

# URBAN AG PRODUCTS

News on Technology for Vertical, Controlled Environment and Urban Farmers.



*FEATURING GROWING POWER:  
AN INTERVIEW WITH WILL ALLEN*

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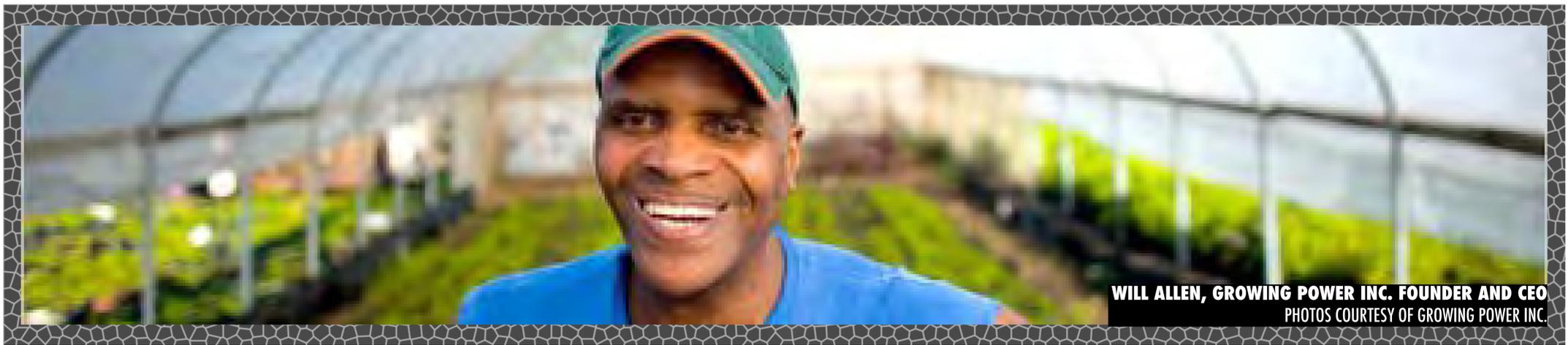
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DAVID KUACK - FREELANCE TECHNICAL WRITER

MICHAEL BRANCH - BRANCH MEDIA PRO  
[WWW.BRANCHMEDIAPRO.COM](http://WWW.BRANCHMEDIAPRO.COM)

CAMERON MUILENBURG & ASAWRIGHT FILMS  
COVER PHOTO: SHOT AT THE FARMER'S MARKET IN DALLAS, TX  
[WWW.ASAWRIGHTFILMS.COM](http://WWW.ASAWRIGHTFILMS.COM)

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WILL ALLEN, GROWING POWER INC. FOUNDER AND CEO  
PHOTOS COURTESY OF GROWING POWER INC.

# GROWING POWER: AN URBAN AGRICULTURE ADVOCATE

*By David Kuack*

**GROWING POWER FOUNDER WILL ALLEN IS USING URBAN AGRICULTURE TO BRING HEALTHY FRESH FOOD TO ALL ECONOMICAL GROUPS IN COMMUNITIES NATIONWIDE.**

**G**rowing Power Inc. in Milwaukee, Wis., is celebrating its 20th anniversary this year. Founder and CEO Will Allen never imagined that this non-profit organization would have become a major voice for urban agriculture not only nationally, but also internationally.

“When I first started out I was already farming,” Allen said. “I bought the last piece of farmland in Milwaukee for selfish reasons. I needed a place to sell my farm produce and planned to use the land for a farmer’s market.”

Allen’s life took a different turn when he was asked to assist a youth group in starting an organic garden in order to sell produce at the farmer’s market. Since then Allen has been a spokesperson and advocate for urban agriculture.

“This work is really about social justice and food justice because everyone has the right to good food,” he said. “We have to come up with systems that make sure people have the opportunity to purchase good food in a dignified way. We can’t continue to allow three out of 10 kids in America to go to bed hungry every night. Food is the most important thing in our lives. You have to have food in order to survive.”

