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UPOV "Seminar on the interaction between plant variety protection and the use of plant breeding technologies"

Role of plant breeders' rights and other forms of IP in promoting plant breeding

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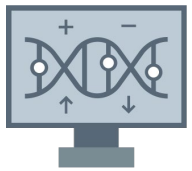


Cutting-Edge Technology Platform

Predictive Design

Multiplex Gene Editing

Uncover genes and pathways for critical problems

Broad toolbox incl. proprietary CAS system **to edit multiple genes with multiple tools simultaneously**

Mission-Driven Product Development

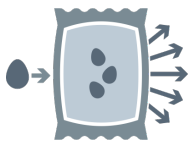
10-20% Yield Increase

40% Less Water

40% Less Fertilizer

Cutting development times and costs across crops and geographies

Creating new seed value while addressing climate change



Collaborative Commercial Model

Parent Seed

Licensing

Co-Development

Go-to-market model with seed companies.

Out-licensing of parent lines (IP-based !).

In-licensing germplasm from breeding companies

Highly Experienced Team

Deep Biotech, Ag & Technology Experience

Deep knowledge: agriculture, biotech, data

>270 employees (U.S., Belgium)

The Potential of New Breeding Technologies

Potential	Example
Establish complex traits in accelerated time • Parallel “multiplexing" drastically reduces breeding cycles • Only efficient method to establish complex traits in multiple varieties.	• Wheat fungal resistance (6 alleles) • Yield / drought tolerance
Improvement of vegetatively propagated crops • Mutliplexing is the only effective method to achieve breeding progress in vegetatively propagating species."	• Disease resistant sugar cane
Create new genetic diversity • Certain loci are not susceptible to natural recombination. Editing can unleash new potential.	• Maize improvement

Plant varieties and seeds are high-tech products in an easy-to-copy form.
They need IP protection for a sustainable business, especially if licensing-based.

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The IP Tool Kit

Tool	Benefits Strengths	Costs Weaknesses	Good For
Patents	• Strong, enforceable right • Limited exemptions	• Country-by-country differences: Plants / plant varieties not patentable in many countries. • High threshold: Non-obviousness, written description/enablement (reproducibility) • Moderate allowance rate • Lengthy examination, high costs.	• New processes • New traits defined by specific sequence, plants comprising them • Variety-independent edits (GM-like) Edits which can be identically created or introgressed in different varieties. • US: Specific varieties
PBR Plant Breeders Rights	• Larger international harmonization • Moderate costs, fast grant • High allowance rate	• Difficult enforcement • No protection for specific traits or sequences (by design !) • EDV provision: Clarity, coupling of dependency and limited scope of protection	• New varieties • Complex variety-specific edits (breeding-like) Multiplex edits which cannot be identically created or introgressed in different varieties.
Trade Secrets	• Could be everlasting	• Requires high efforts • Difficult to license	• Parent lines of hybrid crops

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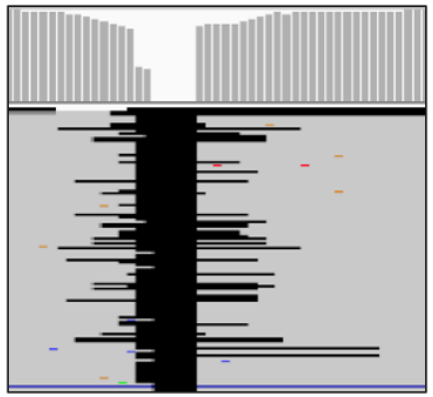
IP Protection for Multiplex Editing

- Complex traits require multiplex editing. The innovation is the combination.
- Multiplex edits are established directly in each elite variety. Introgression by crossing is practically impossible.
- Edits for a specific target gene vary slightly from variety to variety. The specific combination of edits is limited to each single variety.



- Patents do not provide a reliable global strategy:
  - Plants are not patentable in many countries.
  - DNA claims are suitable for single man-made edits but not for combinations of multiple edits.
  - The exact genetic fingerprint is not reproducible ("enablement").
  - Method claims usually only extend to the direct product but not to progenies.
- PBRs is the only practical way of protection.
- **But:** If multiplex varieties are always EDVs, they have limited PBR protection: Every variation falls outside the scope. Relying on the initial variety's PBR is no alternative.

