



Smithsonian

Growing Plants in Space



Georgia Beth

Table of Contents

Plant Power.....	4
What Plants Need.....	6
Protecting Plants.....	12
Choosing Crops.....	18
Bigger Benefits.....	24
STEAM Challenge.....	28
Glossary.....	30
Index.....	31
Career Advice.....	32



Plant Power

Would you eat food that was grown in space? Whether people are on Earth or a far-off planet, they need food to survive.

Scientists hope to have people live on another planet someday. But water and food for a planet of people would be too heavy to pack on a spaceship. So, scientists are studying how to grow plants in space.

One day, space farms will help people live on other planets. They will let people go to worlds that are far away. They may even make **alien** planets feel like home.

All space farmers are also astronauts. They undergo extra training to grow plants in space.



A scientist grows plants in a lab on Earth that has the same conditions as space.

What Plants Need

Plants need water, light, soil, and air to grow. That is true whether they are on Earth or in space. But it can be hard to get those **resources** in space. So, scientists are looking for new ways to give plants what they need.

Water

Both plants and humans can get thirsty in space. Water is too heavy to carry in large amounts on spaceships. And it can be hard to find in space. Scientists have also learned that plants in space grow faster with more water. So, **engineers** are looking to design solutions for the water problem.



What Plants Need to Grow



sunlight

light energy



air



Only

roots

soil

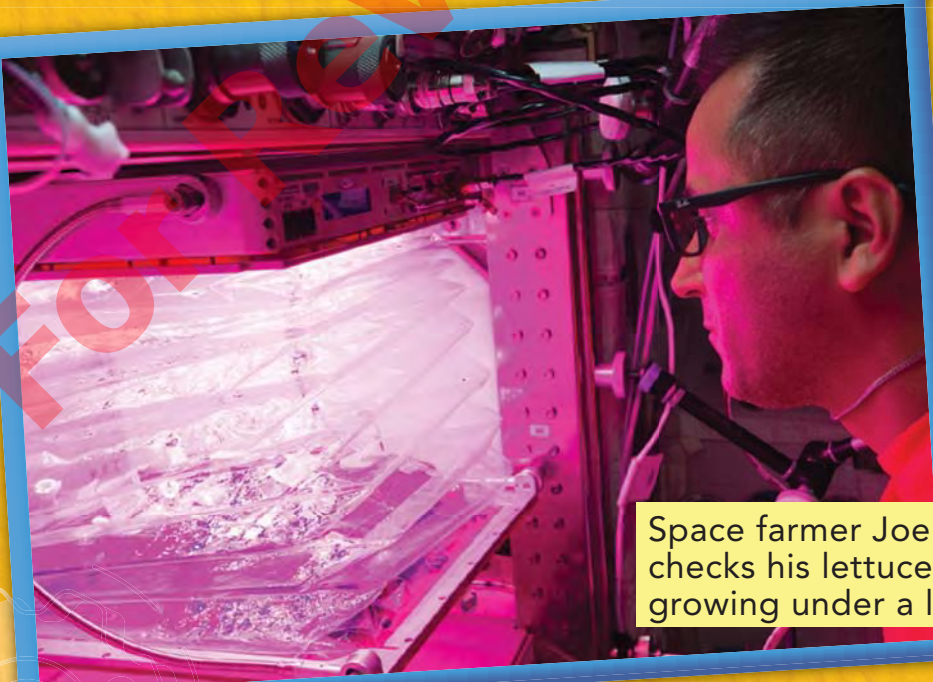
water



Light

Far from the sun, space is very dark. Dust storms may block light. Plants in space may not get enough light. That could cause them to die.

Plants in space can also get too much light. On Earth, the **atmosphere** helps protect plants from the full strength of the sun's rays. But in space, intense sunlight can hurt plants. Some space farmers carefully use the sun to grow plants. Other space farmers use lamps. They need the right balance of light to help plants grow in such a strange place.



Space farmer Joe Acaba checks his lettuce growing under a lamp.

This drawing shows what space farming might look like on Mars.



Cabbage leaves grow under a lamp in space.



STEAM CHALLENGE

Define the Problem

The future of space travel depends on growing plants in space. A group of scientists have hired you to design and build a greenhouse for Mars.



Constraints: Your greenhouse's width and height must be between 30 and 45 centimeters (12 and 18 inches).



Criteria: Your greenhouse must extend and collapse to save space. It must remain stable when fully extended.





1 Research and Brainstorm

Why should your greenhouse be able to get smaller? What shape would be best for your greenhouse?



2 Design and Build

Sketch a plan for your greenhouse. Label its parts. What purpose will each part serve? What materials will work best? Build the greenhouse.



3 Test and Improve

Fully extend your greenhouse. Is it stable? How can you improve it? Improve your design and try again.



4 Reflect and Share

Would your greenhouse still work if it were a different shape? How would your design change if you could use different materials? How could you add technology to your design?

