Comments from the public: MON810 maize

Organisation: Greenpeace and Friends of the Earth Europe
Country: Belgium
Type: Non Profit Organisation

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a. Assessment:
Molecular characterisation

Since MON810 has been on the market for over 10 year, probably enough scientific information has emerged that gives rise to updating information on molecular characterisation. The fact that fragments of the synthetic transgene from MON810 have been detected in blood (Mazza et al. 2005) makes this a big concern.

- What DNA/RNA fragments are around the insert?

- What are the impacts of the unknown DNA/RNA fragments on the human immune system?

Although several unintended and novel RNA fragments have been detected in MON810 (Rosati et al. 2008) EFSA is completely silent on the risk of those identified RNA fragments in MON810 which may – in EFSA terms - have a "regulatory function". This is in contrast to EFSA's analyses of NK603 maize (EFSA 2003).

- What are the risks of the unknown RNA fragments in MON810 which may have a regulatory function?

References: Mazza R, Soave M, Morlacchini M, Piva G, Marocco A (2005) Assessing the transfer of genetically modified DNA from feed to animal tissues. Transgenic Research 14: 775-784.

Rosati A, Bogani P, Santarlasci A, Buiatti M (2008) Characterisation of 3' transgene insertion site and derived mRNAs in MON810 YieldGard maize. Plant Mol Biol 67(3): 271-281.

EFSA (2003) Opinion of the Scientific Panel on Genetically Modified Organisms on a request from the Commission related to the safety of food s and food ingredients derived from herbicide-tolerant genetically modified maize NK603, for which a request for placing on the market was submitted under Article 4 of the Novel Food Regulation (EC) No 258/97 by Monsanto. The EFSA Journal 9: 1-14.

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b. Food Safety Assessment:
Toxicology

Proteomics is recommended in EFSA's own "Guidance document of the Scientific Panel on Genetically Modified Organisms for the risk assessment of genetically modified plants and derived food and feed". But in the MON810 opinion EFSA does not even touch a study which

analyses MON810 with proteomics techniques. Zolla et al. 2008 found with proteomics techniques many differences between MON810 and its near isogenic line. In particular, 7 spots were newly expressed, 14 spots were down-regulated, 13 were up-regulated, while 9 were completely repressed in the transgenic line.

- This type of study could be important- would EFSA consider this study in its risk assessment?

On page 19, chapter 5.1.3.2. Toxicological assessment of new constituents other than proteins, EFSA writes: “Since no new constituents other than the above mentioned Cry1Ab protein are expressed in maize MON810 and because there is no indication of alteration in levels of endogenous compounds, a toxicological assessment for new constituents is not applicable.”

EFSA states on page 12, paragraph 3: “In silico translation of these transcripts identified 2 and 18 putative additional amino acids in different variants, all derived from the adjacent host genomic sequences, added to the truncated Cry1Ab protein. These putative recombinant proteins did not show homology with any known protein”.

These two statements are contradictory. The sentence on page 19 is misleading. New “putative recombinant proteins” as well as fusion RNAs have been identified in maize MON810 there are “new constituents” in the maize which is denied by EFSA on page 19, chapter 5.1.3.2.

- Can EFSA clarify which statement they believe is the correct one?

References: Zolla L, Rinalducci S, Antonioli P, Righetti PG (2008) Proteomics as a complementary tool for identifying unintended side effects occurring in transgenic maize seeds as a result of genetic modifications. J Proteome Res 7(5): 1850-1861.

Allergenicity

Finamore et al. (2008) evaluated the gut and peripheral immune response to genetically modified maize in mice. They fed weaning and old mice a diet containing MON810 or its parental control maize or a pellet diet containing GM-free maize for 30 and 90 days. In this study the authors identified recurrent changes in the immune system like changes in the number of a special type of lymphocytes (γδT-cells). Such T-cells are involved in the modulation of inflammatory response. The authors mention that high numbers of these (γδT-cells) has been observed with asthma or with untreated food allergy in children. Further alterations of the immunophenotypes induced by the transgenic maize were associated with the increase in some cytokines like (Interleukin 6 (IL-6), Interleukin 13, Interleukin 12p70 and MIP-1) which are important in the human immune response. The authors conclude: “These cytokines (IL-6, IL-13, IL12p70, MIP-1) are involved in allergic and inflammatory responses (47-49), and although they were not strongly elevated by MON810 maize consumption, their increase is a further indicator of immune perturbations induced by MON810 maize.” (Finamore et al. 2008)

- At point would EFSA consider such findings significantly important to be considered in the toxicological risk assessment?

