

Eat your veggies: NASA expands plant-growing program on space station

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Chinese cabbage leaves are shown aboard the International Space Station. Photo from NASA.gov

As people prepare their gardens for spring, NASA is trying something a little different: a vegetable garden in space.

On Tuesday, an Atlas V rocket blasted into space from NASA's Cape Canaveral Air Force Station. It carried supplies and scientific equipment to the International Space Station (ISS). Onboard was a new experiment, the size of a mini-fridge. It's called the Advanced Plant Habitat (APH).

Astronauts will use the APH to expand their ability to grow vegetables and other plants on the station, some of which will end up on the menu.

Healthy Food Source For Astronauts

The ability to raise plants in space has been a NASA priority for years. Future human expeditions to Mars would require a reliable food supply. Astronauts would need food for long periods both during the trip to, and on the surface of, the Red Planet. Experiments

like APH will be an important test for finding the best ways to prepare veggies outside Earth, says Chris Wolverton. He's a professor of botany—the study of plants—at Ohio Wesleyan University in Delaware, Ohio, and currently is studying plant gravity on the ISS.

For now, most experts believe astronauts will bring food from Earth to stay fed, Dr. Wolverton tells *The Christian Science Monitor*. Plants, especially leafy greens, are excellent at making vitamins and other nutrients that keep humans healthy, he says.

The new Advanced Plant Habitat is actually an expansion of a previous NASA idea from 2015, known as the Vegetable Production System (also known as "Veggie"). The Veggie program soon produced lettuce for the ISS crew. It was the first food grown by NASA in space specifically for astronauts to eat.

LED Lights Used To Grow Plants

The success of Veggie encouraged scientists to go even farther with the APH project. The old Veggie system had indoor plants that lived in the unfiltered air of the space station. The new APH system will allow astronauts to more fully control the environment inside the growing room. APH will also have brighter LED lights, which mimic the light of the sun. Some of these lights shine more powerful white and infrared light, and they can potentially quadruple the plants that were grown with the old Veggie system.

"It's really a way for the scientists to modify the environment: the light, the water, the atmosphere," program manager Bryan Onate told reporters in March. Scientists will learn lots of important information about future food production on Mars, Onate says.

APH isn't just about what's on the astronauts' dinner table. The unit comes equipped with a variety of sensors and cameras. These will be used to monitor plant growth and give information on how plants adapt to a non-Earth environment. Microgravity, radiation, and other space-related changes can affect the growth of living things in unexpected ways. If future astronauts are going to be using crops grown in space as their main food source, scientists want to know about any possible challenges now.

Gravity Challenges In Growing Plants

One of the major problems with growing plants in low gravity, Wolverton says, is due to the way water moves. It tends to form into droplets rather than into a steady flow, he says. In turn, when these droplets form on a plant, they can burst at a moment's notice, which floods the plant and chokes it of its needed oxygen.

There are other challenges, too. Without normal Earth gravity, plants can even have trouble telling which way is up, he adds.

"Gravity is a major signal to plants that tells them which way to grow," says Wolverton.

For its first experiments, the APH system will be tested with two kinds of seeds. First, astronauts will attempt to grow arabidopsis, a small leafy vegetable in the same family as cabbage. They'll also try to grow a type of wheat. If all goes as planned, arabidopsis will be the main crop for APH's first experiment, which has been designated Plant Habitat 1.

Preparing For Martian Expeditions

Eventually, scientists hope astronauts will be able to use the system to grow larger and more nutrient-heavy plants. But ultimately, the goal of APH and other projects like it is simply to determine the possibility of plant growth in environments other than Earth. This will prepare them for Martian expeditions, says Edward Guinan. He's a professor of astronomy and astrophysics at Villanova University in Pennsylvania.

"To grow plants in Mars' cold climate, plants will need to be sheltered in greenhouses," Dr. Guinan tells the Monitor via email. "The amount of sunlight (solar radiation) on Mars is about 50 percent of that of the Earth since Mars is 1.5 times further than the Earth from the Sun."

Lack of light, increased radiation, and unfriendly Martian soil could pose significant challenges for plants in an alien world. But without experimentation, there's no way to know for sure how Earth vegetables would live on Mars.

"Certain plants might do better than others," Guinan adds. "The experiments on the International Space Station (ISS) will help answer some of these questions."

Quiz

- 1 Which two of the following sentences from the article reflect its CENTRAL ideas?
1. *Experiments like APH will be an important test for finding the best ways to prepare veggies outside Earth, says Chris Wolverton.*
 2. *The new Advanced Plant Habitat is actually an expansion of a previous NASA idea from 2015, known as the Vegetable Production System (also known as "Veggie").*
 3. *Microgravity, radiation, and other space-related changes can affect the growth of living things in unexpected ways.*
 4. *"The amount of sunlight (solar radiation) on Mars is about 50 percent of that of the Earth since Mars is 1.5 times further than the Earth from the sun."*
- (A) 1 and 3
- (B) 1 and 4
- (C) 2 and 3
- (D) 2 and 4
- 2 Which of the following details from the article would be MOST important to include in its summary?
- (A) On Tuesday, an Atlas V rocket blasted into space from NASA's Cape Canaveral Air Force Station.
- (B) It carried supplies and scientific equipment to the International Space Station (ISS).
- (C) The ability to raise plants in space has been a NASA priority for years.
- (D) "Certain plants might do better than others," Guinan adds.
- 3 Dr. Edward Guinan would be MOST likely to agree with which of the following statements?
- (A) The only way to find out if plants will grow on Mars is to experiment.
- (B) Mars is far too cold to sustain plant growth for any period of time.
- (C) It is likely that no plant species will be able to stay alive on Mars.
- (D) If plants grow successfully on the International Space Station, they will definitely grow on Mars.

4 Fill in the blank below.

The author MAINLY explains the importance of being able to grow food in space by...

- (A) discussing the challenges that must be overcome for plants to grow on Mars
- (B) explaining how long the human expedition to Mars is expected to take
- (C) predicting which plants would be the most successful if grown on a planet like Mars
- (D) stating that humans will need to be able to produce food when they travel to Mars