I ATE MY HOMEWORK! HYDROPONICS IN SCHOOLS

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What is happening with urban agriculture?
What IS the statewide approach to urban agriculture?

How to Inspire a Community

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The Florida Food Situation

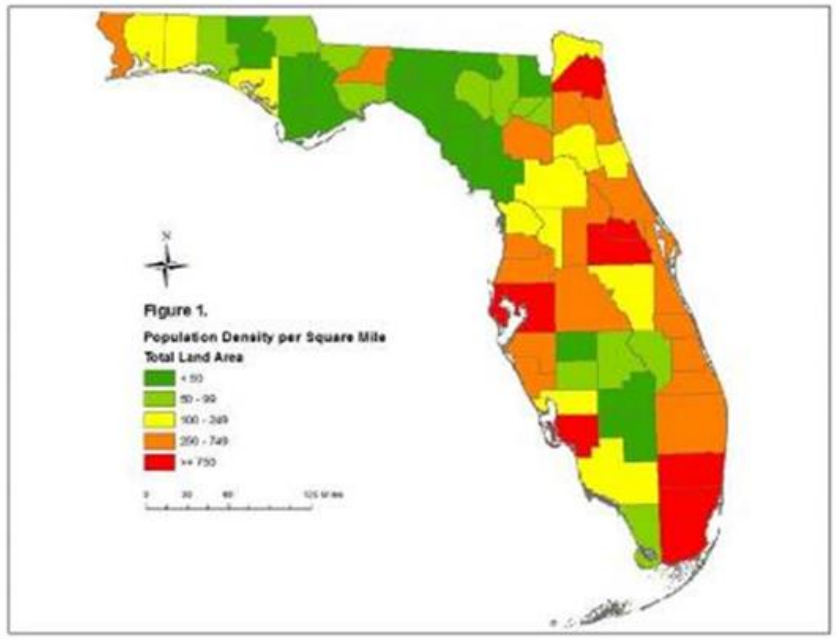
FLORIDA PRODUCES SECOND HIGHEST VEGETABLE VALUE IN US

AGRICULTURE IS SECOND LARGEST INDUSTRY IN FLORIDA

FARMS IN URBANIZING COUNTIES FACE SPECIAL CHALLENGES FOR LONG TERM SUSTAINABLE SOLUTIONS

DID YOU KNOW THAT HALF OF FLORIDA'S DRINKING WATER GOES TO WATERING GRASS LAWNS?

IN 15 YEARS, CENTRAL FLORIDA WILL NOT HAVE ENOUGH WATER TO SUSTAIN THE GROWING POPULATION AND COMMUNITY NEEDS **IF WE DO NOT PLAN NOW.**



Solutions to the Food Situation

Scientifically & Biologically Doable:

- Do the best you can!
- Grow your own
- Local food
- Hydroponics ★
- Organic
- Integrate organic growing methods into conventional agricultural systems
- Agricultural technology
  - Precision agriculture
  - GMOs
- Reduce food waste and buy Fresh From Florida produce!
- Personal values may play a role in your food choices. That is just fine! Everyone has their values and preferences.

