Meetings

Bringing together Europe's young plant scientists

Meeting report on the 10th European Plant Science Retreat, 3–6 July 2018, Utrecht University, Utrecht, the Netherlands

It is often challenging for early career scientists such as PhD candidates to find their way in the scientific community. Besides performing research, a crucial aspect of a PhD career is to establish a scientific network. It is therefore important to attend conferences where PhD candidates can meet fellow scientists and discuss their research. However, many conferences are centred around more senior scientists, often resulting in limited possibilities for PhD candidates to present their research. Moreover, in the presence of established senior scientists many young PhD candidates are reluctant to ask questions and participate in discussions.

To aid young researchers in building a scientific network, representatives from three European graduate schools (Experimental Plant Sciences (the Netherlands), International Max Planck Research School (Germany) and Sciences du Végétal (France)) took the initiative to create an event specifically for PhD candidates in plant sciences. This collaborative effort resulted in the very first edition of the European Plant Science Retreat (EPSR) at Wageningen University (the Netherlands) in 2008. Since then, the EPSR became a symposium organized by and for European PhD candidates, with an emphasis on interactions between young researchers working in plant science. The EPSR has since been organized in Germany, France, the UK, Belgium and Spain.

This year, the EPSR was hosted by Utrecht University (the Netherlands) from 3 to 6 July. Over a hundred PhD candidates working in eight European countries gathered to get to know each other and discuss their work (Fig. 1). Moreover, several of the invited established scientists not only gave keynote lectures, but also actively discussed science with the PhD candidates. In this Meeting report we will highlight some of the exciting science that was presented and share our experience as the organizing committee.

> 'It was a pleasure to participate in the meeting. The investment made into a meeting run by and for PhD students is well worth while.'
>
> Julia Bailey-Serres, keynote speaker

Plant science is a diverse research field. Presentations during the EPSR varied from developmental biology, genetics & bioinformatics and plant physiology to biotic and abiotic stress (Fig. 2). Despite this diversity, there were some cases of overlapping interest between various presenters, as was true for the ubiquitous plant hormone auxin.

For example, Dr Lyuba Ryabova (IBMP, University of Strasbourg, France) presented her work on unravelling a new molecular mechanism behind auxin perception. She explained how auxin enhances translation of specific Auxin Response Factor mRNAs via features in their 5′ untranslated regions (Schepetilnikov & Ryabova, 2017).

Fig. 1 Group photograph of the European Plant Science Retreat (EPSR) 2018 participants.

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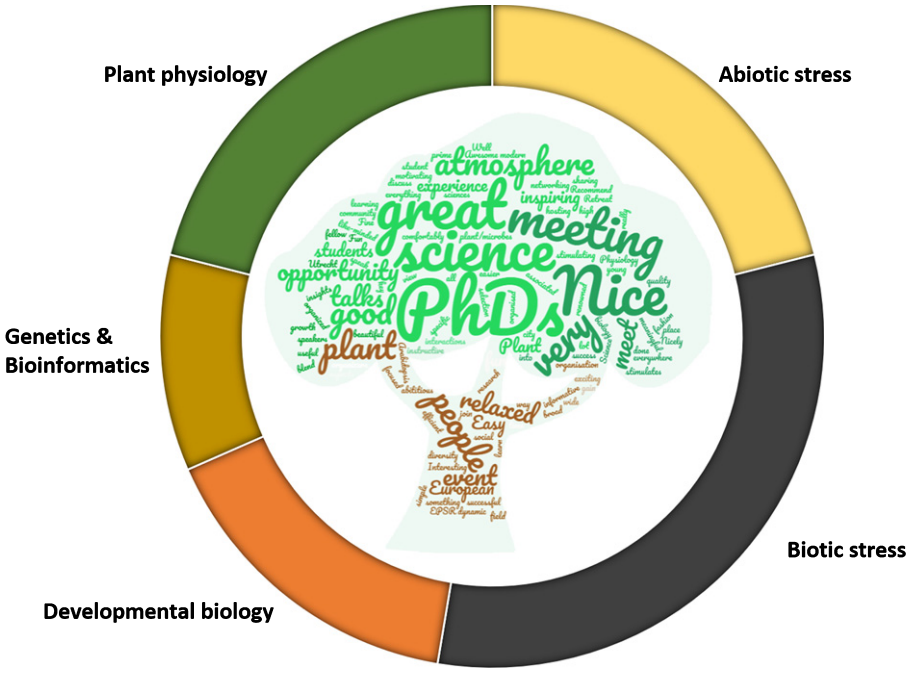

Fig. 2 Relative amounts of European Plant Science Retreat (EPSR) participants working in each of the five defined research fields (ring) and a word cloud based on questionnaire feedback by participants (tree, generated with https://wordclouds.com).

Another exciting study involving auxin came from Thea van den Berg (Utrecht University, the Netherlands), who presented her work on auxin transport during root development. Using a computational model, she demonstrated that root growth and auxin transport dynamics are likely key for lateral root priming (van den Berg & ten Tusscher, 2018). Such auxin signalling in roots plays an important role in abiotic stress responses. Jason Banda (University of Nottingham, UK) explained how asymmetric auxin signalling regulates water-directed hydropatterning of lateral root formation (Bao *et al.*, 2014), and Prof. Christa Testerink (Wageningen University, the Netherlands) discussed the involvement of auxin in salinity-induced root system architectural changes (Julkowska *et al.*, 2017).