## **EXPANDING SUSTAINABLE FARMING**

Growing Power currently has 140 employees, operating 23 farms with over 25 acres of greenhouses and more than 200 acres of fresh food production. The organization helps to operate 15 regional training centers in 13 states that replicate the farming program that Allen started in Milwaukee.

There are eight farms in the Chicago area. Allen said the Chicago area has a lot of potential because of the amount of vacant land available. He said there are about 33 square miles of vacant land.

*“Food is the most important thing in our lives. You have to have food in order to survive.”*

“We are adding farms all the time,” Allen said. “We are putting land in long term tenure. We have hired an attorney and an expert in land trust work to help with that. That is one of our big efforts now, to add more production space in cities and right outside cities. Some of our farms are in nearby rural communities within a half hour of the city of Milwaukee.”

Allen said he expects the training centers will expand to about 20 states in 2013. “Organizations have to apply to operate a regional training center,” he said. “There are criteria they have to meet and they have to go through a five-month training program. They also have to have their own permanent use of land for at least five years. The contract they sign with Growing Power extends over a five-year period and this helps to ensure they have time to develop the necessary infrastructure.”

Growing Power operates greenhouses, including hydroponics and aquaponics, and does field production.

“These other locations try to replicate the integrated food system that we have created at Growing Power,” Allen said. “We are not only growing plants organically, but we are raising fish and other animals in different ways.”

Allen said the majority of the organizations that apply to set up regional training centers have been designated 501c3. He said there are also some for-profit groups that participate.

“We have been doing hands-on training in Milwaukee since 2000,” he said. “We have met a lot of the people from these organizations and have formed partnerships with them. I make the final decision based on the organizations’ stability after they have gone through the training program. Also, we don’t sign off on this program with an organization’s director or CEO. The entire board of directors of an organization has to support and be advocates for the program.”

#### NEED FOR A DIVERSE DISTRIBUTION SYSTEM

As important as it is to be able to produce enough healthy, chemical-free food, Allen said it is also critical to be able to distribute that food.



**“There is no protocol [for organic farming]. You have to visually and spiritually know what you need to do every day.”**

“We have a diverse marketing scheme to distribute our healthy food to everybody in the community,” he said. “This includes wholesale accounts, retail accounts, farm stands, grocery stores, caterers and even working with Sysco to buy produce in case lots for food school programs. We want to be able to get food to everybody in the community regardless of where they are economically. If you are going to have an equitable food

**THE FARMS OPERATED BY GROWING POWER CAN VARY IN SIZE AND METHOD OF PRODUCTION.**



**GROWING POWER SEEKS TO DELIVER GOOD FOOD TO ALL RESIDENTS OF A COMMUNITY REGARDLESS OF THEIR ECONOMIC STATUS.**



system, you are going to have to address the issue of how are you going to get this healthy food to everyone in the community.”

The first thing that Growing Power works on is distributing food to the local community through the organization’s retail outlets.

“We are in a food desert area so we operate retail stores and farm stands,” Allen said. “These have to be business models with cash flow. It may require a more diverse marketing scheme that includes wholesale, retail and a number of different income streams. It is very complicated when you are developing a new local food system and it takes time to develop. You have to let these different accounts know you have the capability to produce enough food to go into their systems. This is probably the biggest challenge with local food production. There are very few organizations around the country that can produce enough food on a regular basis to distribute into the streams that we have.”

## CREATING LIVING WAGE JOBS

The production centers set up by Growing Power are staffed by local employees. Allen said the jobs created at these centers are living wage jobs, not minimum wage.

“Our commitment, regardless of how difficult it is, is to generate cash flow, so we have the ability to create living wage jobs,” he said. “Operating a development training program won’t work unless there is a job ready for the person being trained. If we are training a person to build greenhouses, we need to make sure that at the end of their year of training they have a permanent job waiting for them. And they receive a 5 percent pay increase after that year.”

Allen said the size of the production centers determines how many employees work there.

