Report to the

Department of Industry, Science, Energy and Resources

from the

Australian Society of Plant Sciences

for funding received to conduct activities during the

National Science Week 2021 on the theme of

"*Plant Science Safeguarding Our Future Food Security*"

Application ID
NSWKV000150

Application Title
NSWKV - AUSTRALIAN SOCIETY OF PLANT SCIENTISTS INC

Program Name
National Science Week Grants 2021

Applicant
AUSTRALIAN SOCIETY OF PLANT SCIENTISTS INC.

Reporter:

Dr Peter R Ryan (CSIRO Agriculture and Food)
President, Australian Society of Plant Sciences
30 September 2021

About the **Australian Society of Plant Scientists (ASPS):**

ASPS is an incorporated society that promotes plant science in Australia and facilitates professional contact both within our community of researchers and with secondary and tertiary level teachers. Members of this community make substantive contributions to basic aspects of plant biology and ecology. The society aims to expand scientific knowledge and, through improved understanding, benefit the natural environment and sustainable food production.

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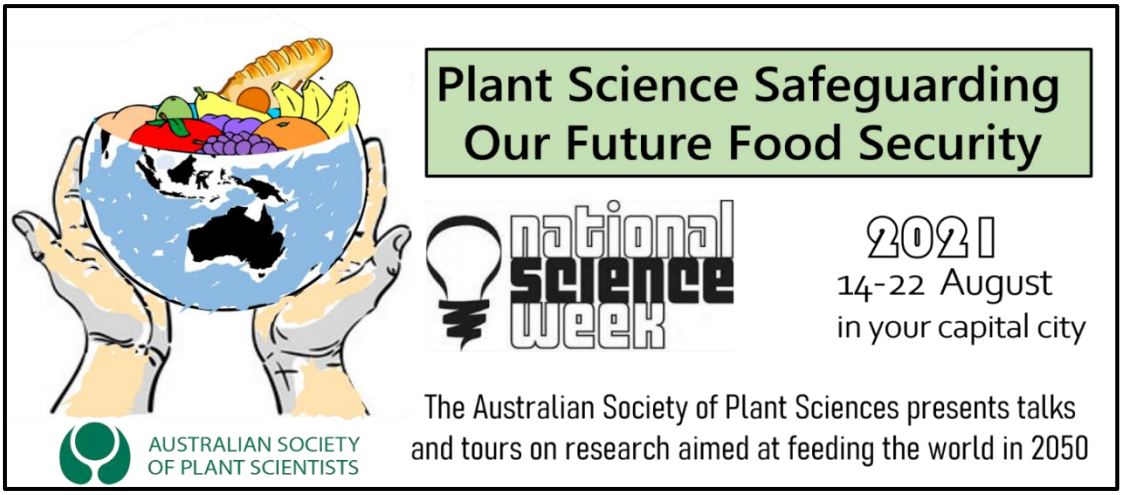
Summary

Food security in a changing climate is a global challenge for the 21st century. The Australian Society of Plant Scientists (ASPS) considered this an important topic to highlight during National Science Week. Consequently, the ASPS planned a series of events around Australia. These included lectures and interactive activities as well as public tours of research laboratories, facilities and field sites. All these events revolved around the theme of plant science, climate change and food production. Our aim was to explain the challenges facing global food security, the importance of plant science to meet these challenges and to highlight the excellent research being conducted by Australian scientists. We were also hopeful that these events might encourage more people to consider plant science and agriculture as important and engaging careers.

The activities organised around Australia involved eight institutions from five states. Covid19 outbreaks caused rapid lockdowns in many cities which forced changes to be made. However, we were prepared to some extent. Although fewer face-to-face events, public lectures and on-site tours were possible we were able to move much content online. One very successful face-to-face event did occur at the Waite Institute in The University of Adelaide and live online events were organised at The University of Sydney. The unexpectedly short notice for lockdowns in some cities meant that seminars were recorded and placed on-line and other new virtual activities were prepared. One of these new activities was called "*Meet a Plant Scientist*" where members of ASPS were asked to briefly introduce themselves and their work to a public audience. This is described further below.

