

Outline for educational experiments for school children about growing food on Mars and Earth

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Date: November 2016

Learning Goals/Subjects Covered

The school children should learn about the following:

1. What is needed for growing food crops; this includes the symbiotic relationships between plants, bacteria, manure, humans and pollination by insects.
2. The differences between growing plants on Earth and Mars.
3. Nutrient content of soils on Mars and Earth.
4. Occasional conditions when heavy metals in soils can effect plants and food badly.
5. The potential to use Martian techniques to grow crops in deserts on Earth.
6. How to conduct an experiment.

Outline

School children can do simple experiments growing plants species (e.g. cress, pea or green beans) in soil that is known to be similar to soil on Mars, called Mars soil simulant. While growing plants in normal Earth potting soil and Mars soil simulant, the children can learn about how to do experiments, what is needed to grow plants and plant growing techniques, as well as potential problems and hazards. It makes it more exciting for children to compare growing plants in both Mars soil simulant and normal potting soil. They can link their experiments to one of our biggest adventures of the 21st century, going to and living on Mars. This adds to their excitement while they learn about one of our primary needs, the growing of crops.

A simple extension of these experiments would be to see if we can use Martian growing techniques to grow crops on Earth in unused soils found in deserts and semi-deserts.

The experiments will be carried out with at least two different crop plants, but preferably more. These crops can be grown in Mars soil simulant, desert sand (e.g. from the Sahara or Arizona) and also control potting soil. The crops may be grown in a greenhouse or in a normal classroom. After

sowing seeds, the main handling needed afterwards will be plant watering. These experiments can be combined with plant growing under LED lights. This would add experimental complexity but this would also make the experiments more like what will happen on Mars. For the desert parts, crops may either be grown in greenhouses, to simulate desert conditions, or whatever site conditions are available for plant growth in the Mars soil simulant.

Growing food in domes can also be presented to the school children. On Mars domes are needed for keep the cold out and suitable air in, while domes might also be used to grow food in deserts where the domes will serve to keep the heat out and the moisture in.

To be successful at growing crops in a sterile environment, such as on Mars, or a near sterile environment, such as in a desert, it is not enough to just plant seeds. Plants need manure (which may be provided by humans on Mars), also worms and bacteria to break down organic matter into soil nutrients, as well as insects, like bumble bees, for pollination. For Mars (and also for Earth) care needs to be taken to consider potential food poisons like heavy metals and chlorides and such hazards have to be kept out of the plants.

These experiments provide many opportunities for teachers to help school children explore the symbiotic relations between plants, bacteria, insects and humans, which are vital for survival on Mars as well as in deserts.