Orlando Urban Farms

Fleet Farming: Grow food, not lawns

Kalera: The Science of Great Greens

WHAT IS URBAN AGRICULTURE

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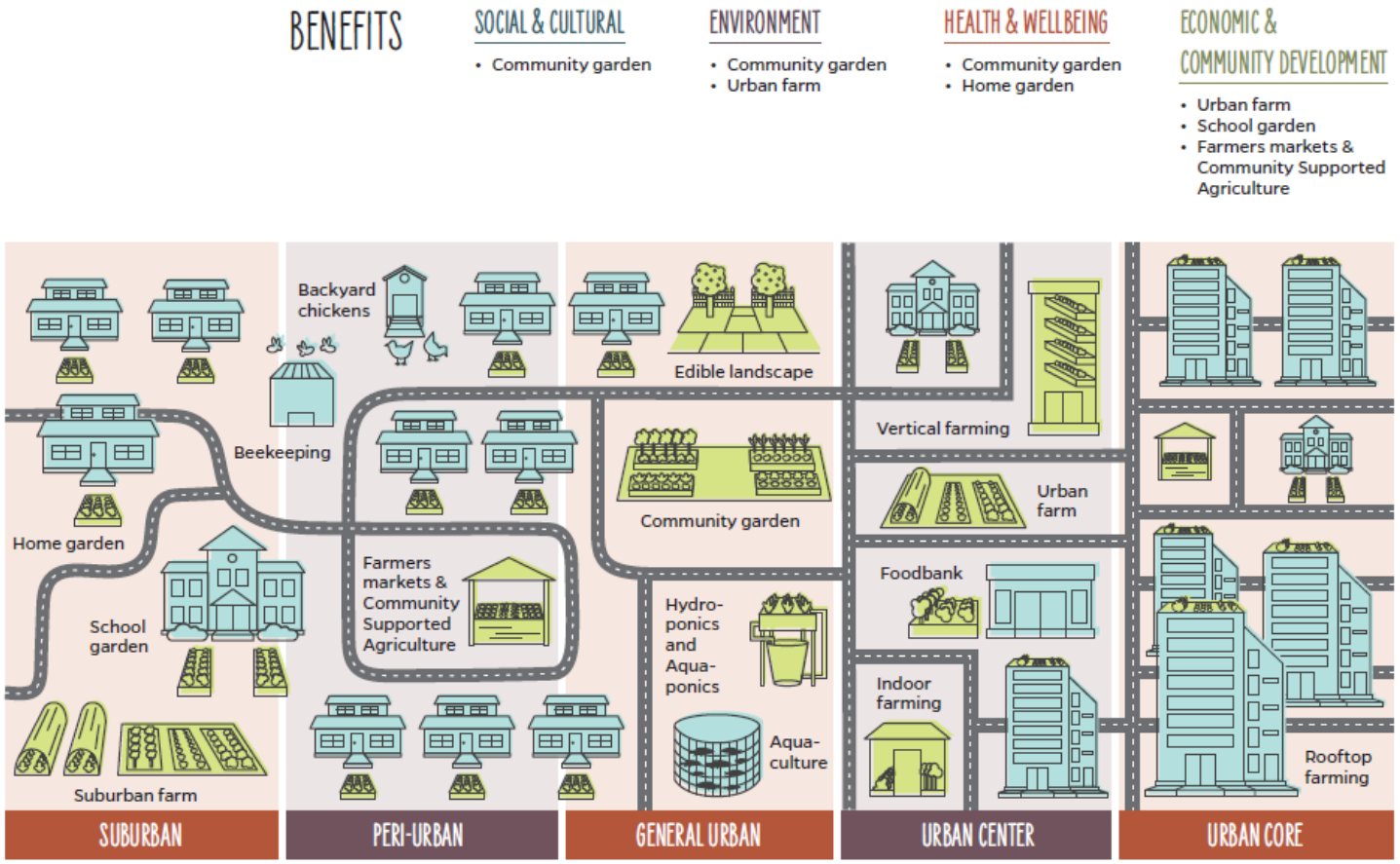


Hydroponic production is well suited for urban agriculture at a variety of different scales.

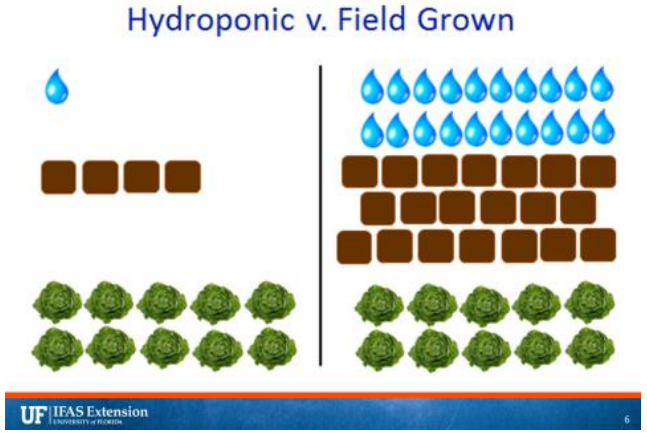
- Backyard, back porch
- Schools
- Community gardens
- Yard farms
- Vertical farms
- Rooftops
- Warehouses
- Lobbies
- Kitchens

Benefits of Hydroponics

- Up to 95% less water used*
- Up to 80% less space used to achieve same yields*
- Efficient fertilizer use
- 2X faster grow cycle is achievable in some cases
- No herbicides or weeding- reduced use of pesticides
- Successful on non-arable land:
  - Urban areas, indoors, brownfields, unsuitable climate
- Go vertical
- Self-sustained city- based food system with less strain on distant farms, transportation, carbon emissions, and habitat. Well-suited for urban spaces.

