Why plants obtained from new genetic engineering should not be deregulated

TEST BIOTECH

Testbiotech
Institute for Independent Impact Assessment in Biotechnology

The EU Commission is currently planning extensive deregulation of plants obtained from new genetic engineering (or new genomic techniques, NGTs). This briefing explains why the proposal should be rejected.

Why plants obtained from new genetic engineering should not be deregulated

A critical appraisal of the European Commission proposal

THE CONTEXT OF THE POLITICAL DEBATE

We must protect nature and the environment from genetic engineering!

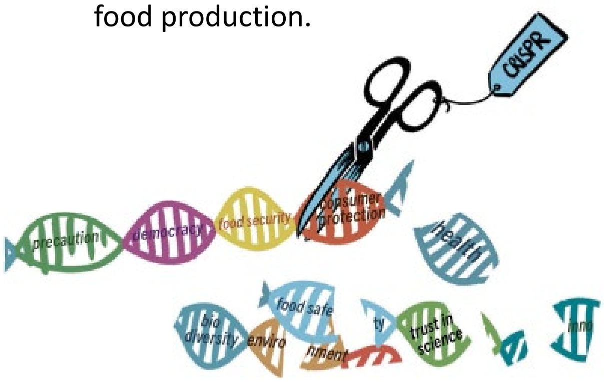
Genetic engineering techniques and tools, e.g. the CRISPR/Cas gene scissors, now make it possible to genetically engineer every gene in every form of life and spread these genetic alterations to entire species.[1]

Disruptive times, disruptive technology

We are living in disruptive times. Wars, social division, climate change, species extinction and new technologies: Societies and ecosystems are often no longer able to adapt – with their destruction as the ultimate result. Genetic engineering is also a disruptive technology, says Corteva, the world's most important player in patent applications on NGT plants.[2] Thereby, they hope to make the technology more attractive to investors.

The particular problem with genetic engineering is that it affects our livelihoods and the future of biodiversity. The possible disruptions can have impacts on several levels:

- processes within the genome and cells,
- interactions within the ecosystems,
- processes in breeding, agriculture and food production.



THE TECHNOLOGY

Why can CRISPR/Cas gene scissors do more than conventional breeding?

The characteristics of species have developed through evolution and co-evolutionary processes. Conventional plant breeding can only change these characteristics to a limited extent. There are certain limitations and constraints. Evolution has led to biological mechanisms and processes that protect species from too many genetic changes of essential gene functions within short periods of time.

CRISPR/Cas gene scissors can overcome many of these limitations, and thus either change the characteristics of a species or add new ones (Kawall, 2019). The technical processes and outcomes of NGT processes cannot regarded as equivalent to those achieved through conventional breeding.[3]

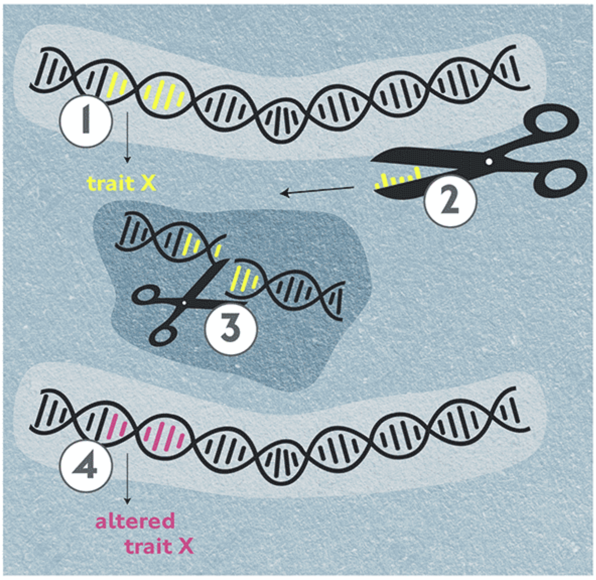
[1] https://www.testbiotech.org/publikation/what-is-a-mammoth-doing-on-mars/

[2] https://www.testbiotech.org/en/publikation/new-ge-and-food-plants-disruptive-impact-patents-breeders-food-production-and-society/

[3] https://www.testbiotech.org/en/limits-to-biotech/

How do CRISPR/Cas gene scissors work?

CRISPR/Cas (Clustered regularly interspaced palindromic repeats/CRISPR associated) consists of an enzyme (nuclease) that can cut DNA (genetic material). The enzyme is coupled with a guide molecule (RNA) that has been synthesized to mirror the desired target region in the genome. This molecule can bind to the DNA in the target region, and thus ensure that the DNA is 'cut' at a specific point. It is aimed to prevent cell repair mechanisms from restoring original gene functions, which otherwise often occurs when DNA is damaged. If the cells succeed in repair, the gene scissors can cut again as long as the gene function is finally altered or kocked-out.



