



# Policy, Economics and IP Protection Considerations for Biotech Crops

by Howard Minigh, CropLife International



# Farmers Face Many Challenges

- Dramatic increases in consumer demand and need driven by population growth
- Pests and plant diseases reduce crop yield and quality
- Climate change has created harsh growing climates such as extreme temperatures and drought
- Constant drive to protect natural resources and the environment

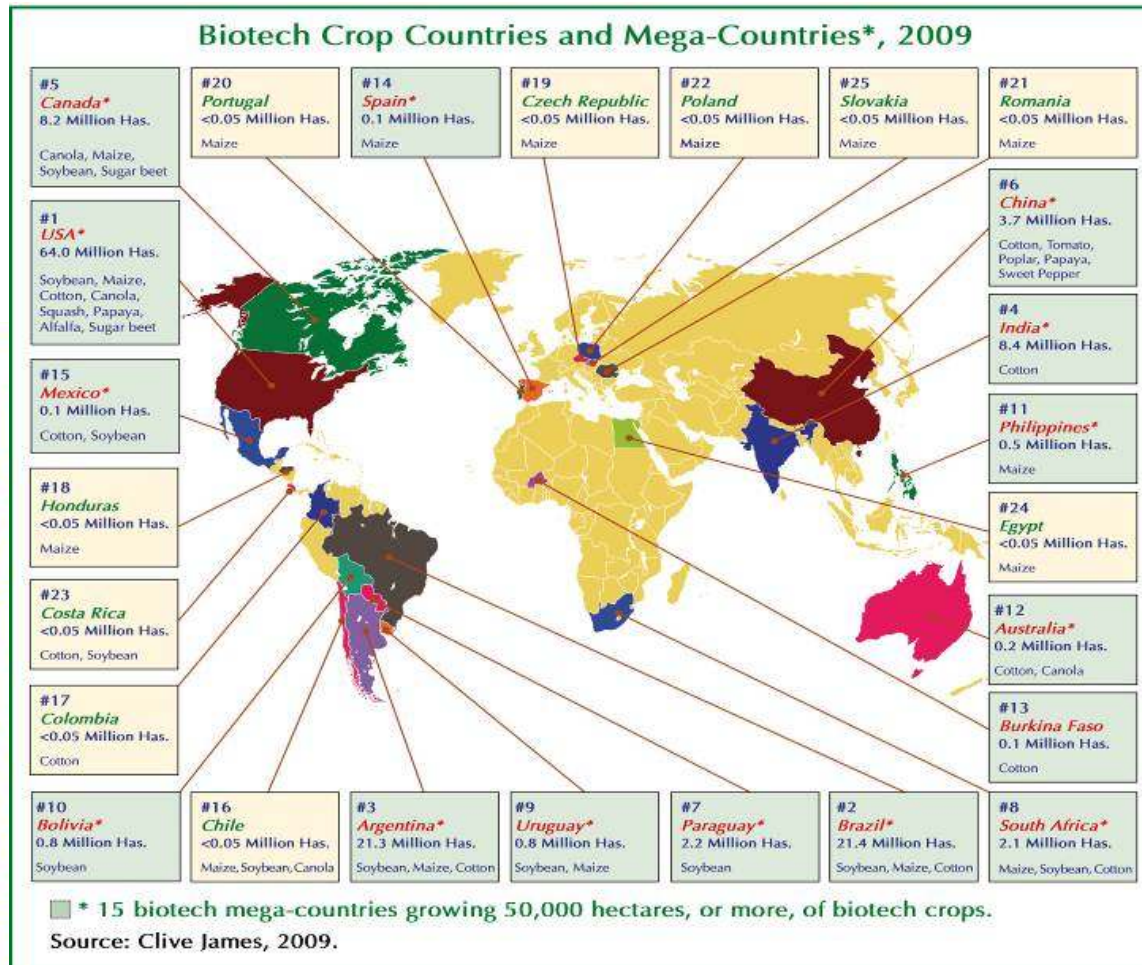


# Farmers Need Access to Tools

- Training programs
- Modern farming techniques and systems
- Advances in machinery and farm equipment
- Selection of high-quality seed
- Variety of inputs



# Plant Biotechnology



- In 2009, biotech crops are grown on 134 million hectares in 25 countries by 14 million farmers
- 90% of farmers are smallholders in developing countries
- Benefits of biotech crops include increased crop yield and farmer income, reduced pesticide applications and carbon dioxide emissions, and less time in the fields



# Biotech Cotton in India



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*"Better harvests [have enabled me] to fulfill my dreams of building my own brick home, leasing land, and providing a more comfortable life for my family."*

*- Farmer Gautam Javade*



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- Increased farm income in 2008 by US\$1.8 billion
- 38% yield increase
- 75% reduction in pesticide applications
- Farm laborer wages increased by US\$40 per hectare
- Increased employment opportunities leads to increased quality of life



# Biotech Maize in South Africa



*"My aim is to do South Africa proud. Biotechnology is the future of agriculture world-wide."*

*- Farmer Motlatsi Musi*



- Increased farm income in 2008 by US\$119 million
- 79% of white maize grown in South Africa in 2009 were biotech varieties
- Average yield improvements of 15%



# Biotech Maize in the Philippines



- Increased farm income in 2008 by US\$49 million
- Average yield increase of 15%
- Beneficial insect populations are thriving



*"I am very proud of what biotech farming has given me and my family. It is very much possible to achieve what ever never though possible."*

- Farmer Rosalie Ellasus



# Plant Biotechnology

- 90% of farmers repurchase biotech seed year-after-year
- 90% of farmers growing biotech crops are in developing countries
- In 2008, farmer income increased by US\$9.37 billion
- Adoption of sustainable agricultural practices such as no-till farming
- Reduced pesticide applications
- Increased crop productivity has saved 43 million hectares of natural land from being turned into cropland
- Improved quality of life – better homes, schooling opportunities, additional sources of income



# A Renewed Need for Plant Biotechnology

*"Our farmers will endure significantly higher costs, for no greater return ... if they are prevented from adopting GM technology."*

*- Australian Senator Julian McGauran*

*"We cannot continue to import food from countries that sustain themselves on biotechnology."*

*- Kenyan Minister of Agriculture William Ruto*

*"For many people, a bag of maize is a luxury. Biotech crops will alleviate this problem."*

*- South African Farmer*

**"To solve the food problem, we have to rely on big science and technology measures, rely on biotechnology, rely on GM."**

**- Chinese Premier Wen Jiabao**

*"Eventually if we can feed our corn to our livestock, there is no need to import corn and the country is economically better off."*

*- Filipino Farmer*



# Elements for Successful Technology Adoption

- Commitment to developing science and technology
- Capacity-building
- Science-based regulatory framework
- Human resource development
- Physical infrastructure development
- Engage stakeholders
- Demonstrate value



# Technology-Enabling Regulatory Environment

- Farmers and consumers need right to choose
- Science-based
- Transparent safety and risk assessments
- Supportive of innovation and intellectual property protection
- Recognize socio-economic benefits
- Acknowledge public opinion
- Responsible technology management and stewardship programs

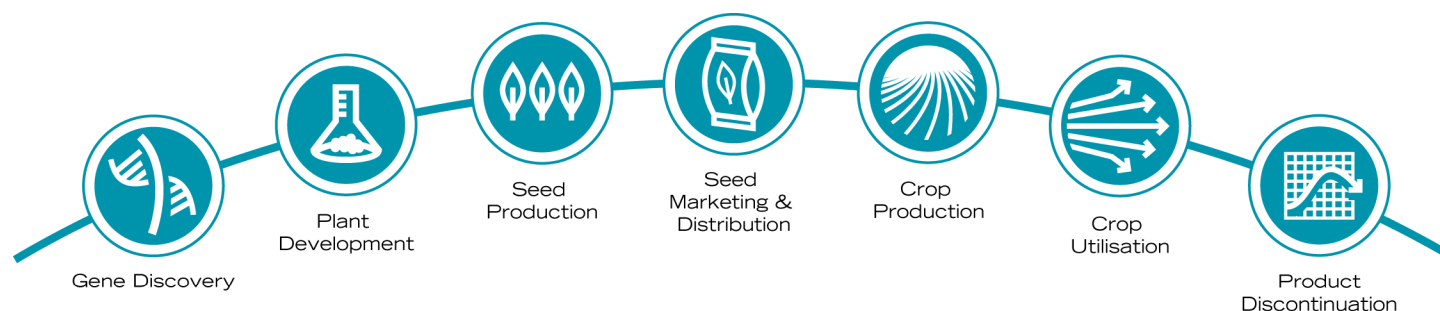


# Intellectual Property Rights Support a Cycle of Innovation

- Agricultural advances are the only way to address farming challenges
- Research and development is resource-intensive and often costly
- Intellectual property rights (IPR) benefit technology providers and users
  - Technology providers are acknowledged and rewarded for their inventions
  - Provides incentive for continued innovation
  - Continued innovation leads to more choice in the marketplace
- IPR supports collaboration and partnerships – which leverage best practices and expertise



# Stewardship – Promoting Good Agricultural Practices



- Stewardship throughout the product life cycle
- Good stewardship practices have been in place since the 1990s and stewardship is an evolutionary process
- Stewardship is a global effort
- Meeting AND exceeding regulatory requirements and guidelines



# Burkina Faso: A Case Study



# Cotton in Africa

- 12% of the world's cotton is grown in Africa
- African cotton represents 5% of world production and 11% of world exports
- African cotton crop yields are 2.6 times lower than the world average

Region	Area (mHa) of Cotton	Crop Yield (kg/Ha)
<b>India</b>	<b>9.26</b>	<b>585</b>
<b>China</b>	<b>6.39</b>	<b>1,253</b>
Africa	3.84	295
<b>USA</b>	<b>3.14</b>	<b>951</b>
<b>Pakistan</b>	<b>2.90</b>	<b>660</b>
<b>Brazil</b>	<b>970</b>	<b>1,485</b>
<b>Australia</b>	<b>0.14</b>	<b>1,950</b>



# “White Gold” in Burkina Faso

- 6 million Burkinabes work in the cotton industry (40% of the population)
  - 350,000 farm families involved in cotton production – about 3 million people
  - 3 million people involved in collateral industries
- 2-5 hectare family farms
- 500,000-700,000 hectares under cotton production (potential to grow to 1 million hectares)



# Biotech Roadmap

2003

- Invitation to explore biotech opportunities in Burkina Faso
- Formal agreement between Monsanto and INERA.
- Trials commenced under presidential decree.
- Conversion of local germplasm

2004

- Biosafety law drafted and reviewed.
- 2<sup>nd</sup> year trials with US germplasm.

2005

- Regulatory agencies established.
- 2 local varieties converted to BGII.

2006-07

- Biosafety law ratified by legislature and signed by President.
- Systems trials on commercial plots of BGII in local germplasm.
- Studies undertaken: *Stewardship, efficacy and socio-economics*.

2008

- Commercial permit granted, license agreement signed.
- 8,500 ha seed production planted by 4,300 farmers.

# Biotech Cotton Success in Burkina Faso

- Three-fold yield increase
- Net income gain of US\$124 per hectare
- Pesticide applications reduced by 75%
- Decreased farm expenditures and time laboring in fields
- Interest in other biotech crops to help with food self-sufficiency



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# An Integrated Approach to Technology Adoption

*"Much of this was made possible through collective leadership, a strong group of scientists who believed in transgenics for modern agriculture, and government support."*

*- Emil Javier, President  
Philippines National Academy of Science and Technology*