Overall, more than 70 APSP members, invited speakers and graduate students volunteered their time and energy to plan and deliver the activities described in this report. Face-to-face events in Adelaide attracted 50 people, a live on-line event in Sydney involved 200 people and the 44 new educational videos produced and placed on YouTube™ have been viewed ~1,500 times by the middle of September. Additional videos have been added recently. The ASPS is very grateful to DISER for their funding. Our Society is satisfied that it has provided fun and engaging activities and delivered important messages to a wide audience, especially considering the extraordinary circumstances imposed on many cities by Covid19. We are very proud of our contributions.

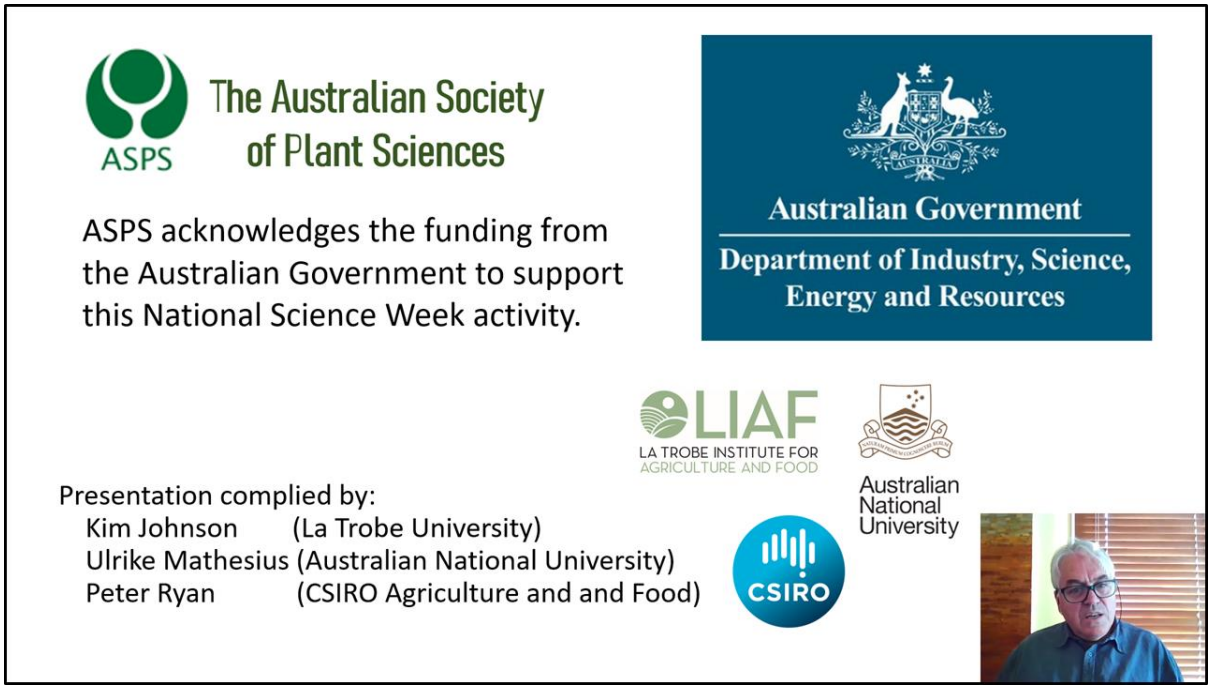


An Introduction to the ASPS Activities

The ASPS organised Science Week events in most major cities (hubs). Although the teams at these hubs were largely independent in their content, we encouraged them all to use a common video to Introduce the activities to provide some common branding cross the country.

The link to the introductory video describing the theme of our activities and the final acknowledgement slide are presented below.

https://www.youtube.com/watch?v=whFUyNK_qMg&list=PLCjVjret6uSjD2hY-jzEkeZZn6Gj9GFGu



"*Meet a Plant Scientist*" an on-line speed-dating experiment with plant scientists.

In anticipation of likely Covid19-imposed restrictions, ASPS introduced an idea not included in the initial application to DISER. It was called "*Meet a Plant Scientist*. Members of ASPS were invited to make a video just 30 seconds long to introduce themselves to the public. In that time, members needed to describe where they work and their research areas and broadly explain the burning scientific question they most want to answer in the future.

