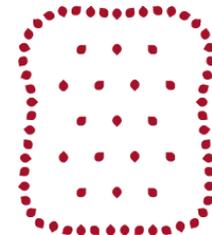
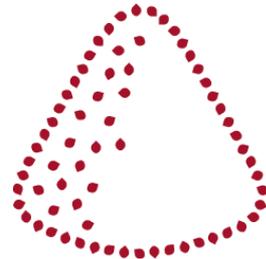
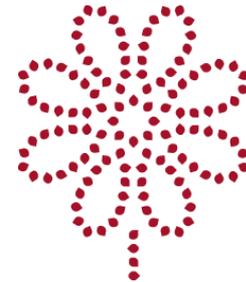




UPOV SEMINAR  
OCTOBER 30th 2019

**« *IMPACT OF EDV  
CONCEPT ON PLANT  
BREEDING: Outlook for  
agricultural crops* »**

Magali Pla





# 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

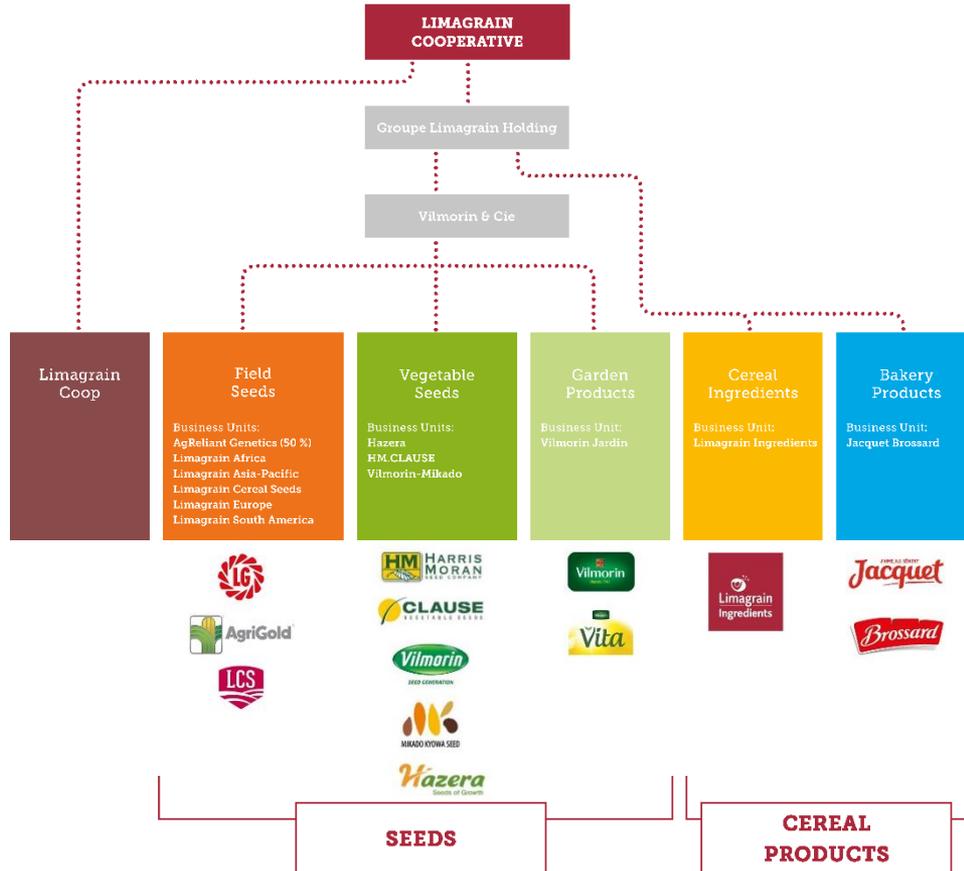
Nearly  
**2.5** billion Euros in sales

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 Vegetable Seeds

## 3 worldwide Business Units



**No. 2 worldwide** €678 M\*

€324 M

HM • CLAUSE

€165 M

**Hazera**  
Seeds of Growth

€190 M

**Vilmorin**  
MIKADO

\* 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.

