ANNEX 1

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

16 July 2009

A – Introduction note

Article 31.7 (d) of Directive 2001/18/EC[1] provides that the Commission should send to the European Parliament and the Council a specific report on the operation of the Directive including inter alia an assessment of the socio-economic implications of deliberate releases and placing on the market of GMOs. These implications are defined in Recital (62) of the Directive as the socio-economic advantages and disadvantages of each category of GMOs authorised for placing on the market, which take due account of the interest of farmers and consumers. In its 2004 report, the Commission noted that there was no sufficient experience to make such an assessment (the Directive became fully applicable as of 17 October 2002 and several Member States had not transposed yet so only little experience of its implementation was available).

Moreover Regulation (EC) No 1829/2003, its articles 7 and 19, asks the Commission to submit a draft of the authorisation decision taking into account, together with the opinion of the Authority in charge of the scientific assessment, "other legitimate factors relevant to the matter under consideration".

At its meeting on 4 December 2008, the Environment Council adopted conclusions on GMOs mentioning among other things the appraisal of socio-economic benefits and risks of placing GMOs on the European market for cultivation. In particular the Council conclusions indicated the following:

"The Council:

7. Points out that under Regulation 1829/2003 it is possible, under certain conditions and as part of a case by case examination, for legitimate factors specific to the GMO assessed to be taken into account in the risk management process which follows the risk assessment. The risk assessment takes account of the environment and human and animal health. Points out that under Directive 2001/18/EC, the Commission is to submit a specific report on the implementation of the Directive, including an assessment, inter alia, of socio-economic implications of deliberate releases and placing on the market of GMO.

   Invites the Member States to collect and exchange relevant information on socio-economic implications of the placing on the market of GMOs including socio-economic benefits and risks and agronomic sustainability, by January 2010. INVITES the Commission to submit to the European Parliament and to the Council the report based information provided by the Member States by June 2010 for due consideration and further discussions.

[1] Directive 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

This possible consideration of socio-economic factors in the authorisation of GMOs for cultivation has also been raised by several Member States in the Environment and Agriculture Councils of the last months[2].

In order to respond to the invitation of the Council conclusions of 4 December 2008 and to the requirements of the legislation, the Commission invites Member States to submit all information they would consider relevant by January 2010 at the very latest.

In order to help Member States in structuring their responses, the Commission drafted a non exhaustive list of areas and stakeholders which could be concerned. In addition, for each of these categories, we have introduced in the annex a list of leading questions which could be used where considered appropriate.

When preparing their contribution Member States are invited to report *ex post* on the socio-economic impact of GMOs that have been approved in the EU and cultivated in their territory. Additionally, Member States are also invited to assess *ex ante* the possible implications of GMOs of currently pending approvals as well as those which are under development according to the best of their knowledge. One possible source of information in that respect is that recent report produced by the Joint Research Centre titled "The global pipeline of new GM crops" (available at http://ipts.jrc.ec.europa.eu**).**
The submissions must be as explicit and informative as possible and supported by evidence and data. When feasible, the socio-economic analysis – be it *ex post* or *ex ante* – should be quantified. In case documents are attached, they should be accompanied by a summary of the relevant part and a specification about the argument or topic that is being defended.

Where stakeholders are consulted at national level (e.g. farmers and consumers), we would appreciate it if their responses would be incorporated in your submission in an aggregated fashion. The list of stakeholders consulted, as well as any other pertinent information, may indeed be attached to the questionnaire.

Please note that the contributions must only deal with "socio-economic implications of the placing on the market of GMOs including socio-economic benefits and risks and agronomic sustainability" for each category of GMOs. These contributions should cover cultivation of GMOs and placing on the market of GM seeds.

If you choose to fill in the annexed questionnaire, please consider that answers should be broken down by the purpose of the genetic modification (herbicide tolerant, insect resistance, etc) if this affects the content of the responses.

