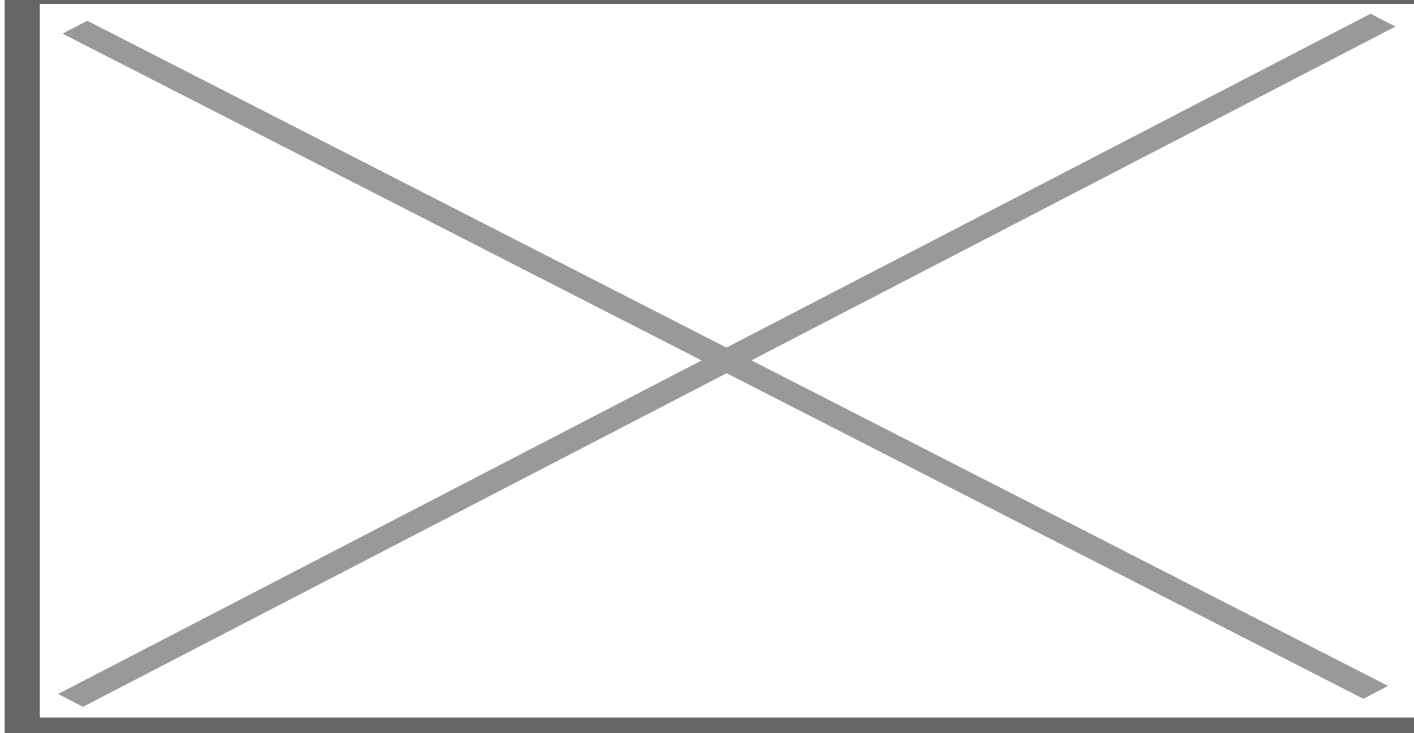


Viewpoint: Britain faces decision of whether to break from Europe's innovation-killing regulations on CRISPR new plant and animal breeding



While a handful of environmental and organic NGOs maintain their opposition to the Precision Breeding Bill at Westminster. Bill, which would regulated CRISPR and other forms of gene editing in agriculture, the overwhelming weight of scientific evidence supports the safety and value of these advanced breeding techniques. Faced with urgent challenges over food security and climate change, even the European Union is now moving at pace to update its legislation to enable the use of modern breeding methods such as gene editing, writes plant scientist Professor Tina Barsby.

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Alessandro Coatti and Professor Robin Lovell-Badge present their opinions on the Precision Breeding Bill during a round of discussion before Parliament. Credit: Royal Society of Biology

The Genetic Technology (Precision Breeding) Bill will overturn a July 2018 decision by the European Court of Justice (ECJ), which ruled that all new genomic technologies – including gene editing techniques such as CRISPR Cas-9 – should be classified as GMOs and regulated under the EU's existing, highly restrictive GMO regulations.

