European Commission Programme Conference organised by EPSO

Crop genetic improvement technologies for a sustainable and productive agriculture addressing food and nutritional security, climate change and human health

14 July 2015 09:00 – 16:00
CNR lecture theatre, Milano

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EXPO MILANO 2015
FEEDING THE PLANET
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08:30 Coffee and Registration

09:00 S1 – Opening – Chaired by Joachim Schiemann, Julius Kuehn Institute, DE
09:05 Welcome: Karin Metzlaff, EPSO, BE & Francesco Loreto, CNR, Rome, IT
09:10 Which challenges can we help to address? Ulrich Schurr, Research Centre Julich, DE
09:35 Overview across the plant breeding technologies; Bernd Mueller-Roeber, Potsdam University, DE

10:00 S2 - How we can help to address the challenges with various Crop Genetic Improvement Technologies – Case studies – Chaired by Aldo Ceriotti, CNR, Milano, IT
10:00 Omega-3 long chain polyunsaturated fatty acids for sustainable fish farming and healthy human nutrition – produced in Camelina as a new crop; Johnathan Napier, Rothamsted Research, UK
10:20 Introduction of new crops for industrial non-food uses*:* Rubber-producing dandelion; Joachim Schiemann, Julius Kuehn Institute, DE
10:40 Comparing and combining various technologies towards Phytophthora-resistent potatoes; Richard Visser, Wageningen University and Research Centre, NL

11:00 Coffee

11:15 Switching annuals to perennials – the feasibility of perennial crops and their environmental advantages; George Coupland, MPI Cologne, DE
11:35 Accessing the vast biodiversity in tomato for health and environmental benefits with introgression lines; Dani Zamir, Weizmann Institute, IL
12:55 Enhancing classical breeding - molecular genetics to identify genes underlying QTL with high agronomic impact in wheat; Cristobal Uauy, JIC, UK
12:15 Translational research to bridge basic research and agricultural practice – plants resistant to viruses; Carole Caranta, INRA, FR
12:35 Breeding for disease resistance in grapevine: when innovation is needed to preserve tradition; Michele Morgante, Univ Udine, IT

12:55 Lunch

13:40 **S3 How to increase Europe's competitiveness and ability to address societal challenges** – Chaired by Elisabetta Lupotto, CRA, IT
13:40 What will farmers need to be globally competitive and address societal challenges? Thor Kofoed, CopaCogeca, DK
13:55 Conservation or innovation – can we match what society wants and breeders need? Garlich von Essen, ESA, BE
14:10 View from an NGO; Caroline Mahr, ELO, BE
14:25 t.b.a. (developing the policy and innovation framework), Dermot Ryan, CAB Commissioner Hogan, BE t.b.c.
14:40 The global dimension of food and nutritional security in the light of climate change; Wayne Powell, CSO CGIAR consortium, FR

Ruth Bastow, Global Plant Council, UK

15:15 Breeding research in Horizon 2020; Annette Schneegans, European Commission DG AGRI, Unit R&I, BE t.b.c.

15:30 S4 Discussion based on social media and audience with the speaker panel – Chaired by Chiara Tonelli, University of Milano, IT
Submission via twitter will be initiated and brought into the discussion by Calum MacKichan, EPSO, BE

15:50 S5 Conclusions
Joachim Schiemann, JKI, DE, Karin Metzlaff, EPSO, BE & Francesco Loreto, CNR, IT

16:00 Close of the conference

Background information

Crop genetic improvement technologies for a sustainable and productive agriculture addressing food and nutritional security, climate change and human health

Plant breeding for improvement of plant-derived products used for human nutrition, feeding of domesticated animals or fiber production has been performed for thousands of years. It is always composed of three steps: (i) Accessing the biodiversity via its genetic diversity, (ii) Selecting the desired trait(s), and (iii) Developing varieties through integration of the trait(s) into elite lines.

