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Cultivating the Red Planet



Cultivation

OVERVIEW

Hello space cadets and welcome back! Now that we have conquered space travel, it is time to get down to business. How are we going to sustain life on Mars? Like all living things, we will need food and water to survive. Both of which are in short supply here in space! Discovering an efficient way to grow food in space is critical for an astronaut's survival. In 2015 astronauts ate the first space grown vegetable, a potato, at the International Space Station. Let's see if we can achieve the same results on Mars!

All plants, even those in space, need five things to grow and thrive.

Water

Sunlight

Carbon Dioxide

Nutrients

Heat

Each of these aspects are critical to the survival of our plant, and in this case, our food source. As we discovered in our Mars rover lesson, the climate of Mars is similar to that of the desert. Think about and research how desert plants receive their water, sunlight, oxygen, and nutrients.



EXPERIMENT

CHOOSING YOUR PLANT

There are two categories of plants: monocots and dicots. A **monocot** has one cotyledon. A **cotyledon** is a plant embryo that gives energy and nutrients to the young seedling. A monocot has long narrow leaves with parallel veins. When a monocot germinates their cotyledons remain underground. A good example would be corn! A **dicot** has two cotyledons. These plants have broad leaves and a network of veins. Their vascular bundles form a ring. Once germinated their cotyledons emerge above ground to continue providing nutrients. They become the first leaves on the plant. An example of a dicot is a soybean. For your greenhouse you can choose to grow either a monocot, a dicot, or both!

CONSTRUCTING YOUR GREENHOUSE

You can construct your greenhouse using found, recycled, or upcycled items. Remember, your greenhouse needs to stand up to Mars' harsh climate.

Suggestions for Greenhouse materials:

- Plastic bottles
- Shoe boxes
- Milk carton/egg carton
- Toilet paper rolls
- Zip-close bags
- Aluminum Pans
- Plastic takeout box with clear lid

Suggestions for Planting materials:

- Potting soil or organic material (leaves, moss, etc)
- Corn or soybean seeds

Greenhouse Examples:



EXPERIMENT

PLANTING

Once your greenhouse is constructed, begin planting! You will want to plant your seed into organic matter or soil according to the suggested seed depth chart listed in the link below. Cover the seed with the excess soil and water it sparingly when needed. If the soil is wet, your plant is hydrated. If the soil is dry, your plant is probably thirsty. Be careful not to over-water!

<https://extension.okstate.edu/fact-sheets/oklahoma-garden-planning-guide.html>

FOLLOW UP

Keep a record of plant growth within your greenhouse on the attached page.

- o What type of plant was planted?
- o Monocot or Dicot seed?
- o Date planted
- o Date seeds sprouted
- o Measure growth rate using a ruler (inches or cm per day/week)



Resource:

<https://www.nasa.gov/content/growing-plants-in-space>

Additional Resources:

Desert Greenhouses: <https://growingspaces.com/southwestern-united-states/>

How Plants Survive in Deserts: <https://kids.frontiersin.org/article/10.3389/frm.2017.00058>

Mung Bean Time lapse: <https://www.youtube.com/watch?v=tamRjJTKNPE>

Plant Classification Info: <https://imgkids.us/kids-zone/imgkidsweb/monocotvsdicot/>

Anthromes Project: <http://ecotope.org/projects/anthromes/>

Global Human Footprint Index: <https://tinyurl.com/ybfbo62r>

Biodiversity: <https://tinyurl.com/y778p3ht>

OSU Planting Guides:

<http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-1383/HLA-6021web.pdf>

<https://tinyurl.com/yapsf3zt>



Plant Type: _____



Circle what kind of plant you chose: **Monocot or Dicot**

Planting Date: _____

Sprouting Date: _____

Take measurements of your plant's growth every Monday and Friday for six weeks. To further your experiment, continue recording your plants growth until maturity!

Measurement Date	Plant Height (cm or in)	Total Growth (cm or in)	Plant Observations (Soil conditions, watering habits, growth formations, etc)

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