

Bayer's Double Trouble

When genetically
engineered rice meets
a toxic pesticide



BRIEFING

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Our most important staple crop – rice – risks being contaminated by a genetically engineered (GE) variety that is tolerant to the toxic pesticide, glufosinate.





Bayer's Double Trouble

The GE rice has been developed by Bayer CropScience AG, a subsidiary company of the German chemical giant Bayer AG. The rice – technical name LL62 – has been genetically-engineered to withstand high doses of glufosinate, sprayed on rice fields by farmers to control a wide range of weeds. The weeds will die, the GE rice will survive.

Any use of the Bayer GE rice will lead to an increased use of the toxic herbicide – undoubtedly boosting sales of Bayer's glufosinate as a consequence. It will also lead to higher risks for farmers, consumers and the environment. Glufosinate is considered to be so dangerous to humans and the environment that it will soon be banned in Europe in accordance with recently-adopted EU legislation.

Currently, Bayer is pushing for legal approval of its GE rice in Brazil, South Africa, the EU, India and the Philippines. In the USA, the Bayer GE rice has already been approved for commercial planting, although farmers in the US are reluctant to plant it. They fear the loss of important markets due to the risks of accidental contamination, and not without reason. Bayer already has a history of causing damages that have been estimated at more than USD 1.2 billion to the global rice industry, when one of its experimental GE rice varieties accidentally entered global rice supplies in 2006.

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The risks of glufosinate

High risk to human health

Glufosinate is a pesticide that is used to control a wide range of weeds in crop fields, and also as a desiccant to dry out crops before harvest. It is registered for use in more than 40 countries under a number of trade names including Basta, Rely, Finale, Challenge and Liberty.

Compared to other herbicides, glufosinate is a comparatively toxic pesticide and has been criticised by governments. It poses a considerable risk to farmers, harms insects in surrounding areas and is potentially dangerous for consumers when eating food containing residues of the herbicide.¹ The evidence against glufosinate is so strong that it is among 22 agrochemicals that will soon have to be phased out across Europe.²

When the EU reviewed the authorisation of glufosinate a few years ago, the European Food Safety Authority (EFSA) in 2005 concluded that:

- The toxic residue level in potatoes on which glufosinate had been used posed 'an acute risk for toddlers';
- 'A high risk to mammals' had been identified;
- Farmers using glufosinate on genetically-engineered maize were being exposed to unsafe toxic concentrations, even when protective equipment was being used; and
- A 'high risk' had been identified for insects and wild plants even outside the sprayed fields, which might lead to a serious loss of biodiversity.

A European Commission working group suggested classifying glufosinate as a 'possible risk of harm to the unborn child' and that it 'may impair fertility'.³ The EFSA study from 2005 states very clearly: "the critical effect of glufosinate-ammonium is severe effects on reproduction toxicity".⁴

Residues in food

Glufosinate residues in food are an area of concern, especially when glufosinate is used as a desiccant. Glufosinate residues can be found, for example, in pre-harvest treated potatoes.

Also for Bayer's GE rice, it is highly likely that toxic residue levels remain in harvested rice. Because of the engineered gene, the rice can be treated, in much later stages of development, with comparatively high glufosinate concentrations. According to the US Environmental Protection Agency, processing studies of Bayer's GE rice showed that glufosinate and its metabolites were found in all processed rice commodities.⁵ Boiling or cooking does not destroy these residues.⁶

Glufosinate is applied to potatoes just before harvesting to kill the green crop above the ground. Glufosinate residues are then found in the potatoes, and are not affected by boiling. When glufosinate was being assessed by the European Union, it was predicted that its use on potatoes could lead to an acute risk for 4-6 year old children consuming treated potatoes. The safety margin between the limit for single high exposure (acute reference dose) for toddlers and the level of glufosinate that caused severe effects in dogs, including damage to the heart and death, was extremely narrow.

The risks of Bayer's GE rice

Based on the company's own data, it must be concluded that Bayer CropScience's GE rice does not have the same nutritional value as its natural counterparts. There are significant differences in composition, especially for two vitamins (E and B5), calcium, iron and erucic acid (a monounsaturated omega-9 fatty acid). This difference was consistent across up to 14 different sites where the rice varieties tested had been growing for over two years.⁷

Apparently, key genetic sequences and metabolic pathways have been interrupted by the newly-inserted gene, leading to as yet unknown changes in the GE rice's metabolism. This has been acknowledged by EFSA: 'The compositional data obtained from individual locations showed statistically significant differences in the level of several compounds'.⁸

Comparing GE rice with a wide range of non-GE rice varieties that vary naturally in their composition is a ploy commonly used by GE companies to ignore these differences. From a safety point-of-view, however, it is important to compare a GE variety directly with its sister variety. Consistent differences when making this direct comparison indicate a major unintended shift in the metabolism with unknown and unforeseeable consequences for human health.

