

WHY DID “OPERATION CREMATE MONSANTO” FAIL?

Science and Class in India’s Great Terminator-Technology Hoax

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ABSTRACT: Though promoted by the Government of India, and endorsed by dominant international organizations concerned with agriculture, biotechnology has produced fierce resistance and divisions. “Operation Cremate Monsanto” combined nationalist appeals, opposition to multinational capital, and rejection of genetic engineering in one integrated critique. The movement failed; Monsanto’s technology spread rapidly and widely in India. The movement illustrated a larger problematic of understanding interests under conditions of rapid and complex technological change. Science continually presents new challenges to the way interests are understood by citizens and political classes that control states; the sea change in redefinitions of interests — of both individuals and states — introduced by, for example, the atmospheric science of ozone holes and climate change is archetypal, as are the internationally contentious battles in trade and property of “genetically modified organisms.” Interests in biotechnology are screened by science, understandings of which are unevenly distributed. Asymmetries of knowledge and skill repertory necessary for participation in global networks of contestation create new class positions within India, and corresponding contradictions in social movements. Cultural capital matters fundamentally in differentiating classes and class interests; authenticity rents become available to some class positions but not others. Divisions matter because movements seeking environmental integrity and social justice may ultimately be weakened by egregious inaccuracies of framing, however effective the short-term gains in dramaturgy may be.

“Pushed into deepening debt and penury by Monsanto-Mahyco and other genetic-engineering multinationals, the introduction of Bt cotton heralds

the death of thousands of farmers....High costs of cultivation and low returns have trapped Indian peasants in a debt trap from which they have no other escape but to take their lives.” — Vandana Shiva (2006, 86)

Failure of a Movement: The Suicide-Seed Coalition

Failure of protest movements is common, no matter how worthy the cause. Struggles to gain women’s suffrage, to abolish slavery, or to end colonial rule took decades. We learn much about politics and society from the success and failure of these movements. This essay examines the failure of a particular episode of protest against genetic engineering that received global attention — the battle over India’s first officially approved genetically modified organism (GMO), Bt cotton.¹ This particular failure suggests what is lost in the move away from class analysis in Indic studies, for both analysts of social movements and for the movements themselves.

Activists who claim to speak for Indian farmers have taken diametrically opposed positions, for and against genetic engineering.² Before any transgenic crop can be approved for cultivation, elaborate biosafety testing is required, in line with international norms of the Cartagena Protocol on Biosafety of the Convention on Biological Diversity. A transgenic cotton with the generic designation “Bt” for the transgene it carried, taken from a common soil bacterium, promised to reduce farmers’ dependence on purchased pesticides and increase harvests by controlling the worst predator on Indian cotton: the bollworm. “Operation Cremate Monsanto” opposed even the testing of transgenic cotton, and attempted through direct action to prevent the trials. The movement was national, and to some extent international, though the first manifestations were in the state of Karnataka.³ Protests were held, test crops were burned in the fields, public tribunals (*bij panchayat*) were staged, courts were moved. Opposition was constructed in terms of threats: threats to national independence, in the form of dominance of agriculture by multinational corporations; threats to farmers, in the form of bondage to monopoly seed corporations; threats to nature, in the form of “biological pollution” [horizontal gene flow]; threats to human health, in the form of undiscovered allergens. The recuperative opposites were posed in terms of universal valents: biodiversity over biological reductionism; self-reliance in place of subordination to foreign market power; safety over uncertainty and risk; the natural over the unnatural.⁴

Operation Cremate Monsanto was launched in 1998; it shared ideology, symbols, tactics, and normative critique with similar movements throughout the world.⁵ Public intellectuals and numerous nongovernmental organizations (NGOs) attempted to alter public understandings of genetic engineering and to

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1. Bharathan 2000; Bunsha 2001; Jayaraman 2001; Parmer and Visvanathan 2003; Herring 2005; Herring In press a; Scoones 2005, Chap. 7.
 2. Omvedt 2005.
 3. Madsen 2001.
 4. Herring 2005.
 5. McHughen 2000.

stop its introduction to India. The movement had international backing: Greenpeace, in particular, as well as Via Campesina and other networks opposed to both globalization and genetic engineering, which were conjoined through the mechanism of multinational corporations' control of transgenic seeds. It is difficult to know who or how many the coalition represented. The Karnataka Rajya Raitha Sangha (Karnataka State Farmers' Organization, or KRRS) that launched the operation claimed a membership in the millions but proved unable to mobilize significant electoral support. The Andhra Pradesh Coalition in Defence of Diversity claims to be a coalition of 140 civil-society organizations.⁶ Numerous other organizations — some ephemeral, some peripheral — add their endorsements to movement demands, such as a moratorium on transgenic plants in India. The most prominent spokesperson is Vandana Shiva of Navdanya, itself a coalition that convenes subnational organizations. Devinder Sharma has been a major spokesperson, representing an “independent collective” in New Delhi, the Forum for Biotechnology and Food Security. The movement waxes and wanes, regionally and over time, and has no coherent structure; it is a moving target for analysis. Nevertheless, the sum total of anti-transgenic activities bears enough commonalities to be analyzed collectively. Organizations promoting the same technology that the suicide-seed coalition seeks to prevent from being tested in India have the same problem of assessing membership and representation: some are intermittent coalitions of farmers' organizations — e.g., the Kisan [peasant] Co-ordinating Committee — and others are major regional farmers' organizations with a continuing political presence and significant following and some clout — e.g., the Shetkari Sanghata [Agriculturalist Association]. On both sides, social-movement organizations represented in this episode are typically not membership organizations, and there is a great deal of overlap among them. Yet it is clear that more recognized activists, both internationally and within India, have been oppositional; this loose confederation of opponents of genetically engineered organisms is what I call the suicide-seed coalition, for reasons that will become apparent.

Despite intermittent victories in delaying approval of transgenic cotton, the movement failed to stop the spread of Monsanto's technology. Even before the Government of India (GOI) approved the Mahyco-Monsanto hybrids for cultivation in March 2002, farmers were growing Bt cotton from unapproved sources, with Monsanto's transgene, beneath the radar screen of firm and state. Bt cotton was not officially for sale until the cropping season of 2002-2003; by 2003, the area under official Bt hybrids came to 230,000 acres; in 2004 this area expanded to 1,213,359 acres and to 3,212,300 acres by 2005. The NGO ISAAA estimates official Bt plantings on 7,907,200 acres in the 2006 planting season. Even by official data, the rate of adoption is very steep, as in China.⁷ But ISAAA's estimate, like the GOI's, counts only official seeds — i.e., varieties vetted by the Ge-

6. Qayum and Sakkhari 2005, 31; on broader alliances and actors, see Scoones 2005, 315–27.

7. James 2002.

netic Engineering Approval Committee in Delhi on biosafety grounds. No one knows the actual area under what I have called “stealth seeds,” but ISAAA estimated 2.5 million hectares in 2005: i.e., almost twice the area under official seeds at that time.⁸ The officially reported area has from the beginning lagged behind the actual transgenic area. The main and undisputed point is that official seeds are spreading to more farmers and acres and the unofficial seeds have become a cottage industry, especially in Gujarat.⁹

Estimates of illegal planting areas are understandably imprecise. Jayaraman cites “industry sources” as estimating that more than half the transgenic cotton in India comes from illegal varieties;¹⁰ my discussions with Gujarati seed producers and farmers suggest a much higher figure for that state. Data from Navbharat Seeds indicate that on an all-India basis, about 34 percent of the cottonseed packets sold are transgenic, of which 9 percent are legal and 25 percent illegal. The ratio is highest in the North Zone (Punjab, Haryana, Rajasthan): 107,000 packets of legal transgenic seeds to 1,170,000 illegal packets, together accounting for about a third of cotton acreage.¹¹ These estimates apply only to packaged and branded stealth seeds, and do not include F2 seeds saved by farmers for replanting. The reason for more rapid adoption of illegal over legal transgenic cotton is both price and better adaptation to local conditions: new varieties are produced by hybridizing the transgenic with a local variety that grows especially well.¹²

Though it is widely accepted that the cultivars into which the Bt trait was officially inserted were not the best, Mahyco-Monsanto Biotech (MMB) has been successful in selling their three approved Bollgard hybrids. Sales in 2004–05 totaled Rs. 166.4 crores, an increase of 207 percent over the previous year. Moreover, MMB has licensed their technology to the dominant domestic cottonseed firms of India, at very steep rates. As of June 2006 there were forty-four officially approved Bt cotton hybrids containing the first Monsanto-Mahyco event (the Cry1Ac gene, known as event BG-I). An additional technology from Monsanto-Mahyco was incorporated into seven more approved Bt cotton hybrids. These hybrids contain stacked Cry X genes (Cry I Ac and Cry 2 Ab, known as Event MON 15985 or BG-II). Contrary to the frequent assumption of monopoly, ap-

8. Data here and below from ISAAA New Delhi, courtesy Baghirath Choudhary. Official data from Ministry of Agriculture. *Press Trust of India*, 10 February 2004, reported that “an illegal variety of Bt cotton covers nearly 90 per cent of the cotton area in Gujarat.” Estimates are inconsistent but all move in the same direction: rapid expansion of Bt acreage. On stealth seeds as a general phenomenon, see Herring In press a.

