

Controversies Surrounding the Introduction of Bt Brinjal in India

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Background info

- ▶ With its rapidly increasing population, India needs to be concerned with food security
 - ▶ India will have 23 million more people than China in 15 years
 - ▶ Total population-1,476,378,000
 - ▶ What food will there be?
 - ▶ How much food will there be?

Bt Brinjal



India [Map] Global Security Accessed 23 April 2014
<http://www.globalsecurity.org/jhtml/jframe.html#http://www.globalsecurity.org/military/world/india/images/india-states-map2.gif> | | |

eggplant. [Photograph]. *Encyclopædia Britannica Online*. Retrieved 23 April 2014, from <http://www.britannica.com/libproxy.uwyo.edu/EBchecked/media/149116>



Introduction

- Bt brinjal is a genetically modified crop that is resistant to the eggplant shoot and fruit borer pest.
- It is currently under moratorium due to the lack of information concerning the health affects of the crop.
- We will discuss the social, economic, and environmental impacts that Bt brinjal could have in India.

Social Impacts

Cry1AC

protein is an endotoxin from *B. thuringiensis* that has been used extensively in both microbial and plant-incorporated protectants as a means of insect pest management.

► Cry1Ac Health Concerns

- Allergenicity
- Gene transfer
- Toxicity

toxicological significance due to the no-observed-adverse-effect-level (NOAEL)

► Pesticide use concerns

- Eye and Skin damage
- Asthma
- Cancer
- Harm sperm and egg
- Development issues



Social Impacts cont.

- Oppressive Corporations (Mayco)
 - Disproportionate Control over Technology
 - Farmers are receiving negative returns on their crops due to the cost of seeds being so high
 - Indebtedness, deterioration of economic and social status, psychological depressions and suicides
- Agrarian Crisis
 - Farmers trapped in a cycle of debt
 - Leading to high rates of suicides
 - 241,679 farmers in India committed suicide between 1995 and 2009
 - constrained by their small landholding and poor resource base





Economic Impacts

- Current problems
 - Rapidly growing population
 - Conversion of agricultural lands
 - Increasing buying power
 - Too risky to grow eggplant currently
 - High costs of pesticides



Economic Impacts cont.

- Genetically modified organisms
 - More efficient than standard cross-breeding methods
 - Reduced pesticide use
 - Less expensive-upfront cost
 - Better for health-lower health costs
 - Better for environment

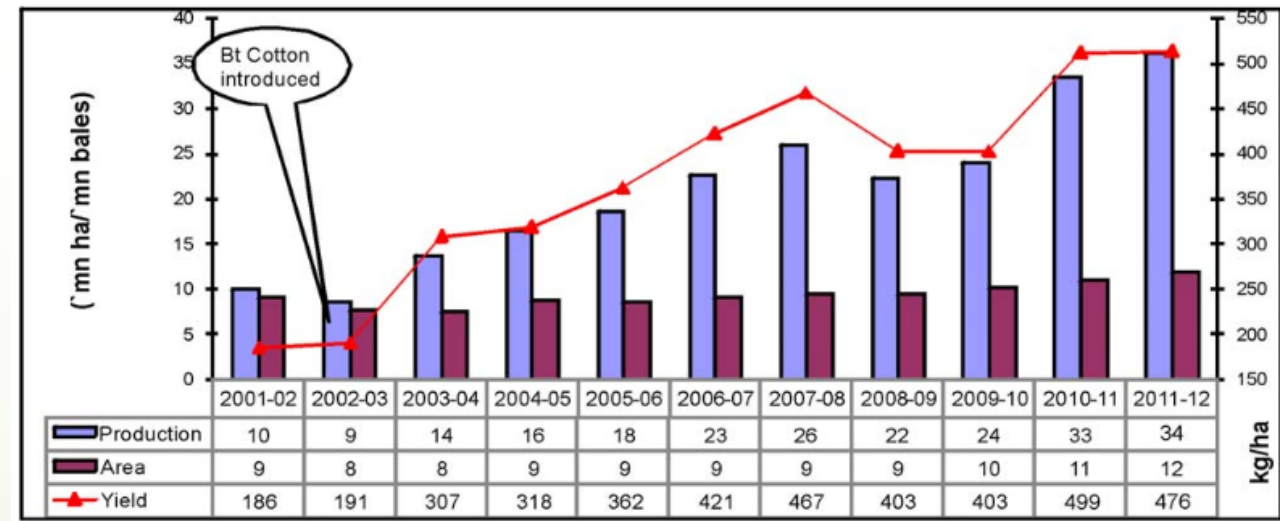
Economic Impacts cont.

