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Svar på spørgeskema om GMO'er og socio- økonomiske kriterier

Hermed fremsendes Danmarks svar på Kommissionens spørgeskema om GMO'er og socio-økonomiske kriterier.

P.A.V.
F.B.

Sonja Canger
Miljøråd

DANISH MINISTRY
OF THE ENVIRONMENT

Environmental
Protection Agency

European Commission
Directorate-General Environment
Directorate B
Att. Acting Director Michael Hamell

Pesticider og Genteknologi
J.nr. MST-689-00057
Ref. OLK/
January 28 2010

Dear Mr. Hamell

./. Referring to Your letter of July 29 2009 please find attached the answers from Denmark to the questionnaire about the socio-economic implications of the placing on the market of GMOs for cultivation.

The Danish answers are based on contributions from The Danish Plant Directorate, Danish Veterinary and Food Administration and the National Environmental Research Institute. Relevant stakeholders have contributed too, and Denmark has decided to let the comments from stakeholders stand alone.

Nonetheless we think, that in relation to the comments from Greenpeace on page 5 on "costs of coexistence measures", it should be stressed, that according to the Danish co-existence regulation it is solely the GMO-growers responsibility to comply with the regulation. The rules of compensation lay down, that neighbouring farmers will be compensated for lower prices as a result of too high contents of GMOs. This arrangement is financed by the GMO-growers, who contribute to a compensation fund 100 DKR (7,44 Euro) per ha cultivated with GMO-crops.

The questionnaire is due to be discussed between the Minister of the Environment and members of relevant parliamentary committees February 12 2010. This might led to supplementary comments which will be forwarded to you as soon as possible.

Sincerely yours

Anne Marie Rasmussen

Deputy Director General
Danish Environmental Protection Agency

QUESTIONNAIRE about the socio-economic implications of the placing on the market of GMOs for cultivation

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Lead questions per area and stakeholder

For each question, answers should be broken down:
- by the purpose of the genetic modification if this affects the content of the responses,
- between ex ante and ex post considerations.

1. - Economic and social implications

Upstream

1.1. Farmers

For each question, answers can be broken down by the range of relevant agricultural stakeholders farmers

- *farmers cultivating GM crops;*
- *and/or conventional crops;*
- *and/or organic crops;*
- *beekeepers;*
- *seed producers producing GM seeds;*
- *seed producers producing conventional seeds;*
- *seed producers producing organic seeds;*
- ...

Has GMO cultivation an impact regarding the following topics? If so, which one?

- farmers' revenues (output prices and agricultural yields);

Comments from
Greenpeace

Farmers cultivating GM crops
There is no commercial GMO-cultivation in Denmark. Looking at experience from USA it is clear that yield from GMO-crops is not higher. Even the USDA states that *"Currently available GE crops do not increase the yield potential of a hybrid variety. In fact, yield may even decrease if the varieties used to carry the herbicide-tolerant or insect-resistant genes are not the highest yielding cultivars"* (The First Decade of Genetically Engineered Crops in the United States/EIB-11 Economic Research Service/USDA, p 9).
Similar results are reported from Sth America. Speaking about soy cultivation in the state of Mato Grosso, Brazil one grower comments:
"We're seeing less and less planting of GMO soy around here. It doesn't give consistent performance," said Jeferson Bif, who grows soy and corn on a large 1,800 hectare farm in Ipiranga do Norte, near the key Mato Grosso soy town of Sorriso.
He said he obtained average yields of 58 bags (60 kg) per hectare with conventional soy last season while fields planted with GMO soy in the same year yielded 10 bags less.
Inae Riveras, Reuters "Biggest Brazil soy state loses taste for GMO seed", Fri Mar 13, 2009 3 http://www.reuters.com/article/internal_ReutersNewsRoom_BehindTheScenes_MOLT/idUS TRE52C5AB20090313

UN panel on agriculture, IAASTD, assess that cultivation in USA of GMO soy and Maize has not resulted in improved yields. Rather yields are slightly reduced (IAASTD synthesis report p 60).

-Farmers cultivating organic or conventional crops:
The non-GMO supply chain is suffering many extra costs to prevent GMO-contamination. Thereby the application of the polluter pays principle is reversed, meaning that GMO impose segregation costs on GMO-free producers thereby creating an unfair price advantage for GMO-feed. In a fair system the cost of protecting GMO-free products from GMO-pollution throughout the entire food chain should be borne by the polluter.

- farmers' production costs;

Comments from
Danish Seed Council
APVD (Association of Plant Variety Owners in Denmark)
If a GM-variety is accepted for growing the seed producers should be free to grow it in accordance with the co-existence rules. Seed producers may see not improvements in economic output but might realize lower input.

- labour flexibility;
- quality of the harvest (e.g.mycotoxines);
- cost of alternative pest and/or weed control programmes;
- price discrimination between GM and non-GM harvest;
- availability of seeds and seed prices;

Comments from
Danish Seed Council
APVD (Association of Plant Variety Owners in Denmark)
The farmer must maintain his/her access to seeds etc. from several suppliers/companies and not be forced to use only one.

- dependence on the seed industry;
- farmers' privilege (as established by Article 14 of Regulation (EC) No 2100/94 on Community plant variety rights) to use farm-saved seeds;

Comments from
Danish Seed Council
APVD (Association of Plant Variety Owners in Denmark)
Farmers and companies in Denmark support the use of certified seed but acknowledge the right to use farm saved seeds when royalties are being paid for those crops where farm saved seed is allowed by derogation from the seed legislation in the EU.