What is new about of new genetic engineering?

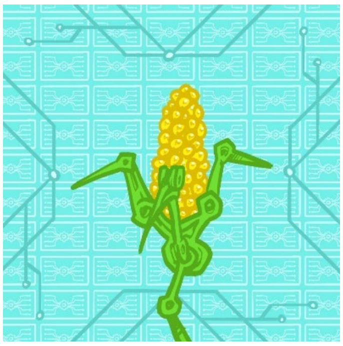
Gene scissors such as CRISPR/Cas are recombinant enzymatic mutagens (REMs), that can cause breaks in the DNA and interfere with cellular repair mechanisms. They can overcome many constraints in conventional breeding and introduce genetic changes and combinations that were previously unknown and also unlikely to occur as a result of conventional breeding method. The resulting genotypes have to be considered as 'new to the environment' (Koller 2025).

A very small number of changes, for example to alter the activity of the plants genes, are often enough to drastically alter the plant characteristics. Unlike older technologies, the new technologies no longer rely on the insertion of additional genes in order to change the characteristics of a species. It is therefore not the number of genes that matters, but the location, combination and the biological function of the genetic changes.

How precise are gene scissors?

The location of the genetic changes can be planned, but it is generally impossible to predict the intended or unintended outcomes of the genetic intervention. This makes it essential to also examine the resulting genetic material for any unintended genetic changes.

What is the role of AI?



Many companies have developed specific generative AI programs that can be used to design new NGT plants. The AI can be instructed, for example, to simultaneously keep the number of genetic changes low and maximize the effect. Using AI enables a significant acceleration in the development of new NGT plants and to circumvent regulatory requirements in order to achieve market approval as quickly as possible.

The convergence with AI opens up new dimensions for the applications of genetic scissors, which also increases the risks for the environment (Juhas et al., 2025).

PRODUCTS OBTAINED FROM NEW GENETIC ENGINEERING

What products are on the market?

As yet, only a few NGT plants, or their produce, have been brought to market or been developed for placement on the market. In the US, Bayer wants to market mustard leaves that have fewer bitter substances[4] and taste like lettuce; in Japan, a tomato with an increased gamma-aminobutyric acid (GABA) content is being marketed as a sleep-inducing and blood pressure-lowering product.[5] These are lifestyle products that are generally sold at higher prices. For other plants, such as camelina, lettuce or soybeans, it is unclear whether they are cultivated and marketed at all. Although there are dozens of field trials[6] in the EU, there are still hardly any published results to show whether these plants can be successfully cultivated.

What are the expected benefits for global nutrition and adaptation to climate change?

Little can be said so far. In theory, there is a great deal of potential to achieve: for example, resistance to fungal attack, improved drought tolerance or higher yields. But there has been no clear success so far. Although new and sometimes extreme characteristics can be induced, these plants are often susceptible to stress and are less well adapted to rapidly changing environmental conditions. Other system-oriented agroecology approaches, which focus, for example, on more diverse crop rotations and building up soil fertility, often seem more promising. Conventional breeding has also been more successful in producing certain traits (such as climate adaptation) than new genetic engineering.[7]

POLITICS

The use of new genetic engineering is not prohibited in the EU

You do not have to be against genetic engineering to demand strict regulation of the risks. If the plants are to be used in agriculture and released into the environment, it is actually the proponents who should be campaigning to ensure that only safe products can be placed on the market.

However, the European Commission is creating the impression that current regulation is basically tantamount to a ban on new genetic engineering. This is not correct, e. g. as as imports of transgenic plants on a massive scale as animal feed show.

The role of the precautionary principle

Genetic engineering regulation in the EU is based on the precautionary principle. The underlying idea is that risky technology should only be used if measures can be taken in case of damage to health and the environment. Genetically engineered organisms must therefore be assessed for risks, and their cultivation and marketing be traceable, their authorization has to be limited for a certain period of time. These principles must similarly apply to NGT plants in order to adequately protect health and the environment. The EU is also

4 https://www.testbiotech.org/en/limits-to-biotech/organisms/crispr-mustard-as-a-salad/

5 https://www.testbiotech.org/en/limits-to-biotech/organisms/crispr-tomatoes/

6 https://www.testbiotech.org/en/projects/field-trials-of-plants-derived-from-new-genetic-engineering-development-in-europe/

