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EUROPEAN COEXISTENCE BUREAU

Summary of conclusions of the 1st meeting of the Technical Working Group for Potato

5 - 6 November 2015,
Seville, Spain

The 1st Meeting of the Technical Working Group for Potato (TWG Potato) of the European Coexistence Bureau (ECoB) took place in Seville, Spain, from 5th to 6th of November 2015. Experts from the following Member States (MS) and the European Commission (EC) services were present:

- Austria (AT), Belgium (BE), Bulgaria (BG), Croatia (HR), Czech Republic (CZ), Germany (DE), Denmark (DE), Estonia (EE), Finland (FI), France (FR), Greece (GR), Hungary (HU), Ireland (IE), Lithuania (LT), Netherlands (NL), Spain (ES), Sweden (SE) and United Kingdom (UK);
- Directorate General for Health and Consumers (DG SANTE);
- Joint Research Centre (JRC), Institute for Prospective Technological Studies (IPTS);
- Joint Research Centre, Institute for Health and Consumer Protection (IHCP).

The main topics for discussion were:

1. Review of the European legislative framework for coexistence.

2. Introduction of the European Coexistence Bureau (ECoB):
   - Scope of ECoB;
   - Blueprint – working together;
   - Internet data exchange tools – ECoB web page and others.

3. Overview of:
   3.1 Potato production in EU, state of art and future trends;
   3.2 Biological, agricultural and technological factors influencing the coexistence in potato production;

3.3 Amflora cultivar, development and production in EU;
3.4 The recent research on coexistence in potato production.

4. Existing national schemes and recommendations for coexistence between genetically modified (GM) and non-GM potato cultivation in EU Member States (MS).

5. Review of methods for detection and quantification of GM potato presence.

6. Proposal for structure of Best Practice Document for potato.

7. Work program of TWG Potato of ECoB.

The welcoming presentation briefly introduced the structure and mission of the JRC, with emphasis on the activities of the IPTS, which hosts the ECoB.

1. Review of the European legislative framework for coexistence.

DG SANTE reviewed: the European regulatory framework for genetically modified organisms (GMOs) and for coexistence; Commission activities in the field; the Commission Recommendation on coexistence and the ECoB mandate.

Brief information about the labelling requirements, thresholds and the exemptions for adventitious technically unavoidable GMO presence in food, feed and seeds were presented.

The changes in EU legislation that occurred in 2015 were reviewed. In particular new provisions on cross border coexistence that stipulate that from 3rd of April 2017 MS in which GMOs are cultivated shall take appropriate measures in border areas of their territory with the aim of avoiding possible cross-border contamination into neighbouring MS in which the cultivation of those GMOs is prohibited, unless such measures are unnecessary in the light of particular geographical conditions. [1]

2. Introduction to the European Coexistence Bureau

The ECoB was introduced by the secretariat.

[1] Paragraph 1a of article 26a, inserted by Directive (EU) 2015/412 (in force form 11th of March 2015), which amends Directive 2001/18/EC as regards the possibility for the MS to restrict or prohibit the cultivation of GMOs in their territory

The main tasks of the ECoB are: organisation of the exchange of technical-scientific information on the best agricultural management practices for coexistence; development of crop-specific guidelines for coexistence measures based on the consensus of the group; and support for the MS in the development or refinement of national or regional approaches for coexistence.

The scope of the ECoB's work is on: technical agricultural management practices for coexistence; crop production - from sowing, harvesting, and transport, storage, up to the first point of processing /sale; and measures to ensure the compliance with the coexistence threshold.

The work of the ECoB is organized on the basis of crop-specific technical working groups. Four groups are established: the TWG Maize (with experts from 20 MS), the TWG Soybean (with experts from 14 MS), the TWG Cotton (with experts from 11 MS and Liechtenstein) and TWG Potato (with experts from 22 MS and Liechtenstein).

The TWG Maize developed three best practice documents (BPDs) for: coexistence of GM crops with conventional and organic farming; monitoring efficiency of coexistence measures in maize crop production; and coexistence of GM maize and honey production.

The TWG Soybean developed BPD for coexistence of GM soybean crops with conventional and organic farming.