# 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

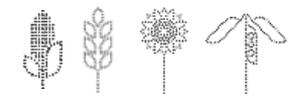


**Limagrain Cereal Seeds**  
2% of Field Seeds sales

including  
**Canterra Seeds (Canada)**

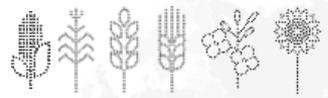


**Limagrain South America**  
4% of Field Seeds sales



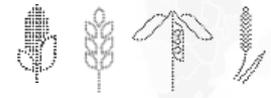
**Limagrain Europe**  
42% of Field Seeds sales

including  
**Soltis (France)**



**Limagrain Africa**  
9% of Field Seeds sales

including  
**Seed Co (Zimbabwe)**



**Limagrain Asia-Pacific**  
2% of Field Seeds sales

including  
**AGT (Australia)**  
**Hengji Limagrain Seeds (China)**



2017-2018 sales:  
**1,302 M€**

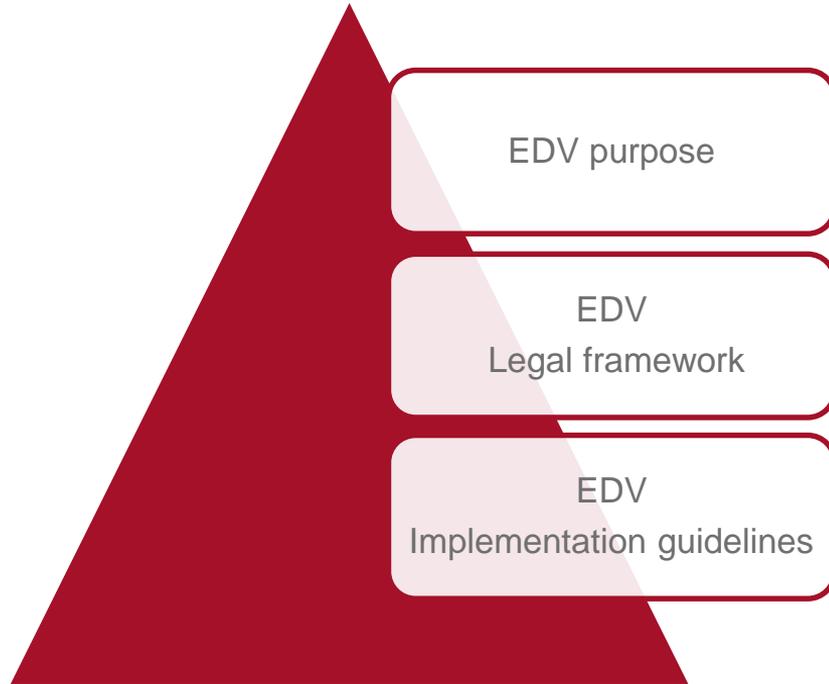
*Figures for the overall scope of activity, taking into account data from the companies AgReliant, AGT, Genective, Seed Co, Soltis, Canterra Seeds and Hengji Limagrain Seeds*



What EDV principle  
means for Limagrain?

# Essential Derivation from an Initial variety (IV)

Three pillars for an EDV principle



# 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 **wheat** to avoid similarity risks.
    - “secured” breeding schemes in **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 industry agreed set of markers and threshold in **corn**.

# Focus on an Industry agreed tool

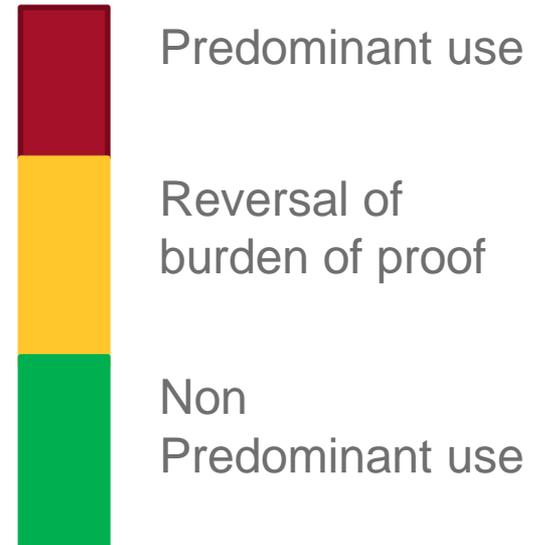
## A practical tool in corn

- 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** ( $0,91 < \text{homology} < 0,95$ ), 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**.



# Limagrain breeding programs

## Four Basic Rules

- 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



# NBT and EDV

## Limagrain position

- 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*