

FACT SHEET

AGROECOLOGY & THE THREAT OF GENE EDITING

Until very recently, genetic engineering had largely fallen off the food and farming agenda. For a long time, before the government's 2021 public consultation on deregulating gene editing technologies, it was rare for it to be included in discussions or actions aimed at raising awareness of food systems and food sovereignty in the UK.

Supporters of agroecology may even feel that their values and approaches to farming are so radically different from those of biotechnologists, that genetic modification poses no threat to them.

Agroecology is not a priority in UK government plans for the future of farming. Gene editing and other biotechnologies, on the other hand, feature heavily in the UK's agricultural, environmental, industrial and economic strategies – and that political support is a direct threat to agroecology.

New language, same technology

Gene editing is a type of genetic engineering. Over the years there has been a flow of technological 'upgrades' in the process, but all forms of genetic engineering alter a living organism's genome by direct intervention at the level of DNA rather than through sexual reproduction – and, for this reason, all are currently regulated.

Like other forms of genetic engineering, **gene editing produces genetically modified organisms (GMOs)**. Public concern over GMOs in food and farming has prompted governments and other promoters of genetic technologies to downplay their agendas by using vague language such as 'new breeding techniques', 'sustainable intensification', 'nature based solutions', 'precision breeding', 'speed breeding', 'nature identical' and the 'bioeconomy'.

At the same time, because gene editing has so often been excluded from public and civil society discussions around food system transition, many have no idea of how fast the technology is



developing and how widespread its potential applications in food and farming have become.

The biotech horizon is growing

Genetically engineered commodity crops are what most people think about when they think of GMOs. For the last 25 years just two traits have dominated agricultural GMOs:

- **Herbicide resisters** – engineered to withstand spraying with weed killers like glyphosate and dicamba. This means farmers can spray the herbicides onto their fields and the engineered crop will remain unaffected.
- **Insecticide producers** – engineered to produce their own insecticide so that when insects eat them, the insects die.

Over time, weeds and insects have evolved a tolerance to these chemicals, and farmers have resorted to using ever greater quantities and mixtures of pesticides – escalating a chemical arms race that harms people, plants and the environment.

Today, however, genetically engineered crops like these are just one part of a bigger picture. Genetic technology is advancing in many different directions and the industry is finding multiple new ways to apply it to food and farming, including:

- **Gene-edited livestock.** Genetic technologies in agriculture and aquaculture are being used to push farmed animals beyond their physiological limits and make them 'fit' better into industrial livestock systems.
- **Gene-edited insects.** Instead of reducing pesticide use, gene-editors are attempting to redesign beneficial pollinators such as bees to be less susceptible to pesticides.

- **Gene drives.** Used to override the laws of inheritance, this technology turns fields into laboratories to spread genetic modifications quickly through plants and animals in the living environment. Because they are intended for use in open fields, gene drives are being touted as 'natural'. But we still don't know the full extent of how they might interact with the natural world or what their potential for harm is.
- **RNAi sprays.** Sprayed directly onto plants in the field, these disrupters change the way genes function without changing a plant's DNA. Currently they are being trialled for pest and disease control, but planned future uses include attempts to boost yields and speed-up ripening.
- **Synthetic biology,** or synbio. Re-engineers microorganisms like bacteria, algae and yeasts to produce substances they would not normally produce e.g. food ingredients/flavourings like vanilla, saffron, stevia, coconut and cocoa, as well as vegan alternatives to meat and dairy. Synbio takes food production off the land and away from farmers and relocates it in labs and factories.
- **DNA created on computers** is also part of the 'synbio' platform. Synthetic DNA can be inserted into living organisms or used to create entirely new ones. Currently this technology is focused on creating new food ingredients as well as novel plants and animals.

- **Microorganisms.** Bacteria and fungi are being re-engineered for a variety of on-farm uses including **seed coatings**, which carry new genetically engineered plant-growth promoters and biological pesticides aimed at increasing yields. **Soil 'improvement' products** such as gene-edited microbes are being designed as 'nitrogen-fixers' or 'carbon-storers' with no consideration for how these might interact with or disrupt the natural soil biome.
- **DNA tracers.** Biological labelling that carries product/processing information can be made from short strands of synthetic or natural DNA and put into or stuck onto farmed products.
- **Conservation.** Gene editing, synbio and gene drives are proposed as tools for reviving declining or even extinct species, eradicating invasive species, and improving soil and therefore plant health and biodiversity in the natural world.

Biotech lobbyists believe that there should be no limits to the application of their products. They are capitalising on legitimate concerns that many have about the need for urgent transition to a more ecological way of farming, in order to push a 'techno-fix' agenda.

Right now in the UK

UK research institutions are running open field trials on a variety of genome-edited crops.

