



Space Crops

Boldly growing where no one has grown before

To go farther and stay longer in space, crew will need sustainable sources of food. Crops can provide fresh food, benefit astronaut mental well-being, and improve space habitats.



Studying how plants adapt to harsh conditions in space can lead to agricultural innovations that support deep-space exploration and improve farming in austere environments on our home planet.

ENABLING SPACE EXPLORATION:

- Provide astronauts with fresh and nutritious food
- Enable bioregenerative life support systems
- Support astronauts' overall psychological well-being

BENEFITS TO HUMANITY:

- Improve the growth and nutritional value of crops
- Contribute to innovations in farming and agriculture

ADVANCING MOON AND MARS MISSIONS*:

- Lunar Effects on Agricultural Flora (LEAF) – planned Artemis III experiment on the Lunar surface
- Plant research aboard the International Space Station, including Veggie and Advanced Plant EXperiment-12 (APEX-12)

SPACE CROPS

BOLDLY GROWING WHERE NO ONE HAS GROWN BEFORE



STRATEGIC FOCUS AREAS

Plants will play a crucial role in human exploration beyond Earth, assisting in the production of oxygen, food, fiber, and fuel. Each space environment presents unique challenges to growing plants, including differing gravities, atmospheres, and access to resources. Space Crops research will inform the science and technology that harness the power of plants to enhance the quality of life for humans in space.

Growth Medium: Since space lacks fertile soil, scientists must develop and utilize innovative methods for growing crops in extreme environments. NASA research will lead to advancements in technologies for new plant growth media, including soilless cultivation methods such as hydroponics and aeroponics. Researchers will also explore ways to make regolith found on other planets more amenable as a growth medium or source of fertilizer.

Crop Cultivars: Astronauts will require nutrient-dense sources of food that can withstand the harsh conditions of space environments. NASA science will focus on selecting and cultivating crop varieties best suited for deep-space journeys. This research could lead to sustainable, nourishing provisions for crew as they go farther and stay longer in space.

Crop Production Systems: Establishing sustainable space crop production systems to support exploration can be challenging because of the lack of mature technologies to monitor plant health and manage water, fertilizer, and light inputs. NASA research will focus on developing space horticultural methods and technologies to support plant growth, while controlling crop disease outbreaks and ensuring that produce is safe for human consumption.

Bioregenerative Life Support Systems: Sustainable bioregenerative life-support systems that produce fresh food and water, revitalize air, and recycle waste are essential for deep-space exploration. NASA research focuses on understanding how the biological components of crop production systems could best be integrated into the physical architecture of ecosystems in space. Insights could contribute to innovations in reusing and recycling resources in self-sustaining life support systems.

**For a more comprehensive list, please visit BPS's website.*



Probing biological and physical phenomenon under extreme conditions advances the fundamental scientific knowledge required to go farther and stay longer in space, while also benefitting life on Earth.

