

Genetic Technology (Precision Breeding) Bill



Factsheet – Precision Bred Organisms

Introduction

The Genetic Technology (Precision Breeding) Bill describes a new category of organism that has been produced using modern biotechnology, for which the existing Genetically Modified Organisms (Deliberate Release) Regulations 2002 and the Environmental Protection Act 1990 will no longer apply. These organisms, known as Precision Bred Organisms, will be governed by a new regulatory framework and must adhere to a specific set of criteria. In this fact sheet we clarify the key differences between Genetically Modified Organisms (GMOs) and precision bred organisms and explain why this means that these organisms will be subject to a different regulatory regime to that which governs GMOs.

The Technology

Nearly all cells contain DNA. DNA is made up of a large number of nucleotides, or letters, which cells can 'read'. In simple terms, these letters come together to form paragraphs (genes), chapters (chromosomes) and ultimately an entire book (the genome). Machinery within cells uses information encoded in these 'paragraphs' to produce proteins that enable our cells to function.

At the advent of genetic modification around 30 years ago, the technologies available to scientists could only introduce DNA into random sites in a plant or animal cell's genome and involved the insertion of foreign gene(s) from sexually incompatible species. The products of this approach are GMOs.

Genetic technologies have progressed significantly in recent years, allowing scientists to make alterations to a cell's genome which can be specific, precise, and targeted to a specific location within the genome. Such changes can range from changing a single nucleotide (letter), to the introduction of an entire gene (paragraph). Meanwhile, insertion of foreign genes from sexually incompatible species is no longer an absolute requirement of the editing process. Thus, newer technologies are more akin to the process of an editor checking a book prior to publication, making changes to specific letters and paragraphs.

What is a Precision Bred Organism?

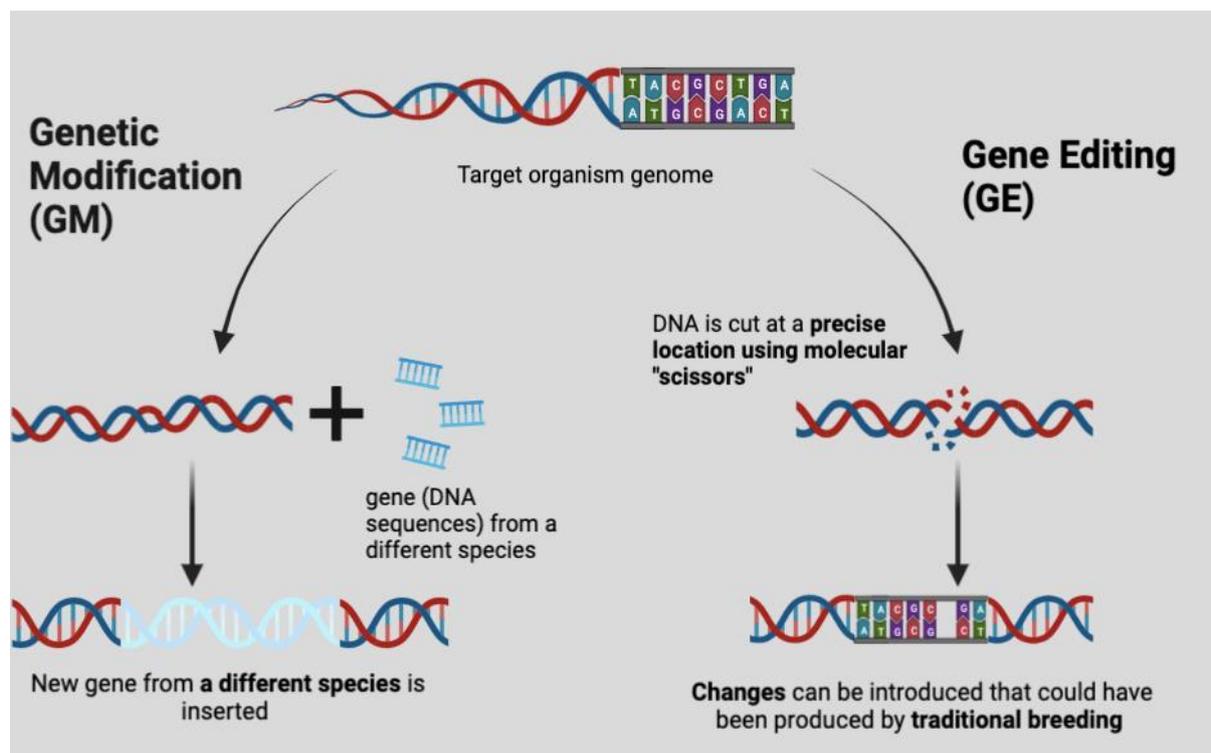
A precision bred organism is an organism that has been subject to a genomic alteration using a modern biotechnology, such as gene editing, which is stable and could also have occurred naturally or through the application of traditional breeding methods. Notably, the final organism must not contain functional foreign genes taken from a sexually incompatible species. It is this that differentiates a precision bred organism from a classical GMO, described above.

How are these organisms similar to a traditionally bred organism?

A large, and growing, body of scientific evidence has shown that genomes are not as stable as previously believed. Rather, genetic material is mutable and varies, even between individuals of the same species. Naturally occurring changes can range from point mutations (i.e., changes to single letters of a genomic 'book') to chromosomal translocations (i.e., movement of all or part of a chapter in the genomic 'book'). Such changes can also be generated using modern biotechnologies, but where changes from traditional breeding methods are random, precision breeding technologies, such as gene editing, can introduce desired changes to a specific region of the genome.

Advice received from the independent Advisory Committee on Releases to the Environment (ACRE) is that an organism produced by gene-editing, or other similar approaches, would not pose a greater risk to health or the environment than a traditionally bred or naturally occurring version of that organism.

Why do we need the Bill?



The current GMO legislation was introduced at a time when technologies were developing that could make genetic changes that were not possible using traditional breeding programmes. However, modern biotechnology is increasingly being used to make changes that could have been selected for using traditional methods. These newer technologies are more precise and can mine the genetic potential of organisms more efficiently than traditional breeding. The Bill is needed to release organisms of this type from onerous controls which apply to genetically modified organisms and replace them with more proportionate regulations.