The following link includes a video Introduction to "*Meet a Plant Scientist*" provided by the ASPS President, Dr Peter Ryan, and all the other contributions:
https://www.youtube.com/watch?v=Z89GTOvT7Iw&list=PLCjVjret6uSjalUbDCO8a8jjuJesKZ8y3&index=1

ASPS National Science Week events by State: Planned and Actual

Queensland

Queensland University of Technology – Key organiser - Dr Brett Williams

The activities at QUT had to be cancelled because of Covid uncertainty and unexpected flurry of academic commitments for the organiser. However, Dr Williams did organise for two interactive videos to be made available online. One is a virtual tour of the science teaching laboratories and facilities at QUT and the other is an interactive video describing the scientific equipment in a standard biological laboratory. These videos were not produced specifically for Science Week. Links to them are here:

https://cdn.qut.edu.au/media/qut-science-experience-anz/
https://my.matterport.com/show/?m=cEBNvWzjjw7

New South Wales

Southern Cross University (Lismore)– Key organiser: Professor Bronwyn Barkla

The events organised by SCU around the theme of "*Farming for our future*" for Saturday August 14th had to change to online activities. Instead, the team generated a series of videos from Early Career Researchers, Staff and Higher Degree Research Students (HDRS) highlighting the work being carried out within the Faculty of Science and Engineering at Southern Cross University. Dr. Priyakshee Borpatra Gohain described her work on "Breeding mustard suitable for Australian Agriculture", Dr. Jay Anderson spoke about "Plants and Fungi: Friends and Foe" and Ms. Janelle Schaffer described her work on "Exploring Plant Compounds"

These Videos are still available here: https://youtube.com/playlist?list=PLCjVjret6uSjLV-oQh-iMEwaixzbn1zLm

The University of Sydney (Camperdown and Camden campuses)– Key organisers: Associate Professor Mary Byrne, Professor Brent Kaiser, Professor Robert Park, Associate Professor Marcus Heisler, and Dr Claudia Keitel.



Two of the University of Sydney campuses in Camperdown and Camden had prepared a series of face-to-face talks and interactive activities on the theme of "*Future Plant for Food Security*". Covid forced these events had to be altered to live online activities. One combined online Zoom event organised comprised of five short talks, followed by four online interactive sessions. The whole program attracted about 200 participants including a high number of students from surrounding schools. Links to these events and online bookings were described here: https://www.sydney.edu.au/science/news-and-events/events/future-plants-for-food-security.html

The team at Sydney University received loads of positive feedback after this session due to the engaging variety of content included in their online activities. Apparently, the online activities "opened their eyes to new ideas". Many of them expressed an interest in attending similar events in the future (preferably in person).

The talks at this session were recorded and the videos were distributed to several schools that had expressed an interest in the event but that could not participate on that day. The videos are also now online for public access. They include the following talks:

"Protein Power"	by Professor Brent Kaiser
"A CRISPR Outlook"	by Assoc Prof Brian Jones
"Cottoning on to Plant Production"	by Prof Daniel Tan
"Diagnosis: Pathogen"	by Professor Robert Park
"Food in the City"	by Floris van Ogtrop,

The online interactive activities targeted a variety of topics such as plant growth, physiology and photosynthesis and plant structure:

"*From Little Things. . . . . .*"	by A.Prof Mary Byrne & A.Prof Marcus Heisler
"*Let's Get Physiological*"	by Dr Claudia Keitel
"*Plants Down the Microscope*"	by Assoc Prof Rosanne Quinnell

The links to these online talks are here:
https://www.youtube.com/watch?v=6tQi0Wuugxg&list=PLCjVjret6uShlw9BYZGmFviqN0m8hpGBs

Australian Capital Territory

Australian National University - Key organisers: Prof. Ulrike Mathesius, Dr Caitlin Byrt

A series of talks by scientists and students at the Australian National University were organised for Saturday 21 August and these were to be followed by tours through the scientific laboratories and plant growth facilities. The events were cancelled when Canberra went into a rapid lockdown on 12 August. However, online materials were generated including this video:

"*Improving Biological Nitrogen fixation*" by Prof Ulrike Mathesius
which is still online at: https://www.youtube.com/watch?v=5OPuvqhCdjg

Dr Byrt's team also prepared a virtual tour of their laboratory and at the same time described how some plants can be genetically modified by dipping their flowers into a soup of special agrobacteria: https://www.youtube.com/watch?v=Hj0iM3zi6_E&list=PLCjVjret6uSh67u7d2U2B1mGRFARal9mt&index=2&t=24s

CSIRO Agriculture and Food (Black Mountain Labs) - Key organiser: Dr Peter Ryan

A series of short and engaging talks from seven scientists at CSIRO and Geoscience Australia were organised for Wednesday 18 August around the topic of "*Plant Science Safeguarding our Future Food Security*". The talks were chosen specifically to highlight the challenges the world faces in feeding another two billion people by the middle of the century and the pivotal role plant scientists will play in meeting these challenges.