“Different farms have different agricultural footprints,” he said. “They can be different sizes. It could be ¼ acre with three hoop houses. Another operation might be 5 acres with 30 hoop houses. It also depends on the crops. Some crops have a higher value than others. For example, collards may not yield as much as spinach or salad greens. There’s also regrowth so you don’t have to reseed every time you harvest a crop.

“Organic farming is a very artisan type of farming and you have to know what you are doing. There is no protocol. You have to visually and spiritually know what you need to do every day.” 

**For more:** Growing Power Inc., (414) 527-1546; [www.growingpower.org](http://www.growingpower.org).

# WHAT IS LIGHT QUALITY?



With LED Grow Lights and other new artificial light technologies now available to commercial greenhouse growers, it is important to understand how light works and what effect it can have on hydroponic vegetable crop or floriculture crop production.

This video highlights the different aspects of Light Quality. 🌱

Contact Hort Americas at [infohortamericas@gmail.com](mailto:infohortamericas@gmail.com) with additional questions.



# PLANNING FOR SUCCESS

*Article by David Kuack, Photos by Richard Billekens*

**THERE ARE MANY FACTORS TO CONSIDER BEFORE STARTING A GREENHOUSE VEGETABLE OPERATION. GREENHOUSE GROWER RICHARD BILLEKENS DISCUSSES SOME OF THE MOST IMPORTANT CONSIDERATIONS BEFORE GETTING STARTED.**

**A**n increasing number of field vegetable growers and ornamental plant growers are considering adding greenhouse facilities or using current structures to produce vegetables. Richard Billekens has 28 years of experience in the production of greenhouse vegetables. He has worked as a grower in the United States, Canada and Mexico. He has also worked as consultant in the United States, Canada, Mexico, Russia and Sweden. He is currently head grower, production manager and head of research and development at Hortinvest Mexico SA de CV in Querétaro y alrededores, Mexico. He manages 18½ acres of greenhouse-grown sweet bell peppers. Billekens said there are some major factors that growers need to consider before building any structures for vegetable production.

## **CHOOSING A LOCATION, MARKET**

Having experience in numerous production facilities worldwide, Billekens said he has found a location about 2,000 meters (6,561 feet) above sea level to be the best.

“This provides a tropical climate, but it is not too hot and not too cold,” Billekens said. “In locations like Holland and Sweden, growers don’t have a lot of options in regards to location. They build there because of the closeness to the market. We built in Mexico because we also wanted to be close to our market, which is the United States and Canada. From here to Detroit it’s a shorter driving distance than from Vancouver, British Columbia, to Toronto. It’s only a two to three day drive for us.”

Being at a high elevation in Mexico, Billekens said light levels are not an issue.

“In December our facilities receive between 1,400-1,800 joules of light per day. In Vancouver during the same time, daily light levels are only 200 joules,” he said. “But Vancouver has light levels that are much higher than Holland and other northern European locations.

“In Sweden and Russia during the winter, some of the growers use lights to grow. But in those locations using lights can be very expensive. Installing and running lights nearly doubles the cost of building the greenhouses.”

Although the peppers grown by Billeken’s company compete with product grown in Canada and Europe, he said he has the advantage of being able to produce peppers when Canadian and European growers are replanting their crops. He said growers in Canada and Europe usually replant during November and December. He replants his crop during June and July. Like Canadian and European growers, he is producing peppers for 38-40 weeks.

“Pepper growers in Canada and Europe are replanting their crops in December. There is no production going on,” Billekens said. “That is the time that I am in full production. I start planting the first week of June and go through Christmas time so that I can get a higher return on my product during November through March. Canadian and European growers are in full production in April and May.”



## WATER SOURCE

Billekens said having a reliable and good water source is a critical factor in growing greenhouse vegetables. He uses water from a well which has a sodium level of 2.5-3 millimoles per liter. He said this level is too high for pepper and tomato production. A reverse osmosis system was installed to remove the sodium and bicarbonates.

