

The Political Economy of Biotech Regulation: Case studies from India

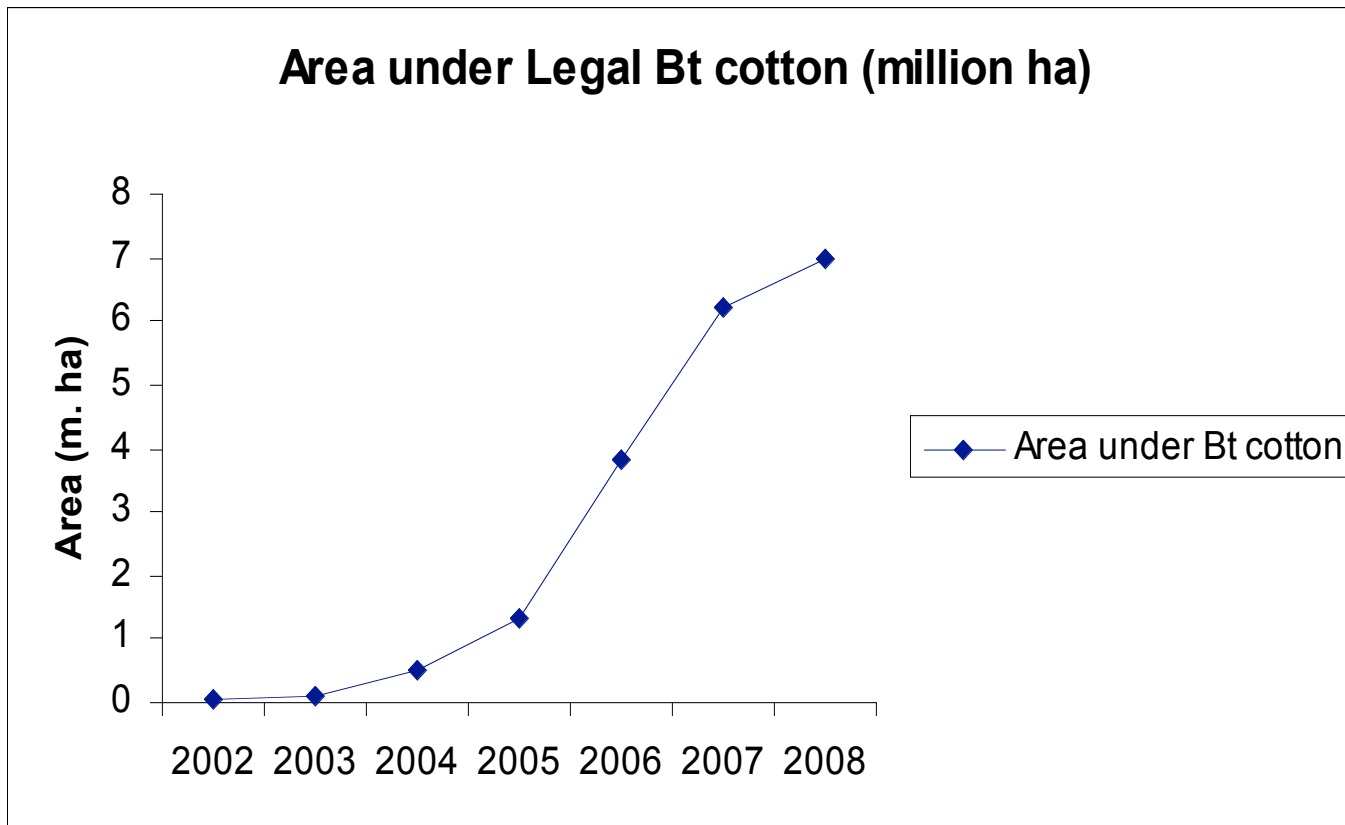