9. Gupta and Chandak 2005; Roy, Herring, and Geisler In press.

10. Jayaraman 2004.

11. Personal communication. October 2005.

12. In June of 2005, I found that locally hybridized transgenic cotton cultivars in Gujarat sold for Rs. 250–700 per packet (roughly enough to plant one acre) — or 15 to 40 percent of the local official seed price; F2 transgenic seeds were selling for Rs. 10 for the same weight packet, so cheap as to be worrisome to some farmers, but much appreciated by others.

proval has also been secured for four Bt cotton hybrids containing Cry1Ac gene, known as Event-1, from the indigenous firm JK Seeds (IIT Kharagpur, India). Finally, a technology from the public sector in China is incorporated into three Bt cotton hybrids: fusion genes (Cry 1Ab and Cry Ac), known as the GFM event, in collaboration with the Indian firm Nath Seeds.¹³ Rather than being kept out of India, Monsanto's specific Bt cotton technology has spread commercially, and has been indigenized, naturalized, and made into something of a cottage industry.¹⁴ Monsanto's Cry1Ac technology has been joined by a newer Monsanto transgenic event, and by transgenic cottons developed in China and India.

Rather than asking why there is such a sharp adoption curve of both small and large farmers, and commercial seed firms, across all cotton areas of India, activists continue to declare "the failure of Bt cotton." Vandana Shiva and Afsar Jafri declared more generally the "Failure of GMOs in India," with sections entitled: "Bt cotton failed in India; Bt cotton does not give higher yields; Bt cotton does not increase farmers' income."¹⁵ Why then do farmers not only buy the seeds, but sometimes save and replant them, and cross them into new Bt hybrids? Why do capitalist firms buy expensive licenses to produce a failed technology?

Property, Patents, and Power: Cultural Urban Bias Confronts Bharat

Opposition to transgenics could involve a claim that the technology does not work, that there are serious ecological risks involved in adoption, or that whether it works or not, is safe or not, biotechnology enables corporate power over farmers. In the movement framing in India, all these claims have been made. If it is Monsanto that needs cremating, property logically comes first; they brought the technology. One wonders what kind of response would have confronted Bt cotton had the technology come first from China or an indigenous Indian firm — as it has subsequently. But in the event, Bt cotton *was* linked to multinational capital. Patents assumed extraordinary power in the movement discourse: to crush nations and farmers. Shiva has provided the main frames for the connection between globalization and transgenics: patents provided the mechanism for "the control of agriculture by multinational corporations."¹⁶ In a typical formulation, the Deccan Development Society study of Bt cotton concluded that "a handful of corporations... [are] using intellectual property rights (IPRs) as tools to exploit farmers."¹⁷ Shiva, the dominant theoretician of opposition, took a stronger line; in a call to mobilize a *bija yatra* (seed march), she defined the objective in opposition to "Seeds of Suicide, Seeds of Slavery, Seeds of Despair." Her explanation for this somewhat counterintuitive linkage was that

13. Data in this section from Bhagirath Choudhary, personal communication, and ISAAA: *Fact Sheet on Approved Bt Cotton Hybrids in India* 2006.

14. Gupta and Chandak 2005; Jayaraman 2004; Roy, Herring, and Geisler In press.

15. Shiva and Jafri 2004.

16. Shiva 1997, 91.

17. Qayum and Sakkhari 2005, 38.

“Farmers’ suicides are concentrated in the regions where corporations like Monsanto have established a seed monopoly, selling costly and unreliable hybrid and GM seeds like Bt. Cotton.”¹⁸

Monopoly is a strong claim about property, particularly in India, where there was no patent protection for Monsanto’s seeds, nor anyone else’s. But the power of the multinational exceeded even that of a monopolist. In an essay entitled “Practicing Earth Democracy,” Shiva wrote: “Patents of life are a total control system....A system in which seed has become a corporate monopoly, a system in which a few companies control the seed supply is in effect a system of slavery for farmers.”¹⁹ Shiva et al. wrote in their 1999 article in the prominent Indian social-science journal *Economic and Political Weekly* that “the promotion of genetic engineering by corporations like Monsanto can only be based on dictatorial, distorted and coercive methods.” Moreover, “genetic engineering in agriculture must necessarily be anti-nature and anti-people.”²⁰ In a market economy, it is difficult to conjure the mechanisms through which dictatorial or coercive powers could be imposed on millions of individual choices about cotton-seeds.

At the same time that these claims dominated news about Monsanto, Indian farmers were growing transgenic cotton with Monsanto’s technology transferred through underground channels and developed by a small Indian firm in Ahmedabad, Gujarat: Navbharat Seeds. The full story of underground seeds is not known, though we do know that at least one farmer — Shankarikoppa Mahalingappa — deserted the KRRS because he found by simple experiment that the suicide-seed rhetoric was a hoax: he got very good germination rates from Bt seeds secreted away from field trials in Haveri.²¹ Far from constituting a monopoly, Monsanto’s seeds were still undergoing field trials for biosafety and unavailable for purchase while farmers were growing Bt cotton with Navbharat’s seeds and their underground offspring, now called “variants” or “indigenous Bt.” Once the Bt technology had been naturalized and appropriated, farmers in Gujarat became engaged in what Anil Gupta has informally called “the greatest participatory plant-breeding experiment in human history,” making and remaking transgenic hybrid cotton varieties.²² The common characterization of this vigorous rural anarcho-capitalism is “cottage industry.”

There is no space in the cottage-industry scenario — which is not disputed — for dictatorial power, coercion, or even monopoly. This specific error could arise because Indian organizations were parroting a European discourse on transgenics — that is, were victims of coalitional discursive hegemony in a hier-

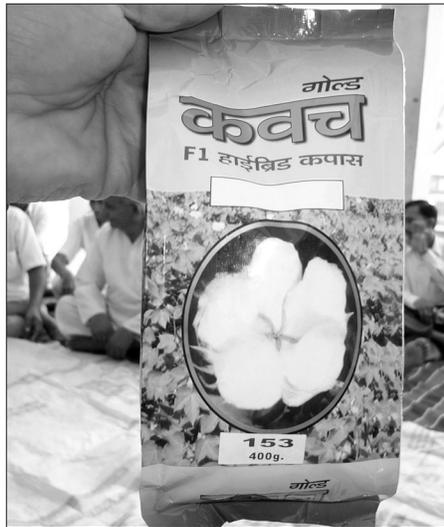
18. URL: http://www.navdanya.org/events/06bija_yatra.htm. Accessed 6 October 2006. See Shiva 1999 for analogies between corporate “manipulation and monopoly” and colonial rule.

19. URL: http://www.navdanya.org/about/practice_earth_dem.htm. Accessed 6 October 2006.

20. www.navdanya.org/articles/ge_trials.htm. Accessed 6 October 2006.

21. Herring 2005, 209–10.

22. Gupta, personal communication 2004; Gupta and Chandak 2005.



(Left) Package of “illegal” Bt seeds. Studies indicated that “more than half the transgenic cotton in India comes from illegal varieties.” (Right) Poster suggesting that nongovernmental organizations fall into the trap of paternalistically regarding Indian farmers as puppets rather than agents “negotiating new technology.” (Ronald J. Herring)

archical system of knowledge. Coalitions seek to keep strands together, even when there are contradictions across strands: if you are against globalization, you are against biotechnology. But for this construction to be accepted in India, activists had to make a radical discursive leap: farmers are assumed to have no capacity as active agents, but merely constitute passive victims. If that is so, the prior question is: Why should farmers be less able to take advantage of leaky global intellectual property rights (IPRs) than are people in other sectors? “Piracy” of computer software, for example, is rampant. Aggregate data from *The Economist* indicate that of business software in use in China, 92 percent is pirated; in Vietnam, 92 percent; in Ukraine, 91 percent, In Indonesia, 88 percent; Russia, 87 percent and so on.²³ Few people of my generation have paid for all the software we use. The phenomenon is general. In his book *Illicit : How Smugglers, Traffickers and Copycats Are Hijacking the Global Economy*, the editor of *Foreign Policy*, Moises Naim, argues that commonly observed illegal transactions are not isolated pockets of deviance, but are integrated with major currents of politics and economics on a global scale. Property systems are vulnerable to the agency of those who would create niches outside the scope and under the radar of states and firms. Why should the same dynamics that operate on the streets of Beijing and Delhi not apply to biotechnology in rural Bharat?