Comments from
Greenpeace
Cultivation of GMO results in contamination risk. The contamination risk means e.g. that, although farmers privilege (to use farm saved seeds) is protected by legislation, farmers are in fact forced to use certified seeds, in order to reduce risk of a contaminated harvest. In many

similar ways even a very small amount of GMO-cultivation will impose lost rights and extra costs on all other farmers.

- the use of agriculture inputs: plant protection products, fertilisers, water and energy resources;
- health of labour (possible changes in the use of plant protection products);
- farming practices, such as coexistence measures and clustering of GMO and/or non-GMO production;
- cost of coexistence measures;

Comments from
Greenpeace
Detail on DK COEX measures favouring GMO-growers. While the risk is born by the GMO-free farmer. This is worsened because the Danish GMO-liability regime does not ensure that the polluter pays, but ensure that GMO-free farmers don't get compensated.

- conflicts between neighbouring farmers or between farmers and other neighbours
- labour allocation- insurance obligations;
- opportunities to sell the harvest due to labelling;
- communication or organisation between the farmers;
- farmer training;
- beekeeping industry.

Comments from:
Danish Agriculture and food council
We have not yet been growing GM crops in Denmark – the main reason is the lack of GM-crops with events that makes sense to grow in Denmark as the only European approved GM crop is resistant to a pest that do not occur in Denmark.

It is, however, the general opinion that in the years to come GM crops will be marketed that will have significant importance for Danish farmers. This may be in relation to revenues (output prices on agricultural products) but rather in relation to reduced costs, increased flexibility in relation to crop protection etcetera – and primarily in relation to cope with the challenges that follows from climate change such as tolerance in relation to abiotic stress (draught or heavy rain) and biotic stress (increased occurrence of pests and diseases) – solving these challenges we will probably need making use of all measures that are available including traditional and modern plant breeding methods.

Dependence on seed industry and restrictions in relation to the use of farm saved seeds will probably be of minor importance in Denmark as most farmers is buying certified seeds and is paying a license even for farm saved seeds.

A prerequisite for growing GM crops in Denmark is, however, that the freedom of choice is guaranteed for all farmers (GM-growers, organic and conventional). In Denmark this is achieved by the legislation on co-existence which protects both the grower of GM crops and other farmers in the neighbourhood growing conventional or organic crops. The way the Danish co-existence legislation is organised should prevent conflicts between GM growers and other farmers as it is based on a dialogue – and protect all parties economically as a loss of income for conventional or organic farmers due to presence of GM material will be covered without any bureaucracy by the compensation scheme that is funded by a minor

"insurance"-payment of 100 DKK per hectare grown with GM crops. It is essential to note that the GM groves are also protected economically as they can not be held responsible to cover the loss if they have fulfilled the obligation according to the co-ex law. It might be comprehensive to have a consultation to be sure that the legislation also takes care of the interests of the beekeepers.

The question of costs and benefits from growing GM crops should not be treated isolated but should be seen in connection with the very large import of feed produced from GM crops and other costs in the production chain in relation European Union legislation on hygiene etcetera.

Comments from
The Danish Beekeepers´ Association

Beekeepers fear that widespread production of GM-crops will lead to further decrease in biodiversity, do to increase in monocultures. We fear that some GM-crops will have negative impact on the vitality of honeybee colonies and demand extensive testing of new GM-crops towards all stages of bees.
The protection of beekeeping and honey production in the "co-existence" legislation is not adequate as the producer of GM-crops is not liable to pay compensation in case of any damage.
There is no protection for the beekeeper against non intentionally pollution of products from beekeeping from GM-crops. (pollen in honey)

Any other impacts you would like to mention:
Comments from
Cooperation of biodynamic consumers
and
Cooperation of biodynamic agriculturalists

Growing more GM crops in Denmark and the rest of Europe will put a pressure on third world countries, who cultivate few or no GM crops, and/or third world countries where the farmers, the public and the scientists are divided over the cultivation of GM crops. If introducing GM crops, many such countries have very weak public institutions that are unlikely to be able to securely measure and control the use and impacts of the cultivation of GM crops. This is not only a moral issue, it might even affect European countries directly by creating even more refugees caused by i.e. GM crop failures or other unintended consequences of the introduction of GM crops. And so, it might have serious socioeconomic consequences.

Certified organic agriculture as we know it will probably become completely eradicated, since over time the GM traits will spread by natural selection to all non-GM crops. This has apparently already happened in Canada. The EU should consider the agricultural policy recommendations for decision makers in North America and Europe as they appear in the regional report of The International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD), issued by a UN-led scientific, agricultural panel in april 2008, in co-operation with the World Bank. The IAASTD report asks decisions makers to consider the multifunctionality of agriculture. Agro-ecology, including many organic practices, is encouraged.

1.2. Seed industry

For each question, answers can be broken down by the range of relevant stakeholders, including:

- *plant breeders;*
- *multiplying companies;*
- *seed producing farmers;*
- *seed distributors;*

And/or:

- *GM seeds;*
- *conventional seeds;*
- *organic seeds;*

And/or:

- *industrial / arable crops;*
- *vegetable crops...*

Has GMO cultivation an impact regarding the following topics? If so, which one?

- employment, turn over, profits;

Comments from
Danish Seed Council
APVD (Association of Plant Variety Owners in Denmark)

It will strengthen competitiveness of European Seed Industry, new developed GM-products secure the future of the European Seed Industry and exchange of optimized germplasm will help to secure the development of new plant varieties necessary to combat the future climatic and population challenges. The development of new products to place on the world market is a necessity to increase or even secure employment, turn over and profits in the long term.

On the downside we predict increasing costs for the breeding companies in the development of GM crops caused by insurance issues (legal risks), increased development cost caused by field trials of GM varieties and costly risk assessments and the need to achieve deregulation for newly developed products.