“It costs about 35 cents per cubic meter to clean the water,” he said. “Some elements like sodium and iron are easy to remove from water. Once the water is treated it is very clean.”

Billekens said rain water is the best source of water because it is very clean to begin with. He said rain water can become polluted when it is stored in catch basins. However, cleaning this water prior to use doesn't usually require as expensive a system or as large a unit as treating other water sources.

“In Mexico and other desert locations like Saudi Arabia there is not much rain. That is why I am using well water,” he said. “Surface water is not as clean as well water. Surface water can collect all types of contaminants including algae and disease pathogens.

“If a water source has a lot of organic matter in it, the irrigation system can become plugged up very quickly. Sand filters can be used to remove this material.”

Billekens said growers in Holland also use municipal water supplies. To reduce the demand for water early in the morning, Dutch growers fill holding tanks at night when the demand for water is low. This also enables the growers to pay less for the water they use since they are drawing city water at non-peak periods.

“Some Dutch growers have as many as three options when it comes to water sources, including rain water, city water and well water,” he said. Since city water is the most expensive, most growers try to mix it with rain water at a ratio of half and half.”

The well water Billekens is using has a pH of 7.5. After the water is treated by reverse osmosis the pH is lowered to 6.5 and it is stored in an outside tank. Acid is then injected to lower the water pH to 6.0. It is then ready to be used for irrigation.

## KEEPING THINGS SIMPLE

Billekens said he has a very simple fertilizer system consisting of a mixing tank with two tanks that contain

separate fertilizers. The fertilizers are pumped into the mixing tank where they are diluted with fresh water. A drip irrigation system then delivers the water to the pepper plants, which are being grown in coco fiber bags. Each plant has its own drip line.

“We are using the hanging gutter system to produce the peppers,” Billekens said. “We found that the coco fiber bags are a little cheaper and a little more forgiving in Mexico's climate, which I consider to be harsh. The hottest time of the year is in April, which is just about the time the crop is finishing. The high temperature is about 38°C (100.4°F) with no humidity, so it is like a desert climate.”

Since the plants are nearly 13 feet (4 meters) tall and covered with a lot of foliage, Billekens has to irrigate between 10 to 20 cycles (5 to 12 liters per square meter per day) to prevent wilting.

“The plants can adjust to the climate in the greenhouse,” he said. “There is a lot of transpiration from the leaves so they are making positive changes to the climate by raising the humidity.”

Billekens said a misting system could be installed to raise the humidity, but the water quality has to be very good to ensure there isn't any clogging of the nozzles. He said a misting system can also be expensive, about \$7 per square meter.

Billekens said his company is the only one in Mexico growing peppers in glass covered greenhouses. “We apply white wash to lower the light intensity from April until September,” he said. “During May we are cleaning the greenhouses and then replanting in June. During that time it's more comfortable to be in the greenhouses covered with white wash.

“There are other pepper growers in Mexico who have plastic covered greenhouses who also apply white wash to avoid stressing their plants. If the plants grown in plastic greenhouses are healthy, white wash doesn't usually have to be applied.”

Billekens has installed circulating fans to keep air moving when the greenhouse vents are closed at night. “The fans aren't used for cooling at all,” he said. “They are used for air movement. The fans help to prevent powdery mildew and other fungal diseases.”

## DON'T SKIMP ON CONSTRUCTION

Billekens said it is critical that a grower find a good greenhouse builder when constructing a greenhouse.

“This greenhouse operation is the ninth construction that I have been involved with,” he said. “Regardless of whether you buy an American, Canadian or Dutch greenhouse, ask the manufacturer where the labor is coming from. If you have to hire the builders from Canada or Holland, that could end up being an expensive greenhouse project. The



RICHARD BILLEKENS USES A HANGING GUTTER SYSTEM TO PRODUCE GREENHOUSE PEPPERS. THE PLANTS ARE GROWN IN COCO FIBER BAGS.



construction costs of the project can increase considerably.”

Billekens said he works with the builder providing 10 to 15 local laborers, including a welder and an electrician, who can handle the simpler construction tasks.