The suicide-seed coalition’s assumption that farmers were hapless before the powers of corporate property illustrates a key weakness of elite interpretation of rural dynamics: correlates of class distance. This particular case manifests a deep cultural bias: urban people are capable of deploying something like “weapons of the weak” against global intellectual property regimes quite effec-

23. *The Economist* 2006, 63.

tively: software, music, films, pharmaceuticals; but in rural areas, intellectual property will somehow overwhelm the rural Volk, who otherwise are held to possess superior knowledge and wisdom. Denigration of “the peasantry” has historically defined farmers as a class — culturally, politically, and economically inferior to those sectors of society that dominate them. The assumption of patent power (especially at a time that India allowed no patents on plants) can be understood only as an outcome of overlapping forces: ignorance of agronomy (the “terminator-technology” hoax discussed below), cultural denigration of rural people, or conformity to a discourse of global coalitions to which activists subscribe.

The argument that Bt cotton technology failed requires one to believe that neither capitalist seed firms nor cotton farmers in India possess simple market rationality; that extraordinary leap of logic is not only unsupported, but curious from a political point of view. What could opposition political forces gain from misrepresenting farmer experiences? Official Bt seeds were certainly more expensive than alternatives, but the spread of the technology suggests — as many farmers say directly — that the extra cost is more than compensated by additional income. Mahyco-Monsanto announced in 2006 significant price reductions for technology fees to licensees, but the price differential remained. There were many alternatives, however, both Bt and non-Bt at different price points. That there was choice seemed of no importance to the discourse of coercion and control. The linchpin of class analytics — property — in Operation Cremate Monsanto and its successor movement was at no point an empirical puzzle, but rather a postulate, without reference to struggles over various strands of property claims in the bundle we call ownership. The role of agency in contesting and constructing property disappeared beneath this unexamined postulate.

At the same time the suicide-seed coalition was mobilizing against monopoly and dependence, farmers were making a cottage industry of Monsanto’s transgenic technology, sans Monsanto. Simultaneously, several global trends were pointing away from monopoly and coercion and toward a more nuanced construction of property in biotechnology. First, there was a rising tide of research in public sectors of low-income countries, especially China, where Bt cotton was rapidly adopted on an average farm size even smaller than India’s.²⁴ The Chinese version of Bt cotton, in collaboration with the Indian firm Nath Seeds, has now been approved for cultivation in India. Second, “humanitarian use transfers” from commercial intellectual property to common property have been pioneered, first in the case of Golden Rice; the Gates Foundation grant of \$25 million for bio-fortification signaled more to come. Finally, it was increasingly evident that multinational corporations (MNCs) were unable to enforce their property claims on transgenic seeds in agriculture, beginning with Monsanto’s failure in Argentina in 1995, then in Brazil 1997–2005.²⁵ Seed police are hard to come by in the villages. The real world was presenting an array of local

24. Pray and Naseem In press.

25. Herring In press a.

anarcho-capitalisms, public-sector developmental statism, and private-sector philanthropy in agricultural biotechnology. An empirical and critical view of property would have avoided the assumption of monopoly. Part of the undergirding of this assumption was bad science: “terminator technology.”

Science: The Great Terminator-Technology Hoax

Property figured prominently in a second strand of oppositional discourse: Monsanto was held to own the patent on a so-called “terminator gene.” Monsanto flatly denied this claim. There does exist a patent for what biologists call gene use restriction technology (GURT), but it is not held by Monsanto and has not been incorporated into any commercial crops. The name terminator — and the alarm in India — originated with the Rural Advancement Foundation International (RAFI) of Canada. The terminator was said to permit engineering of plants that could not produce viable seeds, forcing farmers to return each season to buy new seeds — generating a biological dependence of farmers on firms unmatched by customary arrangements. RAFI rhetorically linked terminator technology to “suicide seeds:” seeds could not be saved by farmers because they were engineered to be sterile.²⁶ Dependency and the cash nexus would replace the venerable cycle of “self-organizing” agriculture.²⁷ This construction — linking multinational capital, globalization, and the cultural abomination of suicide seeds — proved powerful and durable. Monsanto was large, American, and carried heavy historical baggage. Clubbed together with Dow Chemical, which together “brought us Bhopal and Vietnam,” Monsanto was accused of planning to “unleash genetic catastrophes.”²⁸

The global discourse against transgenics assigned the terminator a dual role. First, seeds that terminated tied farmers to corporate monopoly. Second, the very idea of terminator seeds placed the technology itself squarely in the realm of the unnatural: a bio-cultural abomination. The terminator story was not only tenacious in India, but spread throughout the world in knowledge about India. The most unsettling construction was that terminator genes would escape and make all plants sterile. It takes only a little common sense to see the fallacy in sterile seeds mating, and across species at that. More obviously, since Monsanto’s hybrids under testing had been back-crossed into local cultivars, there were

26. RAFI International, “Terminator 2 Years Later: Suicide Seeds on the Fast Track.” RAFI International Office, Winnipeg, Manitoba, Canada. Website no longer active. There is no space here to describe the various ways that terminator technology might someday work; the suicide-seed formulation is only one possibility. Delta and Pine Land Co. holds the patent, in collaboration with the U.S. Department of Agriculture’s Agricultural Research Service: U.S. Patent 5,723,765, granted 3 March 1998.

27. On the construction, see Gold 2003; on the science, see Ramanjaneyula and Ravindra 1999; and Jha 2001. In an interview, Devinder Sharma is quoted as saying “Bt cotton will kill farmers, financially and literally.” <http://us.rediff.com/money/2001/dec/12inter.htm>. Accessed 6 October 2006.

28. Press release, Asian Social Forum [Hyderabad] Seminar, 2003.

at least six generations of Bt cottons in India at time of the field tests: it would be difficult to manage six generations of seeds from terminators.²⁹

From the farmers' point of view, Monsanto enjoyed a privileged market position in 2002–2003 because of Delhi's biosafety regulations, not property. Transgenic alternatives considered superior by many farmers — Navbharat 151 and its local variants — were ruled illegal for failing to receive the approval of Delhi's regulatory system; when these were taken off the market for a time, farmers especially in Gujarat turned to saving and planting transgenic F2 seeds. When Delhi discovered the underground seeds, and ordered Gujarat to destroy the crop in 2001, farmers rose up and defended their cotton fields. Delhi backed down. Maharashtra quickly followed Gujarat in promising its farmers access to the very popular Bt technology. In both cases, counter-mobilization by farmers was decisive.

Suicide seeds took on a darker connotation with publicity about suicides by debt-ridden farmers — most notably in Warangal district, Andhra Pradesh, in 1998. Vandana Shiva and colleagues produced in 2000 a volume *Seeds of Suicide*, “dedicated to the farmers of India who committed suicide.” Deepening dependence on hybrid seeds of multinationals — variously called “seeds of death” or “suicide seeds” — did not distinguish transgenic seeds from other hybrids; nevertheless, field trials of transgenic cotton in 1998 were explicitly linked to terminator technology and farmer suicides.³⁰ Monsanto's marketing director for India responded that the farmers' suicides had nothing to do with Monsanto, but ironically might have been prevented by its technology. With transgenic cotton, Monsanto argued, farmers would have had less debt from pesticide purchase and less loss of yield — less poverty, fewer suicides.³¹ Glenn Stone correctly argued that “India is a key battle line in the global war over GM [genetically modified] crops, and both sides interpret the Warangal suicides as supporting their position.”³² But at this time, no Monsanto seeds were commercially available, and would not be until 2002.

The narrative of terminator technology and suicide seeds carried great power, in India as abroad.³³ How much activists knew about its truth is uncertain. Shiva et al. wrote in 1999 that the Bt seeds “are in an ecological sense terminator, which terminates biodiversity...” And: “The freedom of the seeds [is] simultaneously a resistance against monopolies...like Monsanto and a regener-

29. Gosh 2001, 11.

30. Paarlberg 2001, 99–100; Bharathan 2000. On the debt nexus as a cause of suicides, see Centre for Environmental Studies 1998; Department of Agriculture and Cooperation 1998; Stone 2002; and Shiva et al. 2000, 64–110. There are elements of crisis in Indian agriculture, and many tragic outcomes, but no evidence whatsoever that Bt has made things worse. For a sensible analysis of the real factors in rural India's difficulties, see Vaidyanathan 2006.