GM-growing is characterized by growing varieties containing many patented traits. Access to further plant breeding also with varieties containing patented traits must be secured to keep progress in breeding in the future. Respecting breeder's exemption based on existing UPOV rules.

The unpredictability and uncertainty regarding possibilities for full authorization of GM-crops are at the moment the main reason for EU seed companies not to engage in the development of GM technologies in crops with high out-crossing potential and crops naturally existing in EU (grasses etc.).

Comments from:
Danish Agriculture and food council

It will strengthen the competitiveness of the European seed industry as new developed GM-products may be competitive with and be as efficient as seeds from seed producers in other

parts of the world in relation to meeting the challenges we are facing with increasing global population and climate change. This is both in relation to selling Danish produced seeds on the global market and to get access to and exchange of optimized germplasm with seed producers in other parts of the world. The future competitiveness of European and Danish seed producers is dependent on the ability to develop and place seeds on the global market. The development of new products to place on the world market necessary to increase or even secure employment, turn over and profits in the long term.

On the downside we predict increasing costs for the breeding companies in the development of GM crops caused by insurance issues (legal risks), increased development cost caused by field trials of GM varieties and costly risk assessments and the need to achieve deregulation for newly developed products.

The unpredictability and uncertainty regarding possibilities for full authorization of GM-crops are at the moment the main reason for EU seed companies not to engage in the development of GM technologies in crops with high out-crossing potential and crops naturally existing in EU (grasses etc.).

- **the production of seeds (easiness/difficulty to find seed producers, easiness/difficulty to find areas to produce these seeds…);**

Comments from
Danish Seed Council
APVD (Association of Plant Variety Owners in Denmark)

The production of GM-seeds depends on the crop (out-crosser, natural varieties in production area etc.). To find dedicated GM-seed producers is not seen as a problem, however to identify seed production areas with the least impact on production of conventional varieties can be an issue.

The seed companies have to establish breeding and production procedures which allow production of GM-, conventional- as well as organic-seed and have to establish certification procedures to prove purity as asked for in conventional plant breeding.

Seed production in general, this holds true for conventional seed production as well as for GM-seed production, with zero tolerance for adventitious presence is **impossible** and will be a show-stopper for any GM production in the EU.

In order to allow coexistence of GM- and conventional seed production practical coexistence measures and liability rules must be established for the EU Member States.

Comments from:
Danish Agriculture and food council

The production of GM-seeds depends on the crop (out-crosser, natural varieties in production area etc.). To find dedicated GM-seed producers is not seen as a problem, however to identify seed production areas with the least impact on production of conventional varieties can be an issue.

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Seed production in general, this holds true for conventional seed production as well as for GM-seed production, with zero tolerance for adventitious presence is **impossible** and will be a show-stopper for any GM production in the EU.

In order to allow coexistence of GM- and conventional seed production practical coexistence measure and liability rules must be implemented in all EU countries making it possible to continue organic plant breeding and production of seeds, which is necessary to make a full choice of freedom achievable.

- marketing of seeds;
- the protection of plant breeders rights; - the protection of plant genetic resources.

Does the marketing of GM seeds have an impact on the seed industry and its structure in the EU (size of companies, business concentration, competition policy)? Please specify per sector.

- for plant breeders;

Comments from
Danish Seed Council
APVD (Association of Plant Variety Owners in Denmark)

The production of GM-seeds depends on the crop (out-crosser, natural varieties in production area etc.). To find dedicated GM-seed producers is not seen as a problem, however to identify seed production areas with the least impact on production of conventional varieties can be an issue.

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Comments from:
Danish Agricultur and food council

Only plant breeders organized in a bigger breeding organization or Seed Companies will have the ability and financial strengths to engage in GM-crop development. Deregulation and risk assessment costs are too high for small breeding companies, and only a limited number of product leads with a big market potential will be economically viable.

On the other hand, the production of organic seed or seed of specific conventional varieties opens certain niches for smaller breeding companies. Coexistence measures have to guarantee the existence of both types of breeding industries.

- for seed multiplication;

- for seed producers;
- for the availability of conventional and organic seeds;

Comments from:
Danish Agriculture and food council

Availability of conventional and organic seeds is very important and it must be assured it is possible to achieve these within the legislation and without compromising the production of organic seeds due to prohibitive costs.

- creation/suppression of barriers for new suppliers;
- market segmentation.

Any other impact you would like to mention:

Downstream

1.3. Consumers

Has GMO cultivation any impact regarding the following topics? If so, which one?
- consumer choice (regarding quality and diversity of products);
- the price of the goods;
- consumer information and protection;

Comments from
Danish Seed Council
APVD (Association of Plant Variety Owners in Denmark)

The consumers should have adequate information to make their choices. Production of GMO-crops should be market-driven.

Comments from
Cooperation of biodynamic consumers
and
Cooperation of biodynamic agriculturalists

Certified organic agriculture as we know it will probably become completely eradicated, since over time the GM traits will spread by natural selection to all non-GM crops. This has apparently already happened in Canada. The EU should consider the agricultural policy recommendations for decision makers in North America and Europe as they appear in the regional report of The International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD), issued by a UN-led scientific, agricultural panel in april 2008, in co-operation with the World Bank. The IAASTD report asks decisions makers to consider the multifunctionality of agriculture. Agro-ecology, including many organic practices, is encouraged.