“What I want from the builder are specialists,” he said. “These are specialists who ensure the land is leveled correctly, the greenhouse foundation is laid out properly and the concrete is poured evenly.

“I want someone who specializes in greenhouse construction to come in for five to seven days to make sure the first support post is erected straight. If the first post is put up correctly then the rest of the posts will be straight.”

Billekens said one of the most important parts of building a glass greenhouse is the glazing. He advises growers to spend the money to hire a specialist to install the glazing.

“The glass on the roof has to align correctly,” he said. “If the glass doesn’t align, then there are going to be problems with the roof vents opening and closing and increased chances that the panes will slip and fall out.

“You may spend a little more initially hiring these specialists, but then you know the job is going to be done properly and you won’t have to worry about it later. Also, you want to hire specialists for warranty reasons in case something does go wrong. If you do all of the construction yourself and something does go wrong, then you’re on your own to correct the problems.”

#### MULTI-TASKING EMPLOYEES

Billekens said when he started the operation in Mexico he did not have a hard time finding enough people to work in the greenhouse.

“It takes about five people per hectare (2.47 acres) to operate the greenhouses,” he said. “But I hired 10 people since no one had any experience working in a greenhouse. I had to teach them everything about handling the plants and harvesting the peppers.”

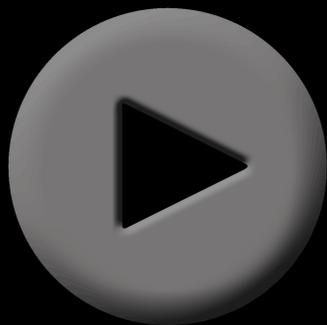
Billekens said it was not difficult for the employees to learn how to handle the crop. He has various groups of employees who do the different tasks, including pruning and winding, harvesting the peppers and pest and disease monitoring and management.

“Every employee is very specialized in one particular activity, but they also know something about each of the different tasks performed by the other employees,” he said. “This ensures that if someone is absent, say because of illness, there is another employee who can cover for the missing employee.” 🌱

**For more:** Richard Billekens, Hortinvest Mexico SA de CV; rbillekens@yahoo.ca; www.freshmex.com.mx.

David Kuack is a freelance technical writer in Fort Worth, Texas; dkuack@gmail.com.

# GreenPower LED



The Philips GreenPower Flowering LED is the perfect introductory tool for commercial greenhouse growers looking to learn about using horticultural LED lighting as an artificial light source. These are highly efficient LED grow lights. Philips GreenPower Flowering LED is good for day length extension, photoperiodic manipulation and other low intensity light needs. The easy-to-install LED lamps have a high reliability and long lifetime that saves on maintenance costs. This Flowering LED has been successfully used in commercial greenhouse strawberry production, bedding plant production, cutting propagation and in stock plant programs to name just a few. 🌱

Contact Hort Americas at [infohortamericas@gmail.com](mailto:infohortamericas@gmail.com) with additional questions.



PHOTO COURTESY OF SMITHERS-OASIS CO.

# FACTORS TO CONSIDER WHEN CHOOSING A SUBSTRATE FOR LETTUCE, GREENS PRODUCTION

*By David Kuack*

**WHETHER A GROWER CHOOSES TO PROPAGATE IN ROCKWOOL, CELLULAR FOAM OR AN ORGANIC SUBSTRATE, THERE ARE OTHER FACTORS THAT CAN IMPACT CROP PRODUCTION.**

Since lettuce, greens and microgreens are relatively short term crops compared to other greenhouse vegetables like tomatoes and cucumbers, a grower has to make sure that he starts out with a consistent substrate and quality seed. Sylvain Helie, an agronomist and phytotechnologist at Jiffy Products of America, said one of the key factors in growing lettuce, greens and microgreens is having a good seed supplier.