31. Mistry 1998.

32. Stone 2001, 1.

33. Consider the novel *All Over Creation*, by Ruth Ozeki. I have seldom given a lecture on this subject, especially outside the United States, without someone commenting that suicide seeds are killing farmers in India.

ation of agriculture....The seeds of suicide need to be replaced by the seeds of prosperity.” Suman Sahai, leader of Gene Campaign, wrote in India’s most prestigious journal of social science: “Trials of a genetically altered cotton variety (Bt cotton) conducted by the American company Monsanto have provided the trigger because Monsanto also happens to own the terminator technology.” Jackie Assayag, repeats this conventional wisdom long after its decisive disconfirmation in the fields of India, in a book ironically subtitled *Perspectives from Below*.³⁴

As the terminator hoax suggests, much of the anti-transgenic discourse takes an instrumental view of science; science ceases to be a method of inquiry with particular canons for truth claims and becomes instead a political weapon or artifact of power. It is argued that science underlay colonial rule in an instrumental fashion.³⁵ Part of the constructivist worldview is that knowledges are plural, with science having no particular advantage over other claims. Moreover, the instrumental view of science enables constructions such as “Western science” and “imperialist science” and “totalitarian science.”³⁶ P.V. Sateesh of the Deccan Development Society talks of “corporate science,” and adds a darker implication. In his response to a critique of NGO studies of Bt cotton as “unscientific,” he responded to the author: “Bravo Dr Shantharam, you have done a yeoman service to your masters but on the day of judgement in a future not so far away, scientists like you will be remembered as ‘Enemies of the People.’”³⁷ Suspicion of science as a system of knowledge figures prominently in critiques of biotechnology. Devinder Sharma, a major publicist of opposition to Bt technology in India explained his skepticism well:

Scientific research is rigged, alarming evidence of health dangers are covered up, and intense political pressure silences the sane voice of dissidents. Distortions, omissions, cover-ups and bribes are used to promote an unhealthy and risky technology, and that too with the “pious” intention of increasing productivity and thereby, eradicating hunger.³⁸

The movement’s view of farmers seems to have precluded their understanding of biotechnology. The subtitle of Vandana Shiva’s *Biopiracy: The Plunder of Nature and Knowledge* is telling: *The Plunder of Nature and Knowledge* presents a world in which biological value resides in the South, clever biopirates in the North. The Bt cotton episode presented precisely the opposite directionality.

Though the CEO of Navbharat Seeds denies it, much of the world views his incorporation of Monsanto’s Bt technology in India as ingenious plant breeding based on unauthorized appropriation of the Cry1Ac transgene. Sharad Joshi,

34. Shiva et al. 2000, 98; Sahai 1999, 84; Assayag 2005, 70–71.

35. Though with emancipatory potential as well. See Prakash 1999; see also Nandy 1990.

36. Nanda 2002.

37. P.V. Sateesh posted this response to Shantharam 2005 on 3 May 2005 at <http://www.gmwatch.org/archive2.asp?arcid=5194>.

38. Sharma 2006.

leader of the pro-Bt farmers' movement Shetkari Sanghatana, dubbed Dr. D.B. Desai, CEO of Navbharat Seeds, "Robin Hood." It was Dr. Desai's transgenic hybrid NB151 that became the stock for farmer-bred "indigenous Bt," especially in Gujarat. When a BBC story portrayed the farmers of Gujarat as clever pirates of Monsanto's intellectual property, Vandana Shiva's Research Foundation for Science Technology and Environment responded: "This rumour about piracy is initiated by Monsanto whose Bt cotton has totally failed throughout the length and breadth of the country and to divert attention of the public and policy makers from the failure of its genetically engineered seeds, Monsanto is trying to focus on the outstanding success as unjust and illegal of an indigenously bred cotton variety."³⁹ Indian official science determined that the "indigenous" label was accurate, and constituted a crime, not for violation of a nonexistent patent, but for commercializing a hybrid that had not been approved through national procedures for biosafety testing.⁴⁰ This Robin Hood was not accused of violating property law, but rather biosafety regulations.

Intellectual property is especially subject to "Robin Hood" tactics — but this position requires a construction of farmers as agents, not hapless objects. There is no reason in biology or empirics to posit inability of rural people to join the global anarcho-capitalism fueled in part by the unauthorized appropriation of intellectual property. The assumption that biopiracy can flow in only one direction is patently false, but does indicate a deep cultural disposition. This final observation suggests another weakness in the campaign that seems diagnostic: the denigration in theory and practice of science as a form of vetting knowledge claims.

Rejection of Enlightenment values by well-educated people is a global phenomenon, as prominent in Washington, D.C., as in Delhi. Yet the devaluation of science as knowledge does not float randomly above class position. The postmodern and constructivist stance on multiple knowledges is affordable by some classes, but not others. Indeed, this privilege of disbelief creates class antagonisms. Farmers as a class, because of their position in production, and the pressures of reproducing farm livelihoods, are driven to science of necessity. They cannot afford ideology: rather, an empirical pragmatism is rooted in, and necessary for, their material life. The same constraints do not apply to activists; indeed, controversy is their mode of production. Protests from Monsanto that there were no terminators in India, nor anywhere else; that Bt cotton certainly contained no such thing; and that the company did not have a patent on any such gene were simply ignored. Evidence was available had movement spokespersons been interested in obtaining it. But what would be their interest in so doing?

39. Press release, 20 June 2003, New Delhi.

40. Sanat Mehta, ed. 2005, 60–76; interviews with Dr. D.B. Desai and the breeder of Navbharat 151, Dr. N.P. Mehta, in Ahmedabad, June 2005.

41. See James 2002 for comparative data; on India, the only carefully controlled study is Bambawale et al. 2005; see also Roy, Herring, and Geisler *In press*;

Class Interests in Genetic Engineering

The most powerful factor in the spread of technology opposed by the suicide-seed coalition was the material interest of cotton farmers. As in China and other countries, Bt cotton technology is adopted by farmers because they believe it reduces input costs, improves insect management, and thereby raises farmer incomes.⁴¹ The more farmers are dependent on pesticides for bollworm management, the greater the attraction of Bt technology. The technology is, unlike many agrarian changes, scale neutral; there are no significant size or scale distinctions differentiating access for size-classes of farmers — in contrast, say, to a tractor or tube well. Indian cotton farms are small, though somewhat larger than those in China. Unless one assumes farmers incapable of calculating their interests, the suicide-seed construction was bound to fail as a mobilizing trope for agrarian movements. Despite its powerful cultural resonance, that narrative ran counter to the experiential base of farmers, who know what grows well in their fields and what does not. Any movement claiming to represent farmers should be able by investigation and consultation uncover these essential agroeconomic and biological facts. Farmers' material interests preclude behavior driven by ideology. The material conditions for reproducing movement leaders are not tethered to crop success or failure, and correspondingly their interests have no necessary connection to empirical consequences.

The most serious empirical question about class interests is that of the most vulnerable class in rural India, but it is a question lost in the rhetoric of terminator technology. The most obdurate rural poverty is that of landless workers who must find wage employment on whatever crops need labor. They are put at risk by crop choice, but have no voice. What is a livelihood for the laborer is a cost for the farmer. In high-wage agriculture, labor-saving technologies are profitable and will be attractive to rational cultivators. Reduction in aggregate demand for labor under many agrarian conditions either destroys livelihoods or puts downward pressure on wage rates or both. Moreover, the rural poor who depend on casual wage labor for a livelihood are frequently those cumulatively disadvantaged across dimensions of social stratification: women, depressed castes, ethnic minorities, migrants. Bt cotton adoption means that laborers could lose work applying pesticides. Are wage losses in chemical applications compensated by more harvest labor if yields increase, and by safer ground water and less exposure to toxins? If net wages are lost, but health improves, a difficult trade-off arises. This trade-off depends on variations in wage systems: for example, when wages are based on weight harvested — rather than a daily sum — income increases with yield and ease of harvest, as sometimes occurs in Bt cotton.⁴² Moreover, whatever the effect on demand for spraying labor, protection from crop loss has implications: there are no harvesting wages if crops are destroyed by bollworms. It was only fields of Bt cotton that survived the “boll-

Morse et al. (2005) explain why varietal difference is consistent with success of Bt technology.

worm rampage” of 2001 in Gujarat.⁴³ To the extent that transgenics reduce the risk of crop failure, they reduce risks for the landless poor, as well as farmers.

Other interests in genetic engineering are quite straightforward: industry would prefer less regulation and faster approval of new varieties.⁴⁴ The developmental state supports transgenic development, noting that China already has already seized the lead in this expanding sector.⁴⁵ Pesticide companies are opposed to Bt technology as it reduces use of their product. Rumors of pesticide firm funding of opposition groups are quite persistent in India, but evidence is illusive.⁴⁶ Though opponents prefer to cast Bt technology as being more important to big farmers, the technology seems to be scale-neutral both theoretically and empirically. There would seem to be no reason for differential class advantages in seed use among farmers given the affordable alternatives and absence of scale effects.

