NEW PLANT BREEDING TECHNIQUES (NPBT)

REPORT OF THE WORKSHOP 2015
New Plant Breeding Techniques

- **Working Group on Harmonisation of Regulatory Oversight in Biotechnology**
- Emerging issues in harmonization
- Discussion of new products and techniques used to produce them
  - New traits – abiotic stress tolerance and industrial
  - New breeding techniques
  - Transportability of data
  - Consensus documents might result
NPB Ts

- No definition, no definitive list
- Used to describe a diverse range of techniques
- Different from “classical” modern biotechnology

NPBT after Lusser et al. (2011)

<table>
<thead>
<tr>
<th>Technique</th>
<th>Description</th>
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<tr>
<td>Agro-infiltration</td>
<td>Genetic material, so-called T-DNA, is inserted in a plant to express transiently by vector such as A. tumefaciens.</td>
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<td>Cisgenesis/Intragenesis</td>
<td>Genes derived from cross-compatible species are inserted into a plant genome.</td>
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<td>Grafting on GM rootstock on wild-type Scion</td>
<td>GM rootstock is grafted to non-GM scion without possessing transgenic elements in the leaves or fruits.</td>
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<td>Oligonucleotide Mutagenesis (ODM) Directed</td>
<td>Specific mutation is introduced in a defined place in a plant genome by introducing synthetic oligonucleotides as a target to homologous genes.</td>
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<td>Reverse Breeding</td>
<td>Homozygous parental plant is generated from selected heterozygous plant by the suppression of meiotic recombination by RNA interference.</td>
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<td>RNA-directed DNA methylation (RdDM)</td>
<td>Methylation of promoter region is induced by the introduction of RNA fragments, which results in silencing of the downstream gene.</td>
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<td>Site Directed Nucleases (SDN)</td>
<td>Targeted mutagenesis of genes or targeted insertions/deletions of genetic material are achieved by some protein complexes.</td>
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Workshop

• To gathering information on NPBT and country experience
• Planning Group established for workshop
• Questionnaire circulated to gather country information
  – Six questions
  – 21 responses
Responses

- Argentina
- Austria
- Australia
- Bangladesh
- Belgium
- Canada
- Czech Republic
- Finland
- Germany
- Ireland
- Japan
- Mexico
- Netherlands
- Norway
- South Africa
- Switzerland
- Turkey
- United Kingdom
- United States
- European Commission
- Business Industry Advisory Committee
Is your country seeing any plants developed by NPBT in the private or public sector?

- **Most mentioned techniques:**
  - Cisgenesis/Intragenesis
  - ODM
  - SDN applications

- **Most mentioned crops:**
  - Apple
  - Potato
  - Maize

- **Most mentioned traits:**
  - Fungal resistance
  - Herbicide tolerance

- Most developments are still in research phase.
Experiences with ERA

Does your country have any practical experience in performing an ER/SA on plants developed from NPBT?

- **Most countries do not have practical experience**
  - Scientific committees investigate potential new issues and formulate recommendations.
  - **Examples: Switzerland, Germany, Austria**

- **A few countries indicated to have practical experience**
  - They indicate that no new issues are identified
  - **Examples: the Netherlands, Ireland, Belgium, Australia**

- **Many countries refer to EFSA opinions**
  - EFSA opinion on Zinc Finger Nuclease-3/ SDN-3 applications
  - EFSA opinion on Cisgenesis/Intragenesis
Key Message

Experience to date indicates that current guidance and tools for ER/SA of transgenic plants are applicable to plants developed using NPBT, where ER/SA of such plants is required.