“Before a grower chooses a substrate he has to know his market,” Helie said. “Is he going to sell to retailers like grocery stores or to restaurants? Market dictates what and how the crops will be grown. If a grower is working with chefs, they are likely going to provide the grower with feedback as to the type of crops and packaging they need. The proactive grower is not only going to provide his customers with what they want, but is also going to supply them with new plants to sample.”

Helie said growers should pay particular attention to new varieties coming from the United Kingdom and Europe.

“It’s very similar to what is happening with new flower varieties from Proven Winners,” he said. “A grower of greens and microgreens won’t survive if he doesn’t have new varieties. The grower has to know what’s new as well as what novelties are available. To be able to do this the grower has to have a reliable and innovative seed supplier. If a grower is supplying chefs with greens, he has to be able to offer them different, attractive colors—greens, yellows, reds.”

## CHOOSING AN IRRIGATION SYSTEM

For the grower with limited production area and limited resources, Vijay Rapaka, manager of grower research at Smithers-Oasis Co., said nutrient film technique (NFT) is the ideal system for lettuce and leafy greens, especially for a small size operation.

“The NFT system is easy to install,” Rapaka said. “The grower recirculates the nutrient solution and maintains the nutrient balance in a stock tank or nutrient mixing tank. Using NFT, the seedlings can be grown in gutters or



**SINCE LETTUCE IS A RELATIVELY SHORT TERM CROP COMPARED TO OTHER GREENHOUSE VEGETABLES, A GROWER HAS TO MAKE SURE THAT HE STARTS OUT WITH A CONSISTENT SUBSTRATE.**  
PHOTO COURTESY OF JIFFY PRODUCTS OF AMERICA

channels. There are a lot of systems that are commercially available.

“With NFT the roots are being bathed in a shallow film of nutrient solution that is constantly recirculated. The root system grows in and above the shallow stream of nutrient solution.”

Phil Johnson, crop consultant propagation at Grodan, said the grower who is operating a NFT system can choose between two different types of gutter irrigation systems.

“Growers have different options when choosing a gutter system,” Johnson said. “For the most part the choice comes down to the initial setup costs.”

There are rigid gutters that are more permanent, which Johnson said are basically extruded plastic, similar to gutters on a house.

“These systems can be fixed rigid gutters or they can be put on rollers,” he said. “The movable system allows the gutters to be moved back and forth so they can be pushed together or apart to maximize space. When the plants are young, the gutters are spaced close together. As the plants grow and take up more space, the gutters are moved farther apart.”

Johnson said there are also gutter systems that are made of a flimsier plastic that are disposable after a few crops.

“These gutters have a shorter lifespan,” he said. “They are relatively inexpensive so they cost less to install. A grower can use the gutters for a couple of seasons and then throw them out and then install another clean setup.”

Johnson said the disposable gutters can be a good option for growers looking to start a business.

“Essentially it can be expensive to setup a system from scratch,” he said. “Once a grower gets his business established he can put in a better, more expensive system. This disposable type of system would be ideal for a small family business looking to get started.”

Another irrigation system that Johnson said is being used more in Europe and larger operations is floating rafts. The growers use large rafts of polystyrene and rooting cubes are stuck in holes in the rafts and then floated on a big channel of water.

“The crops are usually started at one of the end of the greenhouse as a small propagated plant,” he said. “The rafts are pushed the length of the greenhouse as the plants grow larger. Eventually the rafts reach the other end of the greenhouse and the plants are harvested making room for the next crop that is moving in behind them. It’s a constant flow similar to a production line, but it’s with plants.”

## CHOOSING A GROWING SUBSTRATE

Rapaka said that the basic function of the substrate is to establish uniform vigorously growing seedlings. Once the seedlings have true leaves and roots growing out of the substrate, the seedlings are ready for transplant. It takes two days for the seed to germinate. The seedlings are ready to



**USING NUTRIENT FILM TECHNIQUE, PLANTS CAN BE GROWN IN GUTTERS OR CHANNELS IN WHICH THE NUTRIENT SOLUTION IS CONSTANTLY RECIRCULATED.**  
PHOTO COURTESY OF AMERICAN HYDROPONICS

transplant in 10 to 16 days depending on the season.

