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

Handout for participants

EXPO MILANO 2015
FEEDING THE PLANET
ENERGY FOR LIFE

European Union
Official Participant

epso
European Plant Science Organisation
www.epsoweb.org

Dear participant,

Thank you for joining this conference to have an informed debate on the future crop improvement technologies.

This conference aims to present and discuss societal challenges and the various plant breeding technologies which can help to address them, including conventional breeding, new breeding technologies and GM. The conference will bring together participants from across Europe, including science, industry, farmers, policy and civil society.

Challenges include for instance food and nutritional security, climate change, human health and sustainable agriculture. In addition we want to show that the EU plant sector is a major contributor to building the Knowledge-Based Bio-Economy and ensuring employment in Europe.

Speakers please provide your presentation to the helping colleague at the lecture theatre podium from 8:20 – 8:50 (speakers until lunch break) and from 13:00-13:30 (speakers afternoon sessions).

Discussion: You will have time for 1-2 questions after each presentation (session 2: always 15 min presentation + 4 min discussion; session 3: 12 min presentation + 3 min discussion) AND we have a dedicated discussion session towards the end for questions from you as well as from people who can't participate in the conference: In addition, people who can't participate can submit their questions to the speakers through email or Twitter via the hashtag #expocrops**.**

Catering: As this is an official EC EXPO conference, lunch and coffee break for the first 70 participants (invited speakers, organisers and first 50 registrations) is provided by the EC budget. For additional participants (late registrations) EPSO provides a sandwich lunch and coffee break – you were informed upon registration to which group you belong.

With many thanks in advance and we very much look forward to an interesting discussion
The Organising Committee

Karin Metzlaff, EPSO, BE
Joachim Schiemann, Julius Kühn-Institut, DE
Aldo Ceriotti & Francesco Loreto, CNR, Milano & Rome, IT
Chiara Tonelli, University of Milano, IT
Elisabetta Lupotto, CRA, Bergamo, IT

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Programme by 9.7.2015

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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
10:05 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
10:25 Introduction of new crops for industrial non-food uses*:* Rubber-producing dandelion; Joachim Schiemann, Julius Kuehn Institute, DE
10:45 Comparing and combining various technologies towards Phytophthora-resistent potatoes; Richard Visser, Wageningen University and Research Centre, NL

11:05 Coffee

11:20 Switching annuals to perennials – the feasibility of perennial crops and their environmental advantages; George Coupland, MPI Cologne, DE
11:40 Accessing the vast biodiversity in tomato for health and environmental benefits with introgression lines; Dani Zamir, Weizmann Institute, IL
12:00 Enhancing classical breeding - molecular genetics to identify genes underlying QTL with high agronomic impact in wheat; Cristobal Uauy, JIC, UK
12:20 Translational research to bridge basic research and agricultural practice – plants resistant to viruses; Carole Caranta, INRA, FR
12:40 Breeding for disease resistance in grapevine: when innovation is needed to preserve tradition; Michele Morgante, Univ Udine, IT

13:00 Lunch

13:45 **S3 How to increase Europe's competitiveness and ability to address societal challenges** – Chaired by Elisabetta Lupotto, CRA, IT

13:50 What will farmers need to be globally competitive and address societal challenges? Thor Kofoed, CopaCogeca, DK

14:05 Conservation or innovation – can we match what society wants and breeders need? Garlich von Essen, ESA, BE

14:20 View from an NGO; Caroline Mahr, ELO, BE

14:35 Breeding research in Horizon 2020; Annette Schneegans, European Commission DG AGRI, Unit R&I, BE t.b.c.

14:50 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

15:20 S4 Discussion based on social media and audience with the speaker panel – Chaired by Chiara Tonelli, University of Milano, IT
Submissions via email and 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

Your notes:

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.

EPSO statement on Crop Genetic Improvement Technologies

Brussels, 26.2.2015

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

EPSOs request to the European Commission

The European Plant Science Organisation welcomes the outcome of the majority opinion of the Member States expert working group (the "New Techniques Working Group") report (1) and asks the European Commission as a matter of urgency to provide a guideline document that follows these recommendations to provide legal certainty for science and industry concerning the application and exploration of New Plant Breeding Techniques (NPBTs).

