

Evolving Agriculture with Hydroponics



by Keith Waller

When it comes to mass food production, this is the future. With population growth, this is the only way to keep up. Hydroponics uses a fraction of the water of regular farming, and can grow right in town, reducing shipping headaches.

~Brian Lasher

At Ryan Trobaugh's hydroponic greenhouse in Elgin...

I traveled to a small yard in Elgin to see a home-based hydroponic greenhouse that was designed and hand-built by its owner, Ryan Trobaugh. I imagined all the equipment, the building, piping, pumps and systems would be exorbitantly expensive, but some resourceful people have found a way to avoid high costs and still get all the benefits of hydroponics, namely, fresh organic produce all year, just outside the door. The medium-sized vaulted hutch covered in plastic didn't reveal what was inside:



hundreds upon hundreds of growing buttercrunch lettuce plants, ready to be harvested.

"This is running on the NFT system—the Nutrient Film Technique," Ryan explained. Not knowing much about hydroponics, I was first overwhelmed by the electric-green carpet of plants inside and the toilet-flushing sound coming from the hydroponic pumps and piping. NFT is the hydroponic system that involves having the roots of the plants dangle into a pipe that is periodically flushed with water and nutrients. The greenhouse interior was filled with a nearly level plane of waist-high PVC piping, connected to main pipes that disappeared into the sandy soil. Small heaters and fans were everywhere, and it was bright enough in the midday sun to force one to squint.

"I built it all on my own," Ryan continued, as his cherubic little daughter clung to his leg. "Conduits,

chain-link fence top rail, conduit pipe; I used a pipe bender and sleeved and screwed the framing together from stuff I could buy at Lowe's hardware. The plastic sheeting, however, is professional greenhouse plastic I ordered from the Internet. It's specialized infrared filtering anti-condensate material that also holds heat in for winter." It looked exactly like the plain heavy plastic you might use to cover deck furniture, but in gigantic, continuous sheets. "It won't fog up and drip," explained Ryan.

Using common tools and techniques, this amazingly sophisticated system was cobbled together. It operated well through an unusually cold winter in South Carolina, using geothermal techniques with tanks and piping buried underground. The ground kept the hydroponic solutions at 65 degrees during cold nights, while small electric heaters kept the tops of plants from freezing. I envisioned solar power possibly making this system the greenest thing going. This summer, Ryan is building a simple evaporative cooling system to keep the greenhouse within ideal temperatures for his crops.

"Other than lettuce, I've grown crops of cucumbers and basil," added Ryan. "Monoculture [single plant in mass quantity] crops are easier for big industry, but the small mom-and-pop stores and eateries want the mix. I'm going to move into mixed greens, and maybe even mushrooms in the shaded area under the lettuce plants. I am working on a plan for that.

"How much did it cost?" asked Ryan. "Maybe \$9,000, or with expansion and everything else all in, maybe \$14,000." Operating costs for running pumps, heaters and fans certainly must be figured into the plan. But in any given year, a number of high-value crops can be planted, harvested and sold; all organic and absolutely perfect, with no bugs, pesticides, brown spots or de-



fects. There have been mishaps, however, such as a bout of fungus, caused by allowing the humidity to rise, and a pump malfunction that caused the crop to wilt, but plants immediately revived when the systems were back online. Managing an indoor crop still takes vigilance and technology, but the variables of weather, soil, bugs and wildlife are reduced. Experts say that plants grow 30 to 50 percent faster hydroponically and can produce four times the amount of fruit in less time. The extra oxygen in the hydroponic growing system helps to stimulate root and plant growth and fruiting. The har-

vested product can also be completely organic, field ripened and superior in flavor and sweetness. Ryan already has a buyer for this lettuce crop who specializes in delivery of organic and natural foods.

No expensive lighting systems are installed to stretch the seasons yet, but the strong SC sun is enough to get some long seasons. "If I had lights, I could go all year round and grow tomatoes; tomatoes need intense light," Explained Ryan as he snatched a full lettuce plant from the system and placed it into a plastic bag for me to take home.

can do vertical gardening in even less space." Brian recited statistics, figures and plans in rapid-fire pace. If you ask him a question, bring a recorder and replay it again slowly later, because every word is important.

