

## Opportunities

Deep space gateway & the moon

## Challenges

gravity

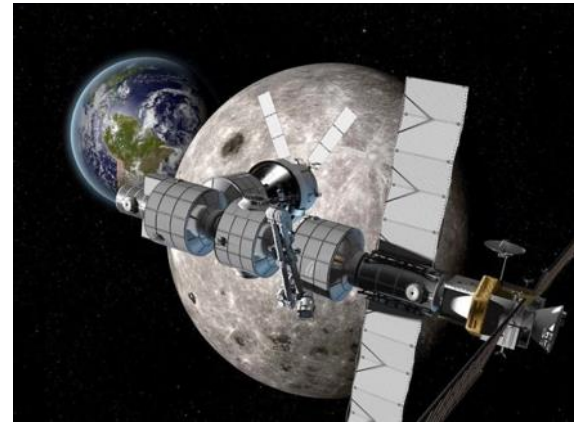
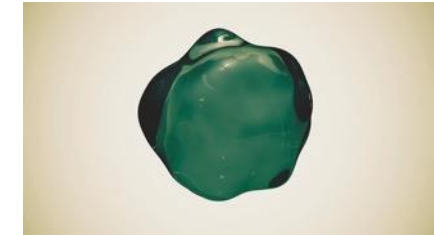
water

air movement

light intensity

UV & cosmic radiation

logistics – time delay



Mars  
Mining

Can Plants  
**GROW**  
with  
MARS SOIL?

**Essential Plant Nutrients**

Macronutrients	Micronutrients
Oxygen (O)	Iron (Fe)
Carbon (C)	Manganese (Mn)
Hydrogen (H)	Zinc (Zn)
Nitrogen (N)	Copper (Cu)
Potassium (K)	Molybdenum (Mo)
Phosphorus (P)	Boron (B)
Calcium (Ca)	Chlorine (Cl)
Magnesium (Mg)	
Sulfur (S)	

= detected on Mars soil, or in Martian meteorites

#JOURNEYTO MARS

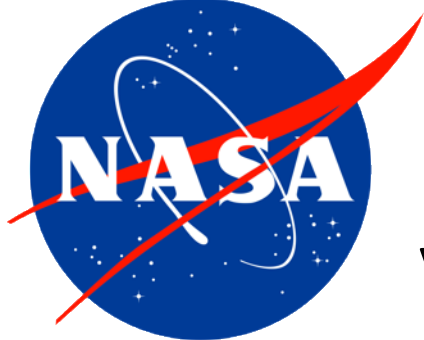
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plant energy biology  
ARC CENTRE OF EXCELLENCE

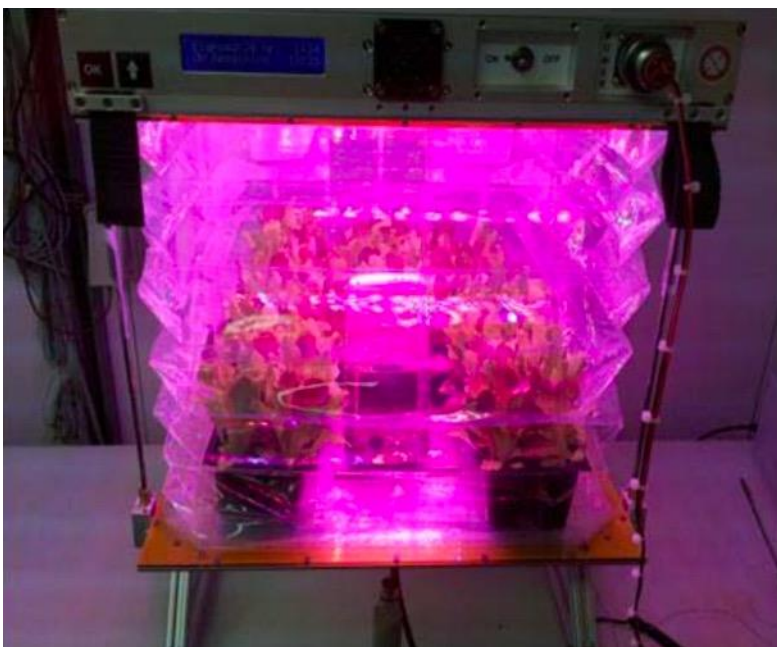


THE UNIVERSITY  
of ADELAIDE



# Plants in zero gravity

Veggie3 (Veg-03)



Lights  
Fan  
Shower curtain

VS.

Advanced Plant Habitat (APH)



Lights  
Camera  
Action

# Research to translation

Requires both biology (SynBio) & engineering solutions

Hypoxia & transpiration

Convection

Water percolation

Light supply

Nutrition

UV and cosmic radiation

Scaling up

*Extraterrestrial crops*

Local resources ( $O_2$ , water, soil, supply of light, UV, perchlorates)

