

Open Source in Crop Biotechnology

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Can Open Source work in biology?

- It has for millennia in agriculture!

Agricultural Innovation History: Precursor of “Open Source” Model

- Farmer/blacksmith innovation, no IPR (Evenson)
- Sharing of germplasm
- Recent example: no-till and low-till agriculture (1970s innovation)
 - Invented by farmers
 - No IP

The Role of Intellectual Property Rights (IPR) in 20th century agriculture before the IPR/biotech revolutions

- Important in Some Horticultural Crops
 - Plant patents, Plant Variety Protection
- Largely Irrelevant in Field Crops
 - yet great yield increases
- Hybrid Corn as the Privatized Exception
 - Capitalist plot?

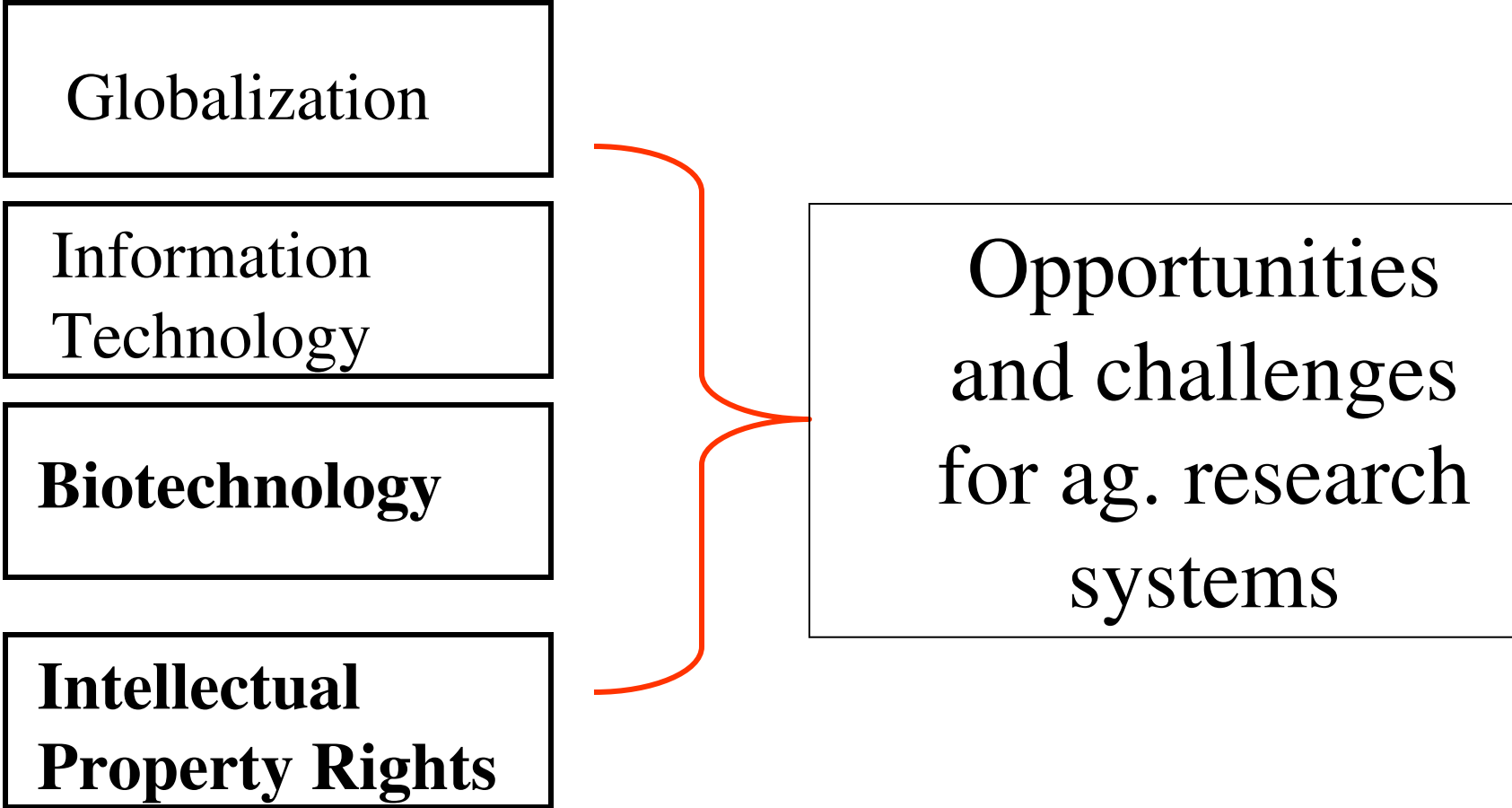
From late 20th century, four revolutions:

Globalization

Information
Technology

Biotechnology

**Intellectual
Property Rights**



Opportunities
and challenges
for ag. research
systems

Revolution in Ag Biotech Patenting

- Crucial court ruling:
 - Diamond v. Chakrabarty (1980): living organism
- Bayh-Dole Act (1980) encouraged patenting of federal-funded research
- NIH federal fund fire-hose
 - \$20B still can buy a lot of patentable basic research!
- Court of Appeals of Fed. Circuit strengthened patentee's rights

