Phytogen April 2016

THINKING BIG – A Report from an ASPS Travel Award Recipient

27 April 2016

By Dr. Zhengyu (Allen) Wen

Postdoctoral Research Fellow, Centre for Carbon, Water and Food, Faculty of Agriculture and Environment, School of Life and Environmental Sciences, The University of Sydney

ComBio 2015 was well above my expectation. As a plant physiologist interesting in ion transporter research, I had previosuly attended conferences relevant to my area of expertise and found myself comfortable enjoying the science. ComBio is a combined conference covering multiple fields of science and I had some minor trouble submitting my abstract to the relevant plenary that best aligned with my research topic, which did make me wonder about the scope of science that was to follow. But as the conference began, I realized that the 2015 ComBio was going to provide a big and pleasant experience. Professor Martin Caffrey's lecture discussed new insights into protein structural biology and how it can effect protein function, which was very interesting from a structural biology perspective. I learn't that there were new ways to crystallise a protein. Given the current difficulties in crystallizing ion transporters, this new method could potentially be used to solve the structure of ion transporters relevant to my research program. I also learn't a lot from the epigenetics talks, which could pave new ways for crop biofortification and modification. Overall, ComBio2015 truly broadened my view in science, pushing me to think big.

Plant Development Discipline Report

27 April 2016

by Dr. Matthew Tucker

ARC Future Fellow at The University of Adelaide

It's been a busy start to the year in terms of conferences and workshops relevant to plant research. The bi-annual Plant Reproduction meeting was held from the 18th to 23rd of March at the University of Arizona in Tucson. The conference brings together experts from diverse fields stretching all the way from meristem development through to sporogenesis, pollen tube attraction, fertilisation, embryogenesis, endosperm development and fruit growth. The ultimate aim of the conference is to describe fundamental research from model species, such as the discovery of genes, mechanisms and biochemical pathways, which might be used to address current and future challenges in crop reproduction and yield. The conference was well attended with approximately 220 attendees, and the quality of data presented was amazing. Australian attendees included researchers from CSIRO Agriculture, The University of Adelaide and the ACPFG. The highlights were talks from Minako Ueda from the University of Nagoya, who showed stunning videos of fluorescently-tagged Arabidopsis egg cells developing into zygotes, Noni Franklin-Tong from the University of Birmingham, who described her work on transferring the self-incompatibility system from poppy into Arabidopsis, and Li Yuan from UC Davis who won an award for his talk on a histidine kinases that controls central cell development in the

Arabidopsis female gametophyte. The discovery of genes controlling or inducing apomixis in maize, Taraxacum and Pennisetum was also a major breakthrough. It was clear from the talks that CRISPR/Cas9 and ChipSeq are now standard techniques in the field, while the capacity to isolate, profile and study previously inaccessible cell types through fluorescence assisted cell sorting (FACS) and microdissection is also rapidly progressing. The next plant Reproduction meeting will be held in Japan in 2018, and I would strongly recommend attending what always proves to be a collaborative, interactive and socially enjoyable meeting.



Photos of the Tucson desert moon, the famed Dr Minako Ueda with the author, the packed conference and Tetsuya Higashiyama introducing the next Plant Reproduction meeting.

Another excellent CSIRO workshop was recently held from the 19th-21st April in Kiama on the NSW south coast. The workshop, also sponsored by the ASPS, brought together Australian and International researchers from the field of Crop Developmental Genetics to discuss old and new strategies for the improvement of crop yield. Cereal crops such as wheat, barley and sorghum were discussed in addition to research on lupins, canola, tomato and legumes. Talks from international speakers including Jorge Dubcovsky from UC Davis, Junko Kyozuka from Tohoku University, Thorsten Schnurrbusch from IPK Gatersleben and Yuval Eshed from the Weizmann Institute were highlights, while students from CSIRO, ANU, the Universities of Adelaide, Queensland and Monash confirmed that the future of plant developmental genetics in Australia is in good hands. The intention was to use this workshop as a springboard for further collaborative research and meetings; plant developmental genetics is a relatively small field that provides so much promise for translating fundamental discoveries directly into breeding outcomes. As part of this I plan to update the ASPS Plant Development page to include information about the field and the research being undertaken in Australia, hopefully this will act as a useful resource for both students and researchers.

