UPOV SEMINAR
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« IMPACT OF EDV CONCEPT ON PLANT BREEDING: Outlook for agricultural crops”

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AGENDA

- Limagrain Presentation
- What EDV principle means for Limagrain?
- How Limagrain implements EDV principle?
- Perspectives in the context of NBTs and Conclusion
An international seed group owned by a Cooperative

Founded and managed by French farmers

- Nearly 2,000 farmer members
- More than 10,000 employees
- No. 4 seed company worldwide
- Nearly 2.5 billion Euros in sales
- Subsidiaries in 56 countries
- 14.3% of sales invested in research
An international seed group owned by a Cooperative
Specialist in seeds and cereal products

Limagrain

Field Seeds

Vegetable Seeds

Garden Products

Cereal Ingredients

Bakery Products

Limagrain Coop

Business Units

AgriGold

Field Seeds

Vegetable Seeds

Garden Products

Cereal Ingredients

Bakery Products

Limagrain

Business Units

AgriGold

Contractor

VEGETABLES

GARDEN PRODUCTS

Bakery Products

CEREAL PRODUCTS

SEEDS
Limagrain Vegetable Seeds
3 worldwide Business Units

No. 1 worldwide in seeds for tomato
carrot
melon
cauliflower
summer squash

No. 2 worldwide in seeds for bean

No. 3 worldwide in seeds for pepper

* Consolidated sales contributed to the Group
Figures for the overall scope of activity, taking into account data from the companies Carthage Génétique and Prime Seed Co.

No. 2 worldwide €678 M*

€324 M

€165 M

€190 M
Limagrain Field Seeds

6 Business Units (Regional)

Grain Corn
Forage Corn
Wheat
Barley
Hybrid rice
Millet
Sunflower
Rapeseed
Soybean

AgReliant Genetics
40% of Field Seeds sales

Limagrain Europe
42% of Field Seeds sales
including Soltis (France)

Limagrain Cereal Seeds
2% of Field Seeds sales
including Canterra Seeds (Canada)

Limagrain South America
4% of Field Seeds sales
including Seed Co (Zimbabwe)

Limagrain Africa
9% of Field Seeds sales
including AGT (Australia)
Hengji Limagrain Seeds (China)

Limagrain Asia-Pacific
2% of Field Seeds sales

2017-2018 sales: 1,302 M€

Figures for the overall scope of activity, taking into account data from the companies AgReliant, AGT, Genective, Seed Co, Soltis, Canterra Seeds and Hengji Limagrain Seeds.
What EDV principle means for Limagrain?
Essential Derivation from an Initial variety (IV)

Three pillars for an EDV principle

- EDV purpose
- EDV Legal framework
- EDV Implementation guidelines
1- EDV : the original purpose

- The breeder’s exemption, as introduced by UPOV for the creation of new variety from the available existing variability, allows all breeders to benefit from the genetic progress of the breeding community.

- However, in 1991 in Geneva, member states delegates had the objective of strengthening the breeder’s right and introduced a dependency of the breeder of the Essentially Derived Variety (EDV) to the holder of the title of the Initial variety (INV).

- The initial breeder’s contribution to a new variety needs to be acknowledged when such contribution is **predominant** in the new variety.

  - The mere addition of a trait in an INV, whatever the importance of such trait, can not prevail alone on the predominant use of that INV.
2- EDV: legal framework

- The title holder of the protected INV needs to get a fair return on the investment whenever such predominant use of his variety is made.

- Extension of scope breeder’s right to EDV and EDV definition provided in Article 14 (5) on the Act of the UPOV Convention 1991. There are three conditions: Predominantly derived from the INV, Clearly Distinguishable from the INV and Conforms, except for the differences which result from the act of derivation, to the INV in the expression of the essential characteristics that result from the genotype.

- Harmonized implementation and interpretation at national levels needs to remain in full alignment with the EDV purpose.

- EDV is a matter of scope of protection and enforcement rights. EDV should be competence of the judiciary power.
3- EDV: Implementation guidelines

- Practical rules and tools to qualify an EDV status from breeders, from sector.