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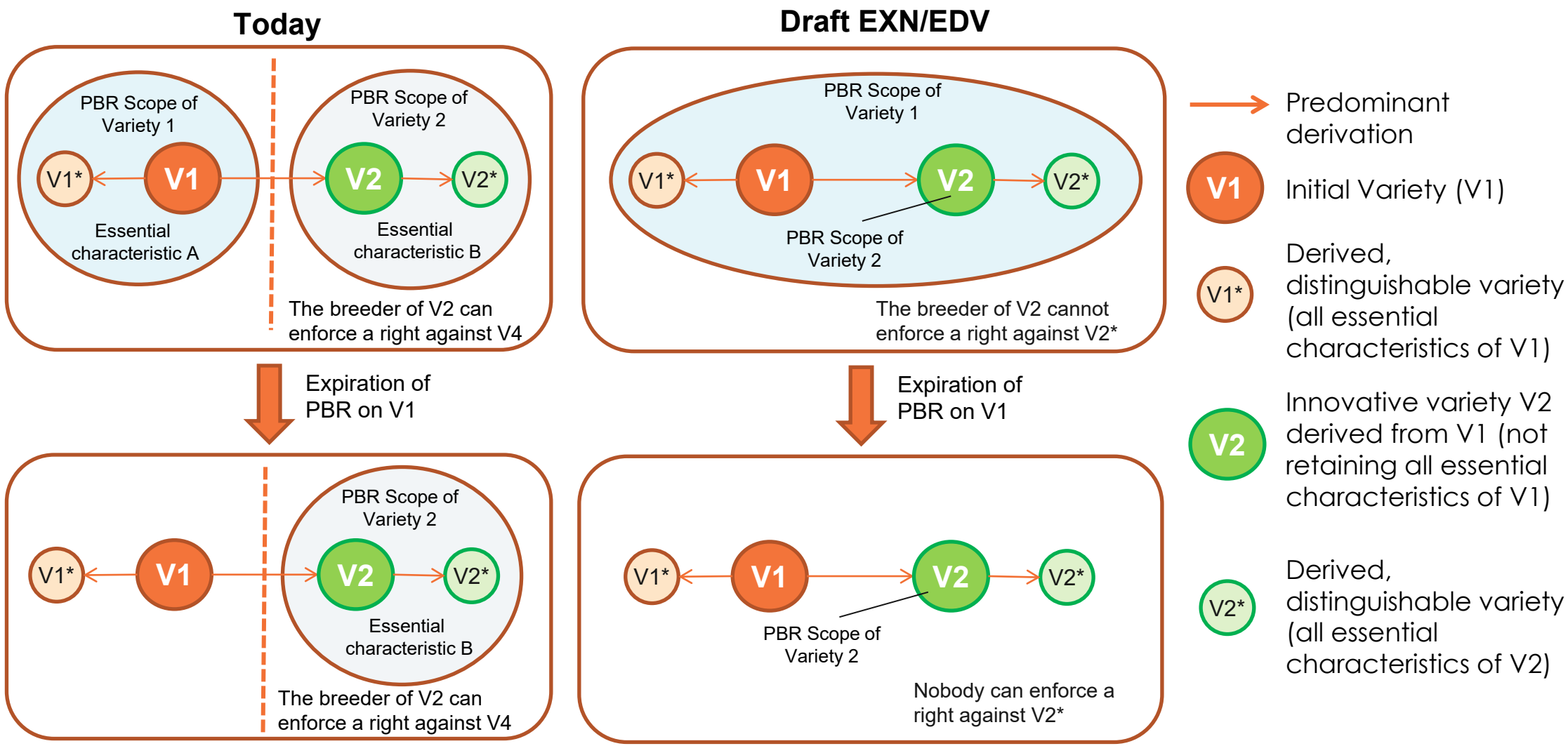
The consequences of a revised EDV definition



UPOV & Breeding Innovation
General considerations

- Breeding innovation is measured by **phenotype improvement**.
- Causative genetic changes are limited. Additional changes are a side-effect of the breeding process, not indicative for breeding progress and undesired.
- NBTs enables targeted causative changes without undesired genetic deviation ("precision breeding").
- Breeders should be incentivized to use NBTs and enjoy full PBR protection.
- Genetic similarity as sole criteria for EDVs cannot be reconciled with the wording of the UPOV 1991 act and convert UPOV into a copyright for plant genetics.
- Legal uncertainty for crops with limited genetic diversity (cotton, lettuce).
- Breeders of NBT-derived varieties have no interest to enable "me-too" varieties.

➢ UPOV needs balance protection for existing varieties and incentive for new breeding innovation agnostic to the method of breeding.