The TWG Cotton developed BPD for coexistence of GM cotton with conventional and organic farming, which presently is in consultation process with EU MS and stakeholders, managed by DG SANTE via the Standing Committee on Plants, Animals, Food and Feed, section GM Food and Feed Advisory Group on the Food Chain and Animal and Plant Health.

The BPD for Potato will cover commonly agreed, scientifically and technically justified measures to ensure coexistence between GM, conventional and organic potato production in the EU.

The interplay of the TWG Potato will take place via meetings and inter-sessional periods.

The BPD will be drafted by the ECoB Secretariat on the basis of information and contributions provided by the TWG Potato members. The members of the TWG Potato will submit information using templates provided by the ECoB.

The members of the TWG Potato reached a consensus, based on the previous

experience of the TWG Maize, TWG Soybean and TWG Cotton that the information exchange will be done mainly via the functional e-mail of the ECoB: JRC-IPTS-ECoB@ec.europa.eu

3.1. Overview of potato production in EU, state of art and future trends.

Ir Michel Martin, president of the European Association for Potato Research was invited to present an overview of main challenges for potato research and production.
The main topics covered were:
1. Potato production: global and EU trend.
2. Issues and challenges for potato future – sustainability:
   - Breeding: knowledge of potato genome allows large improvement of the comportment of the plant for numerous purposes, whilst a lot of questions asked by public about non - traditional breeding must be properly addressed;
   - Pests control: a more and more critical problem in relation with the reduction of insecticide and nematicide registered solutions and in the same time evolution of pest population as a response to climate change and international trade;
   - Diseases control: bad image of potato - necessity to reduce number and quantity of pesticide applied for crop protection. First promising achievement is with the control of late blight (resistance; DSS …), but it should continue with improved control of other diseases (fungi, bacteria, virus);
   - Agronomy and Physiology: more sustainable production linked to reduced water and fertilizers use, preservation of soil fertility, organic and/or biotechnological farming;
   - Post-Harvest; adapted storage techniques for the different markets at low cost and carbon footprint, providing the market with tubers containing low/no residues from products used to control sprouting without deterioration of technological quality;

3.2. Overview of biological, agricultural and technological factors influencing the coexistence in potato production.

Dr Jeremy Sweet, member of the European Food Safety Authority (EFSA) GMO Panel was invited to overview the impact of potatoes biology, production and processing on possibility for coexistence among different production systems. The main issues highlighted are:

1. Potato biology:
   - The autogamy is very high 80-100 %, depending on variety;
   - Cross pollination occurs in very low level and doesn't affect tubers, because potato is clonal. True seed could be affected by crosspollination with GM pollen, but they are not consumed, and not commonly used for crop production, because of the hybridity;
   - However true seed/tubers/tuberparts left in ground after harvest can grow in subsequent years and contaminate subsequent crops. They can survive/grow in some broadleaved crops (peas, beans, sugar beet etc.) as tolerant to some herbicides'. Therefore should avoid

following GM potatoes with non-GM within short rotations. Growing cereals (wheat, barley, maize) in rotation after potatoes and utilization of broadleaved weed herbicides is recommended.

2. Production and supply chain:

- Seed potatoes (clonal) have high levels of varietal purity and health so that there is low frequency of mixing with other varieties;
- Potato varieties are specific for: industrial applications (e.g. high starch); food processing (chips, crisps, edible starch, powder, etc…) and fresh consumption. Therefore most production is of single variety crops so there is limited blending/mixing of varieties;
- Because of market demand harvesting, transportation and storage of different varieties is preferably done separately for identity preservation. Admixture occurs only at low levels;
- Secondary storage, processing and marketing were also reviewed but they are beyond scope of the TWG Potato;
- The use of waste potatoes after harvesting as livestock feed needs to be considered as a stage with high potential for admixture. Particular attention should be taken to avoid putting of waste potatoes onto fields for potato cultivation unless potatoes completely composted and non-viable.

3. The general recommendations in respect to achieve coexistence are:

- Good identity preservation practices at all stages of production, post-harvest and processing;
- Good segregation of varieties at all stages of production, post-harvest storage, transport and processing;
- Seed production in separate fields or 12-24m isolation;
- Crop production: 6m or more separation to prevent admixture at planting, harvesting etc.;

Rotation schemes of 3–4 or more years crop interval with good cleaning crops (e.g. cereals) between potato crops.