TRADEOFFS—

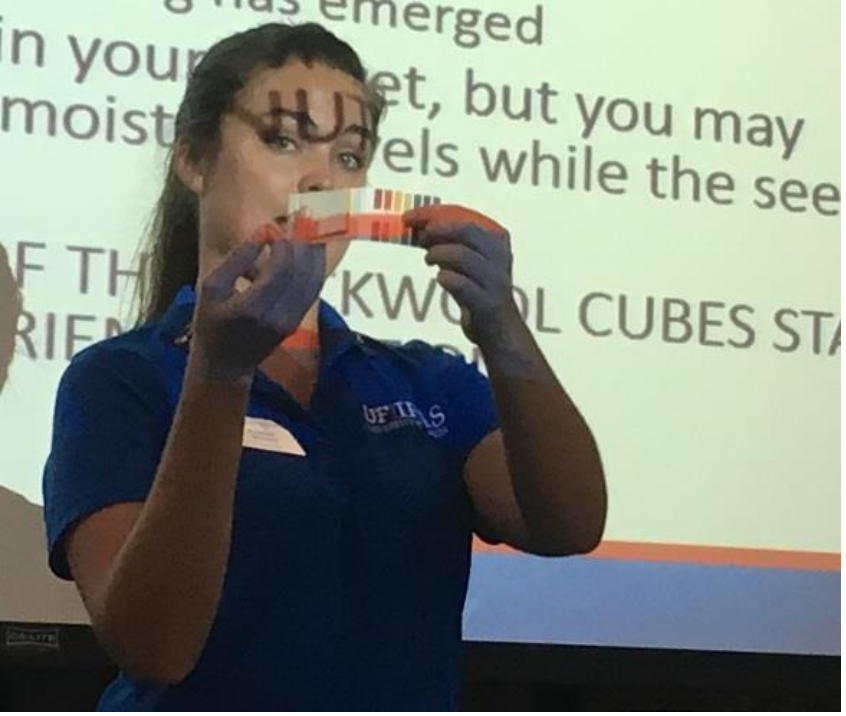
- Up front cost, energy (cost), technical, sanitation & care, floods
- *Generally accepted numbers. If anyone has updated research, please share!



Vertical Farm in Singapore

Urban Smart Farms

- Located in large lobby of second largest convention center in USA, Orange County Convention Center.
- Partnership between Orange County Government, Sodexo food distributor, and Urban Smart Farms.
- Literally vertically integrated, serving garden to plate produce from boxed lunches to banquets.

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SEMINOLE COUNTY
FLORIDA'S NATURAL CHOICE
Leisure Services Department Seminole County Extension Services
Set It and Forget It
Hydroponics
• Learn the basic principles of hydroponic growing
• Build your own hydroponic bucket
• Bring home a complete hydroponic system with 3 lettuce seedlings growing
• Includes materials to replicate the cycle multiple times

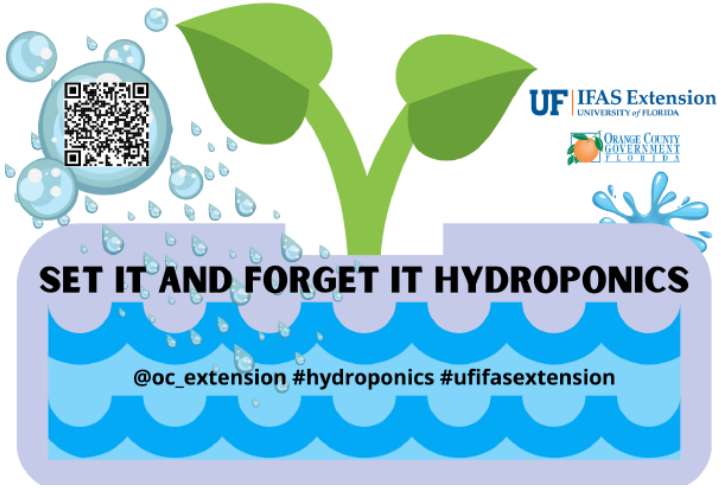
YouTube Hydroponics
Hannah Wooten Hydroponic Lettuce