ComBio2016 – Online registration and abstract submission is now open AND update of student awards and travel grants

19 April 2016

Your membership is paid to [wpmlfield name="paidtodate"] (year, month, day).

ComBio2016: 3 – 7 October 2016

Brisbane Convention & Exhibition Centre

Abstract and Early Registration Deadline, Monday, 27 June 2016

Dear Past and Present Members

ComBio2016 incorporates the annual meetings of the Australian Society for Biochemistry and Molecular Biology, the Australian Society of Plant Scientists and the Australia and New Zealand Society for Cell and Developmental Biology.

We are pleased to advise that the ComBio2016 online registration and abstract submission pages can now be accessed at:

http://www.asbmb.org.au/combio2016/registration.html

and

http://www.asbmb.org.au/combio2016/abstracts.html respectively.

The Provisional Program Timetable can be accessed from: http://www.asbmb.org.au/combio2016/timetable.html

The Provisional Symposium Schedule (including titles of sessions and chairs)will be available from http://www.asbmb.org.au/combio2016/symposia.html at the end of April.

Plenary speaker details including photographs and biographies can be downloaded from: http://www.asbmb.org.au/combio2016/plenary.html

The ASBMB, ASPS and ANZSCDB offer either student bursaries or travel grants, and details will be available from: http://www.asbmb.org.au/combio2016/student.html at the end of April.

The conference secretariat has held blocks of reasonably priced hotel and apartment accommodation in walking distance to the Brisbane Convention Centre. Per night costings start from $129/night for hotel single/twin/double accommodation and from $165/night for one bedroom apartment accommodation which is great for sharing. Apartments include separate living room and kitchen. Bookings must be made directly with the conference secretariat on the online registration form. No deposit is required.

Further information: Sally Jay: combio@asbmb.org.au

ComBio2016 Awards

19 April 2016

- ASPS will make up to 5 awards for research presented as a poster by students at ComBio2016, depending on the number of posters. Each award will consist of recognition at the end of the conference and a prize of $200.
- Student members of ASPS may also apply in advance for a travel award to attend ComBio2016, if presenting their research as either a poster or talk. Applications are due June 10th to the Hon. Treasurer of ASPS: brent.kaiser@sydney.edu.au
- The Peter Goldacre Award is the ASPS award for excellence in early career research. The award ($2000, a medal and invited lecture at ComBio) is sponsored by Functional Plant Biology.
- Award for best paper (2016) by an early career plant scientist published in Functional Plant Biology (certificate, $250 book voucher from CSIRO publishing). Selected from papers published in 2015 in Functional Plant Biology and nominated during the submission process.
- The ASPS Teaching Award may also be presented (certificate and prize) at ComBio2016.
- The R.N. Robertson Lecture will take place at ComBio2016. (The R.N. Robertson Lecture alternates each year with the J.G. Wood Memorial Lecture).
- For more information, http://www.asps.org.au/awards

Plasmodesmata in rice and Setaria: A comparison of symplastic transport mechanisms in C3 and C4 plants

18 April 2016

*Article by **Florence Danila**: Recipient of the ComBio 2015 ASPS Student Poster Prize*

