

Advisory Committee on Releases to the Environment Advice

Advice on the precision bred status of organisms described within a precision breeding marketing notice

Precision Breeding Marketing Notice Reference: PBM/25/HOVU/001

Date: December 2025

Notice summary: A precision breeding marketing notice describing a gene edited barley plant (*Hordeum vulgare*) where CRISPR-Cas9 has been used to create indel knockouts in two genes predicted to encode triacylglycerol lipases (*SDP1A* and *SDP1B*). The resulting phenotype is a barley plant with higher lipid content in the plant tissue.

Advice of the Advisory Committee on Releases to the Environment (ACRE) under section 7 of the Genetic Technology (Precision Breeding) Act 2023 to the Secretary of State for Environment, Food and Rural Affairs.

ACRE considers the organisms described within the referenced marketing notice **to be precision bred**, based on the definition of a precision bred organism outlined in Section 1.2 of the Genetic Technology (Precision Breeding) Act 2023.

Overview

ACRE has assessed the information provided in this marketing notice against the definition of a precision bred organism outlined in Section 1.2 of the Genetic Technology (Precision Breeding) Act (the act). ACRE's advice is as follows:

'(a) Any feature of its genome results from the application of modern biotechnology'

The barley plant has an insertion-deletion mutations in each of two nuclear genes predicted to encode triacylglycerol lipases (*SDP1A* and *SDP1B*) resulting from the application of a site-directed endonuclease (CRISPR-Cas9) and appropriate guide RNAs introduced *via* Agrobacterium mediated transformation. This is a technique of modern biotechnology as defined by the act.

'(b) Every feature of its genome that results from the application of modern biotechnology is stable'

Genotyping of the primary transformants (T0) and their first, second and third progeny (T1,T2,T3) has showed that both mutations introduced are stably inherited over multiple generations.

'(c) Every feature of its genome that results from the application of modern biotechnology could have resulted from traditional processes, whether or not in conjunction with selection techniques, alone'

The transformation of the barley plant with CRISPR-Cas9 and appropriate guide RNAs is accepted to have resulted in incorrect repair by non-homologous end joining within the second exon of two genes predicted to encode triacylglycerol lipases (*SDP1A* and *SDP1B*). This resulted in small indels (1 base pair (bp) deletions) being introduced at the target sites, causing frameshifts and an expected early termination of the encoded proteins and loss of their function.

The 1-bp deletion in the targeted genes described are genetic changes that could have resulted from traditional processes¹ as defined in the act.

‘(d) Its genome does not contain any feature that results from the application of any artificial modification technique other than modern biotechnology’

The barley plant does not contain any feature within its genome made by artificial modification techniques, other than modern biotechnology. DNA sequencing by the notifier and bioinformatic analysis of the data failed to identify any sequences from the T-DNA vector used to generate the transformation of the final barley plant. Additionally, PCR analysis was performed on genomic DNA using primer pairs specific to T-DNA genes used in the transformation and no products were detected.

Therefore, based on the information provided within the referenced marketing notice, ACRE considers this plant to be precision bred.

¹ Pourkheirandish, M and others (2015). ‘Evolution of the Grain Dispersal System in Barley’. Cell, volume 162, Issue 3, pages 527 - 539