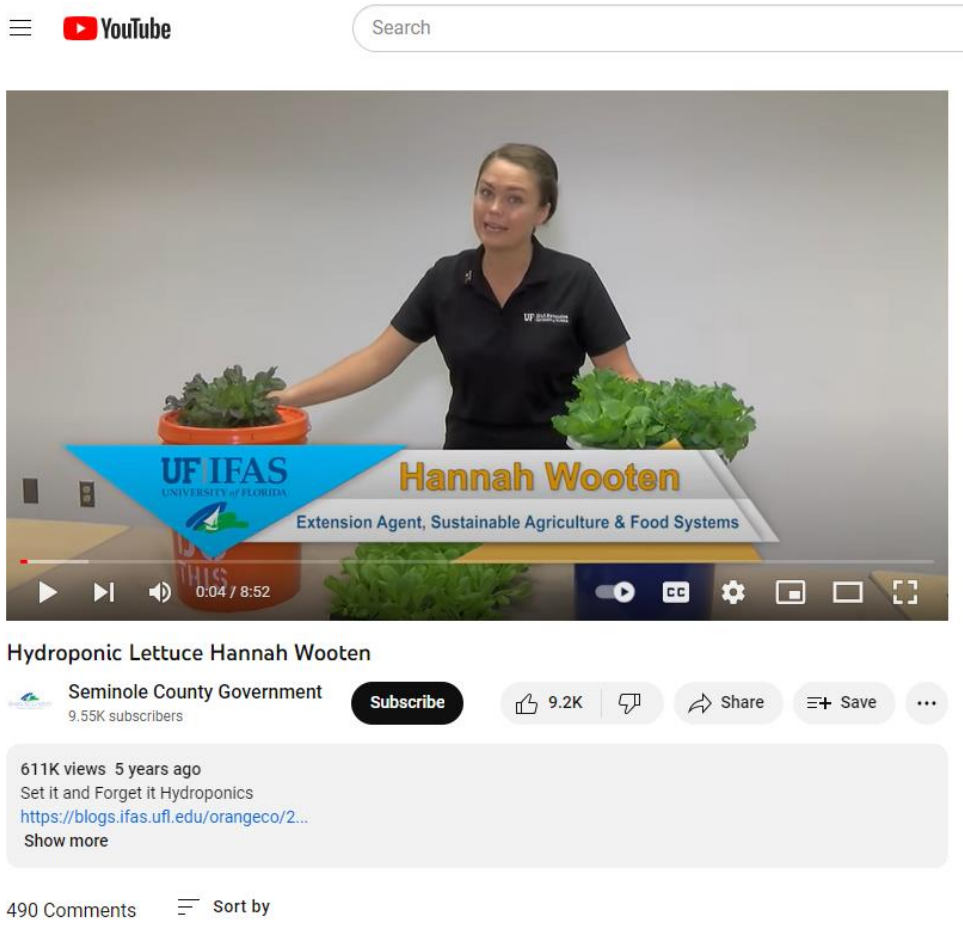
YouTube video developed to supplement workshops

Video exceeds 611,000 views

Wrote supplemental blog

Developed informational sticker for hydroponic buckets

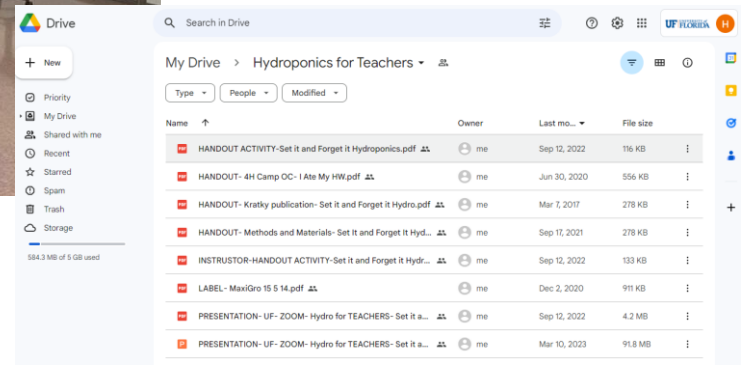




Food Systems in Orange County

- 600+ farms
- Foodie culture
- Michelin Star restaurants in Orlando, FL!
- Every High School has Ag. Teacher
- 2018 Food System Tour
- 2019 Farmer Meet Up
- 2020 Pandemic refocus on local food
- 2021 Urban Ag workshops to County leaders
- 2022 Hydroponics to HS Teachers

