ARC CENTRE OF EXCELLENCE IN PLANTS FOR SPACE

The ARC Centre of Excellence in Plants for Space (P4S) is developing technologies to enable humans to survive and thrive in space, reducing the dependence on constant resupply, and using this lens to transform the sustainability of food and bioresource production on Earth.

We have four core missions:

On demand bioresource production.

This mission aims at using smart plants that operate as programmable biological factories for robust and rapid biomolecule synthesis. Innovations in this mission encompass development of new technology platforms for on-demand or large-scale production of novel, recyclable biomolecules, including plant-based construction materials and pharmaceuticals, that can be processed with minimal energy, resources, and waste.

Zero-waste plant growth optimised for controlled environments

With a focus on fast-growing, zero-waste, 'pick & eat' plant varieties that exceed current on-Earth performance, this mission aims to 're-engineer' plants to be able to remove redundant energy-intensive processes to accelerate growth; enhance nutrient and water use-efficiency; optimise salt tolerance; and create a use for all plant parts.

Complete nutrition via plant-derived sources in a variety of forms to support astronaut nutrition and psychology, and support on Earth market development.

This mission aims for the development of 'complete nutrition' plants that humans could survive on for a year without sacrificing health. Our focus will be on optimising concentrations of all essential macro- and micro-nutrients in a minimal suite of plants that can be processed into appealing food forms to fulfil nutritional needs.

Future ready workforce and society: innovative engagement programs with industry, schools and public

The Centre emphasises the impact of our research on society and includes the anticipatory and responsive legal, regulatory, ethical, and psychological frameworks to determine and refine process design to facilitate successful outcomes. A key element will be to dissect the complexity of human responses to extreme and constrained environments, to ensure that the novel process design is both compliant with legal standards and capable of situational evolution.

Australian Government
Australian Research Council

PLANTS FOR SPACE
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ABOUT PLANTS FOR SPACE

The ARC Centre of Excellence in Plants for Space (P4S) is a transdisciplinary endeavour involving multiple skillsets from systems and process engineering, plant biology, food chemistry, psychology, education and space law. Our international and national consortium has representation across a wide range of industries. This includes space, controlled environment agriculture, and food manufacturing.

We will have a standing load of 200 Australian based researchers by 2026 located in our foundational universities of the Universities of Adelaide, Flinders, Melbourne, La Trobe and Western Australia, and aim to train over 400 researchers by 2031. We will encourage entrepreneurship, and a spin in and spin out culture, to support growth in the Australian space industry. We also have a large outreach program to schools and the general public, with all of our researchers spending at least 10 days per annum on engagement activities.

We provide a nucleus of activity, network and pathway to collaborative industry-academic partnerships globally to perform transformative research, develop plant and food technologies to enable long-term space habitation, and provide new sustainable high-value bioproduction on Earth. We are open to leveraging our skillbase to engage in new opportunities. Contact us for more information.

PLANTS FOR SPACE PARTNERS

Australian Universities
The University of Adelaide
The University of Western Australia
La Trobe University
The University of Melbourne
Flinders University

International Universities
University of California, Berkeley
University of California, Davis
University of Wisconsin-Madison
Rice University
University of Cambridge
University of Nottingham
Research for Agriculture, Food and Environment - INRAE
ETH Zürich

Education and Engagement
The Andy Thomas Space Foundation
Dr Joanna McMillan
The Victorian Space Science Education Centre (VSSEC)
One Giant Leap Australia Foundation
South Australia Botanic Gardens and Herbarium
FOODiQ Global

Controlled Environment Agriculture
Vertical Future
Space Lab
Gaia Project Australia

Government
South Australian Space Industry Centre (SASIC)
Defence Science and Technology Group (DSTG)
Department of Primary Industries and Regions, South Australia (PIRSA)

Space Agencies
National Aeronautics and Space Administration (NASA)
Australian Space Agency (ASA)
German Aerospace Centre (DLR)

Space Enablers
Axiom Space
yuri
Saber Astronautics

Technology Providers
Twist Bioscience
BioPlatforms Australia
Australian Genome Research Facility (AGRF)
Australian Plant Phenomics Network (APPN)

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