

Critical analysis of the jrc – CO-EXISTENCE study

„New case studies on the co-existence of GM and non-GM crops in European agriculture, Joint Research Centre, January 2006, EUR 22102 EN“

Focusing on the maize-section of the study

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Conclusion

The jrc study is based on a wrong definition of “coexistence” and therefore fails to give advice how to secure non-GM production in Europe. Besides this fundamental mistake, the report further fail to clearly state or to justify the assumptions used – assumptions that have great impact on the final estimations.

While Member states have both a legal obligation and a legal right to prevent GMO-contamination the Commission and the JRC are blatantly attempting to turn the 0,9% labeling threshold into a contamination permit to GMO-farmers. It becomes obvious, that member states have to insist on their legal right to avoid contamination and to prevent further attempts of the European Commission to introduce a right to pollute non-GM products with GMOs. This is the main outcome of the study.

Nevertheless the study presents a new approach to understand agricultural practice. This approach might be further developed. While further developing this new technical tool, it must be secured, that assumptions, which have impact on the outcome of such studies must be discussed in public and must be made transparent and should not be hidden in footnotes and appendixes.

Summary

1. Definition of Co-existence: The authors misinterpreted co-existence as to have the right to pollute neighboring fields up to 0,9% [crop production] or 0,5% [seed production]. This wrong definition of co-existence stands in conflict with European legislation, allowing member states to take „appropriate measures to avoid the unintended presence of GMO in other products“¹. This wrong definition of co-existence by the authors leads to wrong conclusions. It would be the end of any non-GMO production as we know it, if there would be anything like a „right to pollute“ non-GM-products.
2. Sound science: The authors ignored bad experiences from Spain but used data from French regions, where GMO-plantings never occurred so far. And at the same time the authors suggest that the jrc-study could be the resource to discuss European wide applicable co-existence rules. This suggestion is misleading: It is not possible to generate a valid model on co-existence in maize production using just two French regions. Or would you believe a weather forecast for Corsica which is based on some data from Ireland. This study is not sufficient to generate recommendations for all of Europe.
3. Manipulated through assumptions: The authors have made several assumptions without scientific reasons. These assumptions influenced the outcome of the study to a certain extent.
 - 3.1 Worst case scenarios were de-escalated by using average numbers for pollen-production
 - 3.2 Worst case scenarios were de-escalated by pooling gm fields to one big field together, in order to decrease the interface to non-GM fields.
 - 3.3 All Scenarios were de-escalated by using averaged data for wind speed. The authors calculated their conclusion by using 3 m/sec in the study. The main region with GM maize in Germany accounts for wind speed up to 6-7 m/sec during the maize-flowering time end of July².
 - 3.4 The authors did not investigate GM maize with more than one artificial gene. And the authors have made the assumption that only heterozygote GM maize will be used.
 - 3.5 Small fields were not investigated by the study.
4. Economic calculations without empiric data: The authors calculate the monetary damage for GM farmers through co-existence rules without any scientific baseline.
5. The study clearly shows, that it is probably impossible to protect the non-GM production from contamination. The main factors are³
 - 5.1. Purity of non-GM seed
 - 5.2. Sharing of machinery
 - 5.3. Isolation distances
 - 5.4. Contingent of GM maize grown in the region

1 Art. 26a of Directive 2001/18

2 Quelle: „Tägliche Windspitzen in Beaufort von Deutschland - Juli 2005“, Deutscher Wetterdienst

3 „Very low GM levels in non-GM production such as 0,1% can only be achieved if: -GM presence in non-GM seeds is almost nil; - no adventitious presence is due to machinery; -non-GM fields are isolated enough from GM fields, the isolation distances depending on the climate, the varieties used and the levels of GM cultivation in the region. In the landscape studied this will be impossible to be achieved within a cluster.“ page 53

Critical analysis and comments on the maize-section of the study

1. Definition of co-existence
2. Sound science
3. Manipulation through selective assumptions
4. Economic calculations without empiric data
5. Additional remarks

1. Definition of Co-existence

The authors misinterpreted co-existence as to have the right to pollute neighboring fields up to 0,9% [crop production] or 0,5% [seed production]. But if all products contain GMO-contaminations, this would be the end of any non-GMO production as we know it.