Training Trainers in Hydroponics

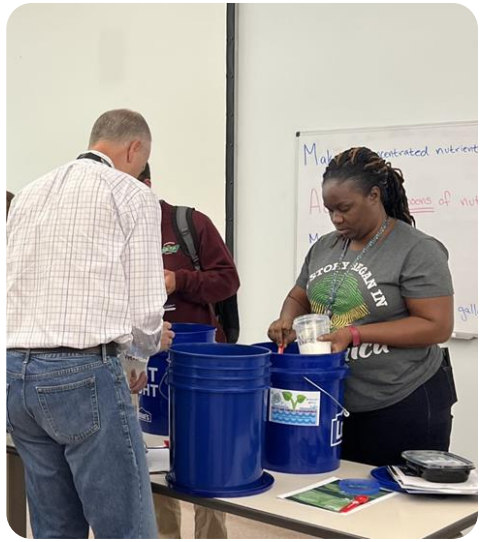


Delivered multiple hydroponics trainings to groups of trainers (n=100)

- Extension Agents, Teachers, Family Nutrition Program educators
- OCPS Agriculture Education Coordinator
- Teach lesson & construct simple hydroponics bucket in 2 hours
- OCPS supplied seeds, pH strips, & buckets on ~$1,000 grant
- Google Drive developed, updated, and shared with trained trainer
- $15 - $40 cost per hydroponics bucket kit depending on supplies purchased

Training Trainers in Hydroponics

- 21 trained trainers responded
- At least 1,924 hydroponics buckets were constructed by the 21 respondents
- Training trainers to teach hydroponics results in **91 hydroponics kits constructed per participant** compared to less than 1 kit per regular class participant.
- Training trainers, especially teachers, is an efficient use of agents' time and resources



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Set It and Forget It Hydroponics

Drill Station

1. Trace net pot on lid in 3 places
2. Place lid on bucket
    1. Hold bucket in place
    2. Place drill over traced circle
    3. Gently drill into lid
3. Place net pot in each hole

Nutrient Solution Station

4. Fill bucket with water until it touches the bottom of the net pot (~ 5 gallons)
   MODIFICATION OPTION for ease of transportation- fill bucket with 1 gallon of water and make concentrated nutrient solution
5. Measure Electrical Conductivity (EC) or Total Dissolved Solids (TDS)- Meter recommended if interested in more advanced techniques, otherwise continue to next step
6. Add nutrients to water to total EC of ~ 1250 µS/cm or ~800 ppm
    1. ~1 tsp/ gallon nutrient solution **(check label recommendations)**(~5 tsp/ 5 gallons)
7. Measure pH of solution- use pH strips or meter
8. Adjust pH of solution to ~ 5.6- 6.0
    1. ~2 tsp./ gallon if using White Vinegar (10 tsp/ 5 gallons)

If you are using meters, record your data here.	**Source Water** (before adjustments)	**Nutrient Solution** (after adjustments)	**Goal Ranges**
Electrical Conductivity (EC)/ Total Dissolved Solids (TDS)			EC~ 1250 µS/cm TDS~ 800 ppm
pH			pH~ 5.6- 6.0

Seedling Station

9. Place lid on bucket
10. Place lettuce seedlings in net cups- make sure bottom of seedling is touching the nutrient solution
11. SET IT outside in a sunny location (September- March)
12. FORGET IT until you are ready to harvest your lettuce!

Materials

- 5 gallon bucket and lid
- 2 inch hole saw
- Drill
- Permanent marker
- Hydroponic nutrients
- pH down- White vinegar
- pH strips/ meter
- EC/ TDS meter (recommended)
- Lettuce seeds
- 2 inch net cups
- Rockwool cubes
- Stirrer
- Teaspoon

Images of hydroponic lettuce submitted by former participants.