DEADLINE FOR CONTRIBUTIONS: January 2010

[2] Environment Council of 2 March 2009, Agriculture Council of 23 March 2009 and Environment Council of 25 June 2009

B - Contact Details

Member State:

Name of ministry/ies contact Person/s:

Contact Address:

Telephone: **Fax**:

E-mail Address

C – Areas and stakeholders on which Member States are invited to comment

1 - Economic and social implications: influence on concerned economic operators

Upstream
1.1. Farmers

For each question, answers can be broken down by the range of stakeholders:
- *farmers cultivating GM crop;*
- *and/or conventional crops;*
- *and/or organic crops;*
- *beekeepers;*
- *seed producers producing GM seeds;*
- *seed producers producing conventional seeds;*
- *seed producers producing organic seeds;*
- …

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;*
- …

Downstream

Consumers;
Cooperatives and grain handling companies;
Food and feed industry;
Transport companies;
Insurance companies;
Laboratories;
Innovation and research;
Public administration.

Economic context

Internal market;

Specific regions and sectors.

2 - Agronomic sustainability

Biodiversity, flora, fauna and landscapes
Renewable or non renewable resources
Climate
Transport / use of energy

3 - Other Implications

ANNEX

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;*
- …

Farmers cultivating GM crops.
Has GMO cultivation an impact regarding the following topics? If so, which one?

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

Herbicide tolerant soybean
The results of a survey conducted at the end of 2006[3] on a sample of 160 soybean growers[4] (operating commercial farms, with the appropriate input mix and technology) in 14 key counties show a number of interesting facts, as follows: (i) conventional soya was treated on average 2.3 times with herbicides per campaign with about 10% of growers making four applications. RR soya was treated on average 1.63 times – but two was maximum number of treatments; (ii) farmers mentioned spontaneously many more disadvantages than advantages for the conventional soya, especially linked to the higher production costs, the lower yield, the lower production quality, the greater difficulties to control weeds efficiently, the lower profit, the greater care needed and the lower flexibility; (iii) RR technology was rated much more positively, with more than 10 attributes mentioned as key advantages by more than 75% of the respondents and spanning a very wide spectrum: excellent weed control, high yield, higher profitability, quality of the crop, convenience, better for the environment; (iv) growing RR

[3] Study prepared by Ask (www.askbmi.com) and commissioned by Monsanto Europe.
[4] Of which all 160 cultivated RR soy, but 54 planted conventional soy as well.

brought a considerable higher income than growing conventional soya - when buying the RR package and doing two herbicide treatments, the net income came to around 170 euro/ha, while with conventional seeds yields a net income of about 85 euro/ha – but when four treatments were needed, net income was as low as 25 euro/ha.

In conclusion, farmers' **production costs** were **lower due to simpler weed control; reduction in the number of treatments (maximum 1-2 treatments).**

The cost of the technology to farmers in Romania has tended to be higher than other countries, with seed being sold in conjunction with the herbicide. For example, in 2004, the average cost of seed and herbicide per hectare was $130/ha. This relatively high cost however, has not deterred adoption of the technology because of the major yield gains, improvements in the quality of soybeans produced (less weed material in the beans sold to crushers which could result in price premia) and cost savings derived. In added value terms, the combined effect of higher yields, improved quality of beans and reduced cost of production on farm income in 2005 was equivalent to an annual increase in production of about 33% (83,000 tonnes). (Brookes & Barfoot, 2006).

In terms of labour flexibility: increased convenience and management flexibility; significant benefit for follow-on crop

In terms of quality of the harvest: growers reported improved quality (which often resulted in price premia) due to less weed material in the beans sold to crushers.

In Romania, there was no price discrimination between GM and non-GM soybeans harvest, on the contrary, the higher quality of GM soybeans was often rewarded with better quotes.

A recent paper (Toma Dinu et. al, 2009) show that the discontinuation of HT soybeans upon Romania's EU accession had a dramatic effect, leading to an abrupt reduction (by 70%) in area planted to soybeans. Other socio-economic consequences are as follows:

- Romania, that had excellent prospects to be self-sufficient for vegetable protein, turns again into a net importer of soybeans and soybean meals and cakes, the calculated hard currency effort triggered by these imports being €60.5 million in 2007, respectively €117.353 million in 2008.
- Farmers' forgone profits (because of the denied access to this technology) were calculated at €11.1 million and 19.85 million in the respective years.
- Indirect losses at farm level stood at €3.4 million in 2007 and, respectively, €5.9 million in 2008, leaving aside the additional efforts for controlling the difficult weeds affecting many parts of country's agricultural regions.