Member states are not only free to implement rules to avoid any contamination in any non-GMO product throughout the whole production chain from field to shelf, it is their obligation to avoid contamination of products⁴. Even if this means to implement extremely strict rules for planting GMOs, even to forbid any planting.

Member states are free to protect non-GMO production

European legislation through the directive 2001/18 gives member states the right to avoid contamination of non-GMO-products with GMOs⁵. The Commission through the non-binding Recommendation⁶ on co-existence tries to misinterpret this right of member states by implementing three much weaker goals:

- a. co-existence rules focus on protecting non-GMO-fields
- b. co-existence rules are restricted to economic issues only and
- c. only rules which are necessary to avoid contamination higher than 0,9% in the harvest should be allowed to be implemented by member states.

These three main points expressed in the guidelines are not in line with the directive 2001/18 and therefore can't be the basis of any rules to avoid contamination as described by the legally binding legislative basis of any commercial deliberate release in Europe.

- a. Products are not limited to field harvest but may include products which are sold to consumers. Co-existence measures have to take this into account.
- b. Member states must have regard to the aims of protecting human health and the environment

4 Regulation 1829/2003 art 12 on scope of labeling rules, it is very clear that 0,9% is NOT intended as a contamination permit and cannot be interpreted as such, article 12:

12(2). This Section shall not apply to foods containing material which contains, consists of or is produced from GMOs in a proportion no higher than 0,9 per cent of the food ingredients considered individually or food consisting of a single ingredient, provided that this presence is adventitious or technically unavoidable.

12(3). In order to establish that the presence of this material is adventitious or technically unavoidable, operators must be in a position to supply evidence to satisfy the competent authorities that they have taken appropriate steps to avoid the presence of such material."

5DIRECTIVE 2001/18/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 March 2001 on the deliberate release into the environment of genetically modified organisms and repealing Council Directive 90/220/EEC, Artikel 26a „**Measures to avoid the unintended presence of GMOs 1. Member States may take appropriate measures to avoid the unintended presence of GMOs in other products.** 2. The Commission shall gather and coordinate information based on studies at Community and national level, observe the developments regarding co-existence in the Member States and, on the basis of the information and observations, develop guidelines on the co-existence of genetically modified, conventional and organic crops.

6 2003/556/EC dated 23 July 2003, Commission Recommendation on guidelines for the development of national strategies and best practices to ensure the co-existence of genetically modified crops with conventional and organic farming.

in adopting any co-existence measures. To secure the non-GM production means to secure food-security by offering the possibility to exclude GM-food, in the case a GM-product has been proven to damage human health.

- c. The labeling thresholds (0,9%) are legally irrelevant to decide how to implement co-existence measures, because co-existence is not directly linked to the labeling-regulation. Additionally, there is no legal basis for a 0,9 % threshold in the European labeling regulation. The European regulation⁷ 1829/2003 defines, that food-⁸ and feed-products⁹ have to be labeled if they contain „material which contains, consists of or is produced from GMOs in a proportion no higher than 0,9 per cent of the food / feed ... , provided that this presence is adventitious or technically unavoidable.“ Any product therefore has to be labeled whenever a contamination with GMO or GMO-products deliberately occurs. The only exception to this general rule is, that if a technical un-avoidable and random contamination below 0,9% occurs, then labeling won't be necessary.

The jrc-study only tries to estimate steps to limit but not to avoid contamination

The jrc-report uses computer-models to estimate the contamination of a field under different conditions. The report does not try to specify which rules are necessary to avoid contamination. The report calculates what would be necessary to end up with 0,1% and 0,9% contamination for crop production and 0,1%, 0,3% and 0,5 % for seed production¹⁰. But the authors did not put much effort into calculating necessary co-existence rules for 0,1% szenarios.

These political assumptions by the authors of the report are misleading in two ways: a) It suggests that society and European member states have no right to protect their non-GMO products truly but contamination below 0,9%¹¹ in the harvest must be accepted and b) it suggests that member states are not allowed to protect the whole production-chain but only the production till harvesting. Member states, the European parliament and several NGOs, including Greenpeace have called for zero tolerance, meaning 0,1%, for seed production. The jrc-study failed to answer this request:

- The study does not include information on isolation distances to reach this goal in the seed-seed scenario¹². The model seems to be able to handle greater distances as can be seen in the seed-crop scenario¹³, but the authors decided without scientific evidence not to present these data.
- In the seed-crop scenario the authors decided again without any scientific reasons not to provide data to calculate the isolation distance necessary to guarantee pure seed [0,1%]¹⁴.

