



Animal &
Plant Health
Agency

United Kingdom

Molecular Techniques: Discussion on molecular techniques in DUS examination

UPOV Technical Committee, 59th Session

Geneva

Presentation by
Dr Sigurd Ramans-Harborough



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A photograph of the Earth as seen from space, showing a curved horizon with a bright blue glow at the edge. The surface is covered in white clouds and dark blue oceans. The background is a deep black space filled with small white stars.

Delivering PBR

for the future

**Molecular techniques
are of increasing importance**



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Genetic Technology Act 2023

Work is progressing
for the implementation
in England



Parliamentary Bills

[UK Parliament](#) > [Business](#) > [Legislation](#) > [Parliamentary Bills](#) > Genetic Technology (Precision Breeding) Act 2023

[Bill feed](#)

Genetic Technology (Precision Breeding) Act 2023

Commons

Lords

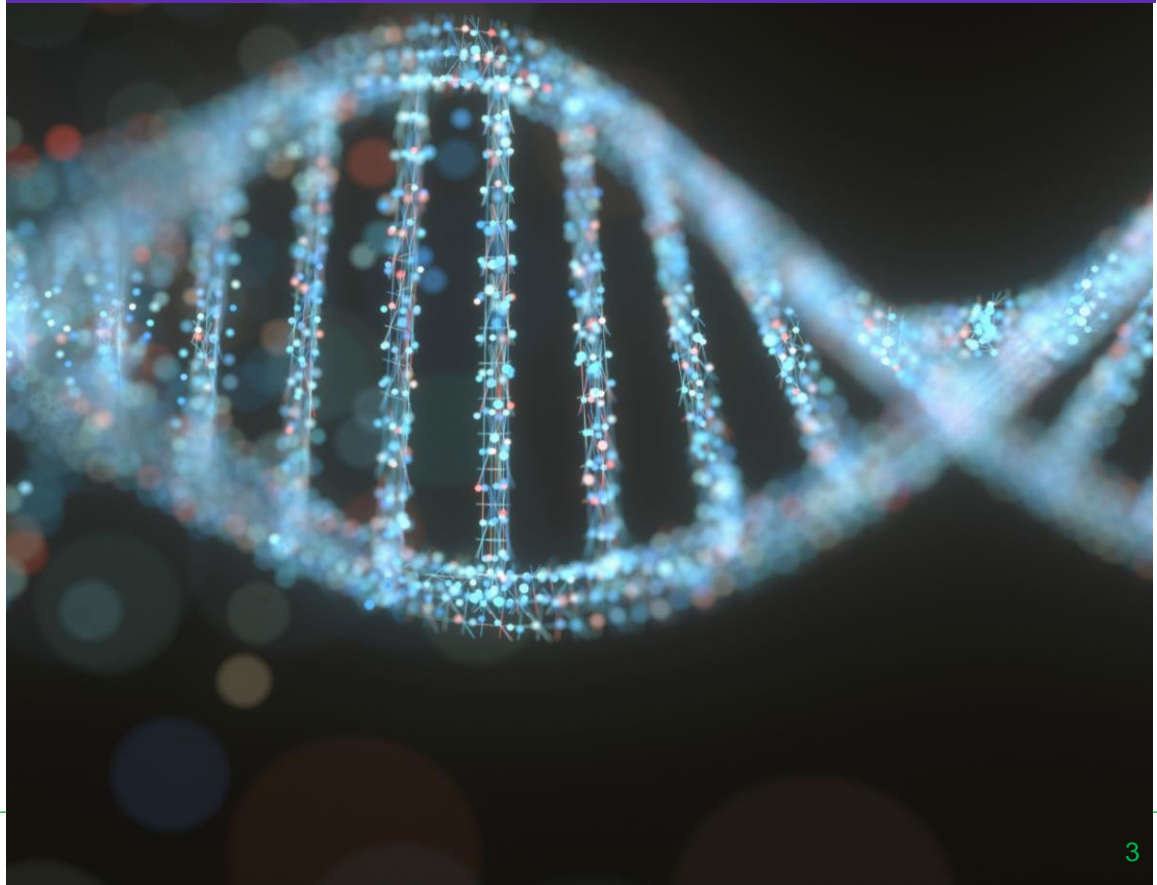
Final stages



Government Bill

[See full passage](#)

Originated in the House of Commons, Session 2022-23





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United Kingdom is Exploring approaches to support DUS testing



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Improve efficiency and quality of DUS testing in the UK

Two research and development projects are in progress, led by the Department for Environment, Food and Rural Affairs (Defra) in the UK in collaboration with the Animal and Plant Health Agency (APHA) and NIAB



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Concept

Exploring new approaches

Genotyping

Analysis of genomic markers by
Artificial Intelligence (AI)

Growing Trial

Defra funded
projects

The aim

is to use marker data to inform the selection of similar varieties before the first cycle of the growing trial.

The ambition

is to remove the need for an additional test year through better trial design



Concept

Genotyping

Analysis of genomic markers by
Artificial Intelligence (AI)

Growing Trial

New Project: DUS Molecular Markers in Barley

Aim:

To determine the most appropriate varieties for the growing trial.

To do this:

70 % of the barley reference collection is being analysed

Methods:

- Genotyping: 50K marker array
- Barley varieties selected to cover the full trait spectrum
- Incorporation of marker data in the DUS database to use alongside phenotypic data



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Concept

Exploring new approaches

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Growing Trial

Defra funded
projects

The ambition

to efficiently analyse large complex data sets to inform the growing trial design, while not delaying the DUS test.



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Concept

Genotyping

Analysis of genomic markers by
Artificial Intelligence (AI)

Growing Trial

Defra funded project

New Project: AI on soft
fruit

Aim: Develop an Artificial
Intelligence program to
identify genomic markers
with the potential to
distinguish between
varieties of *Rubus idaeus* L.

Methods:

- Genotyping-by-sequencing (GBS)
- Whole genome sequencing
- Fully supervised machine learning, followed by unsupervised (deep) machine learning.



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Artificial Intelligence software for DUS

**Open
source to
all**

Following completion of the project and peer review of its results, Defra will produce a short summary report which will be available to all. Pending successful outcome of the project, Defra also aims to make the resulting prediction program available as open source to all.



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Concept

Genotyping

Analysis of genomic markers by
Artificial Intelligence

Growing Trial

**Improve efficiency
and quality of DUS
testing in the UK**

**Minimizing the
number of DUS
growing cycles**

**Support the selection
of varieties of
common knowledge
in the new era of
precision breeding in
the UK**



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