Comments from
Greenpeace

The European food industry avoids using GMO as direct ingredient, so in direct food use consumer choice is largely unaffected. Exception is as in the current GMO-linseed scandal (or the GMO-rice scandal), where GMO-cultivation result in GMO-contamination of foods. Impact on consumers is firstly that they are exposed to untested GMOs; secondly that products are recalled and therefore not available; and thirdly that the cost of the clean-up in the end must be borne by the consumers. The current GMO-contamination of linseeds also illustrates very well that the costs are much higher than cost of replacing the linseeds. The contaminated linseeds have been used in a variety of products (breads, muesli etc) which has a value much higher than the costs of replacing the linseeds. This is the costs of GMO-contamination that must be quantified for the food chain. In addition to quantifying the cost of market closure and clean-up costs for the GMO-free farmers who unwittingly had their harvest contaminated with GMO.

99% of the GMO used in the EU is used as animal feed. Here consumers are both mislead; consumers demanding GMO-free animal products will have to cover the extra segregation costs resulting from the use of GMO.

Informed consumer choice is hindered as there is no labelling of animal products of animals fed with GM-feed. A survey from the independent Danish consumer council found that nearly half of the consumers in Denmark wrongly believe that EU law requires that animal products are labeled if the animals have been fed with GMOs. So, the current labelling scheme is misleading. It is well established that consumer/citizen concern with GMOs goes beyond immediate impact on own health and includes concerns for environment, food security, sustainability, corporate control and irreversibility when GMOs are released in the environment. Therefore it is making a mockery of consumers interests when GMO labelling only covers the miniscule use of GMO in food, while exempting the animal products produced from millions of tons of GMO feed (99% of the GMO used in EU) unlabelled.

A direct result of the misleading labelling law is distortion of the market in favour of producers who use GMO-feed. Producers who are responsive to consumer demands and therefore use GMO-free feeds are not rewarded by the market place for their GMO-free status. This creates a market distortion favouring the producers who use GMO-feed.

Any other impact you would like to mention:

1.4. Cooperatives and grain handling companies

Has GMO cultivation any impact regarding the following topics? If so, which one?

- work organisation;
- handling and storage;
- transport;
- administrative requirements on business or administrative complexity.

Comments from:
Danish Agriculture and food council

The grain handling companies are already handling large quantities of GM products in the form of imported feed. The growing of GM cultivars in Europe will therefore primarily make it necessary to handle GM and non GM seeds including making sure the legislation on co-existence is fulfilled. This also include the obligation to making sure that GM seeds are only

sold to farmers that are allowed to grow GM crops according to the Danish law on co-existence which means they have to be licensed. This will give the companies increased administrative costs which eventually will be passed on to the farmers.

Any other impact you would like to mention:

1.5. Food and feed industry

Has GMO cultivation any impact regarding the following topics? If so, which one?

- range of products on offer;
- employment, turn over, profits;
- work organisation;
- crop handling (drying, storage, transport, processing, etc...);
- administrative requirements on business or administrative complexity;

Comments from:
Danish Agricultur and food council

The primary need of the food and feed industry is the free and non-bureaucratic access to act on the global market. Asynchronous approval of GM in Europe combined with the current zero-tolerance towards not fully approved GM-events despite the risk assessment has stated they do not impose any risk to human or animal health or to nature is one of the most severe economic problems for European food and feed industry. This applies to the production where GM is part such as feed for conventional livestock due to increased costs and economic risk associated with the uncertainty that despite non-approved GM events have not been detected before shipment there is always the risk that a very small fraction could be found in European control. It does, however also - and perhaps even more severely - apply to those producers avoiding GM such as organic producers that has to comply with a zero tolerance in stead of the 0.9 per cent threshold for adventitious and technically non-avoidable presence of approved GM events.

Any other impact you would like to mention:

Comments from
Greenpeace

Lack of GMO-labelling of animal products distorts the feed market. The application of the polluter pays principle is reversed, meaning that GMO impose segregation costs on GMO-free producers thereby creating an unfair price advantage for GMO-feed. In a fair system the cost of protecting GMO-free products from GMO-pollution throughout the entire food chain should be borne by the polluter.

A survey from the independent Danish consumer council found that nearly half of the consumers in Denmark wrongly believe that EU law requires that animal products are labeled if the animals have been fed with GMOs. So, the current labelling scheme is misleading. It is well established that consumer/citizen concern with GMOs goes beyond immediate impact on own health and includes concerns for environment, food security, sustainability, corporate control and irreversibility when GMOs are released in the environment. Therefore it is making a mockery of consumers interests when GMO labelling only covers the miniscule use of GMO in food, while exempting the animal products produced from millions of tons of GMO feed (99% of the GMO used in EU) unlabelled.

A direct result of the misleading labelling law is distortion of the market in favour of producers who use GMO-feed. Producers who are responsive to consumer demands and therefore use GMO-free feeds are not rewarded by the market place for their GMO-free status. This creates a market distortion favouring the producers who use GMO-feed.

If GMO-labelling of animal products was introduced it would enable consumers to reward the producers who are responsive to consumer demands. This means that GMO-free producers would be able to recover any extra costs for GMO-free feed. But fair labelling would also entice many more producers to be GMO-free. When more GMO-free feed is demanded the extra costs per feed unit would also be drastically reduced: firstly when scale increase to allow dedicated GMO-free feed plants, secondly when scale increase so much that GMO-free feed can be ordered as full ships of GMO-free feed (30-50,000 tons) as opposed to ordering only GMO-free feed by the hull (3-8000 tons).
Introducing GMO-labelling of animal products would be fairly cost-free, provided the industry is given approximately 6-12 month to adjust, so the producers who want to be GMO-free have reasonable time to secure GMO-free feed supplies. It is assumed that branded products would be first to shift to non-GMO feed. This would be enough to reach economies of scale and thus result in lowering the GMO-free premium, enticing even more producers to be GMO-free. If a significant share of EU producers gives signals to be willing to go GMO-free, growers in Brazil and Argentina will immediately increase the availability of GMO-free soy.