A large majority of the human population depends on rice (*Oryza sativa*) for survival. Rice production needs to increase by 50% to support a higher demand for food forecasted over the next 35 years due to an increasing human population. Traditional breeding can only increase rice yield by 1% per annum. Switching the less efficient C_3 photosynthetic system of rice to use a more efficient C_4 photosynthesis, would theoretically increase productivity by 50%. The aim of the C_4 Rice Consortium is to add features of C_4 photosynthesis to the C_3 plant, rice. Therefore, it is essential to know whether rice can support the expected increase in metabolite flux between the leaf mesophyll (M) and bundle sheath (BS) cells after all the C_4 biochemistry has been installed. The main pathway for metabolite flux is symplastic, i.e. via the plasmodesmata (PD) connecting M and BS cells. Comparison of the symplastic transport mechanisms between the C_3 monocot crop, rice, and the C_4 plant, *Setaria viridis* was done by looking at the PD density and pit field distribution between the M and BS cells. Electron microscopy and 3D immunolocalisation showed that *Setaria* (C_4) has higher PD density and higher pit field area coverage on M/BS cell interface than rice (C_3). Establishing the numerical difference in terms of PD connections between C_3 and C_4 plants is not only relevant for the C_4 Rice Project but also in plant transport and modelling studies.

Acknowledgements:

ARC Centre of Excellence for Translational Photosynthesis (Research School of Biology, Australian National University, Canberra, Australia). International Rice Research Institute (Laguna, Philippines). CSIRO Agriculture (Canberra, Australia).

KILLING FUNGAL PATHOGENS – DETERMINING THE MODE OF ACTION OF AN ANTIFUNGAL DEFENSIN

06 April 2016

*Article by **JENNIFER PAYNE**: Recipient of the ComBio 2015 ASPS Student Poster Prize*

Plants can't run and and hide from their enemies. They are rooted to the spot and consequently have developed sophisticated defence mechanisms to shield them from potential invaders. Unlike animals they don't have an adaptive immune system and rely instead on physical barriers such as waxy cuticles, secondary metabolites and innate immunity proteins for protection against potential microbial pathogens. Plant defensins, are a crucial part of this innate immune system. They are small, stable, cysteine-rich proteins that are produced by all plant taxa and most plant tissues. NaD1 a plant defensin from the ornamental tobacco *Nicotiana alata*, has potent antifungal activity against a range of serious plant pathogens that can devastate crop yields and we have been exploring its potential application in crop protection. NaD1's antifungal mechanism is complex involving multiple steps, beginning with specific interaction with the fungal cell wall, followed by disruption of the plasma membrane and entry into the cytoplasm where it initiates cell death. Unlike most antifungal molecules, NaD1 requires an intact cell wall for its antifungal activity. The fungal cell wall is unique to fungi, creating an ideal selective target for new generation fungicides. It is composed of three layers; an outer glycoprotein layer, a β-1,3-glucan layer and a chitin layer immediately adjacent to the plasma membrane. Direct binding assays and chemical and genetic alteration of the thickness of the cell wall layers revealed that NaD1 binds with a higher affinity to chitin than β-1,3-glucan. This led to the hypothesis that NaD1 might be directed through the wall and onto the plasma membrane by an affinity gradient, a novel mechanism for passage through the cell wall. Once through the wall, NaD1 must pass through the plasma membrane to enter the cytoplasm and kill the fungal cell. The interaction between NaD1 and the membrane was studied using liposomes and bilayers of different lipid composition together with dual polarisation interferometry. This revealed that; NaD1 only interacts with membranes containing phosphatidylinositol 4, 5-bisphosphate, the membrane becomes disordered upon NaD1 binding, and NaD1 does not dissociate from the membrane after binding (Payne et al 2016). These data supported the work of Poon and colleagues (2014) who reported that NaD1 and phosphatidylinositol 4, 5-bisphosphate form an elegant arc shaped oligomer and highlighted a new mechanism for membrane disruption by an antimicrobial peptide.

References:

Payne, J. A., Bleackley, M. R., Lee, T. H., Shafee, T. M., Poon, I. K., Hulett, M. D., . . . Anderson, M. A. (2016). The plant defensin NaD1 introduces membrane disorder through a specific

interaction with the lipid, phosphatidylinositol 4,5 bisphosphate. Biochim Biophys Acta, 1858(6), 1099-1109. doi:10.1016/j.bbamem.2016.02.016

Poon, I. K., Baxter, A. A., Lay, F. T., Mills, G. D., Adda, C. G., **Payne, J. A.**, ... Hulett, M. D. (2014). Phosphoinositide-mediated oligomerization of a defensin induces cell lysis. *eLife*, *3*, e01808. http://doi.org/10.7554/eLife.01808