The seedlings take up less space so one efficient way to use the space is to hold the seedlings longer in a nursery area. However, the seedlings should not be allowed to become overcrowded because stretching can occur. Rapaka said the higher the plant density per tray the sooner the seedlings need to be transplanted.

He said there are various substrate configurations available and growers should select the ones that best meet their production needs and specifications. Once the seedlings are transplanted into a NFT or floating raft system, the substrate simply acts as an anchoring material and the root system grows outside the substrate.

Michael Christian, CEO and president at American Hydroponics, said when a grower starts producing lettuce or greens using a NFT system, the preferred growing substrate is a root cube.

“The root cube is used basically as a seedling germination and plant support structure,” Christian said. “The media is actually the nutrient solution in which the roots live and derive oxygen and nutrients.”

“The grower usually starts with a seedling tray and moves the two-week-old seedlings into a plant site in the nursery channel. After two more weeks the plants are moved into a finishing channel. Two weeks later the plants are harvested. This production schedule allows a grower to achieve 26 crop turns per year.”

Christian said when he starts working with a new grower he usually recommends using an Oasis cube.

“For the beginning grower, we’ve found, it’s easier to sow the seed into the Oasis cube,” he said. “Growers who are just starting out are doing their planting by hand and it’s easier for most to do with Oasis. Also, we can guide the grower through the watering cycle to make sure the Oasis cubes are not too wet and are at the right moisture level for optimum seed strike, uniformity and growth.”

Christian said one of the advantages of the rockwool cube is its durability in shipping.

“When we ship long distances, for instance large containers to other countries, we ship rockwool,” he said. “It is very durable and can withstand the rigors of shipping.

“The two substrates are similar in their seedling configurations. Some growers will use rockwool during the

**THESE LETTUCE SEEDLINGS ARE READY TO BE TRANSPLANTED INTO NFT FINISHING CHANNELS.**  
PHOTO COURTESY OF AMERICAN HYDROPONICS



**HERBS AND MICROGREENS CAN BE GROWN IN A NFT GUTTER SYSTEM.**  
PHOTO COURTESY OF JIFFY PRODUCTS OF AMERICA



**GROWERS SHOULD SELECT A SUBSTRATE THAT BEST MEETS THEIR PRODUCTION NEEDS AND SPECIFICATIONS.**  
PHOTO COURTESY OF JIFFY PRODUCTS OF AMERICA



**ONCE THE SEEDLINGS ARE TRANSPLANTED INTO A NFT SYSTEM, THE SUBSTRATE ACTS AS AN ANCHORING MATERIAL AND THE ROOT SYSTEM GROWS OUTSIDE THE SUBSTRATE.**  
PHOTO COURTESY OF JIFFY PRODUCTS OF AMERICA



winter and Oasis during the summer.”

Rapaka said that uniformity and vigorously growing seedlings are crucial to ensure successful production. The Oasis Horticulture is a cellular substrate engineered with an optimal air:water ratio for rapid germination and seedling growth. Horticulture has precise dibble holes and uniform depth which allows for either manual or automated seed sowing. Horticulture sheets are etched around each cube allowing for easy separation into individual cubes at transplant.

“The Horticulture material is inert,” Rapaka said. “The pH of the cube is about 5, but once water and the nutrient solution are applied it changes to the pH of the nutrient solution. The cube doesn’t have any buffering capacity or cation exchange capacity and it doesn’t contain any fertilizer. It offers growers the flexibility to change the pH and electrical conductivity to what they want.”

### PROPAGATING THE STARTER PLANTS

Johnson said most growers produce their starter plants in a small propagation area.

“Seed germinate in the rooting cube within 48 hours after being sown,” Johnson said.

Rapaka said that after initial watering, the Horticulture trays should be placed in a dark room at temperatures between 66°F-68°F. Darkness is not required for germination, but it can help the seedlings start uniformly. The seed doesn't need to be covered with vermiculite or any other type of material.