Independent studies on the safety of GE crops for either animals or humans are severely lacking in scientific literature.⁹ We simply do not know if GE crops are safe for animal or human consumption because long-term studies have hardly ever been performed.

There is no doubt, however, that GE crops have a greater potential to cause allergic reactions than those produced by conventional breeding,¹⁰ and a recent study by the Austrian government showed that GE maize had a negative effect on the reproduction of mice.¹¹ Taking the reprotoxic effect of glufosinate into account, major concerns for human health must be raised.





The risks of superweeds

Any use of Bayer CropScience's GE rice will lead to an increase in the spraying of herbicides in the fields to get rid of weeds. However, there is a high risk that, in the mid-term, farmers will suffer from more weeds in rice fields that are difficult to control because they have become resistant to herbicides.

An important weed in rice is the so-called 'wild rice' – weeds that are similar to rice, and which can readily cross with cultivated rice. It is likely that, through the process of sexual reproduction, these weeds will acquire the new artificial gene that confers glufosinate resistance, and will subsequently become a major burden in all rice-growing areas. This passing on of herbicide-tolerant genes from the GE rice to 'wild rice' would have grave consequences. Once they have been integrated into the weeds' population, the herbicide-tolerant genes cannot be eradicated; the feral populations of 'wild rice' would persist and provide a reservoir of herbicide-tolerant genes that would, in turn, contaminate conventional rice.

Similar effects have already been noted with widely planted GE crops that are resistant to another herbicide, glyphosate. Glyphosate-resistant weeds are now occurring in direct association with Roundup GE crop cultivation in many parts of the USA.¹² In Argentinian GE soybean fields, new weeds tolerant to glyphosate are replacing the weeds usually found in the fields.¹³ Other more notorious herbicides are now being advertised to control glyphosate-resistant weeds.¹⁴

GE crops tolerant to glufosinate have not been widely planted but, if they are, weed resistance to this herbicide will undoubtedly become a problem. There are both economic implications because of the additional herbicide costs to farmers, and environmental implications because of the increased and stronger herbicides that will become necessary as a result.

Bayer's GE rice – a 1.2 billion dollar burden on the global rice industry

In 2006, a major scandal erupted as world rice supplies were discovered to be contaminated with an unapproved GE rice variety from Bayer CropScience. Field trials in the US led to Bayer GE rice variety entering global food supply chains. Contaminated food stocks were found on and pulled from shelves in stores and supermarkets across the world. Widespread bans on US-produced rice were enacted.

As a result, farmers, millers, traders and retailers around the globe are facing massive financial costs, including testing and recall costs, cancelled orders, import bans, brand damage and consumer distrust.

The global costs from this one contamination event – which arose from a single, small-scale field trial – have been estimated to be up to 1.285 billion dollars.¹⁵

Bayer CropScience tries to evade any liability for these damages by calling the contamination an 'Act of God'.¹⁶

Conclusion:

Stay away from Bayer's GE rice!

At present, no genetically-engineered rice is grown commercially anywhere in the world. Other big companies have abandoned any intentions to market GE rice and, with rice being the world's most important staple crop, most countries have shied away from allowing risky experimentation with it.

Bayer, however, seems to recognise no borders and it is aggressively trying to force GE rice into markets in Brazil, Europe, Africa and Asia.

For half of the global population, rice is daily food. But Bayer's 'double trouble' – GE rice and glufosinate – are putting farmers' and consumers' health at risk. The high likelihood of new superweeds is a direct threat to food security and global rice markets will suffer financial consequences if Bayer's rice runs wild – again – and causes accidental contamination of global rice supplies.

Greenpeace Demands

- 1)** Greenpeace demands that Bayer stops the marketing of its GE rice globally.
- 2)** We ask the governments of Brazil, South Africa, the Philippines, the European Union and all other countries to protect their own crops and fields by rejecting Bayer's GE rice, and to stop GE rice field trials.
- 3)** We ask all farmers to protect their own fields and crops from GE rice, which can only ever bring with it economic loss and environmental threats.
- 4)** We ask all market stakeholders – from traders and processors to food companies and supermarkets – to say a clear 'No!' to GE rice.

GREENPEACE

Greenpeace is an independent global campaigning organisation that acts to change attitudes and behaviour, to protect and conserve the environment and to promote peace.

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