

Considerations regarding the Co-existence of GMO, non-GMO and organic farming

Introduction

The goal of this paper is to define the scope, general principles, challenges and necessary conditions of co-existence between GM crops, conventional and organic farming in the European Union. In order to meet these conditions scientific and practical knowledge is needed, which may not or only partially be available at present and require further research and studies. The issue of co-existence needs to be dealt with in different pieces of existing legislation on agriculture, environment, health and consumer protection and will require additional legislation at the community level as well as in national laws and regulations. Furthermore standards of good agricultural practice, traceability and quality control of food and feed, of organic certification and other private or public agricultural quality standards will be affected. In order to finally achieve a comprehensive and workable solution these different scientific, practical and legal components must be integrated at an economically and culturally acceptable price. While this paper tries to outline necessary requirements of co-existence it does not preclude at this state of knowledge and discussion that sustainable and effective co-existence between genetically modified crops and conventional and organic agriculture will be feasible.

General Principles and Context

Co-existence between different systems of agriculture and their respective supply and distribution chains are not an entirely new challenge to farmers, processors and retailers. Effective co-existence between conventional and organic farming has been established within the past decades. The potential introduction of genetically modified organisms (GMO) in European agriculture poses new challenges. GMO in agriculture have a new quality because they are reproductive material, which follows different physical and biological rules than chemical substances (e.g. pesticides, fertilisers) or mechanical and physical land use measures.

It must be kept in mind that biological laws and effects cannot be subject to negotiations. The practice of setting and negotiating acceptable tolerance levels for certain contaminants, which has been established in toxicology and management of chemical substances can not be applied to reproducible materials, such as seeds. Initial levels of contamination do not necessarily determine the subsequent environmental input of materials, which are able to multiply. In addition the products of natural reproduction may differ from the initial inputs as they are subject to biological recombination within and beyond their initial variety.

A ruling legal principle of freedom in European and other civilisations establishes that the freedom individuals and groups enjoy are only limited by their obligation not to restrict other individuals or groups rights and liberties.

Another ruling principle, which has been established also for environmental matters and public goods over the past decades is the "**polluter pays**" principle, which requires any damage or adverse effects to be prevented, reduced or compensated for by those who initially cause such damage or adverse effects.

In the context of GMO and non-GMO co-existence the key question is: How can GMOs be utilised and released into the agricultural and natural environment without infringing the right of those, who decide to produce and consume without GMOs?

Co-existence is the pre-requisite for the freedom of both consumers and farmers, as well as the other actors along the entire production and distribution chain between them, to chose whether or not to consume, produce or use genetically modified agricultural products¹. Establishment of co-existence

measures must ensure all the necessary means to guarantee this freedom and to provide for a fair and practical allocation of rights and duties, including all economic and legal, cultural and ethical aspects.

In cases where the right not to use and consume GMOs would become practically impossible due to the use of certain GMOs, the right to avoid GMOs must prevail over the right to use such GMOs. This prevalence is justified not only by the fact that a large majority of European citizens clearly prefer food and agriculture without GMOs. It is also based upon the fact that freedom of choice in this context is primarily a defensive right to avoid certain technologies for precautionary or ethical reasons. It should not be mistaken for a general entitlement to use whatever technology or its products.²

Scope

The issue of co-existence goes well beyond its direct impacts on farmers and their economic interests. Among other aspects the terms of co-existence determine

1. the conditions for the freedom to farm according to chosen principles (such as organic farming) irrespective of the immediate financial consequences
2. the conditions of environmental monitoring and protection of areas of specific environmental and ecological interest
3. the conditions for eventual withdrawal and recall of certain approved GMOs
4. the ability of all citizens to freely choose the content and means of production of the food they consume

While the assessment of environmental and health impacts of a GMO must be conducted according to the dedicated legislation and based upon the best available scientific knowledge at the time, including precautionary aspects, co-existence measures set long lasting conditions for further risk assessment and management. In this context it should be noted that many chemical substances, including pesticides, approved as safe at the time of their introduction, had to be banned later in the light of new scientific evidence and practical experience³. Given the particularly limited experience with the impact of GMOs on the environment and human health at this time, but also as a basic measure of precaution it is imperative that co-existence rules provide for the necessary conditions to enable effective withdrawal and recall of any approved GMO, should this become necessary. There are already practical examples where such measures have become necessary⁴. These aspects of co-existence have a direct bearing on the safety of the environment and human health. In addition long term epidemiological monitoring of potential health impacts, but also some environmental monitoring aspects require *inter alia* non-GMO reference groups and areas.