But then what can citizens make of the avalanche of reports claiming “failure of Bt cotton in India?” It is a complicated question, and much is unknown. Accounts of failure come from NGOs opposed to Bt cotton; most come from Andhra Pradesh, not from Gujarat. Sometimes their studies produce rather implausible conclusions that are picked up by the press:

[I]n North Telengana region, the net income from Bt varieties was five times less than the yield from local non-Bt varieties. In Southern Telengana, the income from Monsanto’s Bt crop was nearly seven times less than what was obtained from the indigenous non-Bt cotton varieties, demonstrating the resounding failure of the Monsanto variety.⁴⁷

Yield and income get mixed in odd ways, as do cultivars and traits: Bt is a trait, not a variety of cotton. Characteristics such as staple length and sensitivity to wilt are attributed to addition of a trait that has no biological connection to these phenotypic variations. Studies illustrating failure seldom are transparent about sampling frames and methodology.⁴⁸

Much of the failure literature, especially that promulgated by the Deccan Development Society, comes from Andhra Pradesh. Is it possible that what has become the dominant technology and a cottage industry in Gujarat fails in Andhra for reasons of soil, climate, or general agronomic variation?

What do adoption rates tell us? In the ISAAA data, adoption of Bt technology has been more rapid in Andhra than in other states: a gain of 250 percent from 2004 to 2005. It was in Andhra that the state government, evidently from political pressure, requested refusal of reauthorization of MMB varieties: local seed

42. See discussion in Roy, Herring, and Geisler In press.

43. See the account of a leader of a local farmer organization in Joshi 2001; see also Visvanathan and Parmer 2002; Shaik 2001.

44. CII 2001.

45. Department of Biotechnology 2001; 2002.

46. See, for example, Scoones 2005, 326. Ajit Singh, minister of agriculture during the discovery of underground Bt plants, believes pesticide firms fund the opposition, along with European NGOs (interview, New Delhi, 22 June 2005).

47. *The Hindu Business Line*, 14 November 2003.

companies have licensed the technology and now sell their own Bt cotton brands with less competition. The rate of change in cultivation of Bt varieties varies quite a bit across states, but is everywhere increasing. Interestingly enough, Gujarat shows the smallest increase, 15.4 percent. The reason is almost certainly that the unofficial Bt varieties are so well established in Gujarat. They are certainly cheaper than MMBL versions and many farmers hold them to be agronomically superior.⁴⁹ Glenn Stone, who has done detailed field work in Andhra Pradesh, and in fact in Warangal district, reports that farmers are adopting Bt cotton seeds with such alacrity that he can legitimately write of “more than innovation adoption, more than a tipping point: it was a craze.” Stone believes this craze is based on poor knowledge of agronomy; Bt cotton has resulted in the “de-skilling” of farmers.⁵⁰

This dispute cannot be settled here. But it is useful to point out that opponents fail to distinguish Bt technology from specific cultivars. Bt confers a trait; some hybrids with this trait do better than others, as there are vast agronomic differences across Indian cotton terrain: varieties that work well in one region, district, farm, or even field, may fare less well in the next. Farmers know this; many who claim to represent them do not. Ecological variability is why Indian farmers grow hundreds of cultivars of cotton, many of which now have incorporated Bt technology. There is great variation in performance of cotton cultivars, both Bt and non-Bt. Reasons for variance are not always discernable, either by farmers or researchers, since there are many unmeasured variables in complex interactions, including local climate, soil chemistry, pest variance, water timing, and nutrients. These variables, and their interaction, vary every season: MECH 184 does well for some farmers in some years, but experiences wilting in years of inadequate, early moisture. This agronomic characteristic is true of the cultivar with or without the Bt trait. Nevertheless, some farmers find better yields with MECH 184 than with other MECH varieties or even Navbharat variants. Second, spurious seeds are pervasive: some varieties sold as Bt are not; some farmers honestly but mistakenly believe their Bt crop has failed. There are adverts in Indian newspapers for underground seeds: there is no way for farmers to verify the quality of these seeds. One reason many farmers prefer Mahyco-Monsanto seeds to the farmer-bred “variants” (Viraat, Rakshak, Maharakshak, Agni, Luxmi, etc.) is that Mahyco has a reputation for reliable seed quality. Third, there are demands for financial compensation from Mahyco-Monsanto and the government for Bt crop failure; there is a material incentive to claim poor results. Fourth, poor performance of some Mahyco-Monsanto hybrids is attributed to the technology. Actually, the MMLB hybrids are clearly not the best germplasm for insertion of the Bt gene: many farmers seem to prefer Navbharat and other varieties, legal and illegal. New firms vigorously entered the market as licensees of MMLBs technology, but with different cultivars.

48. An exception is Qayum and Sakkhari 2005; see also, Shantharam 2005.

49. For an analysis of cotton farmers’ reasoning, based on extensive interviews, see Roy 2006; Roy, Herring, and Geisler In press.

Finally, and most importantly, none of the claims of failure compare two isogenic varieties, one with and one without the Bt gene, to assure control of varietal characteristics.⁵¹ Rather, all disadvantageous variance across over time and space — which will be extreme in India — is attributed to the Bt gene, constructing a biological absurdity. The Cry1Ac gene codes for a single protein; there is no reason for production of that protein — lethal to Lepidoptera — to cause staples to shorten or leaves to wilt.

The most careful controlled study I have seen in of Mahyco-Monsanto Bollgard MECH-162 compared to the isogenic non-Bt MECH 162 and a conventional hybrid. This study used a participatory field trial to test meaningfully paired hybrids with and without integrated pest management (IPM). Consistent with other studies, Bt plants required half the sprayings of other plants, and experienced less bollworm infestation. With IPM, the Bt variety recorded a yield of 7.1 q/ha and a net return of Rs. 10,507/ha. Damage to fruiting bodies was much less with Bt plants, which would account for the premium some Bt farmers receive for their lint in the market. The authors concluded: “Bt Mech-162 used in an IPM mode resulted in highest yields and economic gains to the farmers; pesticide consumption was also reduced.”⁵² Bt technology and improved agro-ecological practices, rather than being incompatible, each contributed to superior outcomes. The most sustainable solution turned out to be new germplasm with traditional means of cultivation.

Claims about the biological and agroeconomic failure of Bt technology are difficult to sustain; that the claims persist is puzzling. It is hard to see a strategic advantage in claiming that “Bt cotton has failed,” or that the seeds are “genocidal.” Measures of success and behavioral indicators are hard to ignore. It is not surprising that opposition has continued with the frame of ecological uncertainty: that Bt cotton will “terminate biodiversity.” Since there is no way of disproving a negative — that something will not happen — this strategy for stopping transgenics by raising anxiety surely stands a better chance than representation of biotechnology as a death threat to farmers. Indeed, the science on horizontal gene flow (“biological pollution”) is incomplete. Keeping uncertainty alive is clearly in the interest of all who have livelihoods as brokers in the global coalition against biotechnology. Tethering the campaign to distal threats (“destruction of biodiversity,” for instance) prevents any decisive confrontation with facts, and rests on anxiety about the unknown, which is inexhaustible. Given the lack of definitive knowledge, and anxiety, the interest of most citizens is rooted in caution. Indeed, one could argue that there is no advantage whatsoever to most Indians in Bt cotton, at least before it was discovered that pesticide levels in bottled water and soft drinks had reached alarming levels.

50. Stone forthcoming.

51. Naik et al. 2005.

52. Bambawale et al. 2004, 1633.

53. McAdam et al. 1996.

54. Edelman 1962.

Brokerage, Cultural Capital, and Authenticity Rents

This account of the failure of Operation Cremate Monsanto has stressed the incompatibility between the interests of farmers and the perceptions of farmer interests by activists. The cognitive screen of leaders seemed impermeable to confounding information. Why would activists continue to declare the failure of a technology that was spreading?

Social movement theorists consider “framing” to be of central importance in explaining outcomes.⁵³ Framing presents both opportunities and dangers for movements. Framing necessarily involves condensation symbols and simplification, especially of issues involving scientific complexity. Effective framing, through necessary for dramaturgical purposes of activism, frequently uses metaphors or scenarios that create or raise anxiety — “Frankenfood” as a framing of what many consider to be ordinary nutrition represents a classic case in point. Conditions of high anxiety and low information enhance the power of symbolic politics⁵⁴ on which social movements feed. To present a rather stark divergence of interests in framing, India in 2003, following Zambia and Zimbabwe in 2002, rejected food aid because the food contained some transgenic grains that North American parents feed their children every day. Coding this food dangerous — or in the African case “poison” — has no consequences at all for some class positions, possibly quite a bit for others. One’s class position determines to a great extent whether this coding is of consequence or not, or how much latitude there is for mistakes.⁵⁵

Activists attempt to form broad coalitions; the size and diversity of these coalitions is to match the size and diversity of the threat.⁵⁶ Globalization has produced global networks for mobilization against globalization. Joining global coalitions presents unique opportunities for national- or local-level groups, as is well recognized, but may also less obviously create risks for social movement organizations (SMOs).⁵⁷ International NGOs such as Greenpeace can link protest sites, symbols, and tactics, and can sometimes provide vital resources for movements. But scaling up to the global level may detach movement leaders from rank-and-file activists, undermine internal democracy, fracture broad social coalitions, and demobilize grassroots activists.⁵⁸ Additional resources become available, but movement toward the global core creates potential conflicts with representation of the peripheral base. If nothing else, conflicts of language and culture become more glaring, as was certainly the case with Operation Cremate Monsanto.⁵⁹ Yet it is the representational claim of a social base that legitimates movement leaders and makes them useful to coalitions.

