

# Big-time Farmer of Tiny Crop

By Ann Gates Weaver



Larry Forrest, owner of Grow Anywhere, a successful aeroponic farm in Colorado, will tell you flat out that he's not a gardener. He's an optometrist and ironically, all the plants in his home are silk or plastic — his lawn is even taken care of by someone else and the bushes watered automatically. Forrest isn't much of a green thumb, yet in just three years, his aeroponic operation has taken off, providing varieties of microgreens to more than 100 chefs in Colorado.

Forrest's interest and much of his success in aeroponics can be attributed to horticulturist and founder of AgriHouse, Richard Stoner. Stoner has been involved in aeroponics since 1982 when he was fascinated by watching peach tree cuttings root in just eight days. A year after, he opened the first commercial aeroponic farm and

started growing culinary basil, and two years later received a U.S. patent for his aeroponic system. By the time Forrest met Stoner in the early '90s the basil venture was over, but Stoner had formed a company, AgriHouse Incorporated, to sell systems and forward aeroponic technology.

Stoner also employed aeroponics to grow yew trees for future taxol production (a compound used for cancer research) in behalf of Hauser Chemical. Forrest found the technology fascinating and immediately took a seat on the AgriHouse board of directors, a seat he hoped would put him ringside for a future investment opportunity. His opportunity came soon enough. AgriHouse was selling systems to universities and hobbyists, but they were convinced that aeroponics had a greater future in the realm of food production. However, they knew that before they could convince others to give aeroponics a try for large-scale food production, they would need to demonstrate its potential with their own fully-functional prototype. So in 2005, Forrest put up the money, started doing market research, and officially became a farmer of varieties of the tiny, trendy greens.

With the help of Mark Haberer, essentially the Grow Anywhere systems engineer, most of the major glitches were solved in a matter of months. Still, Forrest estimates that they've had to make over thirty enhancements between their system's development and facility adjustments since they've been in business. Their current systems use a hydro-atomized spray which breaks up water droplets into just the right size to stimulate lateral root growth. This is compared to ultrasonic sprays which can fractionate water into droplets so small that a vapor cloud results, which only stimulates hairy root growth—thwarting the plants' overall development. Their water/nutrient solution is sprayed for five seconds every twenty minutes. The five-second duration provides the right amount of moisture and nutrients for optimal plant biomass development while the twenty-minute interval allows the oxidation period necessary for primordia root development. Even the force of the spray assists plant growth by cleansing the plants

and keeping them fresh and turgid.

The light array that Grow Anywhere uses is no ordinary greenhouse bulb either. Their NASA developed light arrays have one of the highest photosynthetic outputs per-watt, yet they don't heat up from the ballast. In fact there is only two degrees of difference between the temperature right beneath the bulb and right above the surface of the leaves.

Besides the actual systems, there were other variables that had to be tinkered with as well, and Stoner's previous experience was helpful. When Grow Anywhere was ready to move out of their startup garage and into a commercial facility, Stoner encouraged them to go with a warehouse instead of a greenhouse. After growing culinary basil in greenhouses he just felt it would be far more efficient and cost effective to maintain a consistent growing temperature in a warehouse instead.

When the first crop in the new facility came up it was yellow, and nothing in Stoner's past prepared him for that. They figured out soon enough that water was the culprit. PH tests pointed to a lack of acidity from the new water source. The problem was easily resolved with a few additives.

Within a year and a half their systems were running consistently enough to support customers, but Forrest had done his market research long before that. Even with produce prices on the rise, he still knew it would be difficult for aeroponic food to compete in a regular grocery store, but providing greens to restaurants for garnishes and gourmet salads was the perfect niche for his entrepreneurial venture. Forrest also received some initial help from a soil-based microgreens farmer providing the same product in a different location. That made some of the business details—like coming up with price points—easy because it had already been done. When it was time to start selling, Forrest and his wife went door to door with an aeroponic presentation and product samples in hand. Sales were easy: as soon as chefs saw and tasted the samples they wanted to sign up. Chefs didn't care how the greens were grown, but it soon became clear that the aeroponic process was providing some

special benefits that set Grow Anywhere apart from soil-based competitors. Since harvesting aeroponic plants doesn't require much handling or washing compared to soil-grown plants, their greens were still pristine when delivered. Chefs were soon telling them that Grow Anywhere's produce was fresher, hardier and longer-lasting than other microgreens. The chefs also reported that the greens tasted more vibrant than soil-grown counterparts.

Research done with NASA has shown that aeroponic plants have a greater nutrient uptake than plants grown by all other methods. Grow Anywhere also uses Beyond, its own Organic Disease Control formula developed originally by AgriHouse, rather than using copper sulfate sprays which can impart a coppery taste to crops.