Co-existence needs to be established along the entire food chain from farm to fork and must take into account the practical conditions and interests of all actors along the following chain:

1. Approval and setting of conditions for releases of GMO events including provisions for eventual withdrawal or modification of approval and designation of protected areas
2. Monitoring of GMOs
3. Varietal approval and registration
4. production, import and distribution of seeds
5. Use of seeds in agriculture, including on-farm reproduction and saving of seeds
6. Harvesting, storage and transport of agricultural products (on farm)
7. Storage and distribution of agricultural products (off farm), including imported products
8. Processing and marketing of agricultural products, including labelling and traceability (Food and Feed and traceability Regulation)
9. Distribution, wholesale and retail sale of food and feed

10. Short and long term monitoring of direct and indirect effects of GMOs on human and animal health

Objectives

Key objectives of regulating co-existence are

1. To provide all farmers and consumers with real choice at the lowest costs and expense of work with the highest efficiency for all stakeholders
2. To ensure that such freedom is not impeded or determined by the economic power or strategic position of stakeholders within the production chain
3. To set at an equal level throughout the Community practicable and enforceable, clear and binding rules and legal conditions for
 - a. The rights and duties of all stakeholders
 - b. Liability and redress in the advent of economic or environmental damage
 - c. Access to relevant information and obligations to provide such information
 - d. Resolution of conflicts, including those, which cannot be accommodated or mediated by technical measures
4. To establish an integrated long term strategy and framework providing clarity and investment security for all stakeholders

Challenges

Major challenges to ensure appropriate co-existence will include the following points:

1. A basic prerequisite of any co-existence measures is the guarantee that no GMOs, which are not **approved under Directive 2001/18** are placed on the market, nor traces of them are present in products or seeds. Additional measures may become necessary in the future to guarantee the absence of any unapproved GM crops and may include additional efforts of testing and control. Unapproved GMOs also include varieties, which contain different GMO events, which may be approved individually, as a result of unintended and unapproved recombination (gene stacking).⁵ All further considerations are based upon the assumption that only GMOs, which are approved under Dir 2001/18 are to be regulated.
2. Conditions for the release and **placing on the market** of all GMOs (whether their intended use is for food, feed, pharmaceutical or industrial purposes) within the approval process (2001/18) must ensure that
 - a. The GMO is clearly and uniquely identifiable and means to do so are available publicly
 - b. The GMO can reliably be prevented from entering into protected areas, which may be designated by the member states national and regional authorities or by individual land users and owners as general non-GMO zones or prohibit the use of specific GMOs in this area
 - c. The GMO can be reliably recalled in the advent of withdrawal, expiry or modification of the approval
 - d. The applicant and users are in the position to fulfil potential duties of liability and redress through adequate insurance coverage
 - e. The GMO will not contaminate other areas than those designated for its release above the minimum thresholds for the adventitious presence of GMOs in food and feed
 - f. Clear instructions for the users of the GMO are available as to ensure the above mentioned conditions