These talks were to be followed by tours of the science laboratories in the CSIRO Synergy Building and the plant growth facilities and phenotyping capabilities in the Phytotron building.

A whole day tour of CSIRO field trial sites near Boorowa, NSW, was also planned as explained further below.

The event was advertised with two advertisements in the Canberra Times as shown in this picture. The issue of Food Security was highlighted in two radio interviews with Jaime Howell on ABC 666 Radio (18 August) and with Paul West on ABC South East NSW (19 August).



Public Notice in *The Canberra Times*

The online registration link was here: https://events.csiro.au/Events/2021/July/26/Plant-Science-Safeguarding-our-Future-Food-Security

While the interactive events and face-to-face seminars had to be cancelled, the expert speakers we organised were prepared to record their presentations so they could be made available more widely. These videos listed below are still publicly accessible here: https://www.youtube.com/watch?v=whFUyNK_qMg&list=PLCjVjret6uSh67u7d2U2B1mGRFARal9mt

"*Future Food Security: An Introduction*"	by Dr Peter Ryan
"*Future Crop Breeding*"	by Ms Jess Hyles
"*A Pest-Resistant Food Legume for Africa*"	by Dr TJ Higgins
"*Agriculture Systems Modelling'*	by Dr Di He
"*Plant Diseases*"	by Dr Ricky Milne
"*The Role of Satellites in Food Production*"	by Mr Ryan Ruddick (Geoscience Aust.)
"*Food Security: Balancing Demand, Supply and Price*"	by Dr Tony Fischer

Day trip to the BARS field station: A whole-day tour was planned for Thursday 19 August to visit the Boorowa Agricultural Research Station (BARS) which is CSIRO's newest field trial site in Boorowa NSW 100 km away from Canberra (https://www.csiro.au/en/work-with-us/industries/agriculture/Boorowa-Agricultural-Research-Station). Bus coaches were being organised to take 30 -50 people to tour the research station with lunch and to hear scientists explain the objectives of their field experiments there. The trip was cancelled due to Covid but the CSIRO scientists who had volunteered their time to support this event included Mr Stuart Brown (manager), Dr Alan Richardson, Dr Shannon Dillon, Dr Susie Sprague and Dr Chris Helliwell..

Victoria

La Trobe University – Key organisers - Dr Kim Johnson, Dr Janet Wheeler

Due to a snap COVID-lockdown in Victoria, a planned face-to-face event on Sunday 15 August called "*Food – Different by design. The future is Green*" was changed to a number of online activities on 19 August. The team at La Trobe University organised a series of talks and interactive activities. An event to primary school students was attended by approximately 50 students and teachers and demonstrated different plant-based foods going through the digestive system. Students then participated in their own home experiment guided by the organisers. This led to a discussion on why some foods are healthier than others for our gut and microbiome. A second virtual event was attended by an audience of approx. 80 including many secondary school students and teachers. The session covered the challenges of feeding the future population with sustainable nutritious foods. The session was highly interactive with polls, quizzes and opportunity to propose solutions to the grand challenges facing food production in future.



The flyer for these events is shown above.

Leading up to Science week La Trobe University researchers also promoted learning activities related to "*A Taste of Tomorrow*". A workshop, which included many primary teachers, demonstrated how science activities related to plant-based food can be used in the classroom and described fun experiments for people to try at home. Links: https://www.tastetomorrow.edu.au/; https://www.tastetomorrow.edu.au/activities; www.tastetomorrow.edu.au/experiments

The University of Melbourne & Monash University

The events planned at the University of Melbourne and Monash University had to be halted due to Covid19 and changing teaching circumstances of the key organisers. However, Professor Roslyn

Gleadow at Monash University managed to produce a video explaining why some plants produce cyanide and the consequences of this for people who consume these a lot of these plants species in their diets. The Link is here: https://www.youtube.com/watch?v=6egOt1qNo58

Tasmania

The University of Tasmania – Key organiser: Dr Tim Brodribb

ASPS members at the University of Tasmania realised quite early they did not have enough staff to help organise Science Week Activities. However, they did contribute a video on water stress and drought.