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Science Meets Parliament 2016

06 April 2016

By Professor Yong-Ling Ruan at The University of Newcastle

On behalf of Australian Society of Plant Scientists, I joined Science Meets Parliament (SMP) on the 1st and 2nd of March, 2016 in Canberra. The SMP aims to provide scientists unique opportunities to build mutual understanding and connections between scientists and parliamentarians and to better understand the policy making process connecting science and innovation that underpins Australia's economic, social and environmental wellbeing.



Professor Yong-Ling Ruan, ASPS representative, and Hon Christopher Pyne, MP, and Minister for Industry, Innovation and Science at the Science Meets Parliament 2016 at the Great Hall of the Australian Parliament House in Canberra on the 1 March 2016.

Day 1 of the SMP started with an opening address given by Professor Brian Schmidt (AC, Nobel Laureate and Vice Chancellor of ANU) at the Hotel Realm. Prof Schmidt analysed a broad aspects of Australian Science and offered a few 'tips' on how to talk to politicians. This was followed by a vivid discussion and debate on 'How to turn your science into news', presented by Kylie Walker (Australian Academy of Science), Paul Bongiorno (Network Ten) and Alison Carabine (ABC radio). The meeting continued with an 'Interactive session' on rehearsing for parliamentary meetings and concluded with a Gala dinner at the Great Hall in Parliament House where key note speakers, the Hon Christopher Pyne MP, (Minister for Industry, Innovation and

Science) and the Hon Bill Shorten MP (Leader of the Opposition) addressed the audience outlining their policies and visions for the future of Australian science.

Day 2 featured face-to-face group meetings in Parliament House with Ministers, Parliamentary Members and Senators. Their were concurrent sessions on Science and Politics delivered by past and present Federal Chief Scientists, Professors Ian Chubb and Alan Finkel, respectively, as well as Aidan Byrne (ARC CEO Professor) and Senator Kim Carr (Shadow Minister for Higher Education, Research, Innovation and Industry).

The two-day event proved to be a very rewarding experience. It helped to better understand and appreciate the process of formulating science-related policies and decisions developed at the government level. It provided a unique opportunity to network with politicians, journalists and fellow scientists while advocating plant science to the broader community. To the latter, I attached here a photo with the Science Minister Chris Pyne at the Gala diner following his keynote speech and our informal discussion.

Email: yong-ling.ruan@newcastle.edu.au

Science and Technology March newsletter and GPC March E-bulletin

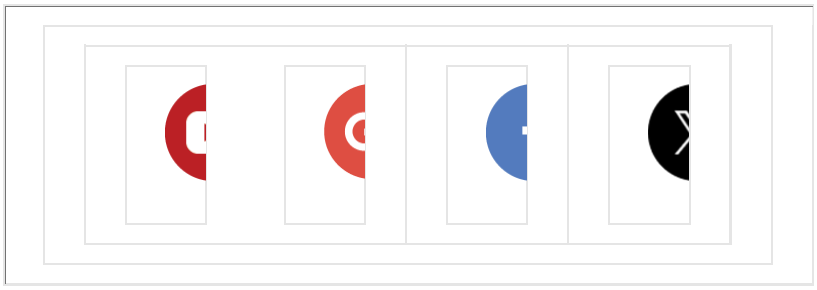
03 April 2016

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Science & Technology Australia – March Newsletter

View this email in your browser

Science & Technology AUSTRALIA



Dear Colleagues,

As the leaves begin to turn in Canberra it seems we are hurtling towards an early election. What a pleasure it is to see that science is high on the agenda across all major political groups as we get closer to the poll. However there is no room for complacency, and as you will read we will be conducting our usual science policy survey and bringing you the results to inform your vote. Also if you missed out on the National Press Club address from three great scientists – STA Vice Pres Emma Johnston, Nalini Joshi and Tanya Monro – on Women in Science. Sparkling stuff.