By taking products which could equally have been bred conventionally out of the scope of the GMO rules we inherited from the EU, the Bill will re-align our regulations with the mainstream approach taken elsewhere in the world. Countries such as Australia, Japan, Canada, Brazil, Argentina and the United States do not treat the products of these techniques as GMOs, but rather as conventionally bred products.

This is an important point. Exempting gene edited products from GMO provisions does not mean they are no longer subject to regulation. The UK has well-proven and robust regulations to approve new plant varieties, underpinned by the general requirements of food safety, novel food and environmental protection laws.

This system has operated with an impeccable safety track record for decades. The UK's plant variety approval process also supports more sustainable innovation in food and farming by ensuring that only varieties which offer improved performance over existing varieties – for example in terms of food quality, physical yield, resistance to pests and diseases, and resilience against crop spoilage – can be approved for marketing and cultivation.

This outcomes-based approach to regulating improved plant varieties is equally capable of embracing the products of new precision breeding techniques within a more pro-science, pro-innovation regulatory system.

The situation is changing rapidly in Europe, too. The ECJ ruling put the EU's position at odds with the rest of the world and led many to suggest that the bloc's 20-year-old GMO regulatory framework was simply not fit-for-purpose to cover more recent breeding technologies. Indeed, that was the central conclusion of a subsequent [study](#) by the European Commission, published in April 2021, which has triggered a drive for regulatory reform in Europe widely expected to mirror the provisions of the Bill currently before the UK Parliament.

A recent informal meeting of the EU Agriculture Council in Prague [highlighted concerns](#) that Russia's invasion of Ukraine, the lingering effects of the Covid pandemic and advancing climate change are impacting global food security and world food prices. Farm Ministers agreed that the EU "must now act in a coordinated way to maximise sustainable increases in agricultural production, and accelerate the use of modern techniques in agriculture."

The Czech Presidency's summary of the meeting included the following remarkable statement:

"Ministers agreed that the EU must react as quickly as possible to the development of modern trends and not hinder innovation. It is therefore important to change the outdated legislative framework by which the EU regulates the use of modern plant breeding methods. This framework not only restricts European farmers, but also leads to an outflow of top experts to countries outside the European Union, so the damage is extraordinary."

Statements such as this stand in marked contrast to the rationale presented for the EU's Farm to Fork Strategy, with its pledge to increase the share of organic farming and curb pesticide and fertiliser use, while at the same time restricting access to the tools of modern biotechnology.

food farm fork ring

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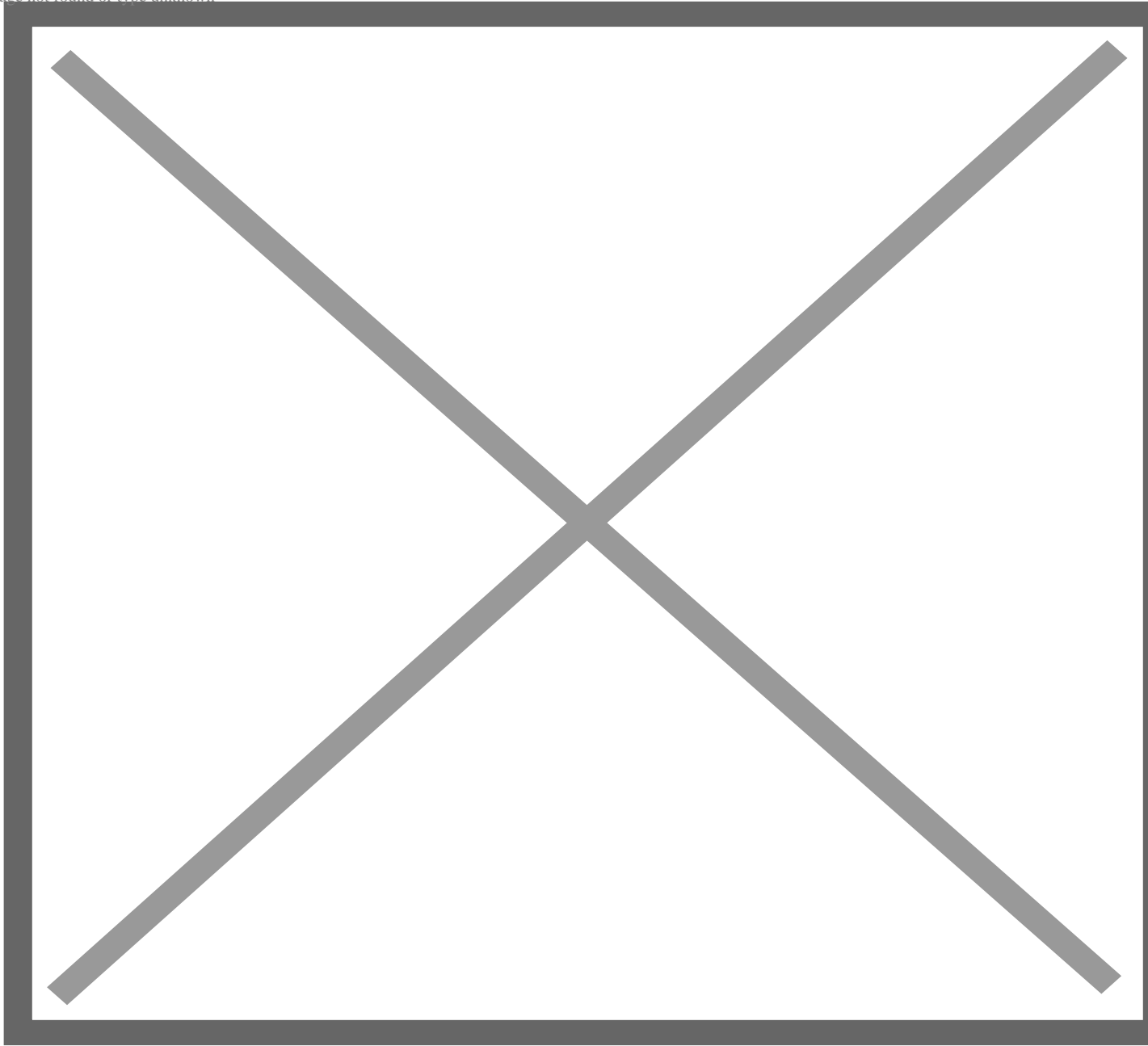
France's President Emmanuel Macron has already [indicated](#) that the Farm to Fork Strategy will need to