7 https://www.testbiotech.org/en/impact-assessment/

obliged to apply the precautionary priciple under international treaties (Cartagena Protocol).[8] However, the current Commission proposal would exempt more than 90% of NGT plants from these precautionary measures (so-called NGT 1 plants).[9]

Impending policy failure

The proposed deregulation would allow that even NGT 1 wild plants could be released into the environment and natural ecosystems without risk assessment. This would radically weaken the existing regulations for genetically engineered organisms. The basic concept: up to 20 genetic changes would be permitted. Plants in this category would not have to undergo risk assessment before being released into the environment or marketed. No labeling of food products derived from NGT 1 plants would be required. There is no scientific justification for such a "magic threshold".

The comparison with random mutagenesis

The Commission claims that 20 genetic changes would be harmless, as random mutagenesis (accelerated triggering of mutations via radiation or chemicals) can lead to a much larger number of genetic changes. In the EU, random mutagenesis is not considered to be regulated as genetic engineering, because it has been used in traditional breeding for many decades.

However, the comparison between new genetic engineering and random mutagenesis is absurd: the probability of achieving a certain combination of 20 genetic changes (and the resulting traits) with random mutagenesis is extremely low. Depending on the target sequence, even single or a few changes can hardly be achieved through breeding (Mundorf et al., 2025).

THE RISKS

Examples of small genetic changes with a big impact

A model experiment in 2025 showed that AI can be used to design NGT plants that are toxic to insects (Juhas et al., 2025). There are numerous examples of other NGT plants with novel characteristics, which despite being new to the environment, would not have to undergo mandatory risk assessment under the current deregulation proposal. They include camelina with substantially altered oil content (Morineau, C. et al. (2017), mustard with a reduced content of bitter compounds (Karlson et al., 2022), tomatoes with larger changes in the composition of ingredients (Nonaka et. al, 2017; Zsögön, et al., 2018), rice with an increased proportion of nitrogen-fixing root bacteria (Yan et al., 2020), grasses with increased seed formation (Liu et al., 2018), poplars with extremely premature first flowering (Ortega et al., 2023) and other plants with drastical changes in flowering such as adaption to pollination by robots (Testbiotech, 2026).

Examples of risks

The following environmental risks associated with NGT plants have already been described in scientific literature[10]:

- undesirable effects of altered plant composition on pollinators, plant pests and food webs,
- increased invasive potential,

[8] https://www.testbiotech.org/en/news/planned-eu-deregulation-of-ngt-plants-in-conflict-with-international-law/

[9] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52023PC0411

[10] https://www.testbiotech.org/en/publikation/convergence_ai_genetic_engineering/

