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Persistent Narratives: Why is the "Failure of Bt Cotton in India" Story Still with Us?

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Science can say nothing conclusive about many important dimensions of the global cognitive and political rift on transgenic agricultural crops. Empirical studies will not answer questions in the realms of food preference, risk aversion, cultural constructions of rural society, or theology. But there are critical empirical questions and much empirical work on transgenic crops. This essay analyzes a puzzle: reports of "the failure of Bt cotton in India"—on agronomic, economic, and environmental grounds—continue to spread globally but are inconsistent with both farmer behavior and scientific studies. This narrative of agro-economic failure has arguably crowded out the more empirically robust story of farm-level success of one trait (insect resistance) in one crop. Why? Understanding this outcome requires conceptualizing the social conditions—interests, relations, cognitive frames—in which production of knowledge claims is embedded. This article argues that there is a critical role for "epistemic brokers," or hinges, between local, national, and international advocacy groups within larger transnational advocacy networks. Reports of failure of the Bt technology in India are not sustainable scientifically but do serve interests in the contentious politics around GMOs globally.

Key words: Pakistan, Bt cotton, India, farmer suicides, agricultural biotechnology, GMOs, NGOs.

> *"After a disastrous track record in 40 countries, Bt cotton is 'welcomed' in Pakistan."* Najma Sadeque, in *Financial Post* (May 12, 2008)

Whose Numbers Count?

Persistence of the Bt-cotton-failure story has seemed puzzling to me. The issue seemed settled: Indian farmers had collectively decided that Bt technology in cotton was useful—neither a miracle seed nor a suicide seed. Insect resistance was a valuable trait and offered some respite from the pesticide treadmill that is both financial and biological. How do we account, then, for the persistence of reports in and about India that "Bt cotton has failed"—in the sense of agro-economic catastrophes ending in suicides, deaths of livestock grazing in Bt fields, allergenicity, and so on? Could purely instrumental reporting of failure be the reason? That is, are the reports of catastrophic failure at variance with the dominant global pattern and general Indian experience purposely falsified?

At the Ravello conference of 2008, my paper spent some time on the question of how honest—i.e., non-instrumental—errors could be made in measuring yield and income effects of Bt cotton on-farm in India. What had settled in India by 2008 was an empirical consensus about Bt cotton: the technology works as predicted, with predictable results, increasingly well-understood by farmers, and incorporated into their risk-avoidance strategies (Roy, Herring, & Geisler, 2007). One excellent recent summary of studies, including their own, is that of Rao and Dev's presentation entitled 'Biotechnology in Indian Agriculture: Evidence from Panel Studies on Bt Cotton' (2008).[1] In what the Bush administration in the United States dismissively refered to as the "reality-based community," something approaching consensus had emerged from years of partial results and some considerable confusion produced by studies claiming disaster in the Bt fields.

1. *Formal-sector studies (industry, government) in the beginning were most likely to find strongly positive agro-economic effects of Bt cotton; academic studies were more mixed but positive, and civil-society organization and NGO studies were likely to be strongly negative (AC Nielsen, 2004; APCoAB, 2006; Bambawale et al., 2004; Basavaraj, Patil & Hanchimal, 2007; Bennett, Ismael, Kambhampati, & Morse, 2004; Herring, 2007d; Naik, 2001; Naik, Qaim, Subramanian & Zilberman, 2005; Narayanamoorthy & Kalamkar, 2006; Qayum & Sakkhari, 2005; Rao, 2004; Roy et al., 2007; Sahai, 2003; Sahai & Rahman, 2003; Shiva & Jafri, 2004; Zahoor, 2004). In recent years, studies have narrowed to converge around the success story outlined in the text. See Herring (2008b).*

Then a Pakistani colleague sent me an article about Bt cotton in Pakistan, the conclusion of which is in its title, which heads this article. Najma Sadeque, in *Financial Post* (May 12th, 2008), wrote a piece entitled 'After a disastrous track record in 40 countries, Bt cotton is 'welcomed' in Pakistan.' This title reflects the fact that much of the world still believes that Bt cotton has failed in India, and the case is commonly used to energize opposition to biotechnology globally.

There have been unconfirmed reports of transgenic cotton illegally growing in Pakistan for some time, much as Bt seeds in India grew and spread under the radar screen of Delhi and Mahyco-Monsanto from 1999 to 2001 (Herring, 2005). Anecdotal and informal confirmation of this phenomenon has been extensive, and it would not be surprising, given farmer agency and propinquity. But, this article was about official approval of Bt cotton, not the ubiquitous stealth seeds that defy both IP and biosafety regimes globally (Herring, 2007b).

This dramatic and counter-intuitive title would be puzzling even if one did not follow agricultural biotechnology at all. If disastrous in 40 countries, why does the Pakistani government "welcome" the technology? If one *does* know the recent history of Bt cotton, the title is even more stunning: why does Bt technology in cotton spread so rapidly across nations and farms if it has already failed in 40 countries? Are farmers irrational or duped? Who is doing the counting? By what criteria is failure measured? And how can there be 40 countries with sufficient experience with Bt cotton that a judgment of "disastrous" can be rendered? Only 23 countries claimed to allow transgenic crops at the time of this article; only some of those countries grow cotton. Granted, there is underground stealth movement of cotton transgenics—Vietnam, Thailand, Pakistan—but 40 countries with a track record long enough to be deemed disastrous seems a wild guess rather than information.

More puzzling still is farmer behavior. If Bt cotton has proved disastrous, why are farmers growing it, legally and illegally, in numbers that increase steeply every year? Why do they risk prosecution for illegally growing a crop that destroys their farm economies and kills their livestock? Most important, why does misinformation persist and have power? As a corollary: why does the global selection of knowledge formation process not weed erroneous accounts? I will use an example from Pakistan, not to embarrass its author—as we shall see, the article is egregiously inaccurate—but as a diagnostic tool, as a clinical case of sorts.

Framing the Farmer: The Gullible Peasant

Najma Sadeque's (2008) article about official adoption of Bt cotton in Pakistan is worth analyzing as an archetype. It reveals dominant elements of the construction of India's