### Trend of international IP agreements

<table>
<thead>
<tr>
<th>International agreements</th>
<th>Patent</th>
<th>PBR</th>
<th>Farmers rights</th>
</tr>
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<tbody>
<tr>
<td>Paris Convention (1883)</td>
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<tr>
<td>UPOV (1961)</td>
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<td>International Undertaking of PGR (1983, 89)</td>
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<td>Convention on Biological Diversity (1993)</td>
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<td>TRIPs (1994)</td>
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<tr>
<td>International Treaty of PGR (2001)</td>
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1. Patent

- In most countries, plants and plant products are not eligible for a patent, except
  - United States, Europe, and Australia

- In United States,
  - Any living organism is patentable, as long as it is the product of human intervention (*Diamond vs. Chakrabarty*, 1980)
  - Protectable objects: plant varieties, plants, parts, components, methodologies, vectors, etc.
  - Dual protection: patent and plant breeders’ rights (*J.E.M. AG supply vs. Pioneer*, 2001)

Current international status

- In Europe,
  - Plant varieties per se are not patentable; they are protected by separate plant breeders’ rights.
  - Transgenic plants are patentable.

- In Australia,
  - All technologies are patentable, except human beings.
  - Like the U.S., plant varieties are patentable.
Features of patent system

- Not enough quantitative information so far
  - U.S.: 1200 patents for plant varieties; 2500 for plants and methods, for the past two decades.

- Features of patent system
  - Different impacts on different industries
  - Static view: Balance between the generation and distribution of innovation
  - Dynamic view: Balance between the current and future incentive for innovation
    - Research tools: upstream research
    - Final products: downstream research

Patenting and Plant Genetic Resources

- Issues in (medical) biology
  - Patenting of basic research tools
  - Anti-commons: too many property rights
  - Royalty stacking: high transaction costs
  - Privatization of public knowledge

- Changing trends
  - Less patenting on basic technologies: public goods
  - Liberal licensing of research tool: Public Intellectual Property for Agriculture (PIPRA)
  - Open source movement: software
2. Plant breeders’ rights

- **UPOV** (International Union for the Protection of New Varieties of Plants)
  - Weaker form of protection (DUS)
- **United States**
- **Europe**
  - National protection from 1940s and 1950s
  - Community Plant Variety Rights (1995)
- **Developing countries: start in late 1990s**
  - India: PBR + farmers’ rights (2001)

### International plant variety protection (2004)

<table>
<thead>
<tr>
<th>Economies</th>
<th>Statutory protection</th>
<th>Legislation prepared</th>
<th>Member</th>
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<tbody>
<tr>
<td></td>
<td>UPOV</td>
<td>WIPO</td>
<td></td>
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<tr>
<td>High income economies (43)</td>
<td>29</td>
<td>4</td>
<td>23</td>
</tr>
<tr>
<td>OECD (24)</td>
<td>23</td>
<td></td>
<td>21</td>
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<tr>
<td>Non-OECD (19)</td>
<td>6</td>
<td></td>
<td>2</td>
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<tr>
<td>Upper middle income economies (34)</td>
<td>20</td>
<td>4</td>
<td>14</td>
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<tr>
<td>Lower middle income economies (53)</td>
<td>20</td>
<td>18</td>
<td>13</td>
</tr>
<tr>
<td>Low income economies (61)</td>
<td>22</td>
<td>3</td>
<td>4</td>
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<tr>
<td>Total (191)</td>
<td>91</td>
<td>29</td>
<td>54</td>
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</table>
Global trend of PBRs

Protected crops under PBRs by country
PBRs and plant genetic resources

- UPOV-type PBRs
  - A preferred way of implementing TRIPs requirement
    - “All member countries should protect plant varieties by patent or sui generis system or combination.”
  - Increasing UPOV memberships

- Cheaper and weaker means of protecting PGR

- But, there are mixed results of its impacts
  - R&D investment might have not increased
  - Less protection with many exemptions
  - May have marketing value: Role of trademark

3. Issues of benefit sharing

- Size of the benefits to be shared?
  - Cumulative innovation: pedigree information
  - Substitute germplasm and the marginal value
  - Size of commercial market: ag vs. pharma
  - Non-monetary benefits

- Costs of the benefit sharing system
  - Reduced demand for germplasm: Access law
  - Reciprocity: I need to pay ‘to be paid.’
  - High transaction costs: national and global

- Net benefit under different sharing mechanism?
Conclusion

- Patents are used in limited territories.
- PBRs are the preferred choice of mechanism
- Not enough evidence of the value of protecting PBRs
- Implementation of benefit sharing needs careful analysis of its likely net benefits
  - Possibly smaller benefits and larger costs than expected