Genetically Modified
Food Security, Health and the Environment

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• IP
• Regulation
• Technical Progress
• Technology Management
• Safety and Health
• Non-Profits
• Land Saving
• Biofuels
• Specialty Crops?
• Effects on Diversity
IP in Agriculture: Special Protections

- Agriculture has three kinds of protection besides patents (in US):
  1. Plant Patents
     - (since 1930) – similar to common (“utility”) patents, but protect only clones (why?)
     - Potatoes and other tubers exempt
     - Not available in overseas markets
Agriculture: Special Protections

2. Plant Variety Protection Certificates (PVPCs)

Criteria:
1. New (at least in US)*
2. Uniform
3. Stable – transmit their characteristics to their progeny

*New characteristics not necessarily useful

   e.g. new soybean with a blue flower was approved for a PVPC
Agriculture: Special Protections

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2 (contd.): Plant Variety Protection Certificates (PVPCs)

- Farmers can save the seed for replanting, but not for sale as seed for replanting
- Seed can be used for breeding new varieties
- Related to world agreement: UPOV
- In other countries this protection covers clones also
Agriculture: Special Protections

3. Hybridization:

What is a hybrid?

Seed from a hybrid crop is not valuable for replanting

- Hybrid’s progeny less productive than the initial seed
- Progeny may have very different characteristics (e.g. flowers)
- Earliest effective means (besides secrecy)
Agriculture: Special Protections

3 (contd.): Hybridization:

- Earliest effective means of protection (besides secrecy used in hybrid breeding)
- In history, who used secrecy to support a monopoly in an agricultural product?
- Hybrid corn industry in US thrived since 1930s
  - But heavy public input role through 1980s
- Horticulture relies heavily on hybrids
Agriculture: Protection Strategies

- Patent holders can also:
  - Issue licenses to exclusive buyers for the seed
  - Bag label contracts
  - Material Transfer Agreements (MTAs)
  - Technology Use Agreements
    - The last 3 ways that patent holders can control their invention involve some kind of contracts

- Most of the private research investment in plant sciences has focused on grain crops, and some horticultural crops
Regulation

- High Fixed Costs
- Duplicative
- No Learning
IP + Regulation

• Complexity of patents – overlap, blocking

• First tools become standard
  – Even if inferior – testing costs so much, takes years

• Disadvantages entrants: Supports Oligopoly

• Disadvantages developing countries
Technical Progress

• Evident advantages

• Double Cropping in Southern Cone

• But ...
Average Yields and Yield Trend for U.S. Corn, 1960/61-2012/13
Technology Management

Private Sector advantage?

• Roundup plus Roundup Ready Seed

• Liberty Link?

• Starlink?
Safety and Health

• Justifiable concerns

• Much misinformation

• *The left’s answer to global warming denial?*

• Ban on *Bt tobacco* as unsafe

• *Bt spray* vs. *in plant*

• Genetic (and other) contamination – old problem
  – Castor oil plant in seed
  – Seed breeder isolation
Non-Profits

• Perverse incentives?

• Squeaky clean
  – Or just squeaky?
Land Saving

• Huge issue for
  – poor consumers
  – Environment
  – Global warming
Biofuels

• Deleted all US corn production increase since peak of 1994

• Negates “food security” argument

• Land expansions counter GM savings
Specialty Crops?

• Economics of small markets?

• Oligopoly does not care

• Should governments?
Effects on Diversity

• New England Chestnut trees?
  – Effects on native turkeys