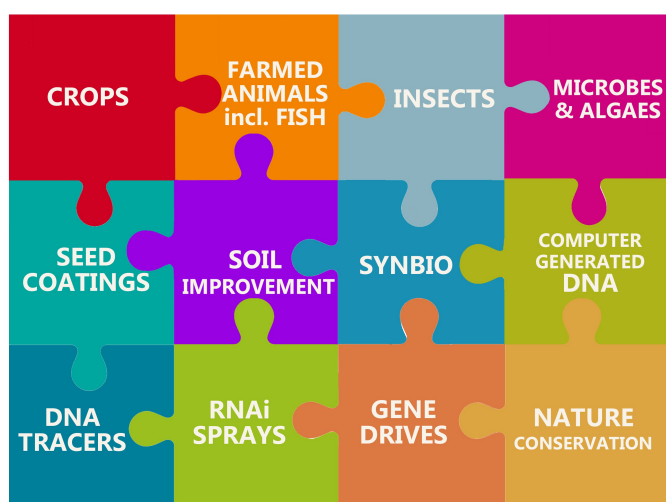
Even Scotland, which has maintained a strong stance against planting GM crops, has continued to expand research and development work for gene edited organisms in agriculture, particularly farmed animals.

At the same time, the UK government plans to deregulate genome editing, claiming that new techniques are essentially 'natural' and should not count as GMOs when, in fact, they carry the same risks as older-style GMOs and bring many new ones of their own.

If these plans succeed, they will likely lead to more widespread deregulation of biotechnologies – including their use in free growing and free living organisms in the wild environment.

A doorway...not a barrier

Agroecology and the development of agricultural genetic technologies represent different values and aims. They are pulling in opposite directions, but powerful forces want to persuade us otherwise.



THERE ARE A LOT OF NEW PIECES IN THE GMO PUZZLE

The ambitions of the biotech industry reach into all parts of agriculture and the natural world. In some cases, as with synthetic biology, its aim is to take food production off the land and relocate it in 'land-sparing' factories. All of this is being done under a banner of 'sustainability' that requires much greater scrutiny.

The UK government's white paper, *Regulation for the Fourth Industrial Revolution*, describes disruptive technologies like gene editing as "blurring the lines between the physical, digital and biological worlds".

The government used its recent *Public Consultation on the Regulation of Genetic Technologies* to emphasise this blurring and persuade us that gene editing is just an extension of "traditional" or "conventional" breeding. This is patently untrue, but such ideas take root in the darkness.

In a shameful act of irresponsibility, the United Nations Food and Agriculture Organization's recent *Strategic Framework 2022-31* is focused almost entirely on biodigital and biogenetic 'solutions'. Systemic approaches, including conservation agriculture, integrated agriculture, agroforestry and agroecology are presented in the framework as "entry doors" through which these "emerging sectors" can be developed and enter the wider farming system.

Why this matters

For the agroecological movement, the consequences of being "a doorway", of not challenging the "blurring" of boundaries, are serious.

Agroecology is rooted in the integrity of the living organism and the connections between soil, plant, animal, farm and community.

Deregulation of gene editing, or any watering down of the transparency, monitoring and labelling of genetic technologies, makes maintaining this integrity difficult, perhaps even impossible.

Important points of vulnerability include:

- **Contamination** from gene-edited crops and products (in the field and elsewhere in the supply chain) is impossible to manage or mitigate without transparency and labelling.
- **Unregulated inputs** in the production and processing systems, including green waste and so-called biogenic compost inputs, are already problematic but will become much more so as gene editing comes on stream.
- **Plant breeding and seeds.** Gene editing could be used on open pollinated, heritage and traditional varieties and new breeding material (even if produced using populations/participatory breeding).

- **Seed dressings, and soil improvers**, including biological inoculates made from bacteria, fungi and algae, could also be gene-edited and marketed as 'natural' or 'nature friendly'.

- **Food processing.** The mantra of "small, local, artisanal" is poorly defined and no protection against this technology. Anything using yeasts or enzymes could be gene-edited and used as a processing aid. Without transparency about processes and provenance, we won't know.

Let's start talking

We urgently need those who support agroecology to put their concerns about genetic engineering back on the agenda.

There are many threats to the future we all want to create, but we cannot make progress towards agricultural transition until we confront the reality of gene editing and other genetic technologies.

As part of the Safeguarding Agroecology project, we offer bespoke online sessions to individuals and organisations to answer questions and address concerns. If you'd like a session with us or support in forming an effective response to the challenges of genome editing, email **Pat Thomas at Beyond GM** or **Liz O'Neill at GM Freeze**.

Further information

These resources can be useful in exploring this topic further:

GMO 2.0 - Can Local Food Chains Survive the threat of Gene editing

A webinar, hosted by the CSA Network, looks at issues raised in this fact sheet in more depth, June 2021.

[Click here to watch](#)

Key Issues in the Deregulation of Gene Editing

A briefing on issues raised by the current government Consultation on the Regulation of Genetic Technologies, February 2021.

Downloadable versions can be found on the **Beyond GM** and **GM Freeze** websites.



This fact sheet was produced as part of the Safeguarding Agroecology project, funded by Farming the Future.