Science meets Parliament 2016

Early March saw another fantastic *Science meets Parliament*, with around 200 working scientists coming together for two days of professional development and networking aimed at bridging the gap between science and politics.

The first day saw a panels of journalists, deputy secretaries of departments and Nobel Prize winner Brian Schmidt AC helping to prepare delegates for their meetings with parliamentarians the next day. Previous *SmP* alumni spoke about their experiences in engaging with parliamentarians and the importance of making a human connection.

Dr Rod Lamberts and Dr Will Grant from the ANU's Centre for the Public Awareness of Science ran a workshop to help delegates present their areas of research in an easily digestible 60-second presentation that cut through the jargon and delivered the exciting and intriguing parts of their work.

A gala dinner in the Great Hall at Parliament House capped off the day. In addition to all our delegates, the current and former chief scientist, some 40 parliamentarians, senior diplomats and industry representatives attended the dinner. Both the Minister for Industry, Innovation and Science, Christopher Pyne, representing the Prime Minister, and the Opposition Leader, Bill Shorten, spoke on the night about the importance of science and research to Australia's economy, culture and place in the world.

The second day was even busier than the first, with close to 60 face-to-face meetings between parliamentarians and small groups of delegates. Some lucky scientists met with the Prime Minister and the Opposition Leader. Delegates had the opportunity to make real connections with parliamentarians, explaining their work and why it matters.

Delegates also heard from former Chief Scientist Professor Ian Chubb AC, Chief Scientist Dr Alan Finkel AO, Assistant Minister Karen Andrews, Shadow Minister Senator Kim Carr, Shadow Minister Richard Marles and Dr Adam Bandt.
Judging by the many smiling (but tired) faces at the finale drinks

and the sparkling feedback it's safe to say that the event was a great success.

Upcoming Events

With *Science meets Parliament 2016* over, STA is now looking ahead to the rest of its events for the year.

Science meets Business is confirmed as taking place later this year, and more details will be provided when they're available. The first *SmB* was held last year and brought together scientists and business people to discuss how to strengthen collaboration between industry and STEM. The event produced valuable insights and helped to reshape and refresh the conversation between theses two important areas, and this year's event is sure to follow on from that success.

Also happening in the latter part of the year is a Member Services Workshop, which provides hands-on training the everyday affairs of scientific and technological societies. The workshop will cover a range of issues facing professional associations, from managing conferences and membership, to creating a cost-effective online presence. Dates and more details will be given when available.

Science Election Survey

As we get closer to a federal poll, the STA science policy election survey will roll out once again. The survey is designed to extract relevant election policy from all major parties and present it to STA members so you can make a more evidence-based decision on election day. With science and innovation much higher on the agenda than in previous years, the results should be fascinating.

Federal Budget

As usual STA will bring members all the science and technology news straight from the Federal Budget lock up. Keep your eyes open for the special bulletin on the new 3 May date.

As always, members are encouraged to email in any useful Federal Budget intelligence that might enrich our understanding of this important document.

Women of Science at the National Press Club

Professors Nalini Joshi, Emma Johnston and Tanya Monro spoke at the National Press Club on 30 March about the role and future for women in science. Covering the difficulties faced by women in STEM fields, particularly those seeking senior positions, they also talked about their experiences and the positive steps being taken to address this imbalance. More on this enlightening and inspiring talk is available here and the video recording is available here

Prime Minister's Prizes for Science open for nominations

The 2016 Prime Minister's Prizes for Science are now open for nominations, and will close at 5pm EST on 28 April. The Prime Minister's Prizes for Science are the pre-eminent annual science, innovation and science teaching awards in the country and are awarded for excellence in the following areas:

- The Prime Minister's Prize for Science;
- The Prime Minister's Prize for Innovation;
- The Frank Fenner Prize for Life Scientist of the Year;
- The Malcolm McIntosh Prize for Physical Scientist of the Year;
- Prize for New Innovators (new award for 2016);
- The Prime Minister's Prize for Excellence in Science Teaching in Primary Schools; and

· The Prime Minister's Prize for Excellence in Science Teaching in Secondary Schools

Each recipient receives an embossed medallion with lapel pin and a share of the $750,000 in prize money.

