Hand holding grain © Bart Sadowski

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Genome editing in agriculture

A Greens/EFA perspective

Biodiversity and ecosystems are under extreme threat, with around one million species facing extinction. To avert the worst consequences of runaway climate change, urgent action needs to be taken now.

In order to respond to these unprecedented and closely interlinked crises, our food and agricultural systems need to be rapidly transformed. High input, industrial farming based on monocultures and factory farming must be replaced by high biodiversity,

locally adapted food production systems, ones which produce healthy food while respecting animal welfare and the environment. Indeed, according to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), 'feeding the world in a sustainable manner, especially in the context of climate change and population growth, entails food systems that ensure adaptive capacity, minimize environmental impacts, eliminate hunger, and contribute to human health and animal welfare'. Sustainable agricultural production options include agro-ecological practices and organic agriculture.

On the horizon, a new set of genetic engineering techniques, collectively known as 'genome editing', are being touted as part of the solution to the climate crisis. Despite the hype, however, these techniques are not compatible with agro-ecological and organic agriculture. Furthermore, since genome-edited crops and animals are being patented, small farmers and breeders will not be able to save and exchange their seeds, ruling out the possibility of them developing locally adapted crops and breeds. On the other hand, conventional breeding has already provided many useful traits, such as drought resistance and increased yield.

Patents on transgenic genetically modified crops have led to the monopolisation of the commercial seed sector by a handful of companies. Transgenic crops are, almost without exception, either herbicide tolerant or produce their own toxic insecticides, or both. Both traits have led to harmful impacts on biodiversity whilst posing risks to human health. With the seed giants profiting from the joint marketing of their patented herbicide tolerant GM seeds and the 'complementary' herbicides, this trend is likely to continue with genome editing. Indeed, the first commercially available genome-edited crop is herbicide tolerant.

Genetically modifying farm animals can have serious consequences for animal welfare as well as aiding intensive agricultural systems in pushing animals even further beyond their physiological limits. It often

involves cloning, which leads to birth defects, spontaneous abortions and early postnatal death. For this reason, a ban on both the cloning and genetic engineering of animals is needed.

A growing body of scientific research highlights the unintended off-target and on-target genetic changes brought about by genome editing, both in plants and animals. These changes may impact food safety as well as having environmental impacts. In order to protect human health and the environment, therefore, genome-edited crops and animals should be subject to stringent risk assessment. They should also be labelled and traceable throughout the food chain. Such requirements are already laid down in EU GMO legislation, applicable to genome-edited products as ruled by the European Court of Justice (ECJ) in 2018. Any legislative proposals from the European Commission which attempt to differentiate between the products of genome editing and more established genetic engineering techniques should be opposed.

This paper outlines why trying to 'edit' the genome of crops and animals does not provide a meaningful solution to the climate and biodiversity crises and, therefore, why we are opposed to the use of GMOs for agricultural purposes. It also outlines why, in order to uphold the precautionary principle, as well as the ECJ ruling, swift and full implementation of EU GMO legislation in relation to genome-edited crops and animals is urgently needed. Whilst this paper focuses on the use of agricultural products for food and feed purposes, the Greens/EFA group remain cautious about the use of GMOs to produce medicinal proteins; even if they could be accepted in vitro, we cannot accept them when their medical or commercial use leads to field cultivation.

The dangers of gene drives, a particular application of CRISPR technology, is also examined. The paper concludes with a set of demands to the European Commission and Member States.

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