55. Unlike the African cases, the India shipments were directly from the United States, not the United Nations, and were part of a continuous program for improving health in areas of high malnutrition.

56. Tarrow 2005.

57. Social movement “organizations” reflects self-representation rather than empirical coding: many “organizations” are thin on the ground but have a substantial web presence. See Bob 2005 on the importance of publicity and the representation of social movements.

Interaction with far-from-local policies and institutions inevitably changes the terrain on which strategic calculations about representation and tactics are made. Making linkages between two or more sites of contention by intermediary agents or organizations is called brokerage. Brokerage often entails the construction of new organizational forms or institutional channels that allow protest to shift from a local to a national or even transnational scale.⁶⁰ Brokerage may be a first step in transforming amorphous or spontaneous forms of social mobilization into more institutionalized patterns of political representation. Coalitions functionally require brokers; brokerage commands resource flows. New connections enabled by both globalization and protests against globalization produce brokerage positions. These are not randomly distributed, but depend on skill sets and cultural capital not universally available. Erik Olin Wright posits “expertise” or “knowledge” as dimensions of class standing in highly differentiated contemporary societies.⁶¹ Knowing how to run a listserv is a valuable asset, as is being able to read, write, and speak in English. International politics and the cultural capital of India’s metropolitan middle class match up well.

Brokers deal with factors removed from the common experience of the social base; they live in a different strategic and cultural environment. This cleavage is particularly evident when knowledge differentials are large, and thus the cognitive mediation of interest more decisive. Even in the most literate of societies, for example, few citizens can independently access the technical issues necessary to determine their interests in genetic engineering. Technical expertise is unevenly distributed globally across societies, and on the ground in social movements; the gulf between metropolitan elites and those they claim to represent may well be yawning. Who speaks for the poor? For the farmer? For indigenous authenticity? For national interest? Metropolitan elites can make these strategic claims only by alliance (partnership is the preferred terminology) with “stake-holders.” Authentic brokers are critical, as coalitions speak for those anonymous stake-holders who cannot easily speak for themselves.

Who is authentic? Authenticity is a function of national subaltern status and individual ethnicity. Authentic critiques must come “from below,”⁶² not from above. Global difference and global coalitions permit cultural capital to be converted into what we might call authenticity rents. A rent is a return on capital, whether physical in the case of a landlord or positional as in the case of “bureaucratic rents.” Cultural capital is a necessary condition to access the metropolitan core of international coalitions; authenticity conveys authority to speak for others without that cultural capital. Continuing the “GMO controversy” preserves

58. Piven and Cloward 1977; Herring 2005, 213–22.

59. Professor Nanjundaswamy’s Inter-Continental Caravan of Indian farmers to Europe caused one participant to complain of the *neta-chamcha* [leader-sycophant] character of relations in the movement. [*Chamcha*, literally “spoon,” carries an even more derogatory connotation than “sycophant.”] See Madsen 2001. Farmers also criticized the use of English by the leaders as exclusionary.

60. On “scale shift,” see Tarrow 2005, 120–40.

61. Wright 1997; on India, see Fernandes and Heller 2006; Harriss 2006.

positions for brokers: mediators, protagonists, and participatory facilitators. There is no normative denigration in this conclusion: just as “tribals” are allowed certain latitude in environmental protection normatively to preserve their subsistence routines, metropolitan members of the NGO industry create and preserve livelihoods from niches enabled by brokerage: cultural capital augmented by indigeneity.⁶³ To expect otherwise is to misunderstand the most basic insights of class analysis.

The availability of authenticity rents is vastly expanded in global settings. Ram Guha wrote in his provocative *EPW Perspectives* piece (22–29 March 2003), “The Ones Who Stayed Behind,” that a parallel trend has appeared in scholarship: “In the eyes of their American colleagues, the diasporic scholar has come to ‘represent’ India much as the Vietnamese or Ukrainian emigré represents Vietnam or the Ukraine.” Guha argues that this outcome is “doubly unfortunate, because post-structuralism and cultural studies are trends of dubious intellectual worth, and because its South Asian proponents belong overwhelmingly to the upper class.” Guha believes that cashing in on this cultural capital has advantaged many scholars from the subcontinent in North American and European markets but at the cost of impenetrable and irrelevant work.⁶⁴ Sharing one strand of the style of scholarship critiqued by Guha, suicide-seed activists have been unconstrained in their discourse by any tethering to fact. Their discourse about India has fed heavily on the global movement against genetic engineering.

Representations of India, in turn, feed the global discourse on the horrors of biotechnology: “40,000 Indian farmers commit suicide” has become a staple of the global argument against GMOs (though curiously the number does not change, even as there are more suicides every week) as did the death of thousands of sheep from eating Bt cotton leaves.⁶⁵ At the UN Meeting of the Parties to the Convention on Biological Diversity, in March of 2006, in Curitiba, Vandana Shiva — always described as a scientist and recipient of the Right Livelihood Award (Alternative Nobel Prize) — summarized a common theme in her writings:

These seeds kill biodiversity, farmers, and people’s freedom — for example, Monsanto’s Bt cotton, which has already pushed thousands of Indian farmers into debt, despair, and death. Bt cotton is based on what has been dubbed “Terminator Technology,” which makes genetically engineered plants produce sterile seeds....High costs of cultivation and low returns from genetically modified seeds have trapped Indian peasants in

62. See, for example, Assayag and Fuller 2005.

63. Chibber 2006.

64. This essay was reprinted as Guha 2003.

65. For example, “1600 sheep die after grazing in Bt cotton field 30 April 2006” sify.com/news/fullstory.php?id=14194773. For full details of the sheep study, see www.gmwatch.org/archive2.asp?arcid=6494. For a scientific response, see Shanthu Shantaram, www.biospectrumindia.com/content/columns/10606151.asp.

considerable debt from which they are escaping by taking their lives. More than 40,000 farmers have committed suicide over the past decade in India — although the more accurate term would be homicide, or genocide.⁶⁶

These are the same seeds that were once only “suicidal.” Simultaneously, a new international movement to “Ban Terminator” has emerged, and quickly attracted endorsements from hundreds of organizations worldwide; the Deccan Development Society is one of eighteen Indian NGOs to sign on.⁶⁷ There is some irony in Indian organizations’ petitioning against the emergence of the terminator, the reality of which they have deployed dramaturgically for eight years.

The movement against biotechnology continues to misrecognize the nature of biology and property in biotechnology, and the agency of rural people negotiating new technology. What difference does this make? This misreading — which has been largely hegemonic among NGOs visibly active on the issue⁶⁸ — undermines the potential of a broad and viable political coalition to seek environmental integrity, agricultural improvement, and social justice under threatening conditions of agriculture in India, exacerbated by globalization, rigged markets, and global warming.

Interests, Politics, and Movement Failure

Social movements opposing government policy frequently fail; causes of failure are multiple, complex, and overdetermined. Asymmetries of power are often decisive. Operation Cremate Monsanto failed in an open political system in which the mobilization of farmers and rural people is both permitted and common, courts were accessible, the press was attentive to controversy. Farmers who adopted Bt cotton believe they are reducing toxification of soil, water, and people by using the technology, and simultaneously reducing expenditures on pesticides and thus the risk of indebtedness. Because these outcomes are inconceivable to the suicide-seed coalition, they could not represent farmers. Their

66. See www.ipsnews.net/africa/print.asp?idnews=32438. Accessed March 2006. Presumably because the article is for sale, it is marked NOT FOR PUBLICATION IN CANADA, AUSTRALIA, BRAZIL, CANADA, NEW ZEALAND, CZECH REPUBLIC, IRELAND, POLAND, THE UNITED STATES, AND THE UNITED KINGDOM. See also Shiva 2006 for similar statements.

67. In one month of campaigning, the organization got 504 organizations to sign the petition: “We oppose all forms of Terminator technology (Genetic Use Restriction Technologies or GURTs). We ask all national governments and international bodies to ban Terminator in order to ensure that the technology is never field tested or commercialized.” See www.banterminator.org/endorsements.