Insect resistant maize

Upon Romania's accession, the only trait approved for cultivation in EU, MON810 (corn resistant to Ostrinia nubilalis, ECB) became available to the local growers. Industry estimates that the ECB annually causes economic levels of damage to between 0.5 million ha and 0.9 million ha in Romania. The areas most prone to ECB damage are in the West, North West, and South. This is the major pest of corn crops in the west part of the country and significantly reduces yield and crop quality, unless crop protection practices are employed.

As summarized in a recent study (Brookes, 2009), the main impact on farm profitability of growing GM IR maize has been via increased yields. The incremental yield due to the GM technology varies by region and year, with the additional yield effects being lower than average in years of low pest pressure and higher than average in years of high pest pressure. At the level of 2007, the average yield impact due to the us of Bt corn was estimated for Romania at 7%.

Year of first adoption	GM trait area 2007	Average trait impact on yield %	Cost of technology 2007 (€ha)	Net increase in gross margin 2007 (€/ha)	Additional production from trait (tonnes): 2007
2007	360	7.1	32	25.40	89

In 2007-2009, the technology cost varied around €30 ha. If we consider just the direct incremental yield, estimated at 700 kg/ha in 2008 (a year with moderate corn borer infestation) at a farm gate market price of € 95/tonne, the net gain is of 36.5 €/ha. In a year with high insect pressure, the production gain will go up accordingly – and so will do the farm income.

Cost reductions compared to the conventional technology results both from not using insecticide chemicals to control the pest, as well as from the associated fuel and water consumption reduction (Carpenter et al., 2002; Phipps si Park, 2002; NCGA & USGC, 2005).

In terms of quality of the harvest: By adopting GM IR MON810 trait, important improvements in grain quality from significant reductions in the levels of mycotoxins in grain have been reported, as acknowledged by numerous studies worldwide. Mycotoxins generally occur in corn as a result of insect feeding, and are thought to cause related diseases for humans and animals. Biotech IR corn is significantly less susceptible to fungal disease and has substantially lower levels of cancercausing compounds such as aflatoxin, fumonisin and other mycotoxins."(Bakan et al., 2002; Hammond et al., 2003; Magg et al., 2003; Masoero et al., 1999; Munkvold, 2003; Wu, 2006; Brookes G (2008).
ISAAA: http://www.isaaa.org/resources/publications/briefs/29/default.html.

Advantages related easier harvesting through reduced number of broken plants.

Intangible benefits:
-farmers are not any longer exposed to insecticides;
-the peace of mind because of the associated less variability in production levels (better control against pests during the entire vegetation period).

1.2. Seed industry

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

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

- 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;
- for seed multiplication;
- for seed producers;
- for the availability of conventional and organic seeds;
- creation/suppression of barriers for new suppliers;
- market segmentation.

Any other impact you would like to mention:

The GM HT soybean cultivation in Romania positively impacted the seed industry in the cultivation period (1999-2006), boosting profitability of operators all along the marketing chain. In the last year of cultivation (2006), 70% of the total soybean area was GM, proving the rapid pace of technology adoption.

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;

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.

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;

Any other impact you would like to mention:

1.6. Transport companies

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

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?

In Romania, because of the limited use of the GM technology in agriculture, there has not been any reported impact regarding the crop insurance mechanisms. Nevertheless, it is important to mention that in US, starting with 2008, because of the diminished variance in production from one year to another, the insurance companies have started offering discounts (reported to stand at around 5-5.5 EUR/ha) to those farmers who plant corn staks (traits for herbicide tolerance and insect resistance). This is a direct recognition of the fact that yields are better protected as the pest damage is eliminated through biotechnology use. Various studies (summarised, for example in Brookes & Barfoot (2009)) highlight the importance of GM IR technology in improving production risk management.

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);

Organisations (public or private bodies) from the UE have invested mainly in biosafety research. Because of the very restrictive legislation, public institution are not capable to invest, or even though they go through the preliminary phases they are nor able to bring it to completion because of the prohibitive costs.
- 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);
There are o lot of new technologies in breeding some of them being subject to these regulations

- access to genetic resources;

- access to new knowledge (molecular markers, use of new varieties in breeding programmes, etc.).

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

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?

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)?