1.6. Transport companies

Has GMO cultivation any impact regarding carriers (insurance, cleaning, separate lines...)? If so, which one?

Comments from:
Danish Agricultureand food council

Cultivation of GM crops will have the impact that transport companies must fulfil the obligations to prevent spreading of GM and especially to fulfil the requirements of the co-existence legislation. Transport companies are, however, currently also handling imported products containing GM or products from GM.

1.7. Insurance companies

Does the GMO cultivation have any impact regarding insurance companies (e.g. in terms of developing new products)? If so, which one?

1.8. Laboratories

Has GMO cultivation any impact regarding the following topics? If so, which one?

- employment, turn over, profits;
- feasibility of analyses;
- time necessary to provide the results;
- prices of the analyses.

Any other impact you would like to mention:

1.9. Innovation and research

Do GMO cultivation and the technology spill over have an impact on the following topics? If so, which one?

- investment in plant research, number of patents held by European organisations (public or private bodies);
- investment in research in minor crops;
- employment in the R&D centres in the EU;
- use of non-GM modern breeding techniques (e.g. identification of molecular markers);
- access to genetic resources;
- access to new knowledge (molecular markers, use of new varieties in breeding programmes, etc.).

Recently, the number of different transgenes and traits in new GMO plants applied for marketing has increased significantly and this tendency is expected to continue. Consequently, there will be an increasing need for information and trials concerning the potential environmental effects of genetic interactions and synergy on target and non-target organisms. This issue has already been included in EFSA's guidelines, but the way of implementation still needs to be defined and optimized.

Comments from:
Danish Agriculture and food council

The current reluctance regarding GM crops has an impact on European research institutions and eventually on the number of patents held by European organisations compared to organisations from other parts of the world and also the future access to genetic resources and tools to include in the other modern breeding technologies including molecular markers.

1.10. Public administration

Has GMO cultivation any impact regarding the actions of the national public administrations and the necessary budget (national and local level) for example policing and enforcement costs

GMO crops are not cultivated in Denmark yet, but Denmark is prepared as legislation on coexistence between GMO crops and conventional and organic crops has been introduced. In addition, a control scheme in order to control compliance with the coexistence rules is introduced.

Any other impact you would like to mention:

Economic context

1.11. Internal market

Does the placing on the market of GMO seeds have an impact on the functioning of the EU internal market on seeds? If so, which one?

The only GMO seed currently allowed for cultivation in the EU is seed from the insect resistant maize MON810. As this maize is not cultivated in Denmark, no experience on the functioning of the EU internal market on seeds is available.

On the other hand the question on the setting of thresholds for accidental presence of GMO seed in conventional seed (to import) which do not have to be labeled is still not resolved. So in practice the individual member states are setting their own thresholds. This situation actually harms the trade of seed between member states. The seed industry has been frustrated for years because of this unsolved problem.

Does it have an impact on the internal markets for services (if so which impact and which services), for agriculture products and on workers' mobility? If so, which one?

Does GMO cultivation have an impact on monopolies? If so, which ones (emergence/disappearance)?

The lengthy approval process for GMO crops in the EU makes it difficult for small and semi large companies to participate in the development of GMO crops. Recently, the last Danish breeding company developing GMO crops stopped the development of a GMO ryegrass with an improved nutrient content because of the long prospects of having returns of the investments (because of the long prospects of getting a permission to market the seed in the EU). This situation contributes to the development of monopolies as only the big biotech companies have the financial volume to tackle this situation. Furthermore, as these companies are multinational, they get quicker returns of their investments because of the more rapid approval process in third countries compared to the EU.

Does it provoke cross-border investment flows (including relocation of economic activity)?

Any other impact you would like to mention:

1.12. Specific regions and sectors

Answers can be broken down on the purpose of the level (national, regional, local) and according to region.

Has GMO cultivation any regional and local impact in those regions regarding the following topics. If so, which one?

- agriculture incomes;
- farms' size;
- the farm production practices (e.g. increase or decrease of monoculture);
- the reputation regarding other commercial activities of the region/localities.

As there is no experience with commercial cultivation of GMO crops in Denmark, it is difficult to answer these questions in a Danish context. It is however expected that changes in cultivation practises will follow from the cultivation of GMO crops, e.g. with the cultivation of herbicide resistant GMO crops. As an example it is worth mentioning research by the National Environmental Research Institute which has shown that it is possible to change the current practise of spraying with four herbicides at fixed times to a more flexible spraying pattern.

The monitoring- and research data in applications for marketing under Directive 2001/18 and Regulation (EC) No 1829/2003 are in most cases primarily based on field trials and data from outside the EU. It would strengthen the conclusions of the assessment process if more relevant trials were made under different environmental conditions in different regions of the EU.

Comments from:
Danish Agriculture and food council

The legislation on co-existence should handle these challenges. The structure of farms, differences in which crops that are grown etcetera may be different in different regions and countries – therefore it is reasonable to have locally adjusted legislation on co-existence within the overall EU framework as published on July 23 2003.

Comments from
Greenpeace

WHERE ARE IMPACTS IN TERMS OF THIRD COUNTRY TRADE? EU's GMO-legislation, allow the import of massive quantities of GM products unsustainably produced in monoculture systems in Latin America has clearly a huge responsibility in causing the serious health, ecological social and economic problems these countries are facing. Thousands of families have been displaced from their lands in countries like Argentina and now live in slums beside cities, chemical pollution has increased massively (due to weed resistance to herbicides), biodiversity have been lost as well as agriculture diversity, with direct consequences for these countries food security.

Any other impact you would like to mention:

2. - Agronomic sustainability

2.1 Agricultural inputs

Does the cultivation of EU approved GMOs for cultivation have an impact regarding the use of pesticides against target insect pests (i.e. corn borer)?