68. NGOs such as the Foundation for Biotechnology and Awareness consistently present alternative views, based in science (see Rao 2004, for example), but the center stage has been dominated by oppositional NGOs. Interests supporting biotechnology largely remained above the fray, knowing they had the support of farmers and the government and were unwilling to draw more attention to the sensationalist claims of opponents. Interviews, CII, DBT Delhi 2002.

movement to stop Bt technology failed because of overlapping misconstructions: of farmers' interests and behavior; of the biology of biotechnology; of the empirics of intellectual property on the ground; of the rationality and agency of farmers. How could these tactical errors be consistent with the interests of intelligent, articulate, and dedicated activist leadership?

Risks of global coalitions for activists locally are that (a) a global discourse replaces discourse rooted in local conditions, empirically validated; (b) authenticity substitutes for knowledge as a source of legitimacy; and (c) external support, premised on conditions a and b above — i.e., incorporation of the global discourse and displaying authenticity — substitutes for legitimation based on democratic methods within movements and an understanding of interests on the ground. These dynamics are similar to those stressed in the literature on “political substitution effect” in foreign aid and ethnic conflict: regimes that come to depend on external props fail to generate internal support by addressing emergent cleavages in society.⁶⁹ The danger for activist movements is that ideology as a cognitive screen replaces empiricism; interests are deduced from global discourses, not science on the ground. Moreover, there are externalities of framing: delegitimization of a broad coalition for environmental integrity and social justice, for example, may result from one egregious strand of inaccurate framing. The divorce of the anti-biotechnology movement from the base it claimed lay not only in different class interests, but in the selection pressure that those interests have exerted on authoritative knowledge. Appropriation of knowledge is not random. The interests of those whose assets are connectivity and rhetorical skill are not tied to any empirical process. Campaign politics selected for junk science over real science, discursive consistency over empirical investigation. Material constraints on Indian cotton farmers operate in the reverse direction: close margins necessitate an empirical and pragmatic approach to technology; the margin for error is small, as recent tragedies have illustrated.⁷⁰

What is most surprising is that cognitive screens between interest and action proved impermeable. Only consonant information penetrated the screen. The screen itself was constructed with inadequate attention to choice and agency, too much structural determination. The global discourse of lumping GMOs into one giant political category defies both biology and the interests of farmers. Hostility to science became part of the screen because of the reality of asymmetric control of genetic engineering resources in 1998. The possibilities of Bt cottons from India and India-China firms and from creative Indian farmers was simply not admissible, but are now realities. Biotechnology is particularly susceptible to cognitive screens for those alarmed by claims and counterclaims. Is food aid from the United States really “poison”? If so, even the hungriest person may rationally avoid it; the interest calculation is simple once the mediation

69. Herring and Esman 2001, 11, *passim*.

70. For example, Department of Agriculture and Cooperation 1998; Centre for Environmental Studies Warangal 1998.

is in place. If not, how does one calculate the risk? Is the risk worse than malnutrition? Interests in genetic engineering are demonstrably contingent, malleable, and situational, and they are filtered through cognitive screens that admit of less nomothetic solidity than the interests of deductive structural accounts.

Globalization seldom produces the clear and monolithic results portrayed in political rhetoric. Interests are difficult for ordinary people to calculate, whether from ecological threats of transgenic organisms or monetarist orthodoxy as the solution to economic crisis; perception of interests is brokered by both cognitive rules of thumb and reliance on trusted intermediaries in civil society, such as political parties, NGOs, and advocacy networks. The indeterminacy of critical knowledge — and the related authority of science — empower articulate intermediaries, however misinformed. Pinstруп-Andersen and Schiøler argue that “too many well-to-do individuals and groups from Europe and North America have taken an unacceptably paternalistic position, claiming to represent the interests of the developing countries and to know what is best for the poor within these countries.” The “almost silent majority” of people are not heard in international forums.⁷¹ The problem for activists is one of scaling up. With scaling up comes the potential loss of legitimacy in the base and increasing dependence on cognitive screens that are not widely shared. The organizational imperative creates a cultural disconnect. The leader of the farmer’s organization at the core of Operation Cremate Monsanto, the KRRS, was Professor Nanjundaswamy; he did own land, and could be called a farmer, but tellingly was called by the title Professor.⁷²

The literature on “new social movements” is a European literature, but so too is much of the anti-transgenic story. One insight of that literature is the connection to “post-materialist values.” That is, movements around issues not involving class interests — the “old social movements” of labor and peasants, for example — are enabled by material prosperity. These are movements of people who have solved the subsistence problem. Jung nicely summarizes:

Scholars of the new social movement theory identified these movements as “new” in that they represented a post-materialist and universalistic critique of modernity and modernization by challenging institutionalized

71. Pinstруп-Andersen and Schiøler 2000, xi.

72. Stig Toft Madsen (2000) describes these effects on the KRRS after its emergence on the global stage as representative of India’s farmers. The Intercontinental Caravan of Indian farmers to Vevey was significant in the dissolution of the KRRS, the farmers’ organization that launched Operation Cremate Monsanto, in part for reasons given in the text. Ironically, Europeans doubted the authenticity of such farmers from India as the farmers were able to afford transcontinental commercial airline fares. These large expenditures fed internal dissension and rumors of funding from pesticide firms with an interest in stopping Bt.

73. Jung 2006, 3.

74. For example, Assayag 2005.

patterns of technical, economic, and political rationality without falling back upon established institutional arrangements such as political parties.⁷³

Post-materialist is hardly a descriptor one would use even for “shining” India. Nevertheless, class differentiation within India has long produced class positions that float above concern with the brute compulsions of economic facts. This material base, as well as the cultural capital so entailed, permit hostility to modernization unsupportable on a two-acre farm. Indian cotton growers face difficult odds, from adverse agronomics to rigged global markets. Though the WTO has ruled against the United States on illegal subsidies for cotton, low and inconsistent yields will continue to threaten subsistence on Indian cotton farms. Some help with the humble but often devastating problem of bollworms made Bt technology attractive, despite the brilliant dramaturgy and articulate rhetoric of Operation Cremate Monsanto.

Much of the world picked up the terminator-technology and suicide-seed story of biotechnology in Indian agriculture, especially in otherwise progressive fora. That Indian nationals were successful in diffusing this hoax about India illustrates the power of authenticity. The deep irony is that the hoax was born on a website in Canada, now defunct. The discursive distortion is bounced back to India via authoritative books about India published in London⁷⁴ — or New York. Inside this resonance chamber there are no constraints, only mutual reinforcement.

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References

- Assayag, Jackie. 2005. Seeds of wrath: Agriculture, biotechnology and globalization. In Assayag and Fuller, eds. 2005. 65–88.
- Assayag, Jackie, and C.J. Fuller, eds. 2005. *Globalizing India: Perspectives from below*. London: Anthem Press.
- Bambawale, O.M., et al. 2004. Performance of Bt cotton (MECH-162) under integrated pest management in farmers’ participatory field trial in Nanded district, Central India. *Current Science* 86 (12): 25 June.
- Bharathan, Geeta. 2000. Bt-Cotton in India: Anatomy of a controversy. *Current Science* 79 (8): 1067–75 (25 October).
- Bob, Clifford. 2005. *The marketing of rebellion*. New York: Cambridge University Press.
- Bunsha, Dionne. 2001. A can of bollworms. *Frontline* 18 (24): 24 November–7 December.
- Centre for Environmental Studies Warangal. 1998. *Citizens’ report: Gathering agrarian crisis — farmers’ suicides in Warangal District (A.P.) India*. Kishanpura.

