

European Coexistence Bureau (ECoB)

Best Practice Document "Coexistence of genetically modified soybean crops with conventional and organic farming"

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Joint Research Centre

Plenary Meeting of the Advisory
Group on the Food Chain,
Animal and Plant Health
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Coexistence concepts

Different agricultural systems coexist side by side in a sustainable manner

Agriculture is an open space activity

Coexistence measures include technical segregation measures to avoid the possible economic consequences of admixture of GM and non-GM crops.

Complemented by administrative and liability rules that are set out to resolve also potential economic consequences of admixture.

Coexistence concepts

EU Coexistence strategies are developed at national level

following general guidelines from the EC.

EC  development of technical advice through the ECoB

The mission of the ECoB (2008) is:

- to organise the exchange of technical and scientific information on the best agricultural management practices for coexistence; and
- to develop consensually agreed crop-specific guidelines for technical coexistence measures.

European Coexistence Bureau

TWG Maize, TWG Soybean and TWG Cotton.

The TWG Maize → three Best Practice Documents (BPD):



European Coexistence Bureau

Technical Working Group on Soybean : 14 Member States
began work on May 2013



Scope of the work TWG Soybean

- Coexistence of cultivation of GM soybeans in the EU with non-GM soybeans and honey production
- Crop production up to the first point of sale, including on farm storage
- Thresholds for coexistence to be analysed: legal labelling threshold and private market thresholds
- Review the methods for quantification of GM soybean presence in other crops and honey
- GM soybeans that contain a single transformation event.



Work of the ECoB TWG soybean

Two meetings : May 2013 and February 2014 in JRC premises

Review of literature (in total 123 references) for:

- adventitious GM presence in soybean crop production
- existing segregation systems in soybean production
- management farm practices
- the presence of soybean pollen in honey;
- detection and identification of GM soybean material in non-GM soybean harvests and honey


Structure of the report

- 1. Introduction**
- 2. Soybean biology**
- 3. Soybean Cultivation in the EU: demand and crop production**
- 4. Existing segregation systems in soybean production**
- 5. Review of the available information on adventitious GM presence in soybean crop production**
- 6. Occurrence of soybean material in honey**
- 7. Detection of GM events in soybean crops and honey**
- 8. Best practices for coexistence of GM maize and honey production**
- 9. Economic analyses of best practice**
- 10. References**

2. Soybean biology

- Self-pollinating plant with autogamy higher than 99%
- Cross-pollination rates decrease to less than 1.5% beyond one meter from the pollen source and rapidly decrease with greater distances from the source
- Wind-mediated pollination appears to be negligible
- Insect pollination occurs, observed increases in yield for honey-bee-pollinated in comparison to self-pollinated soybean

3. Soybean Cultivation in the EU

- Only 2% of the EU consumption of soybean meal (about 31 million tonnes per year) is produced domestically
- The largest soybean producers in the EU are Italy, Romania, Croatia, France, Austria and Hungary accounting for more than 80% of the EU soybean cultivation area
- 367 soybean varieties in the EU Common Catalogue
- Danube Soya Declaration  cultivation of GM-free soybean in Danube region as a protein supply core of Europe.

4. Existing segregation systems in soybean production

1. Soybean seed production.
2. Case study of Coexistence of GMO and non-GMO soybean in France.
3. Canadian Identity Preserved Recognition System.

Case study of Coexistence of GMO and non-GMO soybean in France

- The present practices of soybean seed and crop production maintain the GMO adventitious admixture below 0.9%; but
- The 0.1% threshold requires implementation of a set of coexistence measures:
 - 10 meters from any GM field for seed productions;
 - thorough cleaning of all on-farm machinery and installations;
 - proper processing and verifications of seed use;
 - molecular analyses (PCR) throughout the whole production chain.



Canadian Identity Preserved Recognition System (CIPRS)

In CIPRS the maintaining of IP requirements established by soybean industry on farm level is achieved by utilization of:

- Certified Seed;
- Approved isolation distances (3m, enough for market requirements of 0.5 - 1.0%);
- Field history;
- Cleaned planting & harvesting equipment;
- Cleaned & labelled storage bins;
- Cleaned trucks/trailers.

5. Review of the available information on adventitious GM presence in soybean crop production.

- Outcrossing to wild relatives: wild soybean species do not exist in Europe
- Outcrossing between GM and non-GM soybeans
Studies in cultivated soybean from USA, Japan, and Brazil agree on the absence of any detectable outcrossing at a distance of 10 meters.
- Volunteers: survival almost impossible
- Leftover grain appears in the on-farm machinery
- Seed dispersal may also occur during: seeding, harvesting, handling, storage and transport.

6. Occurrence of soybean material in honey

- Presence of soybean pollen in Soybean **unifloral** honey (studies from USA, Argentina, and Mexico)
 - beehives are located in the vicinity of soybean fields; and honey is seasonally harvested.
- Polyfloral honey can have soybean pollen but as minor one.
- No quantitative data about the presence of soybean pollen in EU produced honey.
- Presence of soybean material other than honey (from the use of soybean-containing substitutes in commercial bee feeding)

7. Detection of GM events in soybean crops and honey

- PCR-based methods, both qualitative and quantitative
- Protein-based methods

The EU-RL GMFF has validated quantitative PCR methods for identification and quantification of several GM soybean events.

A practical and robust PCR protocol able to quantify GM pollen relative to total pollen in honey is not available.

8. Best practice for coexistence in soybean crop production

Best practices for ensuring seed purity

The use of certified soybean seeds (EU legislation)

Best practice for reducing pollen-mediated gene flow

Isolation distances:

- 5 m between the fields to limit cross-pollination to 0.9%
- 10 m isolation if 0.1%

Temporal isolation an alternative to spatial isolation is difficult to achieve under European conditions

Best practices during sowing, harvesting, drying and storage in farm

Harvesting is the most critical step in soybean cultivation. The equipment used for processing of GM crops should be cleaned thoroughly before it can be used for processing of non-GM crops.

Best practice for coexistence with honey production

The current practices in honey production and marketing in Europe are sufficient to ensure that adventitious presence of GM soybean pollen in honey is far below the legal labelling thresholds and even below 0.1%.

9. Economic analyses of proposed best practices

- No empirical data are available
- Economic data from soybean segregation systems operating in elsewhere can be relevant (e.g. CIPRS provides C\$ 0.60 - 0.40 to compensate cost of IP programs)
- Farmers will consider both monetary and non-monetary benefits of GM adoption versus coexistence costs in their decision making process to select what kind of variety to adopt.

10. References



Thank you for your attention

ECoB web site: <http://ecob.jrc.ec.europa.eu>

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