Starting Seeds

- Prepare water to soak grow cubes
- Soak grow cubes in water until saturated
- Place seeds into cubes (1-2 seeds each)
- You can either keep seeds germinating in a container with high humidity
    - Transplant to bucket once seedling has emerged
- OR you can start the seeds in your bucket, but you may need to help maintain high moisture levels while the seed is germinating
- MAKE SURE THE BOTTOM OF THE GROW CUBES STAYS IN CONTACT WITH THE NUTRIENT SOLUTION

YouTube Video & Blog

Hydroponic Lettuce Hannah Wooten

https://www.youtube.com/watch?v=GQey35Tt24I

UF/IFAS Blog: Set it and Forget It Hydroponics

https://blogs.ifas.ufl.edu/orangeco/2020/04/09/set-it-and-forget-it-hydroponics/

Questions?

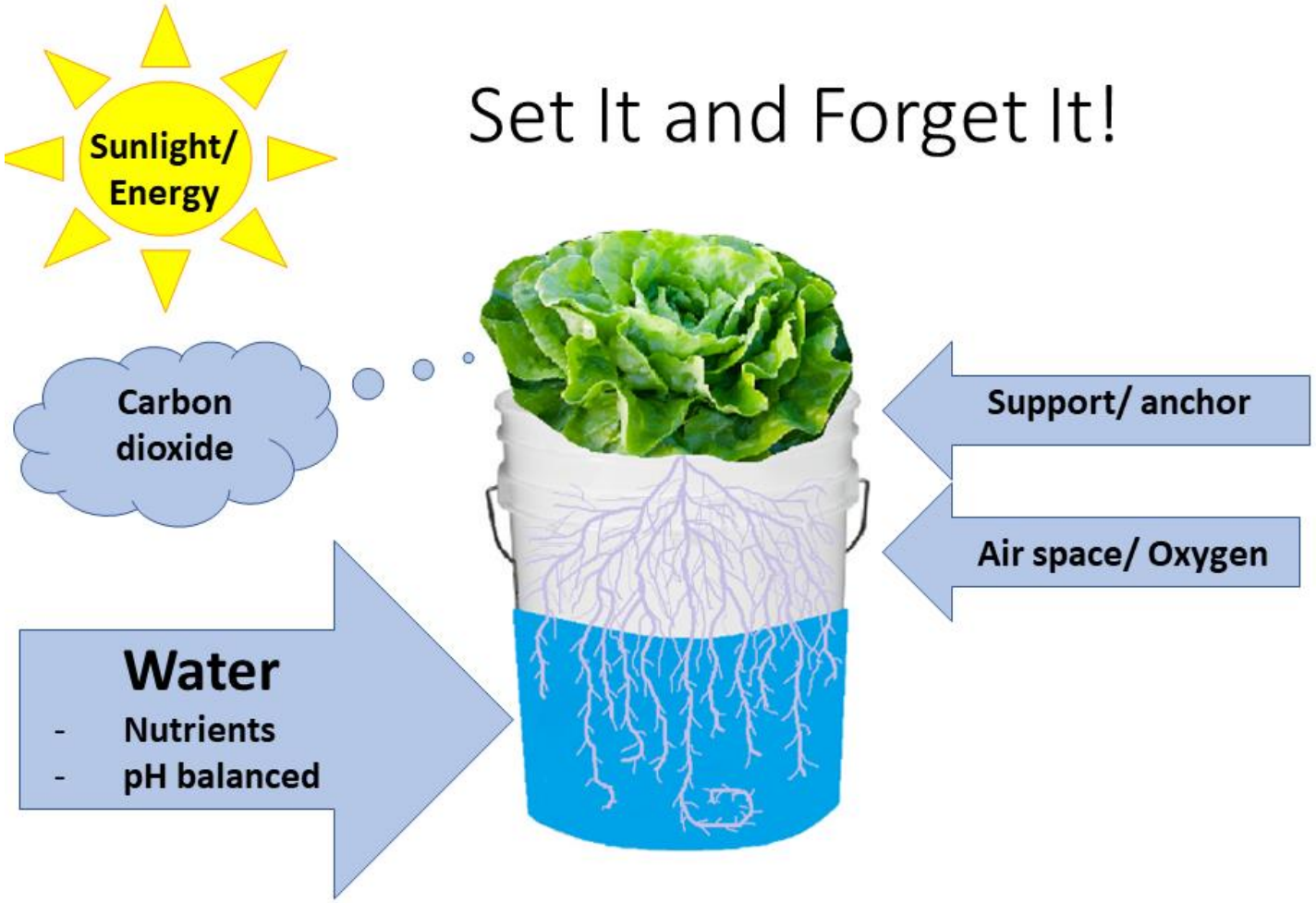
Contact Hannah Wooten at 407-254-9200 or hwooten@ufl.edu

