

SPACE GARDEN



From its beginnings.....



NASA has been involved with plant research and biological science in space.

The space environment provides a new variable – reduced gravity – that can be used as a tool to better understand plant growth and development.

Plant growth in space also provides the information necessary for development of advanced life support systems.

.....and into new worlds

Plants and Gravity



NASA researchers hope to answer these four questions:

- How does a plant know to respond to gravity?
- How does gravity change how a plant grows?
- How is photosynthesis affected by gravity?
- How does a plant react to zero gravity?



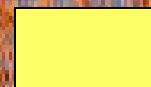
NASA's Biomass
Production Chamber

Plants and Gravity

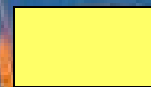
Understanding these basic processes will help scientists develop new plant products for agriculture and forestry.

For example, space research could help develop faster growing trees to regenerate lost forest areas.

NASA's plant research has also helped to break the world record for the highest wheat harvest per acre by growing 5 times more than the previous record holder!



1x



5x

Their information is now helping farmers grow more food using less land here on earth.

Using Plants in Space



People and plants are closely connected.

They can provide:

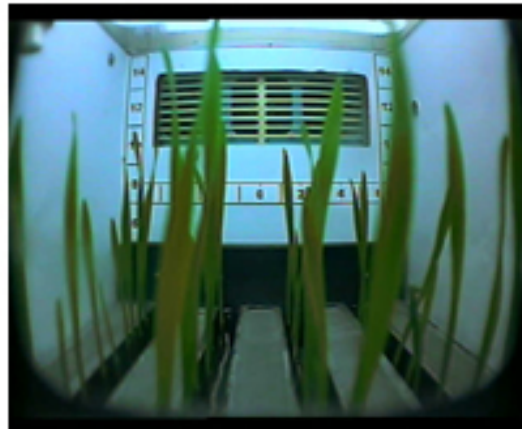
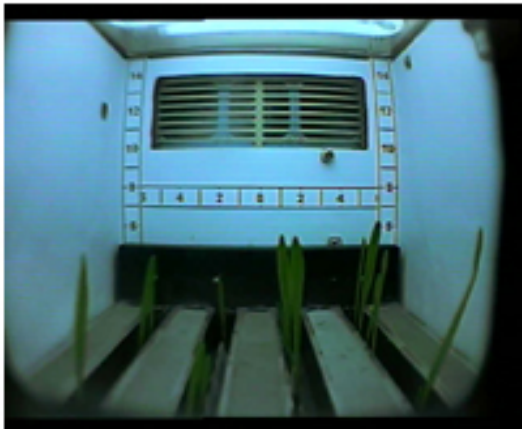
- food to eat,
- sources of fresh oxygen,
- recycled water,
- and even building materials from plant waste.

Plants used for food and oxygen could also play an important role in our ability to live for long duration missions to the Moon or Mars.

Growing Plants in Space



Sealed environmental chambers like ORBITEC's Biomass Production System are one way to conduct plant experiments in space.

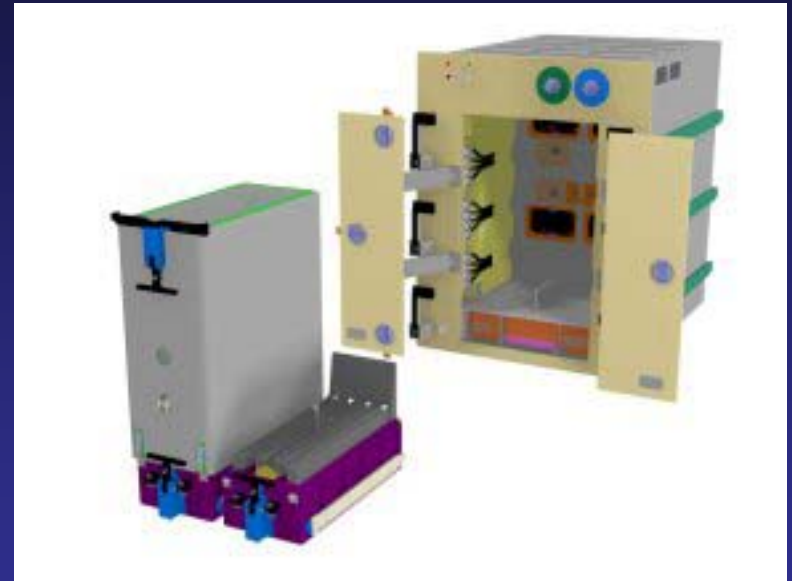


A view from inside the BPS plant growth chamber

Growing Plants in Space



A new plant chamber, called the Plant Research Unit or PRU, is currently under development by NASA's Space Station Biological Research Program for experiments on the International Space Station.

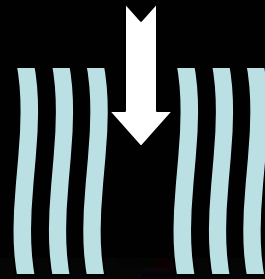


The PRU will be a part of the centrifuge module on ISS, allowing for experiments in varying levels of gravity as well as reduced gravity.

Growing Plants in Space



In the chambers,
oxygen, temperature
and humidity are
carefully monitored

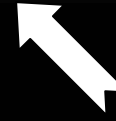
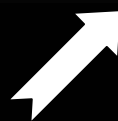


Without gravity water
would simply float
away, so plants have
special systems to
supply water directly
to the roots, instead of
pouring it in from
above.

The plants get high
intensity light from
LED or fluorescent
lights, not the sun.



Instead of dirt, plants are
grown directly in water or
clay-like arcillite.



Special mini or dwarf varieties
of plants are used so they fit
in the chambers.



Growing Plants in Space



Astronauts can also grow their favorite plants using a flight version of Space Garden.

Tending to plants and enjoying their fresh smell and taste is one of the ways that astronauts get a reminder of earth.

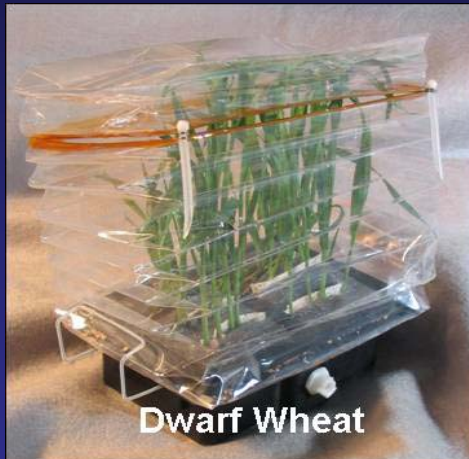
Click on the movies at the right to view the Space Garden in reduced gravity.



Growing Plants on Earth



Your SpaceGarden can be used to grow a variety of your favorite plants.



Dwarf Wheat



Radish



Strawberry



Brassica



Lettuce



Mimulus

Growing Plants on Earth



Space Garden can also be used to demonstrate a number of important concepts, including:

- How light direction and light wavelength (color) affects plant growth
- How the force of gravity drives plant development
- How moisture levels and aeration of the soil affect plant growth
- How nutrition plays a role in healthy plant development

SPACE GARDEN



For more information or to order refill kits, please contact
PLANET LLC at www.spacegarden.net.