"*Why leaves die when they dry out*" by Dr Tim Brodbridd
https://www.youtube.com/watch?v=0M-sZETVoQ8&list=PLCjVjret6uShxXJbRyx1HIJZbEtyS8tK-

South Australia

University of Adelaide – Key organisers: Dr Megan Shelden, Dr Beth Loveys, Dr Georgia Koerber

South Australia was not affected by Covid during this period which allowed them to organise and hold face-to-face activities on 22nd August. Their event was entitled "*Plant Science Safeguarding our Future Food Security*". It was held in a university hall where 45 people were able to gather and listen to short talks on a variety of interesting topics including plant structure, hemp production, secondary products and the physiology of cell walls. Interactive activities were also organised around the hall and engaged people to extract DNA from strawberries, make terrariums, and join tours of the Waite Arboretum, Plant Accelerator, and TERN Plant and Soil Laboratory. The advertising flyer with a full schedule of events held at Adelaide University is shown below. A wonderful event.


national science week 2021

Plant Science Safeguarding Our Future Food Security

Sunday August 22nd, 10:00 am – 12:30 pm
Mcleod House, Waite Campus, University of Adelaide

Program

10:00 – 10:30 am Arrival and Coffee
10:00 – 12:30 pm Terrariums and DNA extractions (Sciren)
10:30 – 11:10 am Presentations and Panel Discussion
Chair: Dr. Beth Loveys, Deputy Head of School, Learning and Teaching

- Acknowledgement of Country
- Dr. Megan Shelden, ASPS Representative
- Professor Martin Cole, Head of School, Agriculture, Food and Wine
- Professor Rachel Burton, Head, Department of Food Science
- Ali Gill, PhD Candidate

11.10 – 12:30 pm Coffee and networking with scientists

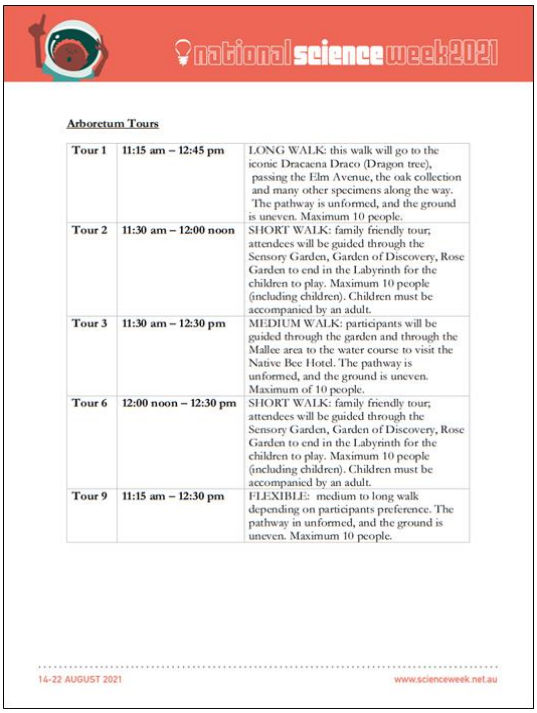
Tours Depart

11:15 am Tour 1 – The Waite Arboretum (90 min)
11:30 am Tour 2 – The Waite Arboretum (30 min)
Tour 3 – The Waite Arboretum (60 min)
Tour 4 – The Plant Accelerator (30 min)
Tour 5 – Terrestrial Ecosystems Research Network (TERN) Plant and Soil Library (30 min)
12:00 noon Tour 6 – The Waite Arboretum (30 min)
Tour 7 – The Plant Accelerator (30 min)
Tour 8 – Terrestrial Ecosystems Research Network (TERN) Plant and Soil Library (30 min)