As there are no cultivation experiments with insect resistant GMO crops in Denmark it is difficult to answer this question. However, experience from Spain on the cultivation of MON810 maize – which is resistant towards attacks from the European Corn Borer – seems to indicate that the cultivation of this maize can result in a decrease in the use of insecticides.

The potential for reduced insecticide use is obvious, but at present not considered relevant in Denmark because the relevant pest insects constitutes no agricultural problem at present. In case they will become a problem in the future, the potential effects on non-target species should be considered both in the risk assessment and in the demands for monitoring activities. The possible increase in other pests and control strategies should also be addressed.

Comments from:
Danish Agriculture and food council

As we don't have these pests in Denmark there has not been any cultivation of these GM crops. When other crops with effective resistance to native pests in the future will be marketed it is the clear expectation that it will lead to a reduction in the use of pesticides.

Does the placing on the market of GMOs have an impact, and if so which ones, regarding the use of pesticides or/and on the patterns of use of chemical herbicides?

Results from experimental cultivation of GMO feed beets in Denmark indicates that it is possible to replace the current practise of spraying with four different herbicides at fixed times to spraying with a single herbicide at more flexible times.

Comments from:
Danish Agriculture and food council

A large scale demonstration project in 1999 conducted as a joint venture between seed companies, agriculture and the authorities showed that farmers growing GM fodder beet was very keen on utilising the properties of the GM beet experimenting both with reduced dosage and delayed spraying with herbicides leading to very high biodiversity in the herbicide resistant GM fodder beet fields – both regarding weeds, insects and birds

2.2. Biodiversity, flora, fauna and landscapes (other impacts than the ones considered in the environmental risk assessment carried out under Directive 2001/18 and Regulation (EC) No 1829/2003)

The evaluation of possible effects on biodiversity, flora, fauna and landscape in Denmark has in numerous cases raised attention to the need for knowledge on environmental effects of the growing of herbicide tolerant crops (HT) and insect resistant crops (Bt). At present these issues are not always addressed properly by the environmental risk assessment carried out by the companies applying for marketing and mostly only formally included in the associated monitoring programs.
These knowledge gaps include:

- **Field edge effects** – HT-crops alter the seasonal timing and the pesticides that are applied. The effects of these changes on biodiversity, flora and fauna are largely unknown and at least poorly quantified.

- **Long term effects** – present days' effects assessment mainly include short or medium term effects. The changed herbicide use in HT growing systems may both lead to environmental positive and negative effects in the long term. In order to give the best guidance to the administrations, industries and agriculture, long term investigations of effects of different cultivation strategies on biodiversity, flora and fauna should be launched.

- **Landscape effects** – When new crops are grown on a larger scale they can influence the function of the landscape. In Denmark the conventional maize area has been expanding over the last 20 years. This has already lead to concern for many wild species in the agricultural landscape such as lapwings and partridge. Cultivation of

genetically modified crops will probably enhance landscape effects, but there is very little knowledge available on these effects and the associated losses of nature values.

- **Non-target effects** – Bt-crops having direct effects on harmful species have a number of advantages relative to conventional crops needing to be sprayed with insecticides. Here can be mentioned that it is mainly insects that prey on the crop that are harmed and they often include refuges to prevent build up of resistance in target pests where unsprayed conventional crops are grown. Such refuges serve as areas for wild species in the cultivated landscape. However, Bt-crops also have the potential to affect non-target species. Knowledge on Bt-sensitive non-target species (e.g. different butterflies) is inadequate in Denmark and Europe at present and therefore it will be impossible to assess possible future losses of biodiversity.

- **Monitoring programs** able to catch up the abovementioned effects does not exist, or are most often not applied properly in the post market monitoring. Furthermore, the feedback from monitoring to risk assessment needs to be improved for attaining more environmentally relevant results. Results from long-term monitoring programmes and other experiences from areas outside the EU could also be used.

Research at the National Environmental Research Institute has shown that the changed cultivation practise that follows from replacing the currently used four different herbicides with Roundup makes it possible to increase the biodiversity in the GMO feed beet fields if the spraying of Roundup is delayed until later in the growing season.

Comments from Greenpeace

The environmental risk assessment currently performed in the EU is totally inappropriate, as it is not capable to assess the risks of GM plants. long term environmental risk assessment is not conducted for GMOs, especially not for GMOs meant for import only (i.e not for cultivation within the EU) and because the EFSA GMO-panel consist of biotechnology and food safety experts and lacks the scientific expertise and the budget capacity to conduct or analyse environmental risk assessments.

In the past years, **new peer reviewed scientific studies have demonstrated that the effects of Bt maize varieties are far from predictable and their potential to cause negative effects is even greater than previously thought**.

In February 2008, 37 scientists from 11 countries wrote an open letter to Environment Commissioner Stavros Dimas supporting his proposal to reject the authorisation for cultivation of two GM Bt maize varieties (1507 and Bt11). They highlighted the "***lack of scientific consensus on the safety assessment of GM crops***", stressed that "***data quality on available studies is highly variable***" and argued for a "***temporary suspension of cultivation until a more rigorous risk assessment has been done***".[i]

Target insects develop resistance to the pesticides produced by the Bt GM crops.[ii] Farmers will then be forced to apply both greater quantities and additional varieties of insecticide to fight these resistant pests, to the benefit of pesticides manufacturers, which are often the same companies that make GMOs.