- Example:
  - Maize breeding practice (ISF Crop guidelines):
    • Available tools the sector agreed on: threshold of genetic distance and specific set of markers to assess such distance.
  
  - ISF view on IP (2012) and Regulation for the Arbitration of Disputes:
    • The burden of proof is placed on the breeder of the putative EDV, on the basis of data provided by the breeder of INV, to prove the non predominant use.
What EDV system also means for Limagrain?

Virtuous long term effect for the sector

- Implementation of the EDV principle provides a good balance between the opportunity to access to genetic elite resources and the creation of a certain level of genetic diversity between commercialized varieties.

- Contributes to the promotion of innovation.

- Limagrain aims to develop new varieties taking into account the EDV principle of UPOV.
How Limagrain implements EDV principle?
Limagrain breeding programs
Four Basic Rules

1- Germplasm qualification process for breeding:

- Database with “Freedom To Operate” criteria.
- The germplasm needs to qualify and get a “valid passport” for breeding.

2- Rely on EDV based-definitions

- EDV based-definitions is, whenever possible, used to define the perimeter of what can be done, who owns what, etc.
- Private breeding agreements between companies for breeding, trait development and commercialization from protected INV owned by third party.
- Acknowledgement of the EDV principle.
Limagrain breeding programs
Four Basic Rules

3 – Rules and tools for a Practical implementation:

in breeding programs to create new varieties from the existing variability:

- Breeding schemes:
  • “secured” breeding schemes rules in \textit{wheat} to avoid similarity risks.
  • “secured” breeding schemes in \textit{corn}: avoid sister lines crosses, when these lines come from the same commercialized hybrid.

- Use of tools during a breeding program:
  • Internal set of markers in wheat or \textit{industry agreed set of markers and threshold in corn}. 
Focus on an Industry agreed tool

A practical tool in corn

- In the maize community EDV debates in the 1990’s resulted in adoption of a common set of guidelines on Homology (1-D) between varieties based on Rogers’ distance.

- A public set of SNP markers is used to define 3 pragmatic zones based on homology (ISF guidelines, Field Crop Section):

A **red zone** (homology>0.95), the homology to an INV is so high that we assume that such INV must have been used to create the new line. There are strong indication that the new line is declared predominantly derived from the INV.

An **orange zone** (0.91<homology<0.95), the homology found is judged to be sufficient evidence to justify a “reversal of the burden of proof”: the accused party has to open breeding books and demonstrate that the INV was not used to create the new line.

A **green zone** (homology<0.91), the homology to the INV is low enough so we assume the new line is a new variety non predominantly derived from INV. It is reciprocal to the red zone.
Limagrain breeding programs

A practical tool in corn

- This practical tool is used, in the frame of an in-house FTO-specific procedure and according to potential contract obligation and restriction, for:

  - monitoring the genetic distance between both parents (hybrid we have access to and our own line) used to create new breeding populations to avoid narrow crosses in order to avoid potential EDV cases.

  - monitoring the genetic distance between progenies and parents in order to identify and discard early potential EDV’s.
4 – Rule for trait introgression:

- Trait introgression to create a new improved variety will be achieved by using Limagrain own germplasm or variety.

- Such new variety is expected to be EDV

- Examples of possible important traits introgressed by backcrossing:

  Trait driven by alleles able to restore fertility (Rf) induced by cytoplasmic male sterility in corn, or alleles for insect tolerance trait in wheat are few possible examples of trait introgressed by backcrossing.
Perspectives in the context of NBTs and Conclusion
We believe EDV principle is independent of the technology used to create a trait.

Therefore, even in a context wherein NBTs will be used for trait development, Limagrain will keep on the same practice:

- Trait creation or introgression will only be made in our own plant material, irrespective of the technologies used (tilling, GM technologies, NBTs, etc.).

With the provision that EDV legal framework and its interpretation remain in line with the EDV purpose of the 91 convention.
Conclusion

- Limagrain breeding process respects and takes fully into account the EDV principle, that is the purpose, the legal framework and the implementation tools and rules.

- UPOV EDV principle need to be reaffirmed.

- Seed business needs to rely on an internationally harmonized EDV legal framework which does not impair EDV principle.
Thank you