7 REGULATION (EC) No 1829/2003 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 22 September 2003 on genetically modified food and feed

8 1829/2003, Article 12

9 1829/2003, Article 24

10 Page 18, Scope

11 „The regulations set a threshold on higher than 0,9% for the adventitious presence of GM material in non-GM food-feed products (Regulation 1829/2003).“, page 17

12 Table 10, page 49 and appendix 7, page 101

13 Table 11, page 50 and appendix 7, page 102

14 Under worst case conditions an isolation distance of about 1.000 m can't guarantee this: Table 11, page 50, please compare with appendix 7, page 102. The worst-case seed-crop szenario calculates 0,3% contamination for a field of 1 ha used for seed-production and an isolation distance of 1.000 m.

2. Sound science

The authors ignored bad experiences from Spain but used data from French regions, where GMO-plantings never occurred so far. And at the same time the authors suggest that the jrc-study could be the resource to discuss European wide applicable co-existence rules. This suggestion is misleading: It is not possible to generate a valid model on co-existence in maize production using just two French regions. Or would you believe a weather forecast for Corsica which is based on some theoretical data from Ireland.

- a. The jrc-study offers no data based on experiences with GMO-plantings in France – since „GM maize is not yet grown“¹⁵ in the region studied.
- b. The jrc-study even fails to consider real data from Spain, the only European country, where GM maize is grown to a certain amount. Experiences from the GMO-plantings in Spain have been collected by Greenpeace and published early April 2006: *“Impossible coexistence - Seven years of GMOs have contaminated organic and conventional maize: an examination of the cases of Catalonia and Aragon“*
- c. This report is based on data from two French regions: one region for maize-crop production and another region for maize-seed production¹⁶. These regions are in no way representing the diversity of maize production in European agriculture. The European Union consists of 25 member states. From Lisbon to Riga Europe measures 3.000 km, the agricultural production differs widely between Spain, Poland, Germany and France concerning field-size, climate and how farmers organize their work.
 - In the region of Poitou-Charentes maize fields are not randomly distributed but rather grouped (clustered)¹⁷. The so called intra-cluster co-existence¹⁸ – co-existence between clusters seems to represent a very artificial or unusual situation in European maize production.
 - The authors do know very well, that the figures may differ from region to region¹⁹. This fact is acknowledged by the authors without any consequences! Without any scientific evidence the authors even state, that the by computer simulation generated data, which are based on the region Poitou-Charentes can be recognized as exemplary „for a typical maize production region“²⁰.

15 Page 12, footnote 7

16 „Simulations were run on landscapes Pyrénées-Atlantiques ... for seed ... and Poitou-Charentes ... for crop production“, page 22

17 „From the analysis of maize field distribution over landscape, it came out, that fields were not randomly distributed but rather clustered due to various reasons (...).“, page 28

18 Figure 3, page 31

19 „Of course, due to interregional variability (climatic conditions, sizes of fields), the figures may change from one region to another.“, page 28

20 The study indicates that, for a typical maize production region, such as Poitou-Charentes in France, the 0,9% threshold can be achieved with current practices in most of the fields...“, page 39

3. Manipulation through selective assumptions

The authors have chosen improbably scenarios, or have made assumptions which reduce contamination of non-GMO fields. Through these unscientific decisions the authors have manipulated the outcome of the report. Some examples, how to manipulate by „scientific“ assumptions:

- To calculate the contamination of non-GM seed with GM-seed fields or GM crop production the authors used averages for pollen production²¹. These assumptions do not represent worst case scenarios, as „the amount of pollen emitted per plant may vary from 1.2 to 3.4 million grains for seed production and from 6 to 10 million grains for crop production“.²² Through his unscientific manipulation the calculated isolation distance needed to reduce contamination below 0,5% decreases from 400 m to 200 m²³.
- The worst case intra-cluster scenario works with only 50 % GMO planting and additionally assumes that these fields are not randomly distributed in the cluster but are clustered inside the cluster²⁴! By this assumption, very few non-GMO fields have any or more than one direct neighboring GMO field²⁵.
- Taking into consideration, that „wind is the major factor for maize cross-pollination“²⁶, it seems unscientific to use a mid-strong wind of 3 m / sec²⁷ for all calculations. Even, if in the model-region, „wind intensity during flowering period is not very variable in this region“²⁸. Through this assumption the impact of unusual strong winds or regions with more wind than 3 m / sec are not covered by the study.
- GMOs with more than one artificial gene are not covered by the report²⁹. Due to this the authors assumed that only 50% of the pollen produced by the GMO plants carry the artificial gene and therefore cause contamination. New GM-plants with more than one artificial gene, which are located on different chromosomes, would cause a higher contamination rate under the same conditions!
The assumption, that breeders use heterozygote male GM plants to produce GM-seed seems to be unlikely as well, but this has to be further investigated³⁰.
- For maize-production the authors investigated only non-GMO fields larger than 3 ha³¹. But many farmers still use smaller fields for maize-production in the EU.
- The special request to protect maize land races has not been taken into consideration³².