- Confederation of Indian Industry [CII]. 2001. Biotechnology on the fast track. Unpublished conference proceedings. New Delhi.
- Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India. 1998. *Report of the Study Group on Distress Caused by Indebtedness of Farmers in Andhra Pradesh*. New Delhi. September.
- Department of Biotechnology, Ministry of Science and Technology, Government of India. 2001. *Biotechnology: A vision*. New Delhi.
- . 2002. *Annual Report 2001–2002*. New Delhi.
- The Economist*. 2006. *World in figures*. London.
- Edelman, Murray. 1962. *The symbolic uses of politics*. Champagne/Urbana: University of Illinois Press.
- Gold, Ann Grodzins. 2003. Vanishing: Seeds' cyclicity. *Journal of Material Culture* 8 (3): 255–72.
- Ghosh, P.K. 2001. Genetically engineered crops in India with special reference to Bt cotton. *IPM Mitr*. 1. December.
- Guha, Ram. 2003. The ones who stayed behind. In Jackie Assayag and Veronique Benei, eds. *At home in diaspora: South Asian scholars and the West*. Delhi: Permanent Black.
- Gupta, A.K., and Vikas Chandak. 2005. Agricultural biotechnology in India: Ethics, business and politics. *International Journal of Biotechnology* 7 (1/2/3).
- Herring, Ronald J. 2005. Miracle seeds, suicide seeds and the poor: GMOs, NGOs, farmers and the state in social movements. In Raka Ray and Mary Fainsod Katzenstein, eds. *India: Poverty, power, and politics*. New Delhi: Oxford University Press.
- . In press a. Stealth seeds: Biosafety, bioproperty, biopolitics. *Journal of Development Studies* 43 (1).
- . In press b. The genomics revolution and development studies: Science, politics and poverty. *Journal of Development Studies* 43 (1).
- . In press c. Genetically modified crops. In Kaushik Basu, ed. *The Oxford companion to economics in India*. New Delhi: Oxford University Press.
- Herring, Ronald J., and Ann Grodzins Gold. 2005. Indian cotton: Biology and utility, meanings and histories. *Economic and Political Weekly*. 17 September.
- Herring, Ronald J., and Milton J. Esman. 2001. Projects and policies, politics and ethnicities. In Milton J. Esman and Ronald J. Herring, eds. *Carrots, sticks and ethnic conflict: Rethinking development assistance*. Ann Arbor: University of Michigan Press.
- James, Clive. 2002. Global review of transgenic crops. 2001 feature: Bt cotton. *ISAAA Briefs* 26. Ithaca, N.Y.: ISAAA.
- Jayaraman, K.S. 2001. Illegal Bt cotton in India haunts regulators. *Nature Biotechnology* 19 (12): 1090 (December).
- . 2004. India produces homegrown GM cotton. *Nature Biotechnology* 22 (3): 255–56 (March).

- Piven, Frances Fox, and Richard Cloward. 1977. *Poor people's movements: Why they succeed, how they fail*. New York: Vintage Books.
- Scoones, Ian. 2006. *Science, agriculture and the politics of policy*. Hyderabad: Orient Longman.
- Jha, Srinand. 2001. Seeds of death, GMO cotton, India. www.tompaine.com. 30 May.
- Joshi, Sharad. 2001. Unquiet on the western front. *The Hindu*, Business Line. 19 December.
- Jung, Jai Kwan. 2006. Disentangling protest cycles: An event history analysis of new social movements in Western Europe, 1975–1989. Paper presented to the Mini-APSA Conference, Cornell University, 29 April.
- Madsen, Stig Toft. 2001. The view from Vevey. *Economic and Political Weekly*. 29 September: 3733–42.
- . 2000. Post festum: The lotus and the mud in an Indo-global context. Paper presented at the Conference on Globalization and Democratic Developments in Asia, Lund University, 18–20 May.
- McAdam, Doug, John D. McCarthy, and Mayer N. Zald, eds. 1996. *Comparative perspectives on social movements: Political opportunities, mobilizing structures, and cultural framings*. New York: Cambridge University Press.
- McHughen, Alan. 2000. *Pandora's picnic basket: The potential and hazards of genetically modified foods*. Oxford: Oxford University Press.
- Mehta, Sanat, ed. 2005. *Bt cotton: A painful episode*. Vadodara, Gujarat: Gujarat Kapas Utpadak Hitrakshak Sangh.
- Mistry, Sharad. 1998. Terminator gene a figment of imagination: Monsanto chief. *Indian Express*. 4 December.
- Naik, Gopal, et al. 2005. Bt cotton controversy: Some paradoxes explained. *Economic and Political Weekly*. 9 April: 1514–17.
- Naim, Moises. 2005. *Illicit: How smugglers, traffickers and copycats are hijacking the global economy*. New York: Doubleday.
- Nandy, Ashis. 1990. *Science, hegemony, and violence*. New Delhi: Oxford University Press.
- Omvedt, Gail. 2005. Farmers' movements and the debate on poverty and economic reforms in India. In R. Ray and M.F. Katzenstein, eds. *Social movements in India: Poverty, power, and politics*. New Delhi: Oxford University Press.
- Paarlberg, Robert L. 2001. *The politics of precaution: Genetically modified crops in developing countries*. Baltimore: Johns Hopkins University Press.
- Parmar, Chandrika, and Shiv Visvanathan. 2003. Hybrid, hyphen, history, hysteria: The making of the Bt cotton controversy. Paper presented at the IDS Seminar on Agriculture Biotechnology and the Developing World, Sussex, UK. 1-3 October.
- Pinstrup-Anderson, Per, and Ebbe Schiøler. 2000. *Seeds of contention: World hunger and the global controversy over GM crops*. Baltimore: Johns Hopkins University Press.

- Prakash, Gyan. 1999. *Another reason: Science and the imagination of modern India*. Princeton, N.J.: Princeton University Press.
- Pray, Carl E., and Anwar Naseem. In press. Supplying crop biotechnology to the poor: Opportunities and constraints. *Journal of Development Studies* 43 (1).
- Press release, Asian Social Forum [Hyderabad] Seminar. 2003. Beyond Bhopal and Bt.: Taking on the biotech giants. Research Foundation for Science, Technology and Ecology. Delhi. 4 January.
- Qayum, Abdul, and Kiran Sakkhari. 2005. *Bt cotton in Andhra Pradesh*. Hyderabad: Deccan Development Society.
- Ramanjaneyula, G.V., and A. Ravindra. 1999. *Terminator logic: Monsanto, genetic engineering and the future of agriculture*. New Delhi: Science for People/Research Foundation for Science, Technology and Ecology. January.
- Rao, C. Kameswara. 2004. *Frontline Mischief*. Bangalore: Foundation for Biotechnology Awareness and Education. 18 May.
- Rediff.com. 2001. Bt cotton will kill farmers, financially and literally. An interview with Devinder Sharma. 12 December. <http://us.rediff.com/money/2001/dec/12inter.htm>.
- Roy, Devparna. 2006. *Adoption Paradox of Bt Cotton in Gujarat, India*. PhD diss. (Cornell University, Department of Development Sociology).
- Roy, Devparna, Ronald J. Herring, and Charles C. Geisler. In press. Naturalizing Transgenics: Loose seeds, official seeds, and risk in the decision matrix of Gujarati cotton farmers. *Journal of Development Studies*. 43 (1).
- Sahai, Suman. 2002. Bt Cotton: Confusion Prevails. EPW Commentary. *Economic and Political Weekly*. 25 May. Posted also on AgBioIndia List, 19 June 2002. <http://www.agbioworld.org/>.
- Scoones, Ian. 2005. *Science, agriculture and the politics of policy: The case of biotechnology in India*. Hyderabad: Orient Longman.
- Shantharam, Shanthu. 2005. The brouhaha about Bt-Cotton in India. *AgBioView*. 2 May. www.agbioworld.org.
- Shaik, Sajid. 2001. Farmers decide to defend their Bt gene cotton crops. *The Times of India*. 31 October.
- Sharma, Devinder. 2001. The introduction of transgenic cotton in India. *Biotechnology and Development Monitor* 44: 10–13 (March).
- . 2006. Risks covered up. *The Deccan Herald*. July 31.
- Shiva, Vandana. 1997. *Biopiracy: The plunder of nature and knowledge*. Boston: South End Press.
- . 1999. Ecological balance in an era of globalization. In Nicholas Low, ed. *Global ethics and environment*. London: Routledge. 47–69.
- . Resources, rights and regulatory reform. *Context* 3 (1): 85–91 (spring/summer).
- Shiva, Vandana, and Afsar H. Jafri. 2004. Failure of GMOs in India. *Synthesis/Regeneration* 33 (winter). New Delhi, India: Research Foundation for Science, Technology and Ecology.

- Shiva, Vandana, Ashok Emani, Afsar H. Jafri. 1999. Globalization and threat to seed security: Case of transgenic cotton trials in India. *Economic and Political Weekly*. 6-12 and 13-19 March.
- Shiva, Vandana, et al. 2000. *Seeds of suicide: The ecological and human costs of globalization of agriculture*. Delhi: Research Foundation for Science, Technology and Ecology.
- Stone, Glenn Davis. 2002. Biotechnology and suicide in India. *Anthropology News*. May.
- . In press. Agricultural de-skilling and the spread of genetically modified cotton. *Current Anthropology*. February (2007).
- Tarrow, Sidney. 1998. *Power in movement*. Cambridge: Cambridge University Press.
- . 2005. *The new transnational activism*. Cambridge: Cambridge University Press.
- Visvanathan, Shiv, and Chandrika Parmer. 2002. A biotechnology story: Notes from India. *Economic and Political Weekly*. 6 July: 2714–24.
- Wright, Erik Olin. 1997. *Class counts: Comparative studies in class analysis*. Cambridge: Cambridge University Press.

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