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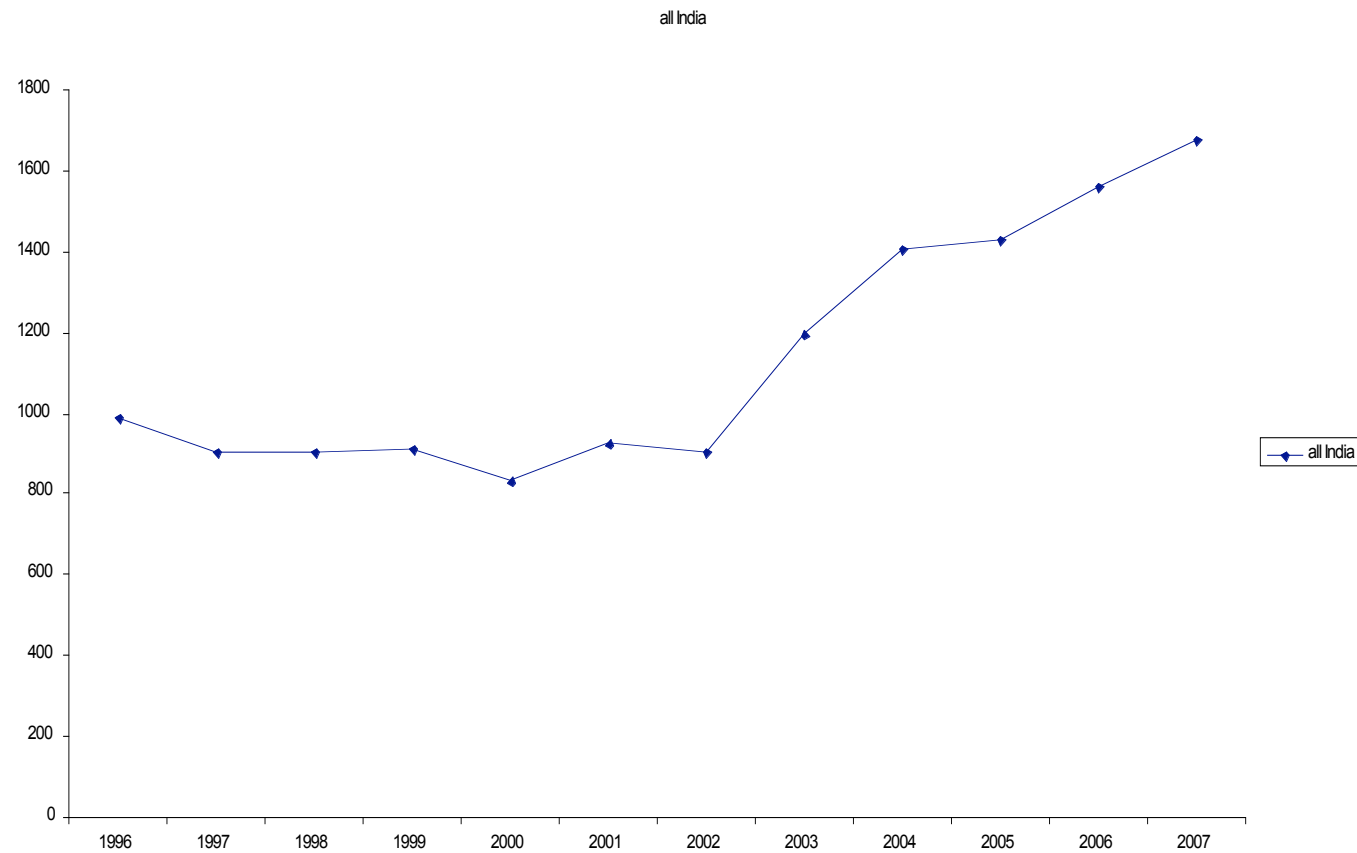
The Market for Bt Cotton Genes: Monsanto's Monopoly

