

The European Commission's science and knowledge service

Joint Research Centre

Coexistence of genetically modified potato with conventional and organic farming

Best Practice Document
European Coexistence Bureau (ECoB)

Civil Dialogue Group Arable Crops - Sugar and Starch
15 September 2017



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

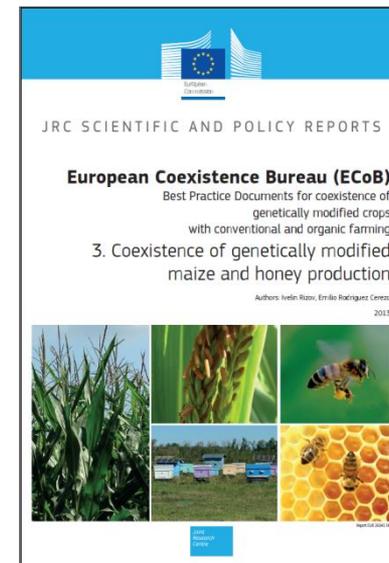
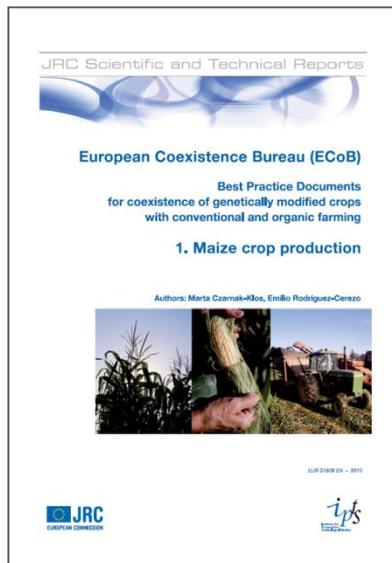
The mission of the ECoB (2008) is:

- 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, TWG Cotton, TWG Potato.

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



European Coexistence Bureau

Technical Working Group on Potato: First meeting in November 2015 attended by experts from 22 countries:

- Austria
- Belgium
- Bulgaria
- Czech Republic
- Germany
- Denmark
- Estonia
- Spain
- Finland
- France
- Greece
- Croatia
- Hungary
- Ireland
- Liechtenstein
- Lithuania
- Luxembourg
- Netherlands
- Sweden
- Slovenia
- Slovakia
- United Kingdom

Scope of the work of TWG Potato

- Coexistence of cultivation of GM potatoes in the EU with non-GM potatoes 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
- Includes methods for quantification of GM potato presence in other crops and honey
- GM potato containing a single transformation event.

Structure of the report

1. Introduction

2. Potato cultivation in the EU: demand and crop production

3. Potato biology, evolution and breeding

4. Review of the available information on adventitious GM presence in potato crop production

5. Existing systems for segregation and identity preservation in potato production in selected EU Member States

6. Occurrence of potato pollen in honey

7. Detection of GM events in potato harvest and honey

8. Best practices for coexistence in potato production

9. Cost analysis of the management practices

10. References

2. Potato cultivation in the EU: demand and crop production

- Second most important arable crop in EU (1.7m ha in 2016)
- Main EU producers are Germany, Poland, France, the Netherlands and the UK
- Grown vegetatively from tubers ("seed potatoes") as an annual crop.
- Use of certified disease-free seed potatoes and fungicide sprays main instruments against disease

3. Potato biology, evolution and breeding

- Many varieties do not produce seeds or produce seeds that are partially or fully sterile
- Complex genetics make breeding inherently difficult, with cycles from initial crosses to variety release 10-30 years.
- GM traits being developed include quality characteristics (acrylamide content), as well as disease and insect resistance, among others (Parisi et al., 2016)
- GM potatoes currently not grown in the EU, a starch potato was cultivated in a few countries in 2010-2011.
- *Innate* potato first cultivated in USA in 2016 on 4000 acres: less bruising + lower acrylamide

4. Review of the available information on adventitious GM presence in potato crop production

- Outcrossing to wild relatives is highly unlikely
- Outcrossing to non-GM potato not very relevant as tuber harvest not affected by fertilisation and would not be transmitted to progeny. No study demonstrated outcrossing by more than 20m, significant outcrossing occurs only at very small distances of few metres.
- Insects not a significant factor for cross-pollination
- Harvesting, storage and transport need to prevent admixture
- Volunteers are the most important problem. It may take several years to get rid of volunteers.

Review of volunteer management practices

- Preventive: proper harvesting technique to remove all tubers from the field
- Mechanical control: non-turning soil cultivation, more effective in combination with chemical control
- Chemical control: herbicides, sprout inhibitors
- Crop rotation: potato usually grown every third or fourth year

5. Existing systems for segregation and identity preservation in potato production in selected EU Member States

- Information provided for Belgium, Czech Republic, Denmark, Estonia, Germany, Lithuania, the Netherlands
- Isolation distances varying
- Mandatory crop rotation breaks between GM and non-GM potatoes
- Cleaning of machinery, storage
- Information reporting requirements

6. Occurrence of potato pollen in honey

- Only two available studies with variable results
- No evidence that honeybees visit potato flowers under normal circumstances, only as a starvation response

7. Detection of GM events in potato harvest and honey

- Several PCR methods for identification and quantification have been developed
- Two events validated by JRC (Amflora and Amadea).
- No validated PCR method to quantify GM pollen in honey.

8. Best practices for coexistence in potato production

1. Use of certified seed potatoes
2. Isolation distances of 5m between fields is enough to limit adventitious presence to 0.9%, 10m for 0,1%
3. Feral plants pose little to no risk as a source or recipient of GM pollen
4. Effective volunteer control strategy essential for coexistence in case of consecutive cultivation of GM and non-GM potatoes in the same field. 3 year break for 0.9%, 4 year break for 0.1%
5. Planting and harvesting machinery should be cleaned for 0.9%, separate equipment necessary for 0.1%
6. No additional measures necessary for honey

9. Cost analysis of the management practices

- Economic data on GM potato coexistence practices have not been found.



Thank you for your attention

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