

Houston's vertical farm plans to grow

By Ileana Najarro; December 21, 2016

Moonflower Farms grows cilantro, arugula and other produce for more than 30 of Houston's top restaurants.

That's where comparisons to traditional farming end.

"I'm a scientist," owner and CEO Federico Marques said. "We're a technology company."

Moonflower Farms is Houston's first commercial indoor vertical farm, using hydroponic technology to grow herbs and microgreens year-round without the need for soil, pesticides or large quantities of water. NASA has been interested in the process for years as a way to possibly grow food in space.

Vertically grown plants are stacked in shelves under LED lighting. Seeds are spread onto a vermiculite, or mineral, blend that doesn't require fertilizer. Automated sprinklers water the crops every other day for three to four minutes.

Marques, also one of the founders of Houston's Ruggles Green restaurant chain, has tapped into a growing industry. Since March, Moonflower Farms has operated in a 900-square-foot space at 4523 Almeda-Genoa in south Houston. Marques said he is finalizing the permitting process to build a 20,000-square-foot hybrid indoor vertical farm and hydroponic greenhouse facility a few blocks away.

Though still small in scale in the U.S., the vertical farming industry has taken off in other countries with more pronounced concerns over population growth, food shortages, a lack of arable land, depleting freshwater supply and the effect of climate change. With major investments in countries such as China, India, Japan, South Africa and Australia, the market is expected to grow worldwide by more than 27 percent annually through 2022, according to Irish firm Research and Markets.

The Moonflower project has a global connection as well. Supplying the expansion project will be Australia-based engineering company A&B Hydroponics. The Houston project will mark its first foray into the U.S., company director Joe Argius said earlier this month. In the U.S., hydroponic technology - a common tool for vertical farming second only to aeroponics technology that relies on a mist system for watering plants - has mainly been associated with NASA research efforts and the cannabis industry.

Chad Sykes, CEO of Indoor Harvest, the Houston engineering and procurement company that provided equipment for the original Moonflower Farms facility, noted that the hydroponics' association with marijuana farms has subdued U.S. investments.

Yet Sykes and **Craig Lawson**, managing director at MHT Partners investment bank, both see changes ahead. They see small investments already being made here, with bigger, more sophisticated investors monitoring the scene.

"What's driving vertical farming today is demand for higher-quality produce," Sykes said.

As it stands, the U.S. vertical farming industry is made up of small research and development startups, like Moonflower Farms. They typically serve a niche market of green-minded consumers and top-tier restaurants that are willing to pay more for better quality. "To be successful and appeal to investors, you have to scale," **Lawson** said.

High operational costs, especially when trying to replicate free resources and processes in nature, are an obstacle. In places like Texas with an established agricultural sector, competition from traditional farms can also pose a challenge. That can be a non-issue in the Northeast, where growing seasons are shorter, or the West Coast as it copes with record drought.

Moonflower Farms currently produces about 25 pounds of product a day, Marques said. But he aims to increase that yield to 1,000 pounds a day in the new facility and said he's already gotten interest from wholesale grocers for his products should he be able to scale up production. The new facility is expected to cost almost \$2 million.

"If the model works, we want to put it in every city," Marques said.

Moonflower Farms also distinguishes itself from existing vertical farms by focusing on microgreens, which pack more protein in smaller bites. Company vice president Constance Tenorio said there's more demand given consumers' growing interest in healthier food alternatives.

Microgreens also have captured the attention of those who are planning to return humans to space, NASA project scientist Gioia Massa said. The agency has been investigating its potential.

Marques pointed to a more terrestrial concern: the need to address the effects of climate change on agriculture.

Regardless of how economically viable vertical farming proves to be, he said, the world must develop new technologies to address climate change.



Moonflower Farms vice president Constance Tenorio climbs down a shelf full of spouts as she checks on plants growing at their vertical micro green farm Friday, Dec. 2, 2016 in Houston. (Michael Ciaglio/Houston Chronicle)