Transgene	Owner	2008	2007	2006	2005
cry1Ac ("Bollgard")	Monsanto	70%	86%	91%	100%
cry1Ac/cry2 Ab (Bollgard II")	Monsanto	24%	8%	2%	0%
cry1A (Fusion)	Nath Seeds	2%	2%	3%	0%
cry1Ac ("Event 1")	JK Seeds	4%	3%	4%	0%

Yet, rapid diffusion....



.....and productivity increase



Monsanto's pricing

- Was Monsanto's pricing strategy moderate?
- Qaim and de Janvry (2003) show that in Argentina, Monsanto priced its seeds "too high" for its own good – slowed adoption of Bt cotton.
- What about India?

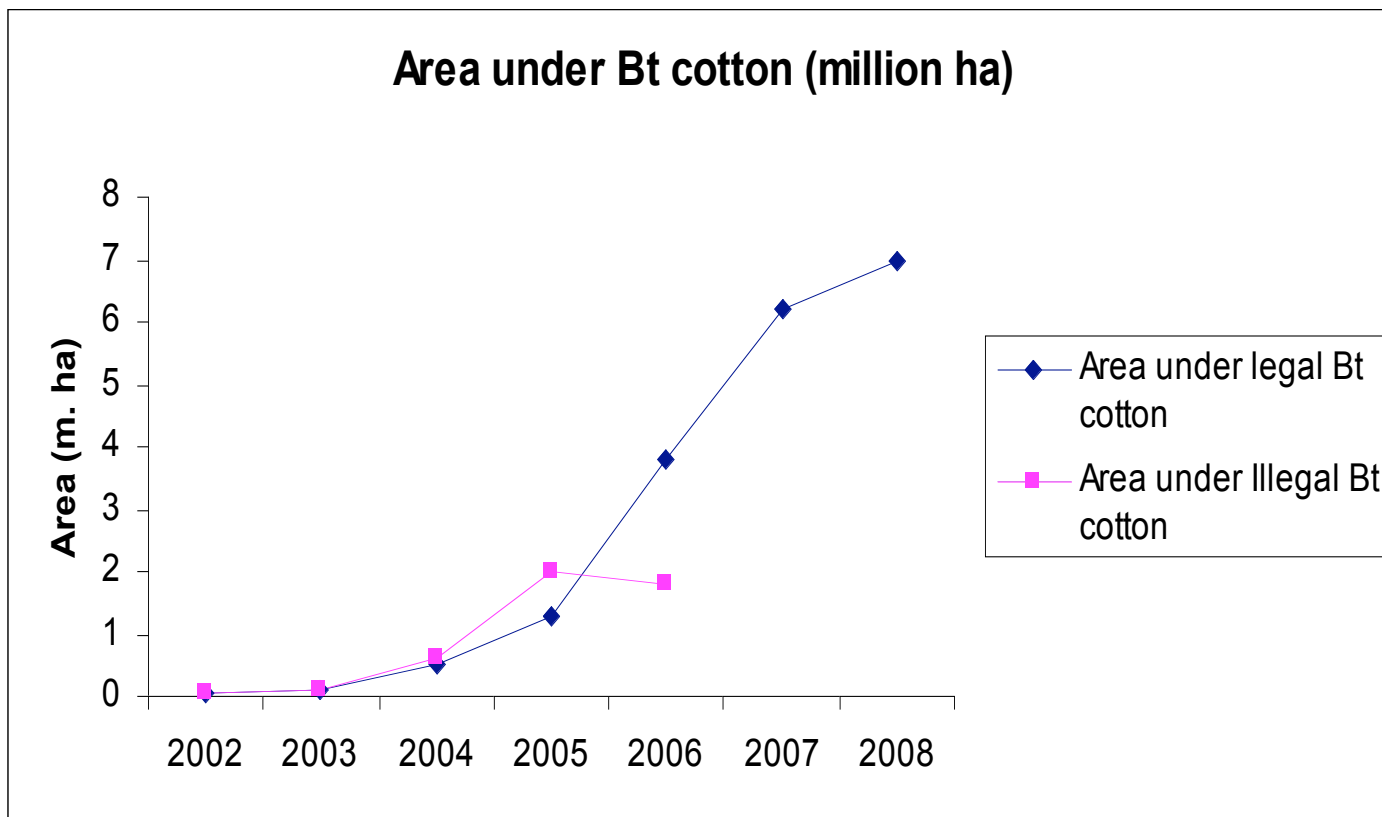
Pricing...India

- In India, till 2006, Bt hybrid seeds priced at 4 times non-Bt hybrids.
- The non-Bt market is competitive and seed production costs are comparable between Bt and non-Bt.
- So Bt price was set at about 4 times the competitive price till price controls hit the market.
- Even at that high a price, growers received a substantial chunk of gains from Bt.

Why rapid diffusion?

- Illegal seeds – contributed to the rapid spread of Bt cotton in Gujarat and to a lesser extent in Punjab.
- Price controls imposed in 2006. The price of Bt seed came down from Rs. 1600 for a packet (of 450 grams of seed) to Rs. 750 per packet. Notice the rapid expansion from 2006 (not the only factor though!)
- In both these episodes, the role of the State was critical. What determines the response of the State?

Illegal Seeds



What is illegal about illegal Bt cotton?

- NB 151 (and its variants) contain cry 1 Ac – that belongs to Monsanto.
- But violation of IPRs is not an issue as the gene is not patented in India.
- Illegal Bt has not received biosafety approval and hence runs foul of environmental protection laws.
- Why have the laws not been enforced?