- General Findings
- In general, Bt brinjal is a more economically viable option as compared to traditional practices
 - Less upfront, direct costs
 - Less indirect costs

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State of Indian Agriculture

Fig. 1.8: Area, Production & Yield of Cotton



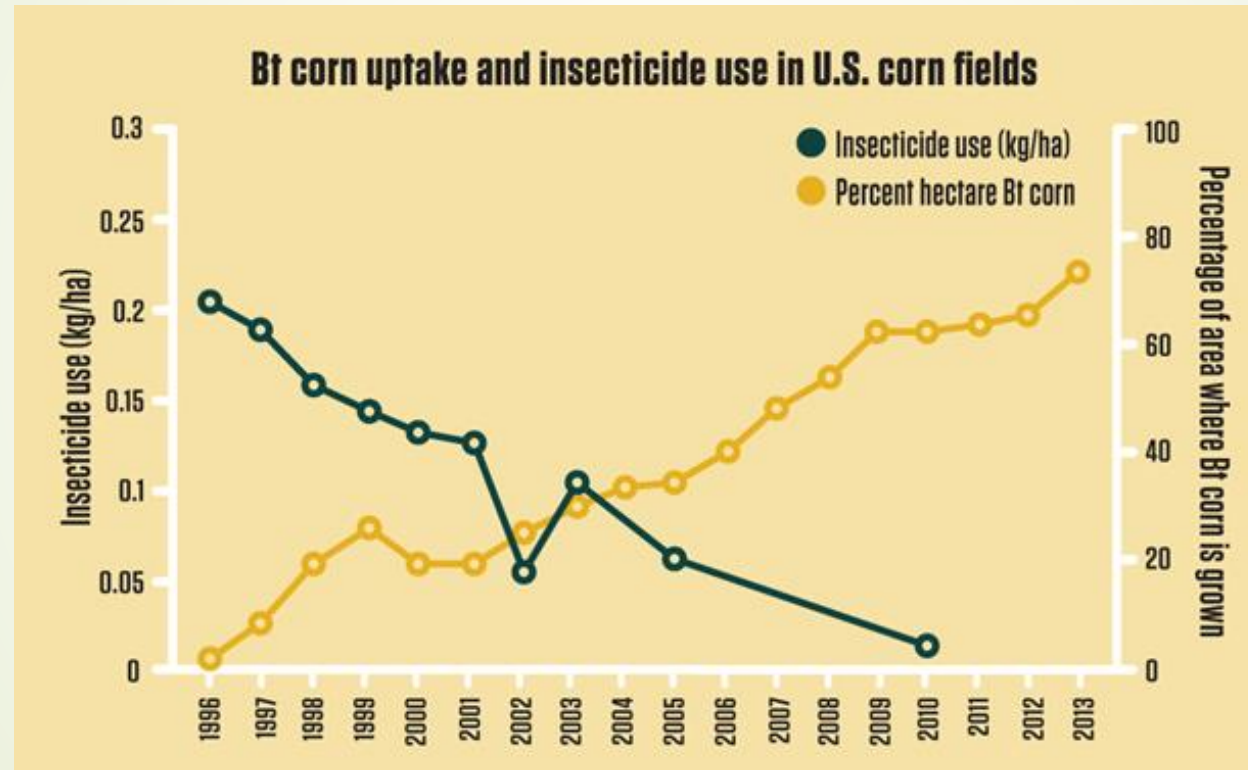
Qaim 2003 doi: 10.1016/j.worlddev.2003.04.005
 Gulati, Ganguly 2010 doi: 10.1111/j.1574-0862.2010.00486.x

Source: Directorate of Economics & Statistics, Ministry of Agriculture.