EFSA states on page 12, paragraph 3: “In silico translation of these transcripts identified 2 and 18 putative additional amino acids in different variants, all derived from the adjacent host genomic sequences, added to the truncated Cry1Ab protein. These putative recombinant proteins did not show homology with any known protein”.

These last two sentences were taken – almost word by word - from Rosati et al. (2008) which state in their abstract: “In silico translation of these transcripts identified 2 and 18 putative additional amino acids in different variants, all derived from the adjacent host genomic sequences, added to the truncated CRY1A protein. These putative recombinant proteins did not show homology with any known protein domains”.

Because the authors have not analyzed the potential human health or environmental risk of these “putative recombinant fusion proteins” they give no interpretation of their data in respect on safety issues.

In contrast EFSA concluded that (on page 12, paragraph 3): “These putative recombinant proteins did not show homology with any known protein and do not raise any new safety concerns.”

EFSA just added the sentence “and do not raise any new safety concerns” but did not provide any data on how the safety of these recombinant proteins was tested, proven or analyzed.

- What is the source of the information that the proteins do not raise any safety concerns?

- How was the safety of these recombinant proteins tested, proven or analyzed?

References: Finamore A, Roselli M, Britti S, Monastra G, Ambra R, Turrini A, Mengheri E (2008) Intestinal and peripheral immune response to MON810 maize ingestion in weaning and old mice. J Agric Food Chem 56(23): 11533-11539

Rosati A, Bogani P, Santarlasci A, Buiatti M (2008) Characterisation of 3' transgene insertion site and derived mRNAs in MON810 YieldGard maize. Plant Mol Biol 67(3): 271-281.

Nutritional assessment

EFSA makes us believe that it has assessed a 90 days study for MON810 as following citation shows (page 19 chapter 5.1.3.3. Toxicological assessment of the whole GM food/feed): “The applicant provided a 90-day feeding study in Sprague-Dawley rats with grains of maize MON810 as a component of the diet. This study is available in the scientific literature (Hammond et al., 2006)”

In the reference list “Hammond et al., 2006” is cited as: Hammond, B.G., Lemen, J., Dudek, R., Ward, D., Jiang, C., Nemeth, M., Burns, J., 2006. Results of a 90-day safety assurance study with rats fed grain from corn rootworm protected corn. Food and Chemical Toxicology, 44: 147-160.”

This study deals with MON863 and does not cover 90 days feeding test with MON810!

EFSA has either cited, or worse, analyzed a study on MON863 instead of MON810. Based on this data provided by EFSA we have to conclude that the safety evaluation of MON810 is not valid!

- Is only the reference mis-cited, or was there, indeed, no animal feeding study analysed for MON810?

Others

EFSA refers many times to scientific literature or data without citing the source of this information. For the reader it is impossible to check, if the information provided by EFSA is based on scientific data or not.

- What is the "additional information provided in 2007"? (page 12, 2nd paragraph, line 1)

- What "bioinformatic analyses were performed"? (page 12, 1st paragraph, line 3)

- Which "previous molecular characterisation of maize MON810" does EFSA refer to? (page 11, 3rd paragraph, line 3)

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3. Environmental risk assessment

The extent and seriousness of the potential effects of GM insect-resistant crops on non-target organisms will depend on geographical factors as the same Bt maize plant could generate different ecological consequences in different biogeographical regions (Snow et al. 2005). The environmental risk assessment therefore needs to be region specific. Given the diversity of agricultural practices in Europe and the regional variation in species composition and abundance, environmental risk assessment of MON810 maize in Europe requires a regional approach. For example, in regions with small-scale farming the interactions between MON810 maize and the surrounding ecosystems will be of orders of magnitude greater than in regions with large-scale MON810 cultivation (Knols & Dicke 2003).

- We would like EFSA to provide an overview of the potential impacts of MON810 maize on non-target organisms for the specific conditions in each biogeographic region of the EU?

EFSA built its own simulation model to evaluate the potential impacts of MON810 on non-target Lepidoptera. "In order to explore possible scenarios for the exposure of European species of butterflies to maize MON810 pollen, the EFSA GMO Panel built a simulation model to help quantify the risk assessment." This is simply unacceptable. EFSA prides itself on only taking peer-reviewed studies into account. Yet this simulation has not been subject to peer-review, or indeed, any type of review. It is simply concocted by members of the panel. This is no way to conduct an environmental risk assessment and should be inadmissible.

- What is the justification behind using a non peer-reviewed study to conduct the key analysis of the possible effects MON810 may have on non-target Lepidoptera?

- How can the scientific validity of the model used by EFSA be assessed?

