you with high quality learning materials and opportunities!

We focus on producing, harvesting, and marketing farm products within the context of sustainability and are here to support farmers and other stakeholders. In addition to hydroponics, our team can teach you about aquaponics, indoor agriculture, aquaculture, and more!

Find your answers at https://www.ext.vsu.edu/.

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