3. **Monitoring** of a GMO placed on the market requires in addition
 - a. That the dispersion of the GMO-event, including potential outcrosses, can be identified and described and can be monitored and controlled by the competent authorities in charge
 - b. That all varieties to which the GMO-event is being transferred are registered and their use is notified to the competent authority
 - c. Knowledge of all cultivated or natural varieties to which the GMO event can outcross directly or indirectly (and from which it could subsequently backcross)
4. **Varietal approval** and registration of genetically modified varieties must take into account the agronomic implications of the use of such varieties including an appropriate agronomic and cultural risk-benefit assessment.
5. **Seed production** of GMO and non-GMO seeds must follow the best obtainable purity standards. As seeds are the starting point of the production chain all non GMO varieties should be free of any GMO contamination. Only when farmers can rely on the purity of seeds bought as non-GMO seeds, they will be able to reliably prevent and identify potential contamination further down the chain. The model for such standards could be the seed legislation already in place in Austria.⁶
6. Seed producers must be in a position to prevent contamination of their products in the **designated areas of seed production**.
7. Equally farmers who reproduce and save their own seeds must be in a position to ensure the purity of such seeds. All **farmers right to save, reproduce and adapt seeds** to their specific needs and conditions is not only an economic asset to be protected, but also a fundamental cultural right, which should not be traded for economic compensation.
8. Prevention of or minimising the spread of GMO-events beyond the designated areas of their use requires a diversity of **agricultural practices**, depending on the characteristics of different varieties and varying agro-ecological conditions. Farmers wishing to use GMOs must be in a position to duly adhere to such necessary practises, which include *inter alia*
 - a. Providing full and timely information for neighbours and full documentation of any use and/or occurrence of GMOs per field for landowners and subsequent users
 - b. Agreement and joint execution of measures which have to be taken together with neighbouring farmers in the area (e.g. timing of planting)
 - c. Identification and assessment of the natural conditions, which may lead to inadvertent spread of the GMO (e.g. wind drift, bees)
 - d. Full knowledge and implementation of physical measures to prevent the spread of GMOs (e.g. distances, barriers)
 - e. Identification and elimination of volunteers
 - f. Cleaning of machinery, transport devices and storage facilities
9. **Segregation** of GMO and non-GMO products from the farm to the storage facilities and further distribution channels will be pivotal for co-existence. Such measures need to be designed along the entire distribution and processing chain. As their necessity and costs at any stage will strongly depend on the level of contamination that may have occurred at all previous stages, prevention at the onset is the best way to avoid costly "end of the pipe" testing and monitoring further down the chain.
In order to prevent unfair and unnecessary costs to arise for certain actors further down the food chain a strict "*polluter pays*" system of liability needs to be established.
10. Clear **regulation of liabilities** for economic losses, contamination of designated as non-GMO areas as well as interference with farmers rights to farm according to their traditional and chosen way are inevitable to guarantee the functioning of co-existence. The general laws of civil liability in the member states are neither designated to deal with issues of biological contamination, nor sufficiently harmonised to guarantee equal competitive standards for the

Communities common agricultural market. It would be socially unacceptable and economically inefficient and unfair to leave these questions to individual court rulings between neighbouring farmers.

11. These problems can be best avoided by a simple, hierarchical "polluter pays" regime, which will hold the initial applicant of a specific GMO event liable for all potential damage caused by this event further down the production chain. Any claims associated with a specific GMO event could, grace to the unique identifier of the GMO, be directly traced and addressed to the owner of the GMO approval. This applicant would then be free to hand down specified liabilities to its customers upon distribution and sale of the event, by setting the terms and conditions of use of its product. Seed producers as well as users of GMO seeds would be in the position to reliably exclude damage claims by adhering to the contractual conditions set out by the provider of the technology.
12. Additional **general costs and measures of segregation** to control and avoid inadvertent contamination of products (e.g. routine testing of bulk products should they become necessary), which may arise at the different stages of the production and distribution chain, should be borne according to the same principle. There is no justification for burdening producers and consumers, who do not wish to use a certain technology, with any economic or other disadvantages just because others want to use this technology to their economic advantage.

Conclusions

- **All seeds not labelled as consisting of or containing GMOs should be required to be effectively free of GMOs (legally and technically established as below 0,1% contamination threshold in the relevant seed legislation)**
- **A full and coherent liability scheme, which puts the burden of proof on the producers of GMOs and follows the polluter pays principle, must be established**
- **Co-existence provisions are to be established along the entire food chain**
- **Risk management and nature protection measures, as well as precautionary environmental and health protection and monitoring must be included in the scope of co-existence**
- **No additional costs and measures should arise from co-existence requirements to farmers, producers and consumers, who do not want to use GMOs**
- **Co-existence is not an issue of commercial interests and compensations but of long term guarantees of the freedom to chose what to consume and how to produce**

¹The Commission has addressed the need for co-existence in its Communication "Life sciences and biotechnology – A Strategy for Europe", Brussels, 23.1.2002, COM(2002) 27 final, where it writes: "Action 17