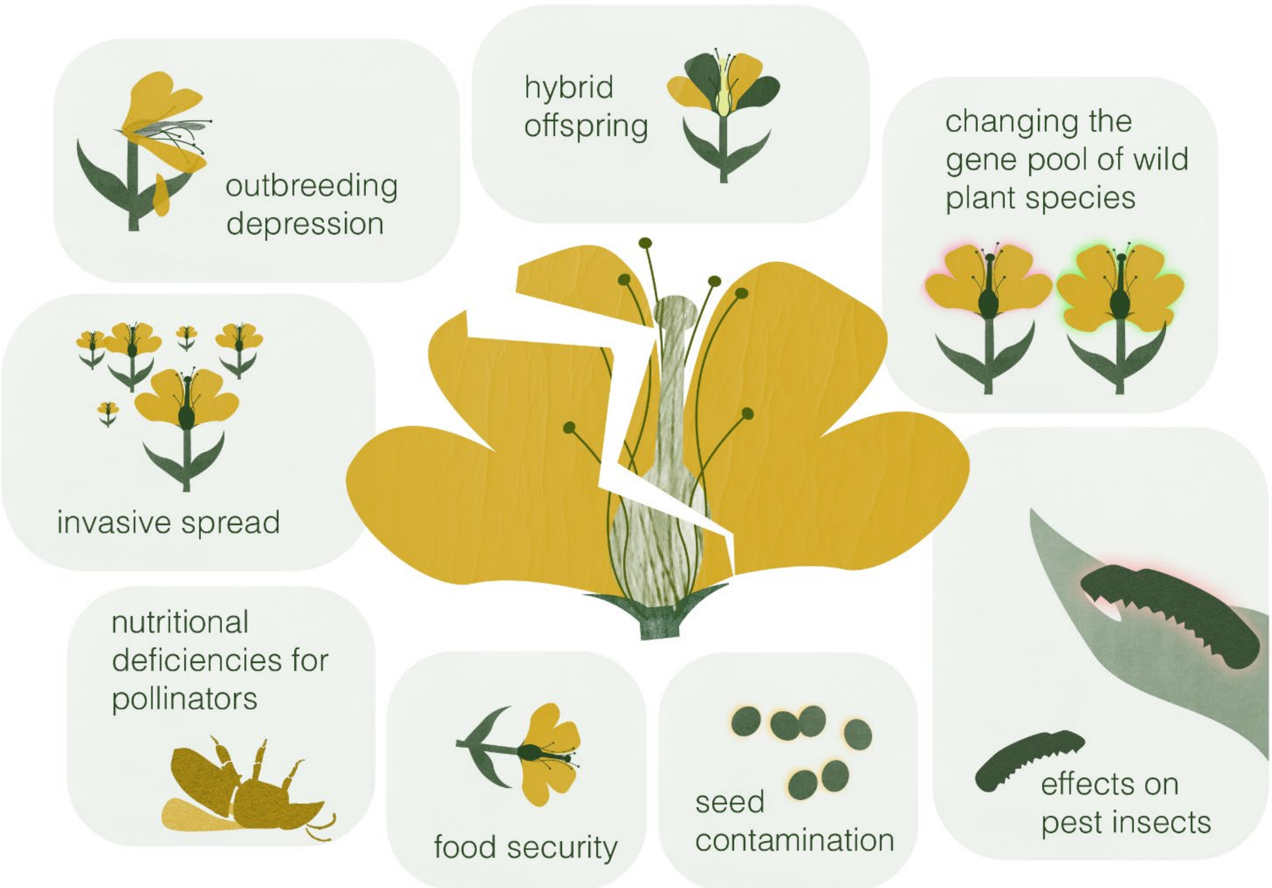
- weakening of natural plant populations,
- increased susceptibility to plant pathogens,
- yield depression,
- insect toxicity,
- changes in the composition of soil organisms with undesirable consequences,
- endangerment of protected species.

In addition, the risks to health from consuming wheat, tomatoes, mustard or oil plants (camelina) with a considerably altered composition of their ingredients need to be examined more closely (ANSES, 2024).

Overburdening ecosystems

New genetic engineering is applied on bacteria, insects, vertebrates, arable plants and wild plants alike. As a result, large quantities of organisms that are not adapted to the environment and belong to very different species could be released within short periods of time. The speed of developments and release of new genetically engineered organisms can overwhelm the adaptability of ecosystems. These are already under severe strain from climate change and species extinction, chemicals and the destruction of habitats.

At the same time, the legal framework largely ignores the systemic risks to the environment associated with many different genetically engineered organisms being present at the same time (Koller et al., 2024). So far, there has neither been a technology assessment nor an assessment of combination effects. If at all, it is only the risks associated with individual applications that are being examined. Ecosystems



and agriculture are therefore largely unprotected from a possible overload of too many novel lifeforms.

The comparison with climate change can be eye-opening: A particular problem of climate change is the extreme speed with which the concentration of greenhouse gases and thus temperatures are increasing. Similarly, the dangers that genetic engineering poses to biodiversity are not only related to the characteristics of individual organisms, but to the speed at which new traits are being introduced into existing populations without giving the environment, i.e. other species, sufficient time to adapt.

CONSEQUENCES FOR BREEDING, AGRICULTURE AND FOOD MARKETS

Protection of GMO-free food production

The EU is obliged under international treaties (Cartagena Protocol) to ensure the transparency and labelling of genetically engineered plants. Nevertheless, the Commission now wants to abolish the traceability and labelling obligations. This means that the separation of production routes, the labelling of products and the traceability of NGT plants would no longer be guaranteed by the proposed deregulation.

In principle, NGT plants, as described above, are clearly distinguishable from other plants of the same species. However, as part of the approval process, companies would need to be obliged to provide precise details of the genetic changes carried out, as well as a suitable identification method.

Patents

Genetic engineering processes as well as any ensuing plants and animals can be patented in the EU. In some cases, these patents also claim plants with characteristics originating from conventional breeding. This means that breeding, agriculture and food production are becoming increasingly dependent on (large) companies that file applications for patents on seeds. If new genetic engineering is introduced into EU agriculture, it can be assumed that this will strongly increase the concentration process in the seed industry. The Commission has so far refused to prohibit or even restrict the patentability of seeds.

DEMANDS

Essential minimum standards for a future EU regulation of genetic engineering should include:

- Every organism must be tested for intended and unintended genetic changes.
- Releases must be controllable in terms of time and space.
- Transparency, traceability and labelling must be guaranteed throughout the entire production chain.
- Patents must be restricted to genetic engineering processes.