21 „Assumptions: - Fields are square; - Amount of pollen produced per plant: - 2.000.000 for seed production – 8.000.000 for crop production...“, page 45

22 Appendix 7, page 100

23 Seed-seed co-existence, 0,5 ha non-GM plot, please compare table 10, page 49 and data from appendix 7, page 101

24 Inset 3, situation 4, page 33

25 „... a non-GM buffer zone of 18 m cannot keep maximum rates below 0,9% in fields 24 and 26. These fields are highly sensitive due to their position in contact with GM fields and their small area compared to the closest GM fields.“, page 35; see also: Figure 4, field 24 and 26, page 36

26 Page 27

27 „average wind speed of 3m/s“, Page 45

28 Page 31

29 „For all cases, heterozygous GM maize was taken into consideration (...), which means that only one copy of transgene is present and that half of the pollen grains produced by the GM plant would bear the transgene.“, page 23

30 If breeders use non-GM female maize and GM male maize to produce GM-seed, all the pollen from the male GM-maize has to carry the artificial gene to secure to produce 100% GM-seed. It seems to be likely that breeders use homozygote male GM plants, and not heterozygote male GM plants.

31 Maize-production: Field scale study... „In the study we considered a 15 ha GM field (worst case scenario) and several cases for the non-GMO field area: 3 ha, 5 ha, 7,5 ha, 10, 12,5 and 15 ha, page 27
Maize-production: Landscape study... „average plot size – 5-15 ha“, inset 1, page 32

32 Page 21

4. Economic calculations without empiric data

The authors calculate the monetary damage for GM farmers through co-existence rules without any scientific baseline. There are no field data on market prize for GM maize, no field data for the performance of GM maize compared to non-GM maize. Some examples:

- The authors estimated an economic advantage of growing bt-maize compared to non-GM maize³³. They do not offer any resource for their estimation.
- The authors used „expert interviews“³⁴ to calculate the cost structure of maize seed production. The authors „assumed ... a total income of €3.365 / ha from seed production“ and „a gross margin of €1.488/ha“³⁵. As the source of this educated guesses remain anonymous, this procedure is not scientific.
- The authors don't even failed to investigate key economic aspects. It would have been highly relevant to compare the costs of keeping the relatively small volumes of seeds clean (0,1%) with the combined costs to all „down stream“ operators from farmers to food producers.
- The authors don't even try to explain how they calculated „costs of buffer zones“³⁶. And it looks as if the authors even ignored the communication cost among the farmers?

5. Additional remarks

- The authors tried to calculate the actual number of grain carrying the artificial gene. All numbers given in the report do illustrate the real number of grain carrying the artificial gene and not the quantity which will be measured by standard PCR methods. To get the actual number of grain carrying the foreign information PCR-results have to be multiplied by 2,48³⁷.
- With this report it becomes obvious, how important cleaning of harvesting machinery is. Without cleaning-practice after harvesting GM fields, non-GM harvest can be heavily contaminated by sharing the same machinery – up to 0,4%³⁸

33 „An economic advantage of €43/ha (on the gross margin) for Bt maize compared to non-GM varieties was estimated mainly to increasing yields of Bt maize and savings in pesticide use.“ page 38

34 „... the cost structure of maize seed production was estimated with help of expert interviews“, page 48

35 Page 48

36 See page 38-39 and Appendix 5. There is no explanation, on the basis of this calculations.

37 „... consider the situation where a maize silk from a non-GM female plant is pollinated by a pollen grain carrying one copy of a transgene.... multiplied by 0,403...“, page 24