References: Snow, A.A., Andow, D.A., Gepts, P., Hallerman, E.M., Power, A., Tiedje, J.M. & Wolfenbarger, L.L. (2005) Genetically engineered organisms and the environment: Current status and recommendations. Ecological Applications 15: 377 – 404. Knols, B.G..J. & Dicke, M. (2003) Bt-crop risk assessment in the Netherlands. Nature Biotechnology 21: 973 – 974.

4. Conclusions and recommendations

MON810 cannot be considered safe and should not be authorised neither for food/feed uses nor for cultivation.

5. Others

EFSA has failed to follow European law and one of the basic principles of science – clearly identifying uncertainties. This in sharp contrast to other scientific bodies, such as the Intergovernmental Panel on Climate Change (IPCC), who clearly indicate the level of uncertainty and agreement within the panel and have developed a methodology for doing so (Risbey & Kandlikar 2007).

References: Risbey, J.S. & Kandlikar, M. (2007) Expressions of likelihood and confidence in the IPCC uncertainty assessment process. Climatic Change 85:19–31.

Organisation: The American Academy Of Environmental Medicine
Country: Non EU
Type: Scientific Institution

a. Assessment:
Molecular characterisation

abrogates natural reproductive processes, selection occurs at the single cell level, the procedure is highly mutagenic and routinely breeches genera barriers, and the technique has only been used commercially for 10 years.

Comparative analysis (for compositional analysis and agronomic traits and GM phenotype)

Several animal studies indicate serious health risks associated with GM food consumption including infertility, immune dysregulation, accelerated aging, dysregulation of genes associated with cholesterol synthesis, insulin regulation, cell signalling, and protein formation, and changes in the liver, kidney, spleen and gastrointestinal system.

It appeared that over time GMO harvest yields were lower than conventional yields and required over time, more not less, highly toxic herbicidal chemicals such as glyphosate.

b. Food Safety Assessment:
Toxicology

Specificity of the association of GM foods and specific disease processes is also supported. Multiple animal studies show significant immune dysregulation, including upregulation of cytokines associated with asthma, allergy, and inflammation. Animal studies also show altered structure and function of the liver, including altered lipid and carbohydrate metabolism as well as cellular changes that could lead to accelerated aging and possibly lead to the accumulation of reactive oxygen species (ROS).

Changes in the kidney, pancreas and spleen have also been documented. A recent 2008 study links GM corn with infertility, showing a significant decrease in offspring over time and significantly lower litter weight in mice fed GM corn. This study also found that over 400 genes were found to be expressed differently in the mice fed GM corn.

These are genes known to control protein synthesis and modification, cell signalling, cholesterol synthesis, and insulin regulation. Studies also show intestinal damage in animals fed GM foods, including proliferative cell growth and disruption of the intestinal immune system.'

Others

There is more than a casual association between GM foods and adverse health effects. There is causation as defined by Hill's Criteria in the areas of strength of association, consistency, specificity, biological gradient, and biological plausibility. The strength of association and consistency between GM foods and disease is confirmed in several animal studies.

The several thousand field trials over the last 20 years for genes aimed at increasing operational or intrinsic yield (of crops) indicate a significant undertaking. Yet none of these field trials have resulted in increased yield in commercialized major food/feed crops, with the exception of Bt corn.'

3. Environmental risk assessment

'Multiple animal studies have shown that GM foods cause damage to various organ systems in the body. With this mounting evidence, it is imperative to have a moratorium on GM foods for the safety of our patients' and the public's health.'

4. Conclusions and recommendations

Citing several animal studies, the AAEM concludes "there is more than a casual association between GM foods and adverse health effects" and that "GM foods pose a serious health risk

in the areas of toxicology, allergy and immune function, reproductive health, and metabolic, physiologic and genetic health."

The AAEM calls for:

* A moratorium on GM food, implementation of immediate long term safety testing and labeling of GM food.

* Physicians to educate their patients, the medical community and the public to avoid GM foods.

* Physicians to consider the role of GM foods in their patients' disease processes.

* More independent long term scientific studies to begin gathering data to investigate the role of GM foods on human health.

The German Minister of Agriculture recently issued a prohibition of planting for Monsanto MON810 GMO corn.

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5. Others

The American Academy Of Environmental Medicine Calls For Immediate Moratorium On Genetically Modified Foods http://aaemonline.org/gmopressrelease.html

The AAEM's position paper on Genetically Modified foods can be found at http://aaemonline.org/gmopost.html

Contact Information

Dr. Amy L. Dean, D.O. Public Relations Chair Member, Board of Directors American Academy of Environmental Medicine 734-213-4901 environmentalmed@yahoo.com

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6. Labelling proposal

Please label all GM food. If you think that there is no big difference with its conventional counterpart, that there is no reason to hide it. Be open, show it, there is nothing to be afraid!