If you know of an outstanding researcher, teacher or innovator, nominate them here

Global Plant Council E-Bulletin March 2016

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E-Bulletin /
March 2016

Welcome to another issue of your monthly Global Plant Council e-Bulletin. Here you'll find a selection of the latest news, events, reports and funding opportunities from across the GPC community, but don't forget there is always lots more to read on our regularly updated website!

Would you prefer to read this e-Bulletin in your own language? Did you know that if you click the "view web version" link above, you'll be taken to a webpage with a clever Google widget in the top right-hand corner, which will do its best to speak your language. It may not be perfect, but it might be useful for non-English-speaking colleagues.

Finally, we'd like to say goodbye and good luck to Amelia Frizell-Armitage, one of our two New Media Fellows who is leaving us for a new job in London, UK. Thank you Amelia!

Latest News /
View more...

If you have news you would like us to share on our website, please contact lisa@globalplantcouncil.org

New Phytologist Trust

nature plants

JXB

This month 62 new breaking news stories were posted on the GPC website including...

In *Journal of Experimental Botany*: WOX genes and the regulation of rice development

In a new article in the March issue of *Journal of Experimental Botany*, Cho et al. provide evidence for a direct cause-and-effect relationship linking the transcriptional activity of rice OsWOX3A and and hormonal changes caused by gibberellic acid.

In *Nature Plants*: Over 70% of essential crop wild relative species in urgent need of collection

Many of the wild plants which will be the building blocks for future global food supply are missing from the world's genebanks, according to new research by the International Center for Tropical Agriculture in coordination with the Global Crop Diversity Trust and the Royal Botanic Gardens, Kew.

EMPHASIS project listed on the European Research Infrastructure roadmap

Multi-scale plant phenotyping to analyze genotype performance under diverse environmental conditions is at the center of the EMPHASIS project, a new large-scale European project coordinated by researchers at Forschungszentrum Jülich.

Scientists race to halt banana catastrophe

Scientists in developing countries are scrambling to find a cure for a devastating fungus that threatens to wipe out the global banana trade and plunge millions of farmers into poverty.

Gene protects against toxic byproducts of photosynthesis, helping plants to "breathe"

Japanese scientists have discovered that a certain gene within plants suppresses the toxic molecules formed as byproducts of photosynthesis.

Events /

View more events on our website...

If you have a conference, meeting, workshop, training course or other event coming up, we can include it in our Events calendar! Please email lisa@globalplantcouncil.org.

UK PlantSci 2016 – Plants in a changing world: molecule to ecosystem
11–12 April 2016. Norwich, UK.

State of the World's Plants Symposium
11–12 May 2016. Kew Gardens, UK.

37th New Phytologist Symposium: Plant Developmental Evolution
15–19 May 2016. Beijing, China.

2016 Global Pulse Convention
19–22 May 2016, Çeşme, Izmir, Turkey

Reports /

Lots of new reports, and an archive of useful documents from the last few years, are available on our website. Head to the Resources page and click 'Reports'.

Report of the Task Group on GBIF Data Fitness for Use in Agrobiodiversity
This report from a team of international experts have completed a report providing makes more than 50 recommendations for enhancing the coverage, completeness and usefulness of data mobilized by the Global Biodiversity Information Facility for research in agrobiodiversity.
More...

Managing Food Price Volatility: Policy Options to Support Healthy Diets and Nutrition in the Context of Uncertainty (PDF)
This policy brief by the Global Panel on Agriculture and Food Systems for Nutrition identifies policy interventions that can anticipate and mitigate the negative dietary and nutritional outcomes of price volatility and market uncertainty.
More... (PDF)

Policy Options for Decoupling Economic Growth from Water Use and Water Pollution
Without altering current levels of water consumption and pollution, almost half of the world's population will suffer severe water stress by 2030, damaging the well-being of millions of people, according to a new report from the International Resource Panel.
More...