Without these minimum standards, the proposal for the future regulation of NGT plants must be rejected.

RESOURCES

ANSES (2024) Risques et enjeux socio-économiques liés aux plantes NTG, Avis de l'Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail relatif aux méthodes d'évaluation des risques sanitaires et environnementaux et des enjeux socio-économiques associés aux plantes obtenues au moyen de certaines nouvelles techniques génomiques (NTG) (Saisine n° 2021-SA-0019). Maisons-Alfort: Anses, 324 p.
https://www.anses.fr/fr/content/actu-nouvelles-techniques-genomiques

Juhas M., et al. (2025) Combining AI and new genomic techniques to 'fine-tune' plants: Challenges in risk assessment. Front. Plant Sci, 16: 1677066.
https://doi.org/10.3389/fpls.2025.1677066

Karlson D., et al. (2022) Targeted Mutagenesis of the Multicopy Myrosinase Gene Family in Allotetraploid Brassica juncea Reduces Pungency in Fresh Leaves across Environments. Plants, 11(19): 2494.
https://doi.org/10.3390/plants11192494

Kawall K. (2019) New possibilities on the horizon: genome editing makes the whole genome accessible for changes. Front Plant Sci, 10: 525.
https://doi.org/10.3389/fpls.2019.00525

Kawall K. (2021) Genome-edited Camelina sativa with a unique fatty acid content and its potential impact on ecosystems. Environ Sci Eur, 33(1): 1-12.
https://doi.org/10.1186/s12302-021-00482-2

Koller F. (2025) The Potential of NGTs to Overcome Constraints in Plant Breeding and Their Regulatory Implications. Int. J. Mol. Sci. 26, 11391
https://doi.org/10.3390/ijms262311391

Koller F., et al. (2024) Environmental risk scenarios of specific NGT applications in Brassicaceae oilseed plants. Environ Sci Eur, 36(1): 189.
https://doi.org/10.1186/s12302-024-01009-1

Liu Y., et al. (2018) Targeted mutagenesis in tetraploid switchgrass (*Panicum virgatum L.*) using CRISPR/Cas9. Plant Biotechnol J. 16(2): 381-393.
https://doi.org/10.1111/pbi.12778

Morineau, C., et al. (2017) Selective gene dosage by CRISPR-Cas9 genome editing in hexaploid Camelina sativa. Plant Biotechnol. J. 15, 729–739.
https://doi.org/10.1111/pbi.12671

Mundorf J., et al. (2025) The European Commission's Regulatory Proposal on New Genomic Techniques in Plants: A Spotlight on Equivalence, Complexity, and Artificial Intelligence. Environ. Sci. Eur. 37, 143
https://doi.org/10.1186/s12302-025-01199-2

Nonaka S., et al. (2017) Efficient increase of ɣ aminobutyric acid (GABA) content in tomato fruits by targeted mutagenesis. Sci Rep, 7: 7057.
https://doi.org/10.1038/s41598-017-06400-y

Ortega M.A., et al. (2023) In vitro floral development in poplar: insights into seed trichome regulation and trimonoecy. New Phytol, 237(4): 1078-1081.
https://doi.org/10.1111/nph.18624

Testbotech (2026) Manipulated flowering in NGT plants: A crack in ecosystems,
https://www.testbiotech.org/publikation/manipulated-flowering-in-ngt-plants-a-crack-in-ecosystems/

Yan D., et al. (2022) Genetic modification of flavone biosynthesis in rice enhances biofilm formation of soil diazotrophic bacteria and biological nitrogen fixation. Plant Biotechnol J, 20(11): 2135-2148.
https://doi.org/10.1111/pbi.13894

Zsögön A., et al. (2018) De novo domestication of wild tomato using genome editing. Nat Biotechnol, 36: 1211-1216.
https://doi.org/10.1038/nbt.4272

As of January 2026

IMPRINT

Testbiotech e.V.
Institute for Independent Impact Assessment of Biotechnology
Frohschammerstr. 14
D-80807 München
Tel.: +49 (0) 89 358 992 76
info@testbiotech.org
www.testbiotech.org
Executive Director: Dr. Christoph Then

Testbiotech is an independent institute for impact assessment in the field of genetic engineering. Our work is strictly based on scientific principles and evaluates the available information from the perspective of protecting health, the environment and nature. Testbiotech is free of any interests in the development, application and marketing of genetically engineered products.

We are funded by private donations, public project and foundation funds.