Limits to Regulation?

- Farmers possess “stealth” strategies (Herring)
- “opportunistic agrarian anarcho-capitalism among farmers themselves” that functions without “property or biosafety”.
- How can this be policed when it is on too large a scale? This is the argument of government officials.

India: Cotton

- Hybrid varieties = 70% of cotton area (2004/05)
- Dominated by private sector: proprietary hybrids.
- Gujarat and AP are centres of hybrid seed production.
- Illegal seeds are hybrids too.

Hybrid Seed Production

- Production of hybrid seed requires access to parent lines and the experience and skill in crossing them manually.
- Specialized task requiring 10 times more labour and 5 times more capital than cotton cultivation (Venkateswarlu).
- In the legal business, seed companies contract production of hybrid seed to select seed growers.

Production of illegal seeds

- Illegal seeds would also require provision of capital, organization of production by select growers and a network for distribution.
- Gujarat: leading centre of hybrid cotton seed production in India and has many experienced growers skilled in producing hybrid seed.
- Loose network of informal seed enterprises, producers & sales agents – “stealth economy”

Experimentation

- Dispersed ownership of the inbred parent lines.
- Wide experimentation & the male parent (with Bt gene) crossed with different female lines.
- NB 151 is generic name for illegals – numerous names known locally.

	2003	Non-Bt	Legal Bt	Illegal Bt
Proportion of are that has seed sourced from seed dealer		0.42	0.82	0.17
Proportion of area that has seed sourced from state seed corporation		0.19	0.01	0.03
....from other farmers		0.14	0.11	0.56
From saved seed		0.07	0	0.01
....from other sources		0.15	0.06	0.23

Seed source in 2007	Approved plots		Unapproved plots	
	#	%	#	%
Seed shop	151	87.79	75	34.4
Farmer-saved seed	0	0	16	7.34
Farmer in village	12	6.98	99	45.41
Relatives	2	1.16	13	5.96
NGO	6	3.49	3	1.38
Farmer outside village	1	0.58	12	5.5
Total	172	100	218	100

Prices of illegal seeds

- In 2003, illegal seeds priced at about three times that of non-Bt hybrids – suppliers of illegal Bt possessed market power!
- In 2008, illegal seeds priced about the same as non-Bt hybrids.

The Role of state government

- Biosafety laws and approval controlled by Central government. Enforcement is responsibility of state govts and local officials.
- In Gujarat, the state government looks the other way as long as there is no “open challenge” to the law.
- India’s seed act does not apply farmer to farmer exchange.

Enforcement: A Choice

- Seeds are diffused by the “stealth” economy of informal seed enterprises, seed growers, and their sales agents.
- The state government has the information and means to stop illegal seed sales.
- Other states, notably, Maharashtra was able to police the seed trade to stop illegal seeds (absence of informal channels of kinship networks might have also helped limit its spread).
- In the Bt cotton case, enforcement is feasible. So why does the government choose not to do it?

State governments can enforce, but why should they?

- Threat to biosafety? No - the cry 1 Ac gene extensively tested for safety.
- Resistance management problem? no evidence that it is any more serious for illegal seeds
- Inferior products / Low quality? no evidence for this either

No incentive to enforce

- In Gujarat
 - No obvious problems from Bt
 - Obvious economic benefits to farmers and local seed companies
 - Farmers and local seed companies lobby against enforcement – “nationalist ideologies”
 - Biotech industry lobbies for enforcement – but they do not have ties to local power structures.

.....on the other hand

- In Maharashtra
 - Seed producers lobby does not exist
 - Monsanto's Indian partner Mahyco is strongly entrenched in the state.

Andhra Pradesh government takes a different approach to Monsanto's monopoly

- AP government goes to Indian monopoly control organization, MRTPC, and argues MMB a monopoly and seed prices should be controlled – evidence is the low trait value it charges in China.
- Bt cotton seed prices for legal seed
 - 2002 – 2005 Bollgard I Rs1600/packet (450gms)
 - Tech fee Rs 1200/packet
 - 2006 beginning Rs1200 Bollgard I
 - Rs 1800 Bollgard II
 - 2006 A.P. fixed prices of Bollgard I and II at Rs750 tech fee Rs300 and other state governments followed their lead

Bt Seed Sales before and after Price Controls

Sales: million packets						
Market Share: (%)	2005		2006		2007	
MMB (BG-I)^a	2.471	(100%)	8.439	(91%)	12.833	(72%)
MMB (BG-II)^a	NA		0.195	(2%)	1.219	(7%)
Nath Seeds^b	NA		0.250	(3%)	0.364	(4%)
JK AgriGenetics^c	NA		0.401	(4%)	0.500	(5%)
Total legal Bt cotton	2.471	(100%)	9.285	(100%)	14.916	(100%)
Illegal Bt cotton	2.320		3.756		2.931	

Why Price Controls?