The European Commission, in its submission to the WTO case, criticised the EU environmental risk assessment on GMOs, and on Bt crops in particular, by stating that "***the***

current state of Bt environmental risk assessment in Europe shows that there were and still are considerable grounds for concern about the toxin Bt, especially non-target effects,..."[viii]

Bt maize results in swapping one pest for another. Catangui et al. (2006)[iv] showed that in the US new insects (Western bean cutworm) fill the niche of the pest organism killed by Bt maize (European corn borer).

Bt maize (including Bt11 and MON810) is unexpectedly susceptible to aphid infestation. Faria et al. (2007)[v] detected differences in amino acid concentrations not described in any of the applications for marketing of Bt maize. This demonstrates that Bt maize is subject to unexpected and unpredictable effects and that plant-insect interactions are too complex to be assessed by the current EU risk assessment.

The Bt toxin from GM Bt maize may affect headwater stream ecosystems. Rosi-Marshall et al. (2007)[vi] demonstrated that GM crops producing Bt toxins can affect ecosystems via unexpected pathways, because interactions in the natural environment are complex and not fully understood. Thus, the current risk assessment does not consider all toxicity pathways and therefore all risks of GM plants.

The level of Bt toxin produced by MON810 varies. Nguyen, H. T. & J. A. Jehle (2007)[vii] showed that the level of Bt toxin produced by MON810 varies strongly between different locations and even between plants on the same field. The reasons for these differences are not known. This raises serious questions about the current capacity to assess the impact of Bt toxins on the environment.

Bt toxin affects behaviour of monarch butterfly larvae. Prasifka et al. (2007)[viii] showed that monarch butterfly's larvae exposed to Bt maize anthers (the part of the flower that carries the pollen) behave in a surprisingly different way, compared to other larvae exposed to non-Bt crops.

Environmental testing invalidated by unknown toxin. Rosati et al. (2008)[ix] showed that the Bt toxin actually produced by MON810 is likely to be different from the Bt toxin used in the crop's environmental testing. This invalidates most, if not all, MON810 environmental 'safety' tests.

Leaves or grain from Bt maize could be toxic to aquatic life in streams. Bøhn et al. (2008)[x] showed that GM Bt maize could be toxic to aquatic life (insects). This underlines the conclusions of Rosi-Marshall et al. (2007, above) that this unexpected pathway is important and has not been considered in the risk assessment of Bt crops.

Herbicide-tolerant GMOs

The introduction of GM crops tolerant to herbicides such as glyphosate (the active ingredient of Monsanto's 'Roundup') have caused an increase in weed resistance. This lead to significant changes in agricultural practices, namely **increased quantities of more toxic herbicides being sprayed on the crops.**

The use of Glyphosate dramatically increased with the introduction of Roundup-Ready GM crops, since their introduction a decade ago[xi, xii]. Now, glyphosate-resistant weeds are occurring in direct association with Roundup-Ready GM crop cultivation in many parts of the US. 34 cases of glyphosate resistance in nine species have been documented in the US since 2000[xiii, xiv, xv, xvi]

In Argentina, new weeds, thought to be resistant to glyphosate, are replacing the usual weeds found in the fields as a result of cultivating GM herbicide tolerant soya.xvii Now farmers are

recommended to spray stronger formulas, mixtures and other more notorious of herbicides to control glyphosate resistant weeds.[xviii, xix]

Does the cultivation of EU approved GMOs have an impact regarding the number of non agriculture species/varieties?

Does GMO cultivation have an impact on agriculture diversity (number of plant varieties available, agriculture species, etc?)

Does GMO cultivation have an impact, and if so which one, regarding:
- protected or endangered species;
- their habitats;
- ecologically sensitive areas;

Does GMO cultivation have an impact, and if so which one, regarding:
- migration routes;
- ecological corridors;
- buffer zones.

Does GMO cultivation have an impact, and if so which one, regarding:
- biodiversity;
- flora;
- fauna;
- landscapes.

Comments from:
Danish Agriculture and food council

It is the general opinion that the current legislation in the EU ensures that GM crops that can be marketed without risks to human and animal health and the environment can also be grown without any further restriction.

Any other impacts you would like to mention:

Comments from
Cooperation of biodynamic consumers
and
Cooperation of biodynamic agriculturalists

By introducing more GM crops to Denmark and the EU, several already existing challenges regarding environment, climate and public health will further deteriorate. Allowing more GM crops within the EU will very likely affect the current restrictions on feed crops grown outside the EU. By keeping GM crops out of Denmark and the EU, it is believed (as mentioned in EU policy papers and the recent danish government-sponsored GMO-synthesis) that over time the livestock production within the EU will diminish considerably due to an expected lack of GM-free fodder. This will have a large-scale positive impact on climate mitigation, water pollution, water usage, biodiversity and global food resources. Livestock production is, according to the introduction to the FAO report "Livestock's Long Shadow" (2006) one of the two or three main causes behind the most serious environmental challenges, at every level from local to global. Both the Chairman of the UN Intergovernmental Panel on Climate

Change (IPCC), Rajendra Pachauri, and economist Lord Nicholas Stern, have argued that meat consumption should be heavily reduced, the sooner the better. Introducing GM crops will help to maintain and further aggravate these challenges, as it will allow the unsustainable overproduction of livestock to continue as it is. This will cost Denmark and the EU possibly trillions of Euros each year, for environmental, climate mitigation and health costs.

2.3. Renewable or non-renewable resources

Does the placing on the market of GMOs have an impact, if so which ones, regarding the use of renewable resources (water, soil…)?

Does the placing on the market of GMOs have an impact, if so which ones, regarding the use of non-renewable resources?

Comments from:
Danish Agricultur and food council
Farmers all over the world will be challenged by climate change – therefore resilient crops with tolerance against draught etcetera will lead to a reduced impact on both freshwater resources and soil as they may lead to more stable yields with less input of water.

