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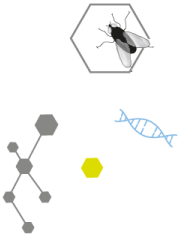

Database PlantGeneRisk | Factsheet

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Glyphosate and herbicide resistant plants

Currently, 60 genetically engineered plants (events) are allowed for import into the EU for usage in food and feed. Of these, more than 80 % are resistant to herbicides. Glyphosate is the most common herbicide used in this context.[1] However, assessment of health impacts due to glyphosate has been an internationally controversial issue since March 2015 (IARC, 2015).

There is a common understanding that commercially traded formulations of glyphosate, such as Roundup, can be more toxic than glyphosate alone. Therefore, the EU has already taken measures to remove problematic additives known as POE tallowamine from the market.[2] However, imports of genetically engineered plants resistant to glyphosate are exposed to high dosages of the herbicide in countries where they are grown, such as Argentina, Brazil and the US. There have been 16 authorisations for the import of genetically engineered plants resistant to glyphosate issued since April 2015. However, problematic additives are still allowed in those countries where the plants are cultivated.[3] The EU Commission has confirmed the respective gaps in risk assessment:

> *"A significant amount of food and feed is imported into the EU from third countries. This includes food and feed produced from glyphosate-tolerant crops. Uses of glyphosate-based plant protection products in third countries are evaluated by the competent authorities in those countries against the locally prevailing regulatory framework, but not against the criteria of Regulation (EC) No. 1107/2009. (…)."*[4]

The European Food Safety Authority (EFSA) agrees that further investigations and data are needed (EFSA, 2015).
There is also agreement amongst experts that combinations of glyphosate with other herbicides, such as 2,4-D, glufosinate, dicamba and isoxaflutole, can lead to cumulative effects which can cause toxicity to exceed the effects of the single substances (Reuter, 2015). In this context, the relevant data to assess those health effects are completely missing. This problem has been recognised by the EU Commission – although this is at odds with their incorrect assertion that there are currently no suitable methods of investigating such effects (MRL stands for Maximum Residue Level):

> *„It is true that the legislation requires cumulative and synergistic effects of pesticide residues to be considered in the MRL setting, but only when the methods for assessment will*

[1] http://www.testbiotech.org/en/database
[2] https://ec.europa.eu/germany/news/glyphosat-eu-staaten-schr%C3%A4nken-beistoffe-und-nutzung-ein_de
[3] http://dip21.bundestag.de/dip21/btd/18/073/1807373.pdf
[4] www.testbiotech.org/node/1637

be available. This is not yet the case and the legislation recognises that further work in this respect is needed.“[5]

Despite all the concerns about potential health impacts, the EU Commission has allowed plants for import, such as the genetically engineered soybean FG 72 produced by Bayer. The harvest of these soybeans is burdened with residues from spraying with isoxaflutole and glyphosate. Isoxaflutole as a single substance is classified as a 'suspected human carcinogen (EFSA, 2017a). There was no investigation of potential interactions of the residues from spraying with these herbicides (Testbiotech, 2016). It appears that the EU-Commission has been influenced by threats from industry; industry stated that feed supplies to the EU would be endangered if market authorisation were not issued.[6]

Just recently, EFSA published further opinions in favour of importing further genetically engineered soybean varieties that can be sprayed with a mixture of glyphosate, isoxaflutole and glufosinate (EFSA, 2017b) or a mixture of glyphosate, glufosinate and 2,4-D (EFSA, 2017c). Glufosinate is also suspected of having negative impacts on health (EFSA, 2005). The EU approval of the active substance is therefore due to expire in 2018 (European Commission, 2015). In the case of 2,4-D, recent publications suggest that carcinogenic metabolites are produced in genetically modified plants (Lurquin, 2016).

In particular, despite all the indications pointing to significant health risks from 2,4-D and isoxaflutole, there has been no detailed investigation of the degradation products of the herbicides in genetically engineered soybeans. Even the EFSA says that industry failed to provide sufficient data in the case of isoxaflutole (EFSA, 2017d).
In this and many other cases, there was no investigation of potential interactions of the residues from spraying with these herbicides. (Testbiotech, 2017).

Health risks can also emerge from interactions between plant ingredients. For example, soybeans naturally contain large amounts of allergenic and estrogenic substances. Risks to health from these ingredients can be enhanced by the degradation products of the herbicides. In a recent study, disturbances were found in the hormonal system of young rats fed with soy milk in combination with glyphosate (Nardi et al, 2016).

Over and above this issue, the risk assessment of genetically engineered plants needs to be completely revised in regard to the residues from spraying with the complementary herbicides. For example, it should also be taken into account that permanent exposure to these residues can impact human and animal health through changes in the intestinal microbiome: The residues might lead to a change in the composition of the microorganisms, and thereby increase the probability of diseases. It is known that glyphosate can change the composition of soil microorganisms (see, for example, EFSA, 2012). In addition, glyphosate acts as an antibiotic on some bacteria such as *E. coli* (Forlani et al., 1997; Carlisle & Trevors, 1988). Thus, it is not at all unlikely that the intestinal microbiome can be affected.

Many genetically engineered plants have been developed to be sprayed with specific herbicides. The respective residues are unavoidable constituents in derivative food and feed. Therefore, they must be assessed before being approved. EU Regulation 1829/2003 requests that genetically engineered plants can only be allowed for import as food and feed if they are shown to be safe as a

[5] www.testbiotech.org/sites/default/files/11_letter_from%20Commission_August_2016.pdf
[6] http://www.politico.eu/wp-content/uploads/2016/06/20160607-ASA-and-USSEC-Letter-to-Commissioner-on-3-soybean-authorizations.pdf

whole. If these plants are burdened with a combination of potentially toxic residues, they must be assessed before any authorisation can be issued.

In conclusion, no more authorisations should be issued for genetically engineered plants until residues from spraying have undergone comprehensive health risk assessment.

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