Rapaka said the trays need to be moved from the dark room to the greenhouse after 48 hours. Leaving the trays beyond 48 hours can lead to stretching of the seedlings.

“Depending on the climate, time of year and size of the rooting cubes, the plants are usually grown on until the stage where the leaves of the plants are touching each other,” Johnson said. “The plants are generally maintained for 14-21 days before the cubes are moved into the production area. Then the cubes are separated and put out in either a NFT gutter system or raft system.

“It's cheaper to keep the plants in the propagation area because a smaller area is being heated and cooled. It's also easier to create a good microclimate around the small plants. The bigger the plants can be grown in the propagation area without allowing them to get leggy, the less time they will spend in the production area. The benefit of this during the summer is when larger plants go out into the production area where the climate is hotter and drier, the plants are more able to deal with and manage these conditions.”

Johnson said one of the advantages of sowing the seed into rockwool cubes is the uniformity they provide when growing a crop.

“A grower wants plants to grow at the same speed so they are the same size,” he said. “When the plants are moved out into the production area a grower doesn't want to have to be harvesting a few plants at a time because they are growing at different rates. A lettuce grower wants to be able to bench clear a crop just like a flowering crop. The grower wants uniformity across the crop from day one.

“Rockwool is inert with no buffering capacity. This enables a grower to make a very precise fertilizer recipe so that the nutrient solution delivered is what is available to the plants. Rockwool is also a clean substrate and won't clog filters or cause the irrigation system to become clogged over time.”

## PEAT PELLETS WORK WITH ORGANIC PROGRAM

Helie is working with an organic grower of lettuce, greens and microgreens who is using Jiffy 7 pellets and QSM (quick soil mix) cubes.

“Jiffy was able to supply the grower with a pellet that was made from only peat and lime. The pellet contained no conventional fertilizer charge,” Helie said. “We sent the ingredient list to the grower's certification organization and it was accepted. The product did not have to be OMRI listed. Jiffy has also produced a rectangle-shaped QSM cube that the grower can use in his NFT gutter system to produce lettuce and greens.”

The grower is also using the rectangle-shaped cubes to produce microgreens. A 26- by 13-inch, vacuum-formed, white germination tray holds 18 of the cubes.

“The trays are solid with no drain holes,” Helie said. “The employees know exactly how much water needs to be added to the tray to thoroughly wet the cubes. The microgreens seed is germinated in the cubes and after five to eight days the plants are ready to harvest.”

Helie said the grower is also using the round-shaped QSM to grow microgreens in clear plastic clamshells.

“One application of water and fertilizer is applied to one cube in each clamshell,” he said. “This expands the cube and the microgreens seed is sown. In five to eight days the microgreens are up, the clamshells can be closed and shipped to market.”



**For more:** American Hydroponics, [www.amhydro.com](http://www.amhydro.com). Grodan, [www.grodan.com](http://www.grodan.com). Jiffy Products of America Inc., [www.jiffygroup.com](http://www.jiffygroup.com). Smithers-Oasis Co., [www.oasisgrower.com](http://www.oasisgrower.com).

David Kuack is a freelance technical writer in Fort Worth, Texas; [dkuack@gmail.com](mailto:dkuack@gmail.com).

**CROPS GROWN IN A RAFT IRRIGATION SYSTEM USUALLY START AS SMALL PLANTS AT ONE END OF THE GREENHOUSE AND ARE HARVESTED AS FINISHED PLANTS AT THE OTHER END OF THE GREENHOUSE.**

PHOTO COURTESY OF SMITHERS-OASIS CO.



**PROPAGATION TRAYS OF LETTUCE READY TO TRANSPLANT.**

PHOTO COURTESY OF AMERICAN HYDROPONICS



**THE SUCCESSFUL GROWER OF GREENS AND MICROGREENS HAS TO PROVIDE HIS CUSTOMERS WITH WHAT THEY WANT, BUT ALSO SUPPLY THEM WITH NEW PLANTS TO SAMPLE.**

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