Any other impacts you would like to mention:

2.4. Climate

Does GMO cultivation have an impact regarding our ability to mitigate (other than by possibly reducing CO2 emissions from fuel combustion – see next section) and adapt to climate change? If so, which ones?

Future GM-crops constitute a possible adaptive capacity to climate change. These new crops are likely to be tolerant to different kinds of climatic stress, i.e. drought, temporary flooding, saline conditions etc. This will help to ensure future supply of agricultural products, but at the same time pose a pressure on the biodiversity, flora, fauna, landscape and other environmental values. Hence areas that today are unavailable for crop production will be included in arable land and consequently be lost for nature.

Comments from
Greenpeace

GMO-cultivation do not solve any problems but creates many more.

In the context of changing climate, Climate change mitigation, food security, soil and water restoration, improved crop stress tolerance etc. The solution is multifunctional agriculture as outlined by the UN panel on agriculture, IAASTD. Some of IAASTDs points summarised below. For an EU context it is worth looking also at the reports from the EU-funded PICCMAT Working group.

- Reduce N2O: An important step in agriculture climate mitigation is to reduce use of N-fertiliser, in order to reduce N2O (ca 300 times worse GHG than CO2). Beans and legumes that capture nitrogen from the air need to replace the use of artificial

fertilisers. In this regard it is a major concern that GMO-soy beans reportedly require artificial N-fertilisation, as opposed to conventional soy-beans growing in healthy soils.

- Increase SOC: Increasing soil organic carbo (SOC) serves many purposes of improving soils, improving water management, improving yields, improving adaptability to erratic weather etc. Most importantly agricultural lands has the potential to off-set the total direct GHG-emissions from agriculture. Also research shows that in soils rich in SOC excess nitrogen tends to form N2, rather than N2O. Whereas N2O is a very serious GHG, N2 is not. In regard to SOC GMO has nothing to offer. Soil needs to be managed using organic methods in order to increase SOC, and feed crops should be perennial (grass) rather than single year monocultures (soy and maize).

- Low input farming. Soy and maize (the big feed crops = the big GMO crops) are primarily grown in huge monocultures, highly dependent on fossil energy and pesticides. This is the type of farming that GMO-crops were developed for. The type of agriculture that according to IAASTD will be needed to meet future food supply is multifunctional farming methods that rely on IPM rather than chemical warfare. In contrast to IPM, GMO, whether it is Bt or HT GMO-crops, both require more and more toxins to combat pests. As pests (weeds and insects) develop resistance to roundup and Bt-toxin farmers apply higher and higher dosages roundup (and biotek industry develop plants that express more and more Bt toxins)

Comments from
Cooperation of biodynamic consumers
and
Cooperation of biodynamic agriculturalists

By introducing more GM crops to Denmark and the EU, several already existing challenges regarding environment, climate and public health will further deteriorate. Allowing more GM crops within the EU will very likely affect the current restrictions on feed crops grown outside the EU. By keeping GM crops out of Denmark and the EU, it is believed (as mentioned in EU policy papers and the recent danish government-sponsored GMO-synthesis) that over time the livestock production within the EU will diminish considerably due to an expected lack of GM-free fodder. This will have a large-scale positive impact on climate mitigation, water pollution, water usage, biodiversity and global food resources. Livestock production is, according to the introduction to the FAO report "Livestocks Long Shadow" (2006) one of the two or three main causes behind the most serious environmental challenges, at every level from local to global. Both the Chairman of the UN Intergovernmental Panel on Climate Change (IPCC), Rajendra Pachauri, and economist Lord Nicholas Stern, have argued that meat consumption should be heavily reduced, the sooner the better. Introducing GM crops will help to maintain and further aggravate these challenges, as it will allow the unsustainable overproduction of livestock to continue as it is. This will cost Denmark and the EU possibly trillions of euros each year, for environmental, climate mitigation and health costs.

Any other impacts you would like to mention:

2.5. Transport / use of energy

Does the cultivation of EU approved GMOs have an impact regarding energy and fuel needs/consumption? If so, which ones?

Life cycle analyses which compares the effect of cultivation of GMO sugar beet, oilseed rape and maize with the cultivation of the conventional versions of these crops have shown decreased emissions of CO2 and ozone (e.g., as a result of reduced fuel use), decreased ecotoxicity, acidification and nitrification, reduced emissions of toxic particulates and a reduction in carcinogenicity by the cultivation of GMO crops.

Does the cultivation of EU approved GMOs have an impact regarding the demand for transport in general terms? If so, which ones?

Any other impacts you would like to mention:

3 - Other Implications

Comments from Greenpeace

Socio-economic impact is important in addition to proper risk assessment. Socio-economic impacts should not be considered as an alternative of bringing the quality of the risk assessment up to the level agreed in Directive 2001/18. The Norwegian GMO-legislation provides example of the proper way to include socio-economic and sustainability criteria. http://www.regjeringen.no/en/doc/Laws/Acts/Gene-Technology-Act.html?id=173031 see §10 "...The deliberate release of genetically modified organisms may only be approved when there is no risk of adverse effects on health or the environment. In deciding whether or not to grant an application, considerable weight shall also be given to whether the deliberate release will be of benefit to society and is likely to promote sustainable development..."

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iii European Communities – Measures affecting the approval and marketing of biotech products (DS291, DS292, DS293). Comments by the European Communities on the Scientific and Technical Advice to the WTO Panel, para 128

iv Catangui M.A. et al. 2006.Western bean cutworm, Striacosta albicosta (Smith) (Lepidoptera : Noctuidae), as a potential pest of transgenic Cry1Ab Bacillus thuringiensis corn hybrids in South Dakota Environmental Entomology 35 1439-1452.

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