

Boca Raton company seeks to boost plant life on Earth and enable it in space

A Boca Raton company has developed technology that could boost plant life on earth and space. Zero Gravity Solutions has been working with NASA to help grow food for Mars Mission.



Andrew Koopman, CEO of Zero Gravity Solutions' subsidiary Zero Gravity Life Sciences, left, and Harvey Kaye, chairman, of Zero Gravity Solutions talk about the BAM-FX product they market during an interview, Monday, Dec. 12, 2016, in Boca Raton. (JOE CAVARETTA / Sun Sentinel)

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A Boca Raton biotechnology company is determined to save Earth from food shortages and even make Mars habitable for human life.

Lofty goals for Zero Gravity Solutions, a startup which acquired technology shown in independent studies to make crops more robust. The company also has been working with NASA, which has a goal of a Mars Mission in the 2030s, to solve the problem of food availability for astronauts visiting another planet.

Harvey Kaye, chairman of Zero Gravity Solutions, conceded in a recent panel discussion at the World Stem Cell Summit in West Palm Beach that the initial idea for the company seemed far-flung even to his wife.

Kaye, 76, recalled his spouse greeted the proposition with considerable incredulity. "You're doing what in space? How old are you and when is it going to happen?"

The company, formed in 2012, is based on intellectual property acquired from inventor John Wayne Kennedy, a consultant who formerly worked for the U.S. Department of Agriculture and the Environmental Protection Agency. He is now Zero Gravity's chief science officer.

Kennedy received a U.S. patent in February for his method of depositing minerals directly into a living plant.

But Kaye, who has led other businesses, wasn't deterred. Formerly, he was a financial adviser to the CEO of GenereX Biotechnology in Massachusetts and Toronto, which developed oral insulin; and CEO of Latitude Solutions in Boca Raton, which developed products, processes and services for contaminated water applications.

To build a solid foundation for Zero Gravity, he recruited top executives who are passionate about the mission and found an investment banker to help raise funds for research.

The holding company has raised \$10.75 million and is a thinly traded over-the-counter public company that is laying the foundation to list its stock on the Nasdaq, Kaye said.

Zero Gravity Solutions is starting to generate revenue through its licensed intellectual property, which has resulted in its first product, **BAM-FX™** (Bio-Available Minerals Formula X), a nutrient delivery system for crops.

The liquid formula, which looks like Windex, stimulates root growth by taking up minerals in the soil, as well as zinc and copper in the formula. BAM-FX is different than Miracle Grow or similar products used to stimulate plant growth. The technology enables minerals to be delivered directly into a plant's cells, which is more effective and also reduces runoff.

That means farmers could use less synthetic fertilizer, which after decades of use in farming have been shown to be at least one cause of water pollution.

Andrew Koopman, CEO of Zero Gravity Life Sciences, a subsidiary, said that as the world's population expands, the need to produce more crops on less land will become critical around the globe.

"We're reaching a cliff here ... in Malaysia, they're burning forests to create more farmland. The only way to avoid decimation of forests is to create more food on the land you have," he said.

BAM-FX could be one solution. The company has completed three years of testing, conducting trials in the Midwest and Rocky Mountain states, California and Florida, as well as Pakistan, Chile, Mexico, Guatemala and India. The studies are being conducted by universities including the University of Florida's Tropical Research and Education Center in Homestead, the University of California at Davis, Ohio State University, and Pennsylvania State University, as well as growers and distributors, Kaye said.

Researchers have shown BAM-FX to be effective in producing better and more avocados, wine grapes, citrus fruit and leafy greens, the company said.

Paul Trauger, a corn farmer in north central Iowa, has tried BAM-FX on his crops for three seasons. He saw the same or greater growth each season, trying more acreage, and different amounts of BAM-FX and fertilizer. The third season this past year brought a record yield. "The root balls were bigger," he said.

"If it turns out good this year again, I'll be sold on it," Trauger said.

Wagner Vendrame, professor at the University of Florida's Tropical Research and Education Center, said initial tests on tomatoes over the past two years in South Florida show improvements after the fertilizer was reduced by 25 percent and BAM-FX was added.

"With BAM-FX, the plants had more green mass and the fruits were of better quality — they looked nicer. When we repeated, we confirmed those results," he said.

Vendrame, who said he's usually skeptical of company claims about such products, said he thinks BAM-FX "has tremendous potential. The fact that growers can reduce fertilizer — we have a lot of problems with fertilizers ending up in the canals. It could be a benefit to environment and reduce the cost."

Zero Gravity's subsidiary BAM Agricultural Solutions has set up a manufacturing plant in Okeechobee to produce BAM-FX and is establishing a distribution network around the world.

Orders are starting to roll in. Kaye said after successful tests with old vines in the Napa and Sonoma valleys in California, wine growers are placing orders or testing the product. In October, the company announced an exclusive distribution agreement valued at \$4 million with a company in Paraguay.

Such revenues could offset the cost of research on uses of BAM-FX in space and other applications.

Under the NASA-Ames Research Center agreement, Zero Gravity is funding research in return for access to the International Space Station and NASA resources.

NASA's senior research scientist David Bubenheim said the space agency has a relationship with Zero Gravity through the Space Act agreement, which allows NASA to work with commercial entities on joint issues.

"This is the kind of technology that — if it pans out to be everything it might be — would be of great utility to NASA in the future," said Bubenheim, who works at NASA Ames Research Center in Moffett Field, Calif.

For Mars, a plant system would be the primary life support system for astronauts on a mission.

Bubenheim said he has run his own tests on BAM-FX in recent months and seen plants enhanced in their growth. "We're encouraged, but not finished," he cautioned.

But he said he hasn't seen any other company with technology like BAM-FX. "I'm not aware of any similar technology being tested," Bubenheim said.

Kaye and Koopman said they expect growing interest in their products as the agriculture industry continues to consolidate.

"(We're) going through a transition with in the industry. Early adopters are coming and starting to use the product. Once the early adopters come in, the other players have to come in because the competitive advantages are so great," Kaye said.

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