3.3. Overview of Amflora cultivar, development and production in EU

Dr Kristofer Vamling from the Swedish board of agriculture was invited to present practical coexistence experiences derived from the process of developing the cv. Amflora GM potato. The main topics covered were:

1. Background information about the Amflora project for development of an altered potato starch quality as an optimized additive in the paper industry;
2. The stages of the GM trait development process;
3. Dynamics of the cultivated area of Amflora;
4. Potato certified seeds: production, multiplication rates and the legislative provisions for varietal purity;
5. Critical steps to minimize presence of off-types in the seed potato process:

- propagation of *in vitro* material;

- greenhouse multiplication;
- planting in field;
- cultivation;
- harvest;
- storage;
- sorting;
- presence of volunteer plants;
- handling of waste;

6. Sweden experience of coexistence on farm level:
   - workable to follow Swedish regulations, however bound with high load of administrative work;
   - differences in interpretation of the legislative definitions at farm and control authority level;
   - local farming community quickly got relaxed about cultivation of varieties carrying GM-traits – how to motivate the differences in handling.

3.4 Overview of recent research for coexistence in potato production

Dr Ewen Mullins from the Irish agriculture and food development authority was invited to present a perspective for establishment of coexistence measures for GM and non-GM potato, based on the achievements of Irish funded research project (DAFM RSF 07 532) about the identification of challenges to the coexistence of GM and non-GM potatoes (conducted from December 2007 to April 2012). The main topics covered are:

1. Background information about the agronomic and economic potential of disease resistance GM potatoes and field evaluation of 'DuRPh' potatoes from Wageningen University with durable resistance to late blight disease.
2. Pollen and seed-mediated gene flow in potatoes:

   2.1. The tracing of gene dispersal by microsatellite profiling (i.e. DNA fingerprinting): pollen mediated gene flow is maintained effectively, in accordance with required labelling thresholds by 21m isolation distance[2];

   2.2. Potato seed-mediated gene flow more significant challenge[3]:

   2.2.1. Average recorded tuber loss of ~141,000±911 tubers/hectare (in 17 of 51 surveyed fields). Primary factors affecting tuber loss are: on field sorting and mesh size for harvester (typically set at 45mm);

   2.2.2. Subsequent volunteer emergence:
   - Average volunteer emergence of 30 789 ± 2 658 / ha (1st post-harvest year of potato);
   - Average volunteer emergence of 3 727 ± 877 / ha (2nd post-harvest year of potato).

[2] Petti C., ·Meade C., Downes M. and Mullins E.· (2007) Facilitating co-existence by tracking gene dispersal in conventional potato systems with microsatellite markers, Environmental Biosafety Research, 6(4):223-35

[3] Phelan S.,· Fitzgerald T., Grant J., Byrne S., Meade C and Mullins E. (2015) Propensity for seed-mediated gene flow from potato crops and potential consequences for the coexistence of GM and non-GM potato systems, European Journal of Agronomy , 67, 52–60.

2.2.3. Factors affecting temporal occurrence of volunteers are: year, location, potato variety, presence/absence of harvesting; presence/absence of ploughing; winter/spring follow on cereals; herbecides;
2.2.4. Factors affecting volunteer fecundity (tuber no./vol) are: year and year/herbicide.

3. Management measures to achieve coexistence between GM and non-GM potato:
   3.1. Short rotation before next potato crop (<4 years):
      - application of sprout inhibitor;
      - grade off field;
      - inspect field summer before next potato crop;
   3.2. Medium rotation before next potato crop (>4 years):
      - grade off field;
      - inspect field summer before next potato crop.

4. Existing national schemes and recommendations for coexistence between GM and non-GM potato cultivation in EU Member States.

The TWG members from: Czech Republic, Germany, France, Finland, Netherlands and UK presented their national recommendations for coexistence between GM and non-GM potato cultivation. All the discussed coexistence approaches are well comparable in respect of identification and estimation of the impact of the different factors affecting possibility for coexistence as:

- potato specific traits;
- possible causes for GM portion in non-GM harvest;
- pollen-mediated gene flow and isolation distance for GM potato;
- tubers/seed dispersal;
- volunteers;
- cultivation break - crop rotation.

