Integration of New Breeding Technologies (NBTs) into variety breeding

How to find the right balance for incentivising innovators

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Who we are

Australia’s national science agency

One of the world’s largest multidisciplinary science and technology organisations

5,672+ dedicated people working across 53 sites in Australia and globally

State-of-the-art national research infrastructure

We delivered $10.2 billion of benefit to Australia in FY22

CSIRO´s Plant Breeding Activities

Breeding and pre-breeding for the major Australian crops

Top-tier PBR and patent portfolio

Cotton
Originator of all Australian cotton varieties

Cereals, Canola
Trait provider to the breeding industry

Fruits & Nuts
Breeding and trait innovation

Legumes
Innovating to serve the high plant protein demand

New Breeding Technologies (NBTs): A huge innovation opportunity

Opportunity	Example
Bringing trait opportunities to vegetatively propagated crops • "Breeding-by-editing" is the only effective method to achieve breeding progress	Disease resistance in grapevine, banana, potato, citrus trees, etc.
Re-wilding • Direct conversion of alleles from wild/syntenic sources into elite germplasm without linkage drag associated with large introgression fragments	Nematode resistance in cotton
Accelerating genetic gain • Liberating breeding from the constraint of trait introgression; Parallel trait conversion of all finished (parental) lines at the end of the breeding cycle	Only limited by editing system's cost and germplasm dependency
Creating novel allelic diversity • Most crops have limited allelic diversity at important loci within their elite germplasm pool, leaving a lot of untapped improvement potential • Best allele available is not necessarily the optimal allele; Functional genomics and recent breakthroughs in protein structure/function prediction are driving allele optimisation opportunities	Optimising well-understood plant metabolic pathways, such as photosynthesis, secondary metabolites
Many other opportunities • Technology is immature	Synthetic biology in crops, site-directed recombination, trait switches, etc

Trait innovation using NBTs and breeding innovation go hand-in-hand

- Breeders and trait innovators both need to be incentivised to use New Breeding Technologies (NBTs)
- Proposed draft text for revision of Explanatory Notes on Essentially Derived Varieties (EDVs) got the balance wrong:
  - Disincentivise the development of new plant varieties using highly innovative NBTs
  - Risk consolidating the control of NBTs with current owners of plant breeders rights and distorting the system in a manner that is at odds with the intention of the breeders' exemption
  - Lead to commercial uncertainty

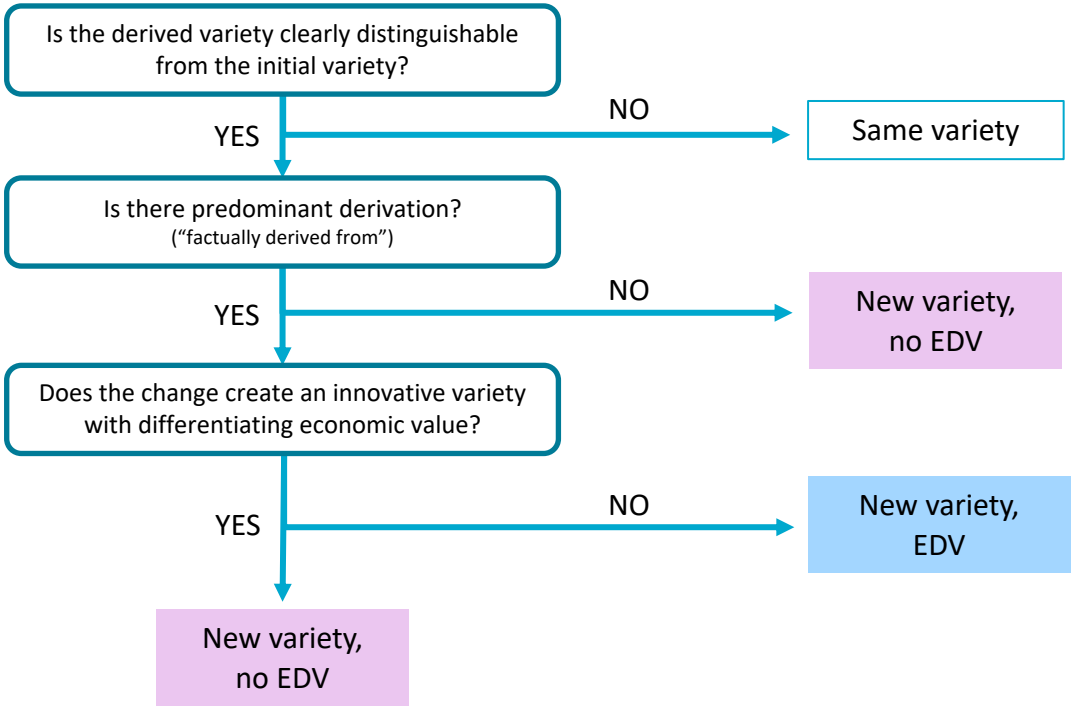
➢ UPOV needs to achieve a balance of incentives agnostic to the method of breeding

Varieties obtained by editing should not be Essentially Derived Varieties (EDVs) by default

- Patents are not always an alternative
  - Patents on plants are not available in many countries and political views on how they should be treated are diverging
  - A key principle of the international PBR regime is to reward incremental breeding. These changes are unlikely to meet novelty and inventiveness requirements
  - Patents are much more expensive than PBR protection

- Increased geographical divergence and complexity
  - Has the potential to stifle innovation and drive industry consolidation

Proposal for fair and clear decision criteria for EDVs



What is the opportunity for UPOV to stimulate innovation?

- Reward innovation that creates economic value
  - Fair and clear decision criteria for EDVs needed
  - Safeguarding the breeders exemption
  - Avoiding perverse outcomes

- UPOV principle: Breeding progress is measured by phenotype
  - Veering from that principle would require a complete overhaul
  - Explanatory Notes are not the right way to change the fundamental principles of the UPOV Convention

Thank you

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