HYDROPONIC GROWER COMBINES TECHNOLOGY AND AGRICULTURE

HOW ONE GROWER COMBINED HIS ENGINEERING EXPERIENCE WITH HIS LOVE OF AGRICULTURE TO START HIS OWN HYDROPONIC GREENHOUSE OPERATION

By David Kuack

Knowing that he didn't have the money necessary to start his own farm, Randy Butts looked at greenhouse hydroponics as a way of starting his own agricultural business. Butts worked as an engineer for 10 years in the automation and controls industry before starting Eden Farms Inc. in Lebanon, Ind., in 2006.

"I had some friends who grew hydroponic tomatoes in the 1990s and it always kind of fascinated me," Butts says. "It was kind of a marriage of my love of technology and my love of agriculture that I put together and started my own hydroponic operation."

Butts got his business started by purchasing 5,000 square feet of greenhouses on eBay.

"They were Crop King's greenhouses that I took down from the company's facility in Seville, Ohio, and moved to Lebanon," he says.

The greenhouses are equipped with a Crop King Grower's Choice environmental control computer. A light sensor is connected to the computer which is used to control Sun System metal halide lights.

"During nine months of the year the computer controls the lights," Butts shares. "The sensor usually turns them on around 9 a.m. The lights could run for as long as 14 hours per day. The lights are used over the entire growing area, including the propagation and finishing areas."

Beginning with Basil

Butts started his hydroponic operation growing 'Genovese' basil in nutrient film technique channels.

"I worked with American Hydroponics on designing my system," he says. "The people at American Hydroponics advised me to start with basil rather than trying to mix different crops since I only had one nutrient reservoir. They felt it would be a major challenge to grow multiple crops. Another reason I chose basil was that it could withstand the heat of the summer."

Butts installed a NutriDose fertigation system manufactured by Autogrow Systems. He says the system monitors the electrical

Randy Butts grows a variety of crops, including basil, watercress, arugula, lettuce and mixed greens (Photo: Eden Farms).

conductivity of the hydroponic solution.

"When the EC drops below a set point it will add fertilizer until the conductivity set point is reached again," he says. "It also adjusts the pH if necessary by injecting sulfuric acid."

Butts initially marketed the basil primarily through wholesale distributors that shipped the product throughout the Midwest states.

"At that time my product was new enough that it garnered a lot of interest in the retail market," he shares. "Initially all of the basil I was growing was sold to wholesalers for retail distribution as living basil plants in a floral type sleeve. Most of the basil was sold to grocery stores."

Butts says it was best for him to start with one crop, to learn how to grow it well before trying to manage multiple crops.

"Starting with one crop and building slowly made sense," he states. "With multiple crops you quickly get into managing different crop cycles and rotation times, which I wasn't prepared to do when I started."

Start Small and Simple

Butts advises growers just getting into hydroponic production to start on a smaller scale than he did.

"I wouldn't necessarily recommend how I got started in regards to the size of my operation," he says. "It's possible to start a hydroponic operation in a garage or basement with a small system to become familiar with growing hydroponically. You should grow enough so that you can offer samples to potential customers to see if there is an interest in the product. That was a step that I skipped, but recommend doing."

Butts was forced to diversify his crop mix in 2009 when a major local customer switched herb suppliers.

"Since this customer was a significant portion of my business, I had to diversify quickly in order to stay in business," he says. "I chose arugula and watercress, which were very similar in production to the basil I was growing. I had trialed these two crops and had talked to another grower who was doing the same combination. Initially the watercress was an easier sell than the arugula. I had picked up a food service distributor that serviced restaurants whose chefs loved being able to purchase locally grown watercress."

Although basil is still his major crop, Butts continues to diversify his crops.

"We now have a large section of lettuce," he shares. "We have also added mixed greens, kale, various herbs, bok choy, mustard greens, collards, green and red sorrel, and tatsoi. All of those crops are sold at farmers markets."

Even as Butts has expanded crop production, he is still only using one nutrient reservoir.

"We had to make a few adjustments to make that work," he says. "We have

Photo: Cornell University

DETERMINING MARKET DEMAND

Randy Butts, president at Eden Farms Inc., advises someone interested in starting their own hydroponic operation to do their homework on potential markets.

"What is the demand for the product or products in the area that you are looking to sell?" Butts says. "Talk to distributors and grocery stores, find out if there is a need for the products and whether they are interested in locally grown produce."

Butts says that he actively works on finding new customers.

"At the time I started my business my product was unique and garnered a lot of interest in the retail market," he says. "About 65-70 percent of our product is sold through distributors. Farmers markets account for 20 percent of sales and 10-15 percent is sold direct to grocery stores and restaurants.

"This is the second summer that we are selling through farmers markets. Once people started to see our product in the marketplace we had requests from three or four other farmers markets. Unfortunately, we can't do them all. We maintain a stand and have people working the various markets for us. By selling directly to consumers we have developed relationships with regular customers at these markets. They come back week after week to see what we are selling."

Every crop that Butts is growing is produced year-round except for spinach.

"Spinach is our only seasonal crop," he says. "We have a difficult time growing spinach through the summer because of the warm temperatures. Everything else we try to grow year-round so that there is a consistency to our offerings."

GREENHOUSE VEGETABLE LIGHTING REQUIREMENTS

Melissa Brechner, greenhouse supervisor at Cornell University in Ithaca, N.Y., says a greenhouse vegetable grower is going to need a minimum of 15 moles of photosynthetically active radiation (PAR) per day in order to produce a crop.