EUROPEAN CONSUMERS DEMAND TO BAN AND LABEL GM FOODS! IT'S OUR ESSENTIAL RIGHT TO ASK YOU FROM!

Organisation: NGO
Country: Non EU
Type: Individual

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a. Assessment:
Molecular characterisation

Insect damage to maize can lead to increased infection by mycotoxigenic fungi such as Fusarium verticillioides (Sacc.) Nirenberg, which produce fumonisins.

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4. Conclusions and recommendations

Fumonisins are toxic to a number of animal species. They produce fatal brain damage (leukoencephalomalacia) when corn grain contaminated with fumonisins are fed to horses. Fumonisins cause death in swine by producing pulmonary edema; liver and kidney damage occurs frequently in many animal species exposed to high levels of fumonisins. Fumonisin B1, the most abundant form of fumonisins produced by Fusaria, produced kidney cancer when fed to rats and liver cancer when fed to mice throughout most of their life span. Fumonisins may contribute to the high rates of esophageal and liver cancer in subsistence farmers in Africa and China. They consume corn as the major component of their diet which is highly contaminated with fumonisins. As a consequence of health concerns from dietary exposure to fumonisins, the FDA has proposed action levels for fumonisin contamination of corn grain used for human food and animal feed.

Organisation: csfv49
Country: France
Type: Individual

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a. Assessment:
b. Food Safety Assessment:
Toxicology

existe t'il des études réalisées sur la toxicité du pollen d'abeilles contaminé par le mon810 et consommé par les humains. CE POLLEN destiné à la consommation humaine peut être contaminé jusqu'à 39% dans les trappes à pollen. voir essai réalisé par M.Coudoin en gironde.

Allergenicity

Mème question pour les allergies

Organisation: Testbiotech e.V.
Country: Germany
Type: Non Profit Organisation

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a. Assessment:
b. Food Safety Assessment:
Toxicology

In 2009 a peer reviewed article was published about synergism, efficacy and selectivity of toxins derived from Bacillus thuringiensis (Then C., 2009, Risk assessment of toxins derived from Bacillus thuringiensis - synergism, efficacy, and selectivity, Environmental Science and Pollution Research, http://dx.doi.org/10.1007/s11356-009-0208-3). This article shows inter alia that (1) the mode of action of Cry1Ab is not fully understood and that contradicting theories have even been published in the last few years. (2) Further it shows that a linear dose-response relationship is not the only (or even typical) way the Bt toxin interacts with susceptible organisms. Apparently there are severeal external factors that can impact the toxicity of Bt toxins. (3) The synergism as mentioned can also influence the selectivity of the Bt toxin as produced in plants.

These aspects can be highly relevant for the risk assessment of plants such as MON810, but are not mentioned by EFSA. EFSA refers to some of the most relevant publications (Broderick et al, 2006 and 2009) but the decisive questions that go along with these new findings are not discussed. As the article (Then, 2009) points out, those and other recent findings put in question the scientific basis of the application as filed by Monsanto.

Further EFSA did not take into account the fact that risk assessment of the Bt producing plants is complicated because so far no general validated protocols are available for the measurement of the Bt content in the plants. As far as we know no ring tested standardised methods are available to date. These methods should be a prerequisite for any risk assessment on Bt crops. A significant number of publications show that the Bt content in plants is influenced by several factors and can vary across broad ranges (some articles are listed in Then C & Lorch A, 2008, A simple question in a complex environment: How much Bt toxin do genetically engineered MON810 maize plants actually produce?, in Breckling B, Reuter H, Verhoeven R (eds) (2008) Implications of GM-Crop Cultivation at Large Spatial Scales, Theorie in der Ökologie 14. Frankfurt, Peter Lang, http://www.gmls.eu/index.php?contact=ja). These findings show the necessity for standardisation of test protocols and more investigation into the possible range of variations and the causes behind those variations.

These conclusions are relevant for food safety/ toxicology and environmental risk assessment.

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3. Environmental risk assessment

see above

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4. Conclusions and recommendations

It is recommended the opinion of EFSA be withdrawn and more data from the applicant be requested before any risk assessment can take place:

fully validated and standardized methods for measurement of the Bt content, developed and validated in cooperation with the EU authorities

comprehensive data about measurements of the Bt content in the plant under extreme conditions (such as climate stress)

systematic research in synergisms, co-factors and potential impact on non target organisms