be fundamentally reviewed, acknowledging that its provisions would significantly reduce European food production and that, as such, the policy was 'based on a pre-Ukraine war world.'

The case for regulatory change also appears to be supported by the people of Europe. A recent European Commission public consultation [found](#) that 80% of the 2200 participants consider existing GMO rules as inadequate for the regulation of plant varieties developed using techniques such as gene editing.

According to the consultation, those in support of regulatory change include a large majority of citizens, academia and research institutions, companies and business associations, public authorities, as well as most trade unions. Only environmental organisations and some consumer NGOs argued for the status quo.

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The Precision Breeding Bill would make gene edited products exempt from overly arduous regulatory process. Credit: SITNBoston

This would appear to mirror the position here, although recent objections raised by environmental and organic NGOs are more semantic than scientific, criticising the terminology used in the Bill – for example challenging both the terms ‘precision’ and ‘breeding’ as inaccurate.

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Plant breeder Nigel Moore of KWS, a former chair of the British Society of Plant Breeders, has [dismissed](#) these criticisms as “a diversionary attempt to split hairs over terminology”, which “suggests those opposed to the Bill are avoiding the scientific arguments.”

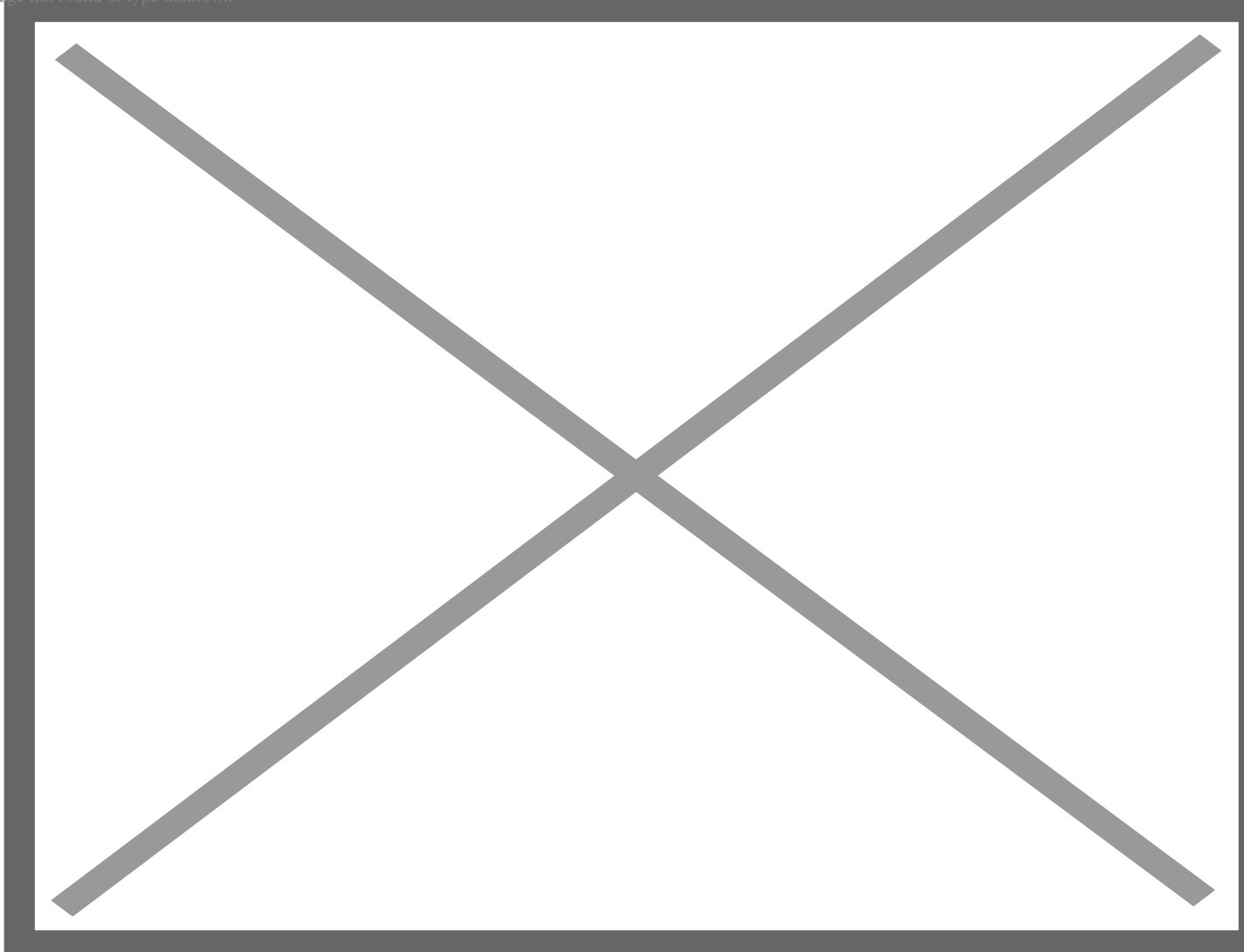
He is right, but I would go further in suggesting that it is perhaps a conscious attempt to mislead, playing on popular misconceptions and a general lack of knowledge about plant breeding.

From a scientific perspective, there is no doubt at all that technologies such as gene editing are much, much more precise than any plant breeding method that has gone before. When compared with other crop improvement techniques, gene editing involves a few targeted genes compared with the random recombination of literally hundreds of thousands of genes which often happens in plant breeding.