12:30 pm Finish

AUSTRALIAN SOCIETY OF PLANT SCIENTISTS
THE UNIVERSITY of ADELAIDE

14-22 AUGUST 2021 www.scienceweek.net.au


national science week 2021

Arboretum Tours

Tour 1	11:15 am – 12:45 pm	LONG WALK: this walk will go to the iconic Dracaena Draco (Dragon tree), passing the Elm Avenue, the oak collection and many other specimens along the way. The pathway is unformed, and the ground is uneven. Maximum 10 people.
Tour 2	11:30 am – 12:00 noon	SHORT WALK: family friendly tour; attendees will be guided through the Sensory Garden, Garden of Discovery, Rose Garden to end in the Labyrinth for the children to play. Maximum 10 people (including children). Children must be accompanied by an adult.
Tour 3	11:30 am – 12:30 pm	MEDIUM WALK: participants will be guided through the garden and through the Mallee area to the water course to visit the Native Bee Hotel. The pathway is unformed, and the ground is uneven. Maximum of 10 people.
Tour 6	12:00 noon – 12:30 pm	SHORT WALK: family friendly tour; attendees will be guided through the Sensory Garden, Garden of Discovery, Rose Garden to end in the Labyrinth for the children to play. Maximum 10 people (including children). Children must be accompanied by an adult.
Tour 9	11:15 am – 12:30 pm	FLEXIBLE: medium to long walk depending on participants preference. The pathway in unformed, and the ground is uneven. Maximum 10 people.

14-22 AUGUST 2021 www.scienceweek.net.au

Photographs taken at the Science Week events at the Waite Institute of Adelaide University.



Dr Megan Sheldon talking about cereals



Prof Martin Cole talking about food security



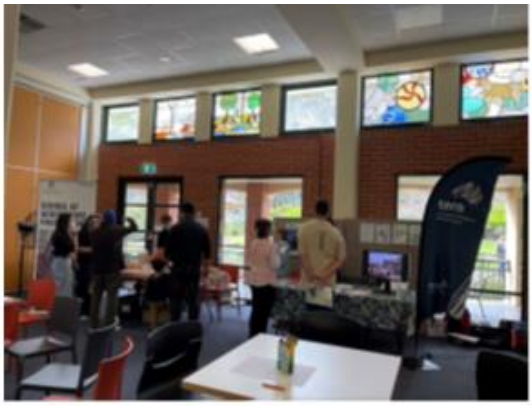
Prof. Rachel Burton and Dr. Beth Loveys showing people in Adelaide how long digestive systems are.



Ali Gill talking about the special properties of hemp.



Stalls for the University's Postgrad association for Phenomics and STEM



Stalls for University's School of Agr, Food and Wine and TERN, Terrestrial Ecosystem Research Network.

Website for the Waite event is here: https://www.thewaite.org/event/plant-science-safeguarding-our-future-food-security-science-week-event/
And the registration link was here: https://www.eventbrite.com.au/e/plant-science-safeguarding-our-future-food-security-tickets-162612425141#

Budget

DISER granted the ASPS $14,400 which was supported by an estimated $24,000 of other expenditure and in-kind contributions from ASPS members and helpers. The largest components of the grant were to support Travel and Accommodation and Consumables and Displays. The Travel and accommodation was intended to hire coaches to transport Canberra people to Boorowa NSW to visit the CSIRO experiment field station (this included morning tea and lunch). Other possible field trips were considered but did not come to fruition. The Boorowa trip had to be cancelled due to Covid. The Consumables and Display expenditure included the cost of DNA extraction kits and PCR kits which were going to be used for the hands-on activities at the various hubs. Again, this component was under-spent because most hubs could not hold face-to-face events.

Grant	$14,400	
Expenditures	$905	Consumables and displays for the Sciren Workshop (Adelaide)
	$422	Printing South Australia
	$280	Advertising South Australia
	$492	Advertising ACT
	$2,099	Total Expenditure (receipts available on request)

We are underspent on our budget. However, we believe the in-kind contribution was greater than predicted because more effort had to be placed in providing the preparing recordings and virtual tours and generating on-line seminars. The ASPS is convinced that we can use the unallocated funds to further our extension work in the future. Therefore, rather than us returning the unspent funds, we request DISER considers this option.

Final Statement

The Australian Society of Plant Scientists was thrilled to be part of Australian Science Week in 2021 and we were very proud with our contributions to this important event – especially under such trying circumstances. We hope to contribute again in 2022 with even more events. Our organisation is absolutely committed to distributing sound, reliable and factually based information about plant science and its importance in our society. Finally, we are very grateful to the Department of Industry, Science, Energy and Resources for supporting our efforts.

Dr Peter R Ryan (President, Australian Society of Plant Scientists).