Starting with conventional breeding, crossing of superior plants obtained by selection breeding has been for a long time the only possible method to improve cultured plants. Such traditional breeding techniques have been complemented since the last century by conventional mutagenesis, translocation breeding and intergeneric crosses leading to a more sophisticated exploitation of the existing natural genetic variation by plant breeders.

With the upcoming of genetic engineering in the 1980s, plant breeding made a step from mostly cisgenic approaches towards transgenic plants in which genes from non-crossable organisms (e.g. bacterial Bt-toxin) are introduced by different transformation techniques. These transgenic plants are produced by undirected approaches delivering the transgene (or cisgene) in a not further specified location of the plant genome. From the beginning, the potential risks of transgenic techniques were analysed and a complex GMO regulatory system was put in place which is based on the technique rather than the product. In transgenic plants of the first generation input traits like herbicide tolerance and insect resistance have been modified. Currently these traits are present in over 180 mill hectares cultivated crop p.a. providing benefits mainly for seed companies and farmers. In second generation transgenic plants mainly output traits like starch composition or content of health-promoting substances have been introduced. Thus the second generation transgenic plants focus more on consumers' interests worldwide. Furthermore, transgenic plants are increasingly established as production platform for pharmaceuticals or other valuable substances.

Since then the development of breeding techniques progressed rapidly resulting in much more sophisticated methods to create plants containing new traits. These techniques are summarized as New Plant Breeding Techniques and especially the genome editing and modification techniques including oligo-directed mutagenesis (ODM) and site directed nucleases (SDN) are tools for sequence-specific changes in the plant genome. Thus precision-based mutation approaches can now be used which, unlike chemical or radiation mutagenesis, do not create hundreds of additional mutations throughout a genome.
These breeding techniques are complementary, not mutually exclusive and are essential tools to meet the challenges of agriculture.

The EU agriculture sector makes a vital contribution to building the Knowledge-Based Bio-Economy, to meeting the challenges of food security and safety, to mitigating the effects of climate change, to ensuring sustainable agriculture and to maintaining employment in Europe. The EU plant breeding sector is a strategic sector which has responded to several major global challenges

over the past 100 years. It has contributed, and continues to contribute, to the creation of benefits for the EU economy and society as a whole: these positive effects can only be achieved if plant breeders can deploy all appropriate tools which include conventional breeding, genetic engineering, the New Plant Breeding Techniques and other emerging technologies.

Presenting and discussing societal challenges and the various plant breeding technologies which can help to address them, the conference will bring together participants from Europe and beyond, including science, industry, farmers, policy and civil society.

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Useful links

Plant ETP Action Plans on Innovation, Research and Education, 24.3.2015
EPSO: Crop Genetic Improvement Technologies, Statement, 26.2.2015
EPSO: Plant breeders' rights and patent rights, Statement, 26.2.2015
EPSO: GMO cultivation – national opt-out, Statement, 26.2.2015
J-C Juncker to MEPs: 'A new start for Europe: My agenda for jobs, growth, fairness and democratic change', 15.7.2014
EPSO: Science Based Policy, 1.9.2013
EASAC: Report "Planting the Future", 2013
EC: New Techniques Working Group: Final Report of the European Commission, 2012
Plant ETP: Statement on New Breeding Technologies, September 2012
EPSO Working Group on Agricultural Technologies: www.epsoweb.org/agricultural-technologies-wogr
EPSO communications: www.epsoweb.org/epso-communications
EPSO member institutes and universities: www.epsoweb.org/membership/members
EPSO representatives: www.epsoweb.org/membership/representatives

About EPSO

EPSO, the European Plant Science Organisation, is an independent academic organisation that represents more than 220 research institutes, departments and universities from 28 European countries, Australia, Japan and New Zealand, and 3.100 individuals Personal Members, representing over 28 000 people working in plant science. EPSO's mission is to improve the impact and visibility of plant science in Europe, to provide authoritative source of independent information on plant science, and to promote training of plant scientists to meet the 21st century challenges in breeding, agriculture, horticulture, forestry, plant ecology and sectors related to plant science. www.epsoweb.org