An application of GIS metering approach for reducing the costs caused by isolation requirements between GM and non-GM potato fields was presented by Finland

5. Review of methods for detection and quantification of genetically modified potato presence.

The JRC-IHCP presentation for detection and quantification methods for GM potato presence reviewed:

1. The relevant EU legislation for:
   - development of reliable and validated detection and quantification methods for GMO;
   - establishment and function of the EU Reference Laboratory for GM Food and Feed (EU-RL GMFF) in the JRC and European Network of GMO Laboratories (ENGL).

2. EU Reference Laboratory for GM Food and Feed:
   - validation of methods for GMOs in food & feed; - support for official control labs;
   - science based policy advice;
   - networking and capacity building.

3. GMO methods: EU database of Reference Methods for GMO analysis[4].

4. Availability of PCR event-specific methods for GM potato analysis:
   - EH92-527-1 (starch potato Amflora) – validated;
   - AM04-1020 (starch potato Amadea) – method validated but not published due to withdrawal of application;
   - PH048 and AV 43-6-G7- submitted but not validated due to withdrawal of applications.

5. Comingling case of starch potato in 2010.
6. Reference gene UGPase (UDP-glucose pyrophosphorylase).
7. DNA extraction[5].
8. Certified Reference Materials (CRM)[6].
9. Use of QT EVE and QT TAX Potato Methods.

6. Proposal for structure of Best Practice Document for potato.

The ECoB secretariat proposed the following structure of the BPD for potato:

- Legislative framework for coexistence, mandate of ECoB and Scope of the BPD;
- Potato biology and conditions for potato cultivation in the EU: demand and crop production;
- Existing segregation systems in potato production;
- Review of the available information on adventitious GM potato presence in potato harvests and honey;
- Possibilities for detection of GM events in potato crop and in honey;
- Best practice for coexistence measures in potato production;
- Cost analysis of management practices.

The mandate of the TWG Potato of ECoB is the development of consensually agreed best practices for coexistence in potato production (GM, conventional and organic), including honey production, which are intended to assist MS in the development or refinement of their coexistence legislation or voluntary standards for good agricultural practice.

[4] http://gmo-crl.jrc.ec.europa.eu/gmomethods/
[5] http://gmo-crl.jrc.ec.europa.eu/summaries/EH92-527-1_DNAExtr_sampl.pdf
[6] https://ec.europa.eu/jrc/en/reference-materials/catalogue/order

The scope of the BPD was proposed to cover:

- the cultivation of GM potato up to the first in-farm storage or sale point as well as coexistence of GM potato and honey production;
- the BPD does not cover potato seed production by itself;
- the thresholds for coexistence to be analysed are the legal labelling threshold (of 0.9%) and the practical limit of quantification (of about 0.1%), which is required by operators in some markets;
- the BPD refers to the methods for quantification of GM potato presence in crop harvest and honey;
- the BPD covers only GM potato containing a single transformation event.

The subsequent discussion pursues the proposed structure of BPD and covered the topics of:

- potato biology[7];
- EU potato production;
- the existing segregation systems in potato production;
- impact of insect pollinators on potato pollen dispersal;
- the potato volunteers (from seeds and tubers) and frequency of their presence;
- the machine management practices during sowing, harvesting, transportation and in-farm storage;
- the potential transfer of potato pollen in honey;
- the cost analysis of the management practices.

It was admitted the sufficient experience in potato production for EU conditions, with limited practice of GM potato cultivation. All these information need be further elaborated for the task of TWG for potato and complemented by knowledge available world widely.

7. Discussion on work programme of TWG Potato

After extensive discussion about the availability of data sources concerning coexistence in potato production, it was decided that the ECoB secretariat will circulate by middle of November a detailed template (following the agreed structure of the BPD) among the members of the TWG Potato requesting a contribution of background information. The deadline of one month for background information submission was agreed.

Once contributions are received the ECoB secretariat will prepare the first draft of the background document for consultation in the TWG Potato by the middle of February 2016.

After the finalization of the consultation process, the second plenary meeting of the TWG Potato is foreseen for the first half of April 2016.

[7] http://www.oecd.org/science/biotrack/46815598.pdf