- Anti GM NGO activity most intense in AP –
 - Center for sustainable agriculture.....
 - Deccan development society...
- Farmers who adopted Bt cotton may have benefitted less than elsewhere – so the high price of cotton seed was visibly seen as a constraint.
 - Initial Bt cotton varieties least suited to A.P. – Naik, Qaim and Zilberman.
 - Substantial gains from Bt cotton in AP (Mahendra Dev and Chandrasekhar Rao)
- Domestic seed companies unhappy about MMB contracts for Bt –
 - Want to improve negotiating position
 - Want to reduce dominance of MMB

...domestic seed companies

- Unhappy about dependence on Monsanto for technology

- Prabhakar Rao, Nuziveedu Seeds (largest cotton seed company)

- “In India, the delay in the development of Bt technology in the public sector research and resultant monopoly of technology raised the seed prices”

Common elements in Gujarat and A.P.

- Major seed production base for cotton...
- Strong local companies...
- Maharashtra, other important location of seed companies (but no seed production), but leading company, MAHYCO, is partner with Monsanto.

Changes in Monsanto-MAHYCO Biotech Profits

Year		2005	2006	2007
WITH Price Controls	Sales : million packets^a	3.100	8.439	12.833
	Profits: million \$	54	76	115
WITHOUT Price Controls (Desai estimates)	Sales: million packets^b		4.090	5.033
	Profits: million \$		82	101
% difference from actual profits^d			-7%	15%
WITHOUT Price Controls (Monsanto estimates)	Sales : million packets^c		6.550	9.8
	Profits: million \$		131	196
% difference from actual profits^d			-42%	-41%

Profits of Indian Bt suppliers

		Year	2006	2007
JK AGRIGENETNATH SEEDS	WITH Price Controls	Sales: million packets	0.250	0.364
		Profit: million \$	1.500	2.184
	WITHOUT Price Controls	Sales: million packets	0.121	0.274
		Profit: million \$	1.212	2.744
	% difference in profits			24%
JK AGRI ICS	WITH Price Controls	Sales: million packets	0.401	0.500
		Profit: million \$	2.406	3.000
	WITHOUT Price Controls	Sales: million packets	0.194	0.377
		Profit: million \$	1.943	3.770
	% difference in profits			24%

Central government takes a third approach

- Enforce biosafety
- Enforce IPRs
- Allow high prices

Why?

- Don't have to implement regulations so they do not get complaints.
- Have to maintain international agreements
 - WTO, biosafety regulations
- Monsanto has more influence in Delhi than in the states –
- No real domestic seed industry lobby
 - Seed industry weak at national level where they cannot compete with other industry lobbies – but powerful in key states like A.P. and Gujarat
- Biotech lobby is much stronger in Delhi....
 - All India Biotech Association
 - Specific department to work with them in Delhi - Department of Biotech which is part of Ministry of Science and Technology

A generic issue

- Governments follow time-inconsistent policies.
- Would like to promise high returns and monopoly pricing (via IPRs, biosafety regulations as entry barriers) to attract investors and new technologies.
- But once they have come in, it is not usually optimal to enforce the law. Static welfare maximization plus discounting the future would ensure that.

.....in conclusion

- India has achieved rapid adoption by watering down monopoly profits.
- Monopolies are politically vulnerable.
- Long run costs in terms of reduced investor interest.
- May not matter so much for off-the-shelf technologies.

.....concluding

- But could matter for India-specific traits e.g., for India-specific pests in cotton and for crops important to India (e.g., drought tolerance in pulses).
- India is a large market – limits to free riding.
- Interest in ag-biotech diminishing among Indian firms.
- So what can be done?

Policy Alternatives

- Market solution: Promote competition – but how?
- Is it easy? Why does Monsanto tower over others?
- What should the public sector do? Unlike China, public sector biotech investments in India have not been sizeable.
- Technology buy-outs? How should that price be determined? – Kremer and Zwane (2004) advocate this for precisely targeted development programs aimed at commercialization.