How to balance PBR and patents in plant breeding programs

Lantmännen perspective
Patent vs PBR

- Patent
  - Novel
  - Inventiveness
  - Reproducible
  - Technical solution to a problem

- PBR
  - Novel
  - Distinctiveness
  - Uniformity
  - Stability
  - Name
Trend in more IP rights and use of patents
## Traits in canola breeding

<table>
<thead>
<tr>
<th>Trait</th>
<th>Source</th>
<th>Provider</th>
<th>Patent</th>
<th>Agreement</th>
<th>License fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low erucic acid</td>
<td>Cultivars Species cross</td>
<td>Public institute</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Low glucs</td>
<td>Cultivars Species cross</td>
<td>Public institute</td>
<td>No</td>
<td>No</td>
<td>No</td>
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<tr>
<td>Hybrid restorer</td>
<td>Protoplastfusion Species cross</td>
<td>Public institute</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Clearfield®</td>
<td>Mutation</td>
<td>Private company</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>Roundup Ready</td>
<td>GMO</td>
<td>Private company</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>Omega-3</td>
<td>GMO</td>
<td>Private company</td>
<td>Yes</td>
<td>No</td>
<td>Not available</td>
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<tr>
<td>??</td>
<td>CRISPR/Cas9</td>
<td>??</td>
<td>Yes</td>
<td>??</td>
<td>??</td>
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</tbody>
</table>
Lantmännen represents the whole value chain

Trait provider → Plant breeding → Seed sales → Grain trading → Product-development → Consumer products

From trait... ... to consumer!
Lantmännen is an agricultural cooperative and Northern Europe’s leading player in agriculture, machinery, bioenergy and food.

We are owned by 18 000 farmers, have 10 000 employees, operations in some 20 countries, and an annual turnover of Euro 5 billion.

Our Base Is the Value Chain from Field to Fork in Northern Europe

Chairman of the Board: Per Lindahl
Group President and CEO: Magnus Kagevik
We breed plants for farmers, industries and consumers – and for the environment

**Farmers**
- Yield
- Resistance
- Agronomy
- Environment

**Industry**
- Quality
- Cost of raw material
- Processing qualities
- Environment

**Consumers**
- Health
- Green proteins
- Environment
- Price
EDV – Essentially Derived Varieties

EXPLANATORY NOTES ON ESSENTIALLY DERIVED VARIETIES UNDER THE 1991 ACT OF THE UPOV CONVENTION

Document adopted by the Council at its thirty-fourth extraordinary session on April 6, 2017

- Well defined concept in theory, but more difficult in practise
- Few examples in Lantmännen
  - Armstrong
- Likely more important in the future

Figure 1: Essentially Derived Variety “B”

Initial Variety “A”
bred by Breeder 1
- not essentially derived from any other variety

Essentially Derived Variety “B”
bred by Breeder 2
- predominantly derived from “A”
- retains expression of essential characteristics of “A”
- clearly distinguishable from “A”
- conforms to “A” in essential characteristics (except for differences from act of derivation)
Much of Lantmännen’s Work on Innovation Is Done in an International Innovation and Research Network
SLU GROGRUND – Centre for Breeding of Food Crops

SLU Grogrund joins forces from academia and the industry to develop competence to secure access to plant varieties for a sustainable and competitive agricultural and horticultural production throughout Sweden.

➢ Functional genomics
➢ Prediction models
➢ Underutilized crops
➢ Regional adaptation of crops
➢ Targeted mutagenesis
How does the use of PBR vs patents affect the trust from farmers and consumers?

Svalöv 2002
Take home message

- UPOV should be the main Intellectual Property system for plants
- Support from farmers, consumers and the society is a prerequisite for long term trust in the UPOV system
- There must be a balance between Breeder’s exemption and the return on investment for patents and basic research
- The limited breeding exemption in the EU’s unitary patent should be incorporated in the national legislation in all EU countries
- Mutations created through random (contrary to targeted) mutagenesis should not be patentable
- The concept of “essentially biological processes” is very important
- Screening segregating offspring and developing markers is standard knowledge and should not be patentable
- It is difficult for Small and Medium Enterprises to compete with Big Business when they have to navigate in a patent environment