"For Ithaca, N.Y., and for many other places, the light levels range from a high of 15 moles per day in January up to about 65 moles per day in July," Brechner says. "Those levels are not going to change drastically whether a grower is in Arizona or in Ithaca. What is going to change is that in Arizona there aren't the really dark 0 and 1 mole days that occur in Ithaca.

"For tomatoes and cucumbers I tell growers that they should have more than 20 moles per day to produce a good crop. I don't know how different production would be if the light level was 30 moles per day. Is it worth the extra 10 moles for the grower to put in supplemental lighting? I'm not sure. But it is certainly worth it for a grower to go from 1 to 10 moles and from 10 to 20 moles."

Optimum light levels

Brechner says that growth is directly correlated to the amount of light the plants receive, especially when they are in a vegetative state.

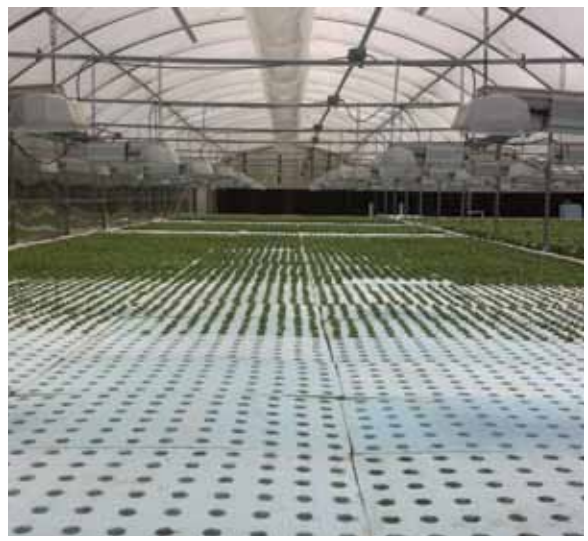
"I think lettuce is a less forgiving crop. Tomatoes and cucumbers if you don't give them as much light they will still grow," she says. "Lettuce should have 17 moles of PAR per square meter per day. This refers to the combination of natural light that is transmitted through the glazing as well as any artificial light that is used. Our research has shown that an average of 17 moles gives optimal growth while minimizing tip burn.

Brechner says there are some differences in the amount of light that different types of lettuce will tolerate.

"We've found for Boston (bibb) lettuce that a daily light integral of 17 moles of light per day used with vertical airflow to increase the rate of transpiration in order to increase calcium uptake prevents leaf tip burn," she says. "Romaine lettuce can't take as much light before it gets tip burn. And it certainly can't take as much light without having vertical airflow.

"Lettuce grown outside receives more than 17 moles of light per day, but it is windier outside. Lettuce, especially romaine, grown outside will get tip burn if there is too much light. Even during December you can find field-grown lettuce coming from California that is tip burned."

For more information, contact Melissa Brechner, Cornell University Agricultural Experiment Station; 607.255.2527; mlk38@cornell.edu.



Eden Farms is using a raft system at its Illinois facility to produce a large volume of one or two commodities to take advantage of the efficiency gained with this production method.

been able to find a nice balance that lets us grow all of the crops on one nutrient mix. The lettuces, particularly bibb, were the hardest to learn to grow with one reservoir since they are the most sensitive crops nutritionally."

Expanding Efficient Production

In 2012, Butts expanded his production when he began leasing an abandoned tomato greenhouse

operation in Raleigh, Ill. One of the benefits of the Illinois facility is the availability of methane gas for heating the greenhouses.

"The greenhouses in both locations are Crop King structures," Butts says. "That actually made it simpler for me when I went in to rehab the Illinois greenhouses. I was familiar with all of the systems in Illinois because they were just like what I had been operating in Indiana.

"We started growing in this 22,000-square-foot greenhouse that was a tomato facility in the 1990s and had been left to deteriorate. The tomatoes had been produced in grow bags, but we went in and retrofitted the houses for a deep water culture system. There are no longer any tomatoes. We are currently using half of the production space available. The majority of it is being used for lettuce, including bibb, oak leaf and lolla rossa varieties."

In addition to the lettuce crops at the Illinois operation, Butts is also growing smaller quantities of basil, watercress and arugula and a few other miscellaneous crops.

"We are trialing other crops because we want to try growing them in the raft production system," he says. "We want the Illinois facility to be able to produce a large volume of one or two commodities. The raft system lends itself better to that type of production. With the raft system we are working from the ends of the pond to either transplant or harvest. There is an efficiency gained with the raft system if one large crop is grown."

The houses were originally equipped with P.L. Light Systems 400-watt high pressure sodium lamps, which required some repair work before they were operational.

"The lights had been left exposed to the elements for a number of years and needed to be refurbished," Butts shares. "We replaced the capacitors and starters in each one. Being able to fix and use the lights saved us a great deal of capital in our rehab process."

The lights, which cover the entire growing area, are not controlled by a light sensor like the metal halide lights in the Indiana operation.

"The high pressure sodium lights are time-based controlled," Butts adds. "They run on a fixed schedule based on time of day. We don't run the high pressure sodium lights as long as the metal halides because there is more sunlight during the winter in the Illinois operation, which is located further south than the one in Indiana. We run the high pressure sodium lights about six hours at night."

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