

Could radishes thrive on the Red Planet?

A UL Lafayette biologist is intrigued by the potential to grow radishes on Mars. So is NASA.

The space agency recently awarded Dr. Karl Hasenstein a \$573,000 grant to assess the effects of space flight on the growth and metabolism of the nutritious little vegetable.

His experiment will take place aboard the International Space Station, 240 miles above Earth's surface. The long-term goal is to determine whether radishes and other plants can live on Mars – and beyond.

Earlier this year, NASA administrators discussed deploying a “magnetic shield” between Mars and the sun that would protect the Red Planet from solar particles.

That shield would consist of a closed electrical circuit, or dipole, that would be powerful enough to create an artificial magnetic field.

About 3.5 billion years ago, Mars was likely temperate and had surface water, but exposure to solar particles robbed the planet of its atmosphere. The proposed shield conceivably could restore environmental conditions where plants could grow and where people could live. That's where Hasenstein's experiment comes in.

NASA's goal of terraforming other planets to make them more like Earth hinges on whether nutritionally valuable food crops can be grown where reduced gravity exists. The Martian environment is one such place.

Hasenstein's previous experiments studied how plants in a weightless environment sensed gravity. His latest proposal examines how altered or reduced gravity affects plants' growth and metabolism.

A 2003 experiment aboard the doomed space shuttle Columbia yielded no data and Hasenstein waited more than a decade before his experiments could again take place in space. A 2014 experiment on the International Space Station determined that plant growth in space mirrored that in a controlled environment on Earth. That study examined *Brassica*, or field mustard plants, which are in the same family as radishes.

The radish seeds at the center of Hasenstein's most recent study will likely travel to and from the space station in the same way his 2014 experiment did – aboard an unmanned Dragon capsule propelled by a Falcon 9 rocket. Both were designed by SpaceX, a private company whose craft regularly resupply the station.

Once the seeds reach the station, astronauts will place them in an Advanced Plant Habitat, an enclosed, environmentally controlled growth facility with sensors inside



Dr. Karl Hasenstein

that constantly monitor light, moisture and temperature. The habitat is 18 inches square and enables plants to reach a height of 16 inches.

Two sets of radish seeds will be grown in the space station and two sets will be grown on the ground over 28 days. That's how long it takes for radishes to grow before they can be harvested. The seeds' growth then will be compared.

Radishes are an ideal subject to study in space, Hasenstein said. They're small, grow quickly and can be eaten in their entirety. “Even though most people would not eat the leaves, they are actually very good in a salad,” he observed.

When consumed on Earth, radishes are a source of vitamin C, dietary fibers, a slew of minerals, carbohydrates and folic acid. So, they have strong health benefits.

“What I am really interested in is the comparison between what happens with that tiny little plant when you grow it on Earth as opposed to in space. The big difference is gravity or the effects of gravity,” Hasenstein said. “There are also other factors. The wind blows over a field here and you have fresh air. These are not an option in space.”

He contends that researching the effects of growing plants in space “is important for the establishment of human colonies on the moon, Mars and farther outposts.”

He noted that some people believe that seeds, “because of their longevity and requirement of nothing, are the best biological vectors ... You can seed Mars with these seeds and hope that the experiment will work, that something will be able to establish itself there. Once it is established, it will convert carbon dioxide to oxygen and terraform Mars.

“But by no means does Mars have to be the final frontier. Why not think big?”

DOUG DUGAS