The Commission will take initiative to develop, in partnership with Member States, farmers and other private operators, research and pilot projects to clarify the need, and possible options, for agronomic and other measures to ensure the viability of conventional and organic farming and their sustainable co-existence with genetically modified crops. Moreover, the Commission recognises the importance of safeguarding the existing genetic resources in agriculture. It will launch a new action programme for the conservation, characterisation, collection and utilisation of genetic resources in agriculture in the Community. Implementer: Member States, professional associations, other operators, Commission Timeframe: 2002 onwards

Action 20

The Commission continues its work with a view to finalising the legislative proposals which have already been announced, such as initiatives concerning GM plant propagating material, environmental liability and the implementation of the biosafety protocol. Implementer: European Parliament, Council, Commission Timeframe: 2002-2003"

http://europa.eu.int/eur-lex/pri/en/oj/dat/2002/c_055/c_05520020302en00030032.pdf

However no reference to these Action points are being made in the Commission's recent progress report on this strategy.

² See "Wahlfreiheit als Abwehrrecht" ein Beitrag der Eidgenössischen Ethikkommission zur Debatte um die gentechnikfreie Produktion, in Neue Züricher Zeitung, 24.2.2003

³ A long list of examples and discussion of this problem can be found in the European Environment Agency report No.22, "Late lessons from early warnings:the precautionary principle 1896–2000"
http://reports.eea.eu.int/environmental_issue_report_2001_22/en/tab_abstract_RLR

⁴The most prominent case is the recall and subsequent withdrawal of the approval of the Aventis (Bayer) GM-maize variety "Starlink" in the USA, which created massive costs and significant problems partly due to the fact that no appropriate precautionary measures had been taken. "Starlink" is still not fully eliminated from US seedstocks and products.

⁵ The proposed tolerance thresholds for transgenic impurities in seed have been derived from the food labeling regulations, where a threshold of GM material is currently permitted, but do not take into account the needs of environmental protection, and will undermine the effectiveness of the regulatory system in preventing undesirable gene flow.

At the threshold levels for seed impurities presently proposed by the Commission (0,3 for rape, 0,5 for maize and beets) of approved GM varieties in conventional seed, farmers could unknowingly sow many thousands of GM seeds in each field. For oilseed rape up to 10,000 GM seeds per hectare could inadvertently be sown. Neighbouring farmers could sow either the same or different transgenic seed without knowing either how many GM seeds are present or which transformation(s) are in the seed batch.

If these proposals were adopted, it would be possible (assuming that several GM varieties of a crop receive marketing consent) for transgenic impurities to be composed of more than one transformation, and still be legal to market. In the near future these transformations could include a mixture of herbicide tolerances, but in the longer term these traits could be combined with GM insect, fungus and virus resistances and perhaps quality traits or pharmaceuticals. Inadvertently growing such plants as mixtures within conventional (or even GM) crops would by cross-pollination within fields inevitably lead to uncontrolled 'gene stacking' emerging in volunteer populations. This has already happened in Canada, where rape tolerant to two GM and one non-GM herbicide tolerances has been grown in adjacent fields, giving rise to triple tolerant volunteers in the second year. These 'stacked gene' crop plants will have unpredictable behaviour and the regulatory system is unlikely to be able to assess their environmental and agricultural safety.

For crops that are sexually compatible with native plant species (for example oilseed rape can hybridise with several European brassica species, and beet crops are the same species as sea and weed beets) transfer of stacked transgenes from volunteers could affect the ecological fitness of hybrids with wild plants. This could lead to disruption of native ecosystems or to the gradual development of weediness in native species.

⁶ Federal Law Gazette for the Republic of Austria, December 21, 2001

478th regulation of the Federal Minister for Agriculture, Forestry, Environment and Water Management on the contamination of seeds with genetically modified organisms and on the labelling of GE varieties and seeds of GE varieties (Regulation on seeds and GE)

official German text: <http://bgbl.wzo.at/pdf/2001b478.pdf>

English translation and explanation: http://www.zs-l.de/gmo/downloads/austrian_situation.pdf