Since an increasingly number of new breeding techniques will be developed, a more detailed and comprehensive discussion on a new approach for the regulation of new plants is required. This new approach might be based on the new characteristics of a product/trait and should take the following into account:

a. A clear and reliable definition, based on scientific evidence, of what constitutes a novel plant trait, and thus needs to be assessed by an appropriate body (legal certainty);

b. The need to avoid overregulation whereby an unwarranted number of processes and products will have to undergo expensive and lengthy authorization procedures (disadvantage for SMEs and scientists);

c. The need to uncouple the question of environmental risk and safety assessment from the question of labeling (consumer acceptance).

Contribution of the EU agriculture sector

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. Additionally, the plant breeding sector should be supported by continuous funding opportunities for fundamental research as well as a clear, workable legislative framework.

Crop genetic improvement technologies are progressing rapidly

Crossing of superior plants followed by selection of improved progeny has, for a long time, been the basis for crop improvement. Such traditional breeding techniques have been complemented since the last century by chemical or radiation mutagenesis, translocation breeding and intergeneric crosses leading to a more sophisticated exploitation of natural genetic variation by plant breeders. The emergence of genetic engineering in the 1980s allowed the development of transgenic plants as an additional approach to complement plant breeding techniques. These breeding techniques are complementary, not mutually exclusive and are essential tools to meet the challenges of agriculture. From the beginning, the potential risks of transgenic techniques were analysed and a complex GMO regulatory system was put in place. Since then, the development of breeding techniques has continued to progress rapidly resulting in even more sophisticated methods to create plants with new traits. Collectively, these techniques are summarized as New Plant Breeding Techniques (NPBTs). Among them, site directed nucleases (SDN) and other genome editing and modification techniques such as oligo-directed mutagenesis (ODM), allow the introduction of 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.

Current European legislation neither reflects the progress made in new crop genetic improvement approaches nor the positive economic, social or environmental impact of the resulting biological outcomes

The current EU GMO-legislative framework is focused on the technique used to produce a new plant, and not on the final trait/product. As some of the NPBTs require an intermediate transgenesis step, the plants obtained by these techniques may be considered as GMOs. This legislation is not reflecting the progress made in the development of new techniques. It also does not reflect the evidence accumulated by thousands of GMO biosafety studies clearly demonstrating that GM technology *per se* does not carry any greater risk of a negative impact on health and the environment than any other technology used in plant breeding**. Therefore, it would be more evidence- and science-based to evaluate the crop genetic improvement technologies including genetic engineering and the NPBTs and other future ones according to the potential impact of the resulting end product/trait rather than the technique used. (2)

The European Commission should create favourable regulatory conditions for the European plant breeding sector

The European Commission's delays in clarifying the legal status of the NPBTs weaken the competitiveness of the EU plant breeding sector. It is clear that for the plant breeding sector and the farming community at large, the status quo on this dossier is not an option and would have a significant negative impact on the current situation for EU farmers. EU farmers already suffer unfair competition from primary producers in other regions of the world regarding access to all appropriate tools including genetic engineering and NPBTs. It is important that the European Commission creates favourable regulatory conditions for the European plant breeding sector to maintain its position of worldwide leadership in the area of research and innovation.

The European plant science community calls upon policy makers to implement a science-based policy as a priority

The European plant science community is following the current debate on the legislative classification of NPBTs along the lines of European GMO legislation with great interest and concern. We are concerned that more and more processes and products will have to undergo expensive and lengthy authorization procedures, even in cases where no foreign DNA is contained in the resulting end product or where these products are completely indistinguishable from traditionally bred crops. We support the conclusions of the New Techniques Working Group (1) that the legal definition of a GMO does not apply to most of the NPBTs and that these techniques either fall under the exemptions already established by the legislation*** or should be exempted as they do not differ from plants obtained by traditional breeding. We support the requests of the Plant ETP (3) based on the reports of several scientific bodies that have assessed and evaluated NPBTs. The European plant science community calls upon policy makers to implement a science-based policy as a priority. For a new start in Europe, the plant science community encourages the new Commission President and his team of Commissioners and policy makers in the Member States to work towards balanced support for all crop genetic improvement technologies that allow the plant science sector to address the Grand Challenges facing our planet.

** to avoid misinterpretation: this does not imply that conventional breeding should be restricted by similar regulations

*** techniques that are not considered to result in genetic modification (Annex I, Part B of Directive 2009/41/EC and Annex IA Part 2 of Directive 2001/18/EC) or yield organisms that are excluded from the Directive (Annex II Part A of Directive 2009/41/EC and Annex IB of Directive 2001/18/EC)

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