

MRS FREIA VAN HEE, DR ARNAUD GOOLAERTS, AND DR PAUL WILEY DISCUSS
HOW THE ERA-CAPS NETWORK IS PROMOTING SUSTAINABLE COLLABORATION
IN PLANT SCIENCES

Essential networks

Plants are essential to human life. Directly or indirectly, plants produce most of the world's food as well as renewable sources of energy and materials. Past improvements in our knowledge of plant biology and agronomy have underpinned large increases in crop yield and enhanced access to a far greater diversity of food on a global scale. With an exponentially growing population (projected to increase from six billion to nine billion by 2050), our planet is more than ever facing a unique challenge. For instance, global demand for food is expected to increase by 50% by 2030 and to double by 2050, due to population growth and urbanisation.¹ In the meantime, crops may play an increasing role in the so called 'green chemistry'. It therefore becomes essential to ensure the reliable production of safe food and renewable carbon supplies for green chemistry, without the use of excess land, energy, water, and chemicals.

The molecular level

In order to deepen and expand our knowledge of plants, accelerating research in plant sciences at the molecular level is crucial.² This is why a number of research funding agencies from Europe and beyond have joined forces to implement a joint research programme. This network of 26 agencies from 23 countries is supported by the European Commission's Seventh Framework Programme under the 'ERA-Net' scheme (European Research Area Network).



The flower of a potato plant

'ERA-CAPS', the name of the network, stands for co-ordinating action in molecular plant sciences, and was launched in December 2011. The ERA-CAPS members aim at developing and strengthening the co-ordination of their respective research programmes. Mechanisms for achieving this include joint funding a transnational research programme and networking with other European and international plant science initiatives. A privileged partner is the European Plant Science Organisation (EPSO), which represents plant scientists from 30 countries in Europe and beyond.³

ERA-CAPS was preceded by the successful ERA-Net in Plant Genomics (ERA-PG) that ran from 2004-2009 and administered several joint calls resulting in no less than €55m of funding for transnational plant genomics research as well as producing influential reports and position papers.⁴

'Omics' technologies

When plant science entered into the era of 'omics' technologies, it became obvious that it would help to answer fundamental questions regarding plant growth, flowering, resource consumption, stress resistance, etc. The scientific community soon realised that answering these questions could also help in addressing key challenges such as crop production with restricted access to water, tolerance to drought and salt, and higher carbon dioxide sequestration.

ERA-PG paved the way for ERA-CAPS in that it forged ties between the different participating organisations and fostered trust while also putting procedures and processes in place that could later be transposed to ERA-CAPS.

ERA-CAPS

ERA-CAPS has now reached the half-way mark, and the most significant result thus far has been the launching of a first joint call for transnational research projects, which occurred in November 2012 and closed on 15 February

2013. An overwhelming 110 proposals were submitted to this call.

The proposals involve 500 research teams from 21 European and non-European countries, including New Zealand and the USA. The call also attracted researchers from outside the call consortium while several companies have provided letters of support to applying consortia. This wide interest can potentially increase the impact of ERA-CAPS and the research that it fosters. The proposals are currently undergoing external peer review and the outcomes of the scientific evaluation are expected in September 2013.

Horizon 2020

The topics that are addressed by the proposals include: biotic and abiotic stress, adaptation to climate change, food security, and research on non-food crops. As such, the research supported by ERA-CAPS addresses several of the policy priorities and societal challenges identified in the Horizon 2020 strategy.

First and foremost, there is the challenge related to food security, sustainable agriculture and the bio-economy in which the importance of sustainable, safe and secure food supply as well as sufficient supplies of raw materials is underlined. Research areas related to food security in the ERA-CAPS call include yield optimisation, quality traits and nutrient use efficiency.

The bioeconomical theme is closely linked to the 'Secure, clean and efficient energy' challenge of Horizon 2020. Advances in molecular plant sciences will eventually contribute to making plant-based bioenergy more competitive and sustainable and some of these advances are included in a number of proposals on non-food crops where the end use includes bioenergy or industrial biotechnology.

Moreover, the climate challenge of Horizon 2020 is being addressed by research proposals in terms of the adaptability of plants to climate change as well as abiotic stress, which is often linked to climate change, and which is the most harmful factor concerning the growth and productivity of crops worldwide.⁵

In short, molecular plant sciences clearly have a role to play in this challenge-based approach and, as such, ERA-CAPS can bring together a critical mass of resources and knowledge in this field.

The ERA-CAPS members aim at developing and strengthening the co-ordination of their respective research programmes



The future

There is great enthusiasm among the members of the ERA-CAPS network to continue supporting transnational funding for molecular plant science through joint calls. The next call for transnational research projects is expected to be launched at the end of 2013 or early in 2014. Further activities of the network include continuing engagement with other initiatives be it at the level of the member states (for instance, the Joint Programming Initiative on Agriculture, Food Security and Climate Change) or at the EU level (for example, the European Innovation Partnership 'Agricultural productivity and Sustainability').

A future challenge for the network will be to continue these activities on a self-sustained basis once the funding from the European Commission has come to an end in December 2014. It seems that the scale up or integration of ERA-CAPS into a more ambitious structure is a must to achieve sustainability. Nevertheless, ERA-CAPS should maintain its uniqueness in that it provides support to basic plant sciences and, as demonstrated above, there is a strong societal, economical and environmental need for continuing to support transnational research in this field.

¹ www.fao.org/fileadmin/templates/wsfs/docs/expert_paper/How_to_Feed_the_World_in_2050.pdf

² The molecular aspect includes, but is not limited to, genetics, 'omics' technologies, molecular breeding, molecular evolution, developmental biology, molecular plant pathology etc.

³ www.epsoweb.org

⁴ ERA-PG was an ERA-NET focused on Plant Genomics supported by the European Commission's Sixth Framework Programme. It consisted of a collaborative network of ministries and agencies running programmes in plant genomics. ERA-PG started in 2004 with 12 member organisations from 11 countries. In 2009, at the end of its contracting period, the network was enlarged to 23 partners from 17 countries.

⁵ Qin, F, Shinozaki, K, Yamaguchi-Shinozaki, K: 'Achievements and challenges in understanding plant abiotic stress responses and tolerance.' *Plant and Cell Physiology*, Volume 52, Issue 9, 2011, 1569-1582



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