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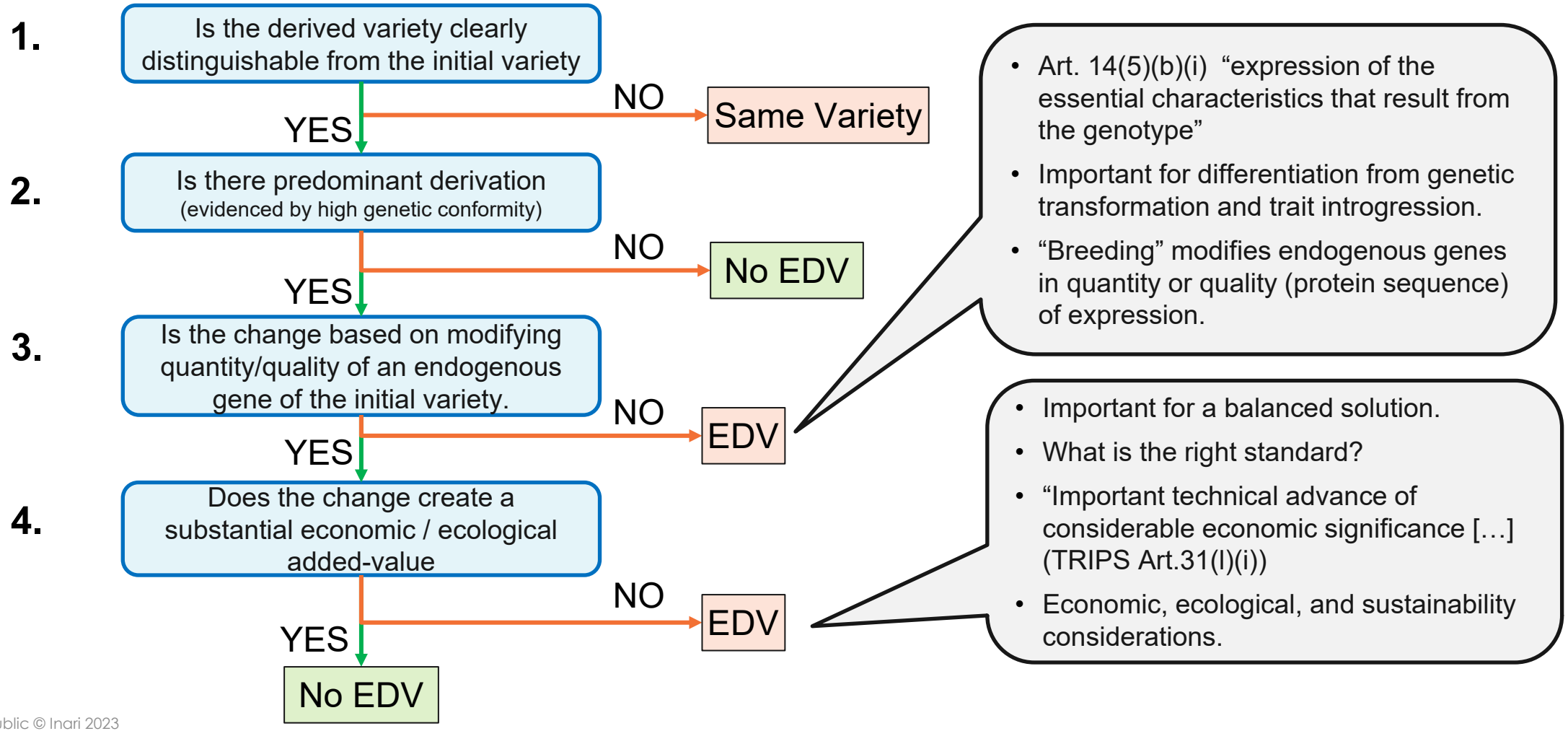
UPOV & Breeding Innovation

How to find the right balance?

Clear and fair decision criteria are required:



Conclusions

- New breeding technologies are essential for breeders.
- UPOV must provide balanced protection agnostic to the breeding method.
- A phenotype-based assessment of the added-value is important.
- Guiding principles should be developed for case-by-case assessment.
- Abandoning the current explanatory notes is not a solution.
- If no agreement on guiding principle for added-value can be found, a revision of UPOV might be unavoidable
  - Article 14(5)(i): Uncouple dependency and limited scope of protection. → Enable multiple dependencies.
  - Article 17(i): Enable compulsory (cross-) licensing.

Thank You

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