Funding Opportunities /

Spotted a funding opportunity we've missed? Please tell us about it by emailing lisa@globalplantcouncil.org

We're always on the look-out for funding opportunities that might benefit the plant science community, so in this post we highlight some recent grants and awards including the Rank Prize Nutrition Committee Travel Awards (UK), several UK/Japan awards from the Daiwa Foundation, and a mobility award with opportunity to work in Estonia.
More info...

USDA-NIFA has also announced some new funding calls – read this post for more information.

On the blog /
View more...

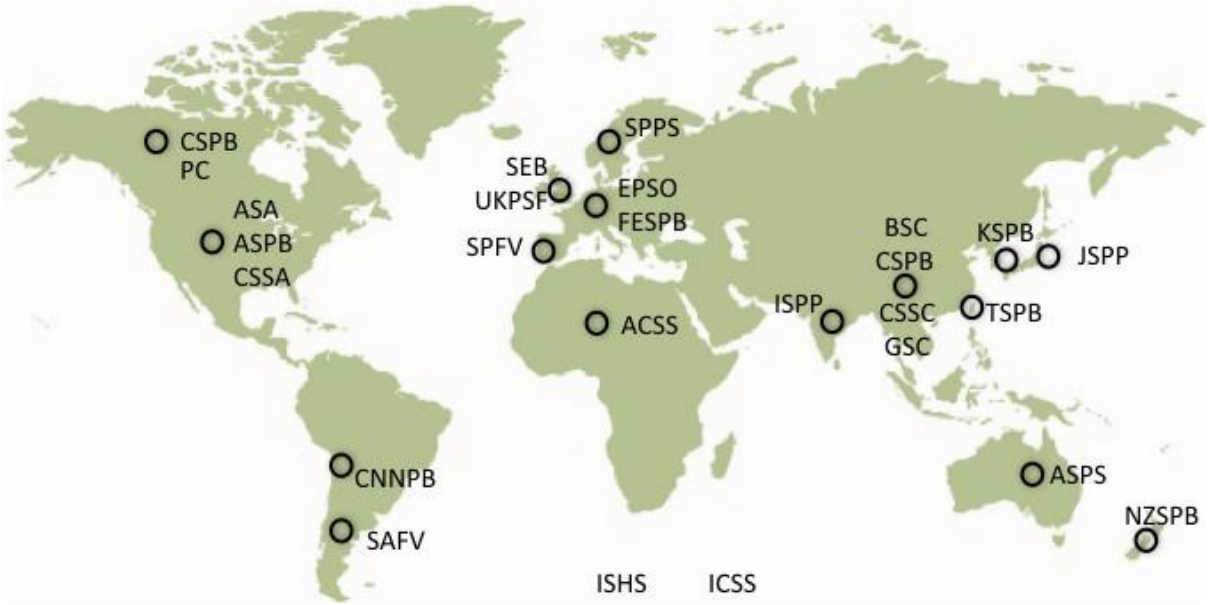
Would you like to contribute an article to the GPC's blog? Please get in touch! Email lisa@globalplantcouncil.org

The Secrets of Seagrass
Sarah Jose explores some new research revealing mysteries hidden in the genome of *Zostera marina*.
More...

International Year of Pulses – Join the Movement!
Did you know it's the International Year of Pulses? Tilly from the Global Pulse Federation highlights some of the activities happening in 2016.
More...

The Importance of Botanic Gardens in the 21st Century
Fresh from a 'Novel Frontiers in Botany' meeting in Japan, Sarah Jose explains why botanic gardens are crucial not only for recreational use, but also for plant science research, conservation and education.
More...

Members /



Click here for details of the GPC Member Organizations and representatives.

Please contact Ruth Bastow (ruth@globalplantcouncil.org) to find out how your organization can join the Global Plant Council.

The GPC is a coalition of plant and crop science societies from across the globe. The GPC seeks to bring plant scientists together to work synergistically toward solving the pressing problems we face.

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