Revolutionary complementarities

- Biotech made patents **enforceable**
- Patents made private biotech **fundable**
- Impressive results in four major crops

Second-Round Problem: “Anti-Commons” in North

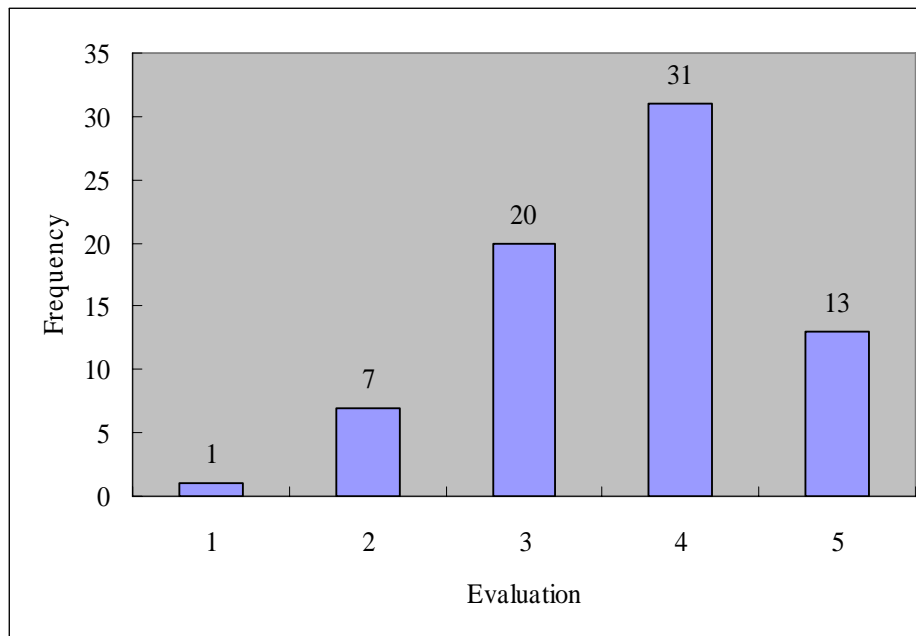
- Cumulative technology in seed package:
- multiple prior claims (unlike Pharma)
- High transaction costs of licensing
 - Uncertain, excessively broad, and conflicting IPR claims
 - Difficulty of identifying valid licensors
 - Much costly and slow litigation
 - Liability, brand image, and externality control

Problems for Public Sector

- Public/nonprofits have IPR and freedom to operate challenges too
- Public sector also patenting, increasing the problem
- Public sector cannot avoid problems by integration
- Public sector is a big deal in ag research

What Land Grant agricultural biologists say:

“Overall, IP protection of research tools is having a NEGATIVE impact on research in your area.”



1: disagree strongly
3: neither disagree
nor agree
5: agree strongly

11 respondents have no opinion

Source: Lei, Juneja and Wright 2008

Will patent sharing solve the problem?

- What can we learn from Golden Rice?
- “...the recent example of Golden Rice shows that patented technologies need not necessarily be a barrier.”
(Nuffield Council on Bioethics 2004 p. xix)

Golden Rice: Reality Check

- Patents are **NATIONAL** in scope
- There are **few or no valid patents** in major rice-consuming countries (pre-TRIPS environment).
- Most rice **not traded** where most patents held*

*Binenbaum, Eran, Carol Nottenburg, Philip G. Pardey, Brian D. Wright and Patricia Zambrano. 2003. "South-North Trade, Intellectual Property Jurisdictions, and Freedom to Operate in Agricultural Research on Staple Crops. *Economic Development and Cultural Change*, 51(2): 309-355.

Other initiatives

Multilateral cooperation in sharing IP:

- **PIPRA**
- **AATF** (African Agricultural Technology Foundation)

Open Source Biology

“Open Source”: Key Features

In its Modern Incarnation, must deal with privatized research inputs, and patentability of outputs

1. Full disclosure of enabling information including source code
2. Use of legal instruments including copyright to confer rights and responsibilities
3. Commons for all who agree to share alike

Modern Open Source Origins

- Free software movement as a software development paradigm
 - free as in “free speech,” not as in “free beer”
 - “software libre”
 - embedded Linux as one example

Open Source Efficiencies

Research Tools are:

- shared
- dynamically enhanced
- establish efficacy and reliability
- have low or no cost

One example: BIOS License

- Full commercialization rights
- Share (or keep secret) all improvements to the core technologies
- Not assert, over BIOS licensees, own or third party rights that might dominate defined technologies
- Share with public all information re biosafety

Can Open Source work in biology?

- Copyright is free to obtain, patenting costs money
- Patents are *national*: global cover is costly
- Universities claim title to patents, not generally to copyrights
- Easier to get or re-establish “Freedom to Operate” in copyright

Can a *Restoration* of Open Source Work in Crop Biotechnology?

- Is the software/copyright analogy appropriate?
- It worked fine in a world without IPRs
- Key Issue: Can it work in the new world of patents?