It is equally misleading to suggest that conventional plant breeding to date has been confined to ‘natural reproduction’ – in other words simply crossing sexually compatible plants and selecting the most promising offspring. Again, the reality is very different, as so much of the success of modern plant breeding is based on invasive, laboratory-based techniques, such as tissue culture, protoplast fusion, embryo rescue, doubled haploidy, somaclonal variation, and both chemical and radiation-induced mutagenesis – all of which, it could be argued, are as difficult to understand as ‘precision breeding’ – if not more so!

These techniques are commonplace within all modern breeding systems, including organic. Indeed, a celebrated example is the barley variety Golden Promise, a mainstay of the organic brewing sector, which was created by bombarding seeds with gamma rays in a nuclear reactor to induce random mutations, and then picking out the seeds with the desirable character.

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The gamma-ray created barley is popular for brewing. Credit: Simpson's Malt

In its simplest terms, the process of plant breeding has been likened to playing a fruit machine, not with three or four reels, but with several hundred. Recent progress in modern plant breeding, applying our improved understanding of genomics and genetic function, has dramatically improved the breeder's chances of hitting the jackpot by reducing the randomness of earlier techniques and allowing the creation of valuable new sources of variation.

Since gene editing allows even more targeted changes to be made, and with far fewer unintended effects than other breeding methods, the term 'precision breeding' seems to me entirely accurate and defensible from a scientific standpoint.

Faced with worsening global hunger, increased pressure on future crop productivity from a changing climate, and the need to avoid expansion of agricultural land use, these technologies can help plant

scientists and breeders deliver the tools farmers need for more sustainable, productive and climate-resilient agriculture.

That is why the Bill before Parliament is so important.

Tina Barsby is a plant geneticist and a former CEO of NIAB, where she led the implementation of innovative approaches in plant breeding. She was awarded an Honorary Professorship in Agricultural Botany by the University of Cambridge in 2021. Follow Tina on Twitter [@TinaBarsby_NIAB](https://twitter.com/TinaBarsby_NIAB)

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