Researchers explore possibilities of growing plants on Mars

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Researchers at Florida Institute of Technology grew Outredgeous lettuce in a preliminary experiment comparing, from left to right, potting soil, Martian regolith simulant with added nutrients, and simulant without nutrients. Credit: NASA/Dimitri Gerondidakis.

Tucked away in a Florida Institute of Technology lab, a would-be

Martian garden grows.

A little more than a year after the Buzz Aldrin Space Institute opened at Florida Tech with the overarching mission to get humans to Mars, this horticultural research will attempt to address one of the most critical issues facing the first Martian settlers: how to grow food on a cold and toxic world.

No lush, green rows of veggies or vines covered in fruit exist quite yet: The garden is in its infant stage. Drew Palmer, an assistant professor of Biological Sciences, Brooke Wheeler an assistant professor at the College of Aeronautics, and astrobiology majors from the Department of Physics and Space Sciences, are growing Outredgeous lettuce (a variety of red romaine) in different settings - Earth soil, analog Martian surface material known as regolith simulant, and regolith simulant with nutrients added - to find the magic formula for the type and amount of nutrients needed to grow a plant in inhospitable Martian dirt.

"We have to get the regolith right or anything we do won't be valid," said Andy Aldrin, director of the Buzz Aldrin Space Institute.

Unlike Earth soil, Martian regolith contains no helpful organic matter and has fewer minerals plants need for food, such as phosphates and nitrates. Adding to the challenges, real Martian regolith in its pure state is harmful for both plants and humans because of high chlorine content in the form of perchlorates.

The current Mars regolith simulant isn't perfect. Until a real sample of Mars dirt comes back to Earth, which could happen on a mission estimated to be at least 15 years from now, Florida Tech researchers will spend the next year trying to create an accurate regolith analogue by applying chemical sensing data from the Mars rovers.

Eventually, it may be possible with the addition of fertilizer and removal of the perchlorates to grow various plants in a Martian soil. Florida Tech scientists are partnering with NASA scientists who have experience growing plants on the International Space Station to help figure out ways to make Martian farming a reality.

With costs approaching $1 billion per person per year, and logistical concerns over the transporting enough food from Earth to Mars, growing food on the planet itself is a necessity, Aldrin believes.

"You can't sustain civilization if you have to ship everything," he said.

Florida Tech's involvement is allowing NASA to work on other Mars-related challenges.

"With our academic partners working on planetary surface food production, NASA is able to focus on the near-term technologies and systems needed to get our crews to the Red Planet," said Trent Smith, veggie project manager at NASA's Kennedy Space Center.

Ralph Fritsche, senior project manager for food production at KSC, added, "It's terrific having academic institutions plant both feet into the problems of long-term human exploration of Mars—performing experiments to determine how to grow crops off-Earth."

Palmer and Wheeler expect to introduce their Martian garden to other factors, such as the radiation exposure seeds would experience as they journey from Earth to Mars, as well as root growth in weaker gravity and how much water they would need and where that water would be sourced.

Even if Red Planet habitation is still decades away, the research could have an impact here on Earth.

"Thinking about ways to live on Mars is the ultimate test of sustainability," says Daniel Batcheldor, professor of physics and space sciences at Florida Tech and project lead for the Buzz Aldrin Space Institute.

"Learning to grow plants in an inhospitable environment like Mars could help us maximize food productivity and minimize the use of precious resources such as water and fertilizer back here on Earth."

Provided by Florida Institute of Technology