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

Several companies active on the Romanian market and licensed for MON810 technology have explored opportunities to provide their own seeds with the incorporated trait. Similarly, back in 2005-2006, Pioneer was licensed by Monsanto to sell the RR soybean trait in their own varieties. This demonstrates that Monsanto has enabled the use of its traits in competing

products. This way, farmers have choice. In 2008 and 2009, only Monsanto and Pioneer biotech hybrids were available on the market, because the other players did not pursue this business. Which combinations of traits and hybrids farmers will choose to plant in the future, (especially as other traits may become available in EU), will be a rational decision based on the problem that the concerned products can address and at what cost.

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.

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)?

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?

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)

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.

Any other impacts you would like to mention:

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?

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?

Any other impacts you would like to mention:

There is a growing body of literature showing that biotech crops made a significant contribution to reducing greenhouse gas emissions from agricultural practices by 14.8 billion kg of carbon dioxide. This is the equivalent of removing almost 7 million cars from the road for one year (Brookes 2008, GLOBAL IMPACT OF BIOTECH CROPS: SOCIO ECONOMIC AND ENVIRONMENTAL IMPACTS 1996 – 2006):

- In 2006 GM crops have resulted in reduced pesticide use and reduced ploughing. This has reduced fuel usage with biotech crops and resulted in a reduction of more than one billion kilograms of carbon dioxide emission.
- GM crops have also facilitated the use of reduced tillage or no tillage farming systems, which results in more plant residue being stored, or sequestered, in the soil. This carbon sequestration saved the equivalent of almost 14 billion kilograms of carbon dioxide emission 2006.

Other papers: "Quantification of the Impacts on US Agriculture of Biotechnology-Derived Crops Planted in 2006" - Johnson S. R. et al. Published in February 2008 – The research has been conducted in 2006 by the National Center for Food and Agricultural Policy, Washington, and compares US crops of 2005 and 2006. The researchers found that: "The planted biotechnology-derived crops in 2006 led to improved crop production of 3.531 billion kilograms, lower crop production costs of approximately $1.9314 billion and reduced pesticide use of 49.97 million kilograms"

"Increased revenue from higher yields and reduced production costs improved net returns to growers by $2.629 billion"

Concerning the impact of pesticide use, the study found that:

"The insect-resistant crops accounted for 8.6 percent of the reduction in pesticide applications.
One of the unquantifiable effects of the insect-resistant crops was the "halo" effect, which holds that the insect populations are affected by the use of insect-resistant crops. This means less spraying for the non biotechnology-derived crops and that farmers who do not use the biotechnology-derived crops benefit from the use of biotechnology-derived crops by other growers"

The Executive Summary of the study can be downloaded at this link:
http://www.ncfap.org/documents/2007biotech_report/Quantification_of_the_Impacts_on_US_Agriculture_of_Biotechnology_Executive_Summary.pdf

Another recent and important study is "*Bt* corn in Spain - the performance of the EU's first GM crop" – Joint Research Council (JRC), European Commission, published in 2008 – The survey demonstrated a decreased insecticide use as evidenced in Spain. A face-to-face survey conducted among Spanish commercial maize farmers in the three leading *Bt* maize-growing regions (Aragon, Catalonia and Castilla-La Mancha), which accounted for ~90% of the *Bt* maize–growing area in Spain in 2006, shows insecticide use for corn borer control on surveyed farms.

1. Reduced insecticide treatments per year: "*conventional corn farmers applied 0.86 treatments/ year (2002–2004 period) compared with 0.32 treatments/year for Bt corn farmers."*

2. Reduced use of insecticides: "*The percentage of farmers applying no insecticides were 70% for Bt corn growers against 42% for conventional corn growers."*

"GM crops could reduce need for herbicides European Commission" - Environment DG: Published in December 2008 - The Environment DG conducted an analysis of large-scale European field trial data concluding that lower quantities of herbicides are applied to crops genetically modified for herbicide-resistance compared with conventionally grown crops.

1. Reduced need for herbicides. The study revealed that:

"lower quantities of herbicides are applied to crops genetically modified for herbicide-resistance compared with conventionally grown crops".

2. Benefits in terms of climate change. The findings also revealed that:

"A life cycle analysis (LCA) of the herbicide production chain, including transportation and field applications, has revealed that adoption of GR beets could reduce energy use by up to 50 per cent and global warming potential by 19 per cent".

The press release of the analysis can be found at this link: http://www.environmental-expert.com/resultEachPressRelease.aspx?cid=8819&codi=41058&idproducttype=8&level=0

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?

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