

Rocket science

A satellite with two large blue solar panel arrays and a white dish antenna is shown in orbit around the planet Mars. The satellite has the ESA logo on the dish. The background is the reddish-orange surface of Mars with some craters, set against the blackness of space with some stars.

Liz Sheffield looks at the significance of science experiments in space and explains how you can become part of one

Astronauts need food, and if we are to survive on other planets we will need to grow crops there. Since 2002 plants have been grown and harvested aboard the International Space Station. This is not only good for the astronauts' psychological wellbeing and their diets, but has also benefited those of us back home. The experiments have helped to advance Earth-based controlled-environment agricultural systems so farmers can produce better, healthier crops in small spaces using the optimum amount of water and nutrients.

The Martian

The method used to cultivate plants in the movie *The Martian* was not as far-fetched as you might think. Large-scale controlled experiments growing plants in Mars and Moon soil simulants have already been carried out. Tomatoes, wheat, mustard and cress germinate and grow well on both Martian and Moon soil simulant without any additional nutrients. Growth and flowering on Mars 'soil' was much better than on Moon 'soil' and slightly better than on control soil (nutrient-poor river soil from Earth). The greatest challenge for Martian farmers of the future will not be the soil, but getting sufficient water. The discovery of water on Mars, coincidental with the release of *The Martian*, was timely indeed.



Rocket plants

Take part in project Rocket Science

Rocket Science is a partnership project between the Royal Horticultural Society (RHS) and the UK Space Agency, in celebration of British astronaut Tim Peake's Principia mission. Rocket is an easy-to-grow plant in the cabbage family. It is rich in vitamin C and potassium, with a tasty, peppery flavour. The experiment aims to extend our understanding of the effects of space travel on seeds — and your school can take part.

Two kilograms of rocket seeds have been transported to the International Space Station. When the seeds are returned to Earth at the end of March they will have experienced microgravity, and been subjected to higher levels of ionising radiation than their counterparts back on Earth. Schools are invited to apply to the project to grow plants from these seeds in a controlled experiment. Pupils from up to 10,000 schools will be responsible for collecting data on germination, growth, leaf count and plant height. The results will be sent to the RHS Campaign for School Gardening, analysed by professional bio-statisticians and shared with the world.

How will the seeds perform?

The school experimenters will not know whether they have space-worn or stay-at-home seeds. It might be

expected that the space-travelled seeds will perform more poorly than those left behind — but you never know. One experiment carried out on the Space Station in microgravity showed that accidentally over-watered seeds actually grew better than seeds given what was thought to be the optimal amount of water. So we know that organisms aboard the Space Station don't behave the way they do on Earth, and may well surprise us.

Rocket Science activities

Sign up to Rocket Science here:

www.tinyurl.com/z57k2lc (applications close end of March 2016).

Find out more about the Campaign for School Gardening here: www.tinyurl.com/hfcenfl

For supporting activities on plant science and space see the Principia website:

www.tinyurl.com/oqj3cz3 Scroll down for a video from Tim Peake about the project.

Weblinks to follow up

Learn about the experiments already performed aboard the Space Station:

www.tinyurl.com/pgbr424

What is microgravity? See

www.tinyurl.com/pwwxumc

Could we really mix faeces into Martian dirt and grow potatoes? See the article at:

www.tinyurl.com/j5222da

To find out more about earthly plants grown in simulated soils see the paper at:

www.tinyurl.com/hf86qp4

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