"How to get started?" Brian asked. "For an indoor hydroponic garden, anywhere in the house, 400 watts of light covers a 2-foot-by-2-foot area, but a little bit of natural sunlight from a nearby window goes a very long way. Always use as much natural light as possible. Double it to 4 feet by 4 feet and grow in layered racks with a couple of florescent lights to trick the plants into seasons. One thousand watts of light is normal for 4 by 4. Anything to fruit or flower takes intense light, but even indirect sunlight is more powerful than many think. But adding lights, with 12 hours on and 12 hours off, will induce fruiting and flowering. You can grow mixed salad greens, leafy greens, peppers, squash, lettuce—all 100 percent organic, pesticide free. Strawberries grow awesome hydroponically.

"And there are no seasons in hydroponics," Brian continued. "You



At All Good Hydroponics and Gardening retail store, in Columbia...

"Everyone can grow their greens for themselves," said store owner Brian Lasher. "To provide all of the greens for a family of four, an 8-foot-by-8-foot, or maybe 10-foot-by-10-foot, greenhouse would be way more than big enough, and you

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grow continuously, all year round. In fact, being around these lights, I don't even feel the winter seasons anymore. We use blue spectrum for vegetation cycles, red for blooming cycles; but these are specialty bulbs, pretty pricey. You can get sun bulbs of 4000 Kelvin [light color spectrum] for \$150 a bulb or new T5 fluorescents that are very close to natural sunlight color.



"The hydroponic solutions come with organic certifications," Brian explained. "Technology has changed tenfold in recent years. OMRI [Organic Materials Review Institute] approval of the products you buy is a big issue, and is "stricter than USDA, and is run by hardcore vegans."

"It can be an expensive hobby, but you can start small with an indoor system and build most of it yourself if you

have the time and know-how, and for free, I'll tell you how to do it," Brian offered. "Power usage? A 600-watt light set-up, fan filters and pumps might use \$30 to \$40 per month in electric, and to buy the equipment up front, maybe \$1,000 to \$1,500."

Brian has ridden the growth of hydroponics and is growing his business, too, to match the increasing demands. Besides several new locations in South Carolina, he is also looking at new store locations in California. Research shows that commercial hydroponics production is expanding quickly worldwide: Israel—30,000 acres, Holland—10,000 acres, England—4,200 acres, and Australia and New

Zealand—8,000 acres between them. In the United States, Utah, California and Texas are ideal climates for large-scale hydroponic farms, but hydroponics works literally anywhere there is space and light and power, even right downtown on a rooftop. Small home-based hydroponics has a tremendous future as well.

"When it comes to mass food production, this is the future," Brian declared. "With population growth, this is the only way to keep up. Hydroponics uses a fraction of the water of regular farming, operates year round, and can grow right in town, reducing shipping headaches. I've heard of plans for hydroponic high-rises in cities with the grocery market on the bottom floor, all literally fresh picked. It is the future. And desert countries can have fresh-grown fruits and vegetables; it uses very little water."

Reducing water use, eliminating runoff, eliminating pesticides and using a relatively tiny amount of space, makes hydroponics an Earth-friendly practice. "In soil, tomatoes need 20 gallons of water a week," Brian said. "Hydroponic tomatoes use a 2 to 2 1/2 gallon reservoir and recycle that same water all week. It really saves water, nutrients and money."

Back at home...

I placed the lettuce plant from the Trobaugh hydroponics operation in a water bowl in the sunny kitchen window. It perked up quickly, and several lettuce leaves made their way into salads and sandwiches over the period of a week, until seven days later, without refrigeration or care, the remaining nearly bald stalk was finally tossed to the compost bin. Fresh organic lettuce for a week, on the table, not refrigerated. That seems like another culture shift to get used to.

For more info, contact Brian Lasher at All Good Hydroponics and Gardening, 6729 Two Notch Rd, Columbia, 803-708-4819, or visit AllGoodHydroponics.com.

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