4-H S.T.E.M. Day Camp

Grow Your Food in Space!

4-H Summer Series
Delivered at Summer Program Sites

Simple Project for Student Success



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I Ate My Homework! Hydroponics for 4-H STEM Camp

Before Workshop: Watch these videos

Future of Food: Farming in the age of climate change
https://www.youtube.com/watch?v=Tjr6z1GMDqc

Fleet Farming? How One Groups Wants to Turn Your Front Yard Into a Full-Fledge Farm
https://www.youtube.com/watch?v=ginu4kJUxlQ

Square Roots Urban Farm Grows Fresh Food for Innovative Farm to Fork Experience
https://www.youtube.com/watch?v=lZmgeGobMB0

Prepare Your Work Station Before Workshop

Delivered Materials	Bring Your Own Materials
1 inch root cube (Oasis or Rockwool)	1 gallon plastic jug (recycled, rinsed, and pre- cut)
2 inch net pot (reusable)	Permanent Marker
1 tbsp. nutrients (Botanicare Pure Blend)	Tape
1 or 2 seeds in manila envelope	Water
Aluminum Foil 12" x 24"	

Day of Workshop

1. Get pre- cut gallon jar with 2 inch hole in lid.
2. Carefully wrap gallon jug with sheet of aluminum foil 12 inches wide and 24 inches long.
3. Tape aluminum foil.
4. Use permanent marker to write name and date on jar.
5. Empty nutrients from small cup into gallon jug.
6. Fill gallon jar with water, 2 inches from the top.
7. Place grow cube into the 2 inch net pot.
8. Soak the net pot with grow cube into the water for 10 seconds. Remove from water and allow to drip briefly.
9. Place seeds from the manila envelope into the hole in the grow cube. Black Eyed Pea in warm season, lettuce in cool season October- March in Florida.
10. Take pot outside in the full sun.
11. Remove net pot and top off gallon jar with water.
12. Clean your area.
13. Observe while the plant while it grows!
14. Take a picture of your plant growing hydroponically.
15. **Eat your homework!!!**

Day How to Pre- Cut the Gallon Jug

Cut a 2 inch hole in the top of a 1 gallon jug. The hole will hold a 2 inch wide net cup that needs to fit in the hole without falling through. There are many creative ways to cut your hole like hot knifes, hole saws, or large PVC pipe cutters, but you probably do not just have those things laying around your house. You can use a knife and scissors.

1. Draw your 2 inch diameter circle around the neck of the jug.
2. Either jab into the plastic or cut down the side of the neck of the jug carefully.
3. Begin to slice around the jug.

If the hole is too big, you can provide extra support for the net cup with toothpicks or paper clips.

Contact Information

Hannah Wooten, UF/IFAS Extension Orange County, Commercial Horticulture
hwooten@ufl.edu

YouTube Video: Hydroponic Lettuce Hannah Wooten
https://www.youtube.com/watch?v=GQey35Tt24I

A special thanks to UF/ IFAS Extension Seminole County Master Gardeners and the local teachers for piloting and proving this project in the Seminole County Public School system. Rudy White, Jan Mangoes, Mary Lynn Hess, and Amy Thomas are rock star volunteers and teachers! Thank you all, and many more!

Build the Gallon Jug System

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THANK YOU! QUESTIONS?

TAKEAWAYS

- Target your audience
- Youth are motivated to build the system
- Training trainings is an efficient use of Extension Agents' time and resources because trainers can exponentially increase outreach, outcomes, and impacts
- Remain locally rooted and represent your local roots by elevating issues, innovations, and solutions to your Specialists

CONTACT INFORMATION

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