Crop losses due to abiotic stresses, like salinity and drought, are threats to food production and new stress-resistant varieties are necessary. A form of abiotic stress that has increased in frequency and intensity over the past decades is flooding. Jana Müller (University of Bayreuth, Germany), Sjon Hartman (Utrecht University, the Netherlands) and Prof. Julia Bailey-Serres (University of California, Riverside, CA, USA) use a wide range of plant species and tools to investigate how plants deal with flooding-induced hypoxia. Specifically, Prof. Bailey-Serres presented an inspirational talk with the success stories of flooding tolerant SUB1A rice and the underwater germinating AG1 rice (Kretzschmar *et al.*, 2015).

In addition to abiotic stress, biotic stress is another major challenge for food security. This was reflected by the large number of participants at the EPSR that work on biotic stress (Fig. 2). For example, Prof. Paul Birch (John Innes Centre, Norwich, UK) and Manon Neilen (Utrecht University, the Netherlands) discussed molecular mechanisms behind effector protein delivery into host cells during *Phytophthora infestans* and downy mildew pathogenesis. Inside the plant cell, effector proteins aid the pathogenesis, often through suppression of the plant immune system. In particular, Prof. Birch showed experiments with transformed *P. infestans* in which fluorescently labelled effector proteins were translocated through nonconventional pathways (Wang *et al.*, 2017). On a related topic, Prof. Carlos Ballaré (IFEVA-IIB CONICET, University of Buenos Aires and National University of San Martín, Argentina) explained the balance between elongation growth and defence during light competition between plants. In ambient light conditions, *Passiflora edulis* (passionfruit) produces extrafloral nectar to attract carnivorous ants for indirect defence. Nectar production and indirect defence are reduced in simulated shade conditions, to which plants respond by rapid elongation growth (Izaguirre *et al.*, 2013).

The microbial communities that are associated with plants do not only cause stress, but can also aid plant defence and growth. Prof. Jos Raaijmakers and Adam Ossowicki (both from NIOO-KNAW, Wageningen, the Netherlands) and Gilles Vismans (Utrecht University, the Netherlands) shared new insights on how disease suppressive soils develop and help plants fend off pathogen infection (Ossowicki *et al.*, 2017; Berendsen *et al.*, 2018). In addition to the functioning of the natural microbiome, Prof. Raaijmakers talked about how synthetic communities, designed to have all the right properties, could be applied to improve plant health and productivity (Oyserman *et al.*, 2018).

The appreciation of applied research

The importance of applied and translational plant science was further highlighted by the talk of Prof. Guido van der Ackerveken (Utrecht University, the Netherlands), who was recently appointed as Professor of Translational Plant & Microbial Biology at Utrecht

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University. Prof. van der Ackerveken explained how basic research in *Arabidopsis thaliana* led to the identification of the *dmr6* mutant that is highly resistant to biotrophic pathogens (van Damme *et al.*, 2005). Through patenting his discovered gene, Prof. van der Ackerveken started collaborations with industry, where mutations in *DMR6* are used to gain qualitative resistance in different crop species.

The popularity of application-driven research was also noticeable amongst the EPSR participants. The presentation by Camille Chalvin (IPS2, Paris-Saclay, France) was voted second best by her fellow PhD candidates. She described how clary sage (*Salvia sclarea*) can be used to produce sclareol. Sclareol is a diterpene alcohol precursor for the production of ambroxide, a highly valued perfume component. Another inspirational study was presented by Matthijs Hoelscher (Max Planck Institute of Molecular Plant Physiology, Potsdam, Germany), who was awarded the best oral presentation prize by his peers. He discussed how the protein synthesis machinery of *Nicotiana tabacum* can be used to efficiently produce griffithsin in plasmids (Hoelscher *et al.*, 2018). Since griffithsin functions as an anti-HIV microbicide, his research helps develop cost-efficient and large-scale production of HIV medication.

Many research projects, both applied and fundamental, receive financial input from private partners. This interaction between the private and scientific sector was also visible during the EPSR. To begin with, the EPSR was free of charge for all participants partly due to financial contributions from the private sector. In addition, almost all presentations, both from senior scientists and PhD candidates, ended by acknowledging funding from private partners. Furthermore, at the end of the EPSR, Dr Raymond Hulzink from Keygene (Wageningen, the Netherlands) presented his career path from science to industry, and enthusiastically informed us on what working in a company can offer young scientists.

We, as the organizing committee, look back at the EPSR 2018 with pride and satisfaction. The science that was shared at the EPSR 2018 was of a high quality and the diversity in topics allowed for interaction between PhD candidates from diverse backgrounds. After receiving feedback from the participants, it became clear that the open, interactive and informal atmosphere in this meeting was much appreciated (Fig. 2). Moreover, *c.* 70% of the participants who filled out the questionnaire are convinced that the EPSR 2018 helped them develop their scientific network. Perhaps more importantly, more than half of the participants indicated that they want to attend the EPSR 2019. The host of the EPSR 2019 was discussed amongst the participants. We are happy to announce that the EPSR 2019 will be organized at the University of Nottingham in the UK.

Organizing the EPSR has been a valuable and rewarding experience for us. Not only did it put us at the heart of a young and vibrant community of plant scientists for a few days, we also gained experience in arranging funding, event planning and public speaking. These general skills are valuable for the professional development of any young scientist. We would therefore recommend organizing such a large event to any PhD candidate.

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Author contributions

All authors contributed to designing and writing the manuscript. The author order was randomized.

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