<http://pib.nic.in/archieve/others/2012/mar/d2012031302.pdf>

Environmental Impacts

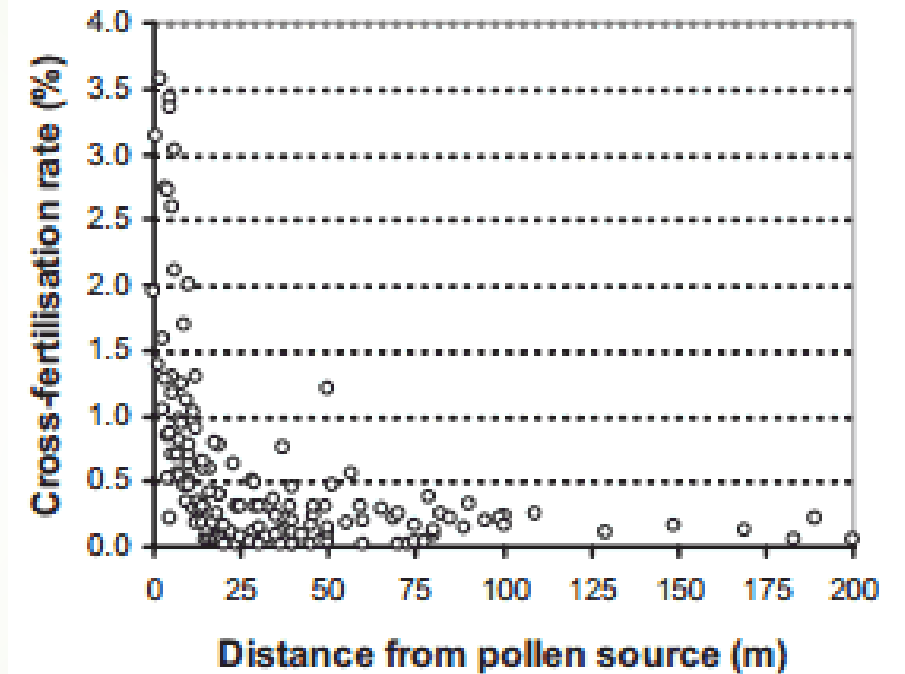
Positive Impact: Reduction of insecticide use



Bt corn uptake and insecticide use in U.S. corn fields. [Graph]. Washington Post. Accessed April 23, 2014.
<http://www.washingtonpost.com/blogs/wonkblog/wp/2013/08/18/the-world-uses-billions-of-pounds-of-pesticides-each-year-is-that-a-problem/>

Environmental Impacts cont.

- Negative Impacts
 - Genetic drift
 - Wild Species
 - Neighboring field of the same crop
 - Loss of Biodiversity
 - Center of origin
 - Effects on non-target insect species



Devos et al., 2008 Agron Sustain Dev. Doi: 10.1051/agro:2008051



Environmental Impacts cont.

- Neutral Impacts
 - Insect resistance
 - Five year monitoring of Bt maize in France found no evidence of insect resistance
 - Impacts on soil
 - No problems with Bt proteins in soil
- Not a threat now
 - But could become an issue in the future

Policy Problems

- Genetic drift affects biodiversity
 - Should conditions change...
 - Insect evolution causing resistance
 - New research on health Impacts
- Contradictory Policies
 - Biotechnology Strategy – GM foods a “sunrise sector” encourages use and development
 - “Government and industry have to play a dual role to advance the benefits of modern biotechnology while at the same time educate and protect the interests of the public”(BTS)
 - National Environment Policy
 - “Conservation of genetic diversity, is crucial for development of improved crop varieties resistant to particular stresses” (NEP)



Conclusion

- ▶ In our opinion, we agree with the current moratorium on Bt brinjal in India.
- ▶ We suggest that more research be done by independent third parties before Bt brinjal is implemented on a national scale.



Thank you

- ▶ Special thanks to our professor, Ramesh Sivanpillai and the Haub School of Environment and Natural Resources.
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