Now they distribute to over a 100 restaurants in the Denver metro area. Forrest estimates that they ship out twenty five pounds a week of greens as diverse as sunflower shoots, fennel greens, corn shoots, shiso, china rose, radish, beets, and several varieties of basil. The future looks good for Grow Anywhere; the company has more sales than they can support right now and are ready to extend production into the other half of their 3,000 square-foot warehouse in Frederick, Colorado as soon as they find investors to help them do so.

Once they expand, their greens should be showing up on the aisles of gourmet food markets, and their door to door sales have now been replaced by representation by Shamrock Foods, though Haberer, Forrest, and his wife are still the main employees (Forrest still works three to four days a week at his optometrist practice.)

Through trial and error Grow Anywhere has turned into a successful operation serving a niche restaurant market. The technology has turned this ophthalmologist into a green thumb of sorts—a kind of futuristic farmer of a high-tech microgreen farm—and he's pretty secure that his new career will continue to thrive. 🌱

# Aeroponic Food: A Super Food?

By Ann Gates Weaver

Could aeroponic food be more nutritious than food grown by other methods? Research performed by founder of AgriHouse, Richard Stoner, in conjunction with NASA in the late '90s seems to indicate that it is. In 1998, NASA held a series of experiments comparing aeroponic systems with other growing systems. One experiment involved a comparison of the final product. When lettuce nutrient films were compared, the results showed that the aeroponic lettuce had an 80-percent increase in dry weight biomass per square meter over the other methods while using 75 percent less nutrients and water.

"Plants need oxygen as well as CO<sub>2</sub>," says Richard Stoner, "and even when you add it to your system, nothing can compare to the oxygen exposure plants get when their roots are surrounded by air." This in turn allows quicker, and therefore, increased uptake of nutrients during plant growth. In fact, according to Stoner, plants have a 90 percent uptake of minerals and vitamins. Perhaps in the future, aeroponic food will become a new type of super food sought for by those looking to increase their own nutrient uptake.

## Organic Disease Control For Earth and Beyond

"Hey, no blue!" This was the comment of many Colorado chefs when Larry Forrest first presented them with samples of his aeroponically grown microgreens. What they were referring to is a common symptom of greenhouse plants treated with copper sulfate: a blue tint and a penny-like aftertaste. Unfortunately, copper sprays are one of the few organic options for greenhouse growers, but lucky for Larry, he just so happens to have his own Organic Disease Control (ODC). The ODC that Larry uses is a formula called Beyond, developed by his buddy and long time greenhouse grower, Richard Stoner.

Back in the 1980s when Richard Stoner was growing aeroponic greenhouse basil, every time he'd get a couple of cloudy days mold

and fungus would take over his crop. "There's no way to totally eradicate all pests because most plants carry insects and diseases with them in the seed," Stoner explains. However, plants have the genetic ability to overcome those diseases, but when the disease pressure gets to high when the plant is overly stressed, pathogens spread faster than plant immune systems can handle. This constant battle in his past was the catalyst for seeking something better after AgriHouse was formed.

In 1992 Stoner enlisted some researchers from Colorado State University to begin development on an alternative to copper sprays. The technology that they came up with stimulates the existing ability of plants to fight off disease. Not a true pesticide itself, Beyond elevates enzymes in plants increasing their efficiency in nutrient and moisture uptake, making crops hardier, increasing yields, and making the plant stronger and

less susceptible to pests.

In 1997 NASA caught wind of the project and sponsored further experiments on the MIR Space Station using adzuki beans and adzuki bean seedlings. Those treated with the ODC method grew more robustly and exhibited less fungal infection, both on the MIR as well as in the concurrent earth crop. Further post-biochemical analysis showed that these plants continued to retain their fungal-fighting abilities later, even throughout their entire life cycle. Now AgriHouse sells the shellfish-derived product to growers everywhere who swear by its results.

By the time Larry Forrest started the Grow Anywhere indoor farm, copper sulfate wasn't even a consideration. Larry doesn't know much about copper sulfate, but he does know that Beyond helps him provide his customers with what they want: microgreens that both look and taste green. 🌱



Rick Stoner, founder and president of AgriHouse Inc. demonstrates the Inflatable Flex-Aeroponic System developed under his NASA research grant. This inflatable system was designed and built using materials found in the space suits used by space shuttle astronauts. The Flex-Aeroponic material that supports the small delicate seeds was developed and manufactured by AgriHouse. The Flex-Aeroponic material holds no water allowing the aeroponic mist to have complete access to the developing seed. It provides potential growing conditions for plants to germinate and grow to maturity. Grow-Anywhere licensed the materials and technology from AgriHouse.