



Growing Communities, Growing Food: Hydroponic Gardening for Urban Audiences

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Florida ranks second in the United States for vegetable production, and the second largest industry in Florida is agriculture. Florida's climate is ideal for production of specialty crops, and is desirable for urban development. Labor and land are costly inputs for agricultural production. Despite abundant rain, water resources are managed for growing human populations. Hydroponic food production can produce the same yield as traditional agriculture using up to 95% less water, 80% less land, and lower labor costs due to automation. Equipping urban audiences with knowledge and tools to successfully grow food hydroponically provides new options for feeding the growing population in nontraditional growing environments. Hydroponics workshops have been taught in Sanford, Florida, and workshop participants completing postevent evaluations (n = 133) report a 100% knowledge gain about hydroponic production and 95% intend to grow their own food hydroponically using hydroponic kits built in class. Ninety-five percent of participants demonstrate skills and confidence in their ability to measure and adjust pH, make a nutrient solution, build a hydroponic bucket, and grow their own hydroponic food. Participants completing three-month follow up surveys (n = 31) report the following: 94% grew at least one cycle of a hydroponic crop, 29% grew additional cycles of the crop, and 32% made additional hydroponic systems. Additionally, 45% of participants are interested in using advanced hydroponic systems, and 10% of participants have commercial hydroponic interests. Hydroponic gardening proves to be an excellent production method, especially for urban audiences.

Florida has a rich agricultural history from cattle to citrus to sweet corn. Many of Florida's larger cities were once major agricultural trade hubs, shipping goods to the rest of the United States and world. Florida has the ability to grow a wide variety of specialty crops thanks to the mild winters, and can grow plants suited for temperate, subtropical, and tropical climates. Additionally, Florida annually receives about 55 inches of rainfall, providing crops with the water needed to thrive. These factors are the reason that Florida produces the second highest value of vegetable crops in the United States, and that agriculture is the second largest industry in the state. Agriculture and natural resources cover 2/3 of the land in Florida and are significant contributors to the state's economy. Florida's abundant resources, natural beauty, and mild winters are cherished by many, and are the same reasons that Florida is also desirable for growing communities.

Seminole County, FL, is centrally located just north of Orlando. It is a mostly urban county with one of the highest population densities in the state. There is still agricultural production in the area; however, the cost of land is ever increasing, making it more difficult for the next generation of farmers to be successful. Less than about 1/4 of 1% of Florida's farmers claim farming as their primary occupation and their average age is around 59 years. The high land values and lack of knowledge of farming is making it more difficult for growers to remain competitive, yet the urban population is eager to enjoy fresh produce with increasing favorability for "local."

Florida is still growing, and the rising population and urban development creates new opportunities for innovation. One growing method that is suitable for urban areas is hydroponics. Hydroponic growing has a variety of benefits, yet still has a technical learning curve for growers, both novice and experienced. Benefits include the ability to achieve the same yields as traditional field grown crops using a fraction of the water and land, efficient fertilizer use, reduction or elimination of pesticides, and the ability to grow on nonarable land. Additionally, good business planning can result in increased profits per square foot of growing space when taking full advantage of hydroponic technology.

Hydroponic technology does not have to be complicated; it only needs to be effective at meeting an individual's goals. Technology is defined by the Merriam-Webster dictionary as "the practical application of knowledge especially in a particular area". In Seminole County, FL, hydroponics training programs are strategically delivered to facilitate pathways for success for class participants to meet their personal goals as growers. Goals range from supplementing a minimal portion of one's diet with homegrown food, all the way to commercial and institutional goals of growing produce to feed populations.

Methods

Introductory, intermediate, and advanced hydroponic training classes are offered in Seminole County, FL. The classes are strategically designed. "Set it and Forget it Hydroponics" and "Hydroponics for Students" cover introductory content. Introductory, intermediate, and advanced topics are included in "Hydroponics:

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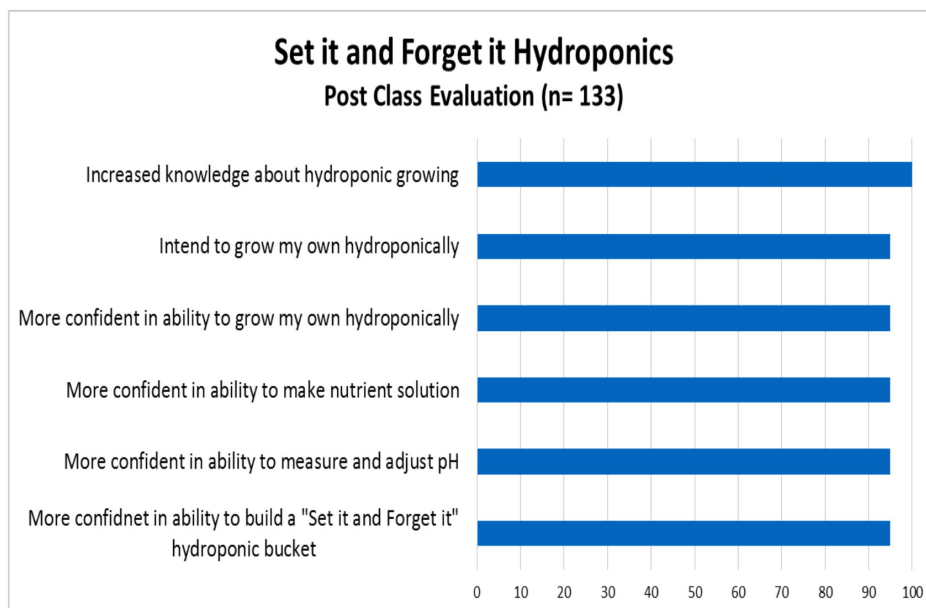


Fig. 1. Post workshop evaluation results for Set it and Forget it Hydroponics workshop offered in 2018 at the Seminole County Extension Office, Sanford, FL.

Elementary to Experienced” and the “John E. Polk Correctional Facility Hydroponics Program.”

Introductory content is a part of all classes offered in Seminole County. First, interested is piqued by providing history and education about the global food situation and the role that an individual can play in the food system. Next, basic concepts of plant science are introduced followed by a hydroponics demonstration reinforcing all of those basic concepts. Classes are offered as quick demonstrations, full scale workshops, and multi-day classroom and hands-on trainings. Participants are encouraged to determine their personal production goals and to take the classes that meet those needs.

The John E. Polk Correctional Facility Hydroponics course includes 26 hours of training, classroom, and hands-on. Students prepare, plant, observe, record, manage, and harvest a crop of microgreens during the course. They also measure and record nutrient levels and practice scouting for pests and diseases. Additionally, the participants make their own hydroponic system from scratch, prepare nutrient solutions using measurement tools, and proceed to manage the crop after the conclusion of the class.

Results

Some students are satisfied with the introductory workshop, and do not desire anything more complex. Most other students are eager to expand their knowledge base and are excited to

learn more advanced hydroponic systems to provide more fresh produce year round. Workshop participants completing post-event evaluations (n = 133) report 100% knowledge gain about hydroponic production and 95% intend to grow their own food hydroponically using hydroponic kits built in class. Ninety-five percent of participants demonstrate skills and confidence in their ability to measure and adjust pH, make a nutrient solution, build a hydroponic bucket, and grow their own hydroponic food (Fig. 1.).

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Conclusion

Hydroponics is a suitable method for growing some of Florida’s specialty crops and is especially adaptable for urban areas. Facilitating pathways for success for the new age urban farmer is essential to promoting adoption of hydroponic growing practices. Introducing hydroponics in a user friendly manner and inviting participants to be a part of the global food solution is encouraging to new audiences. There is a need for new research to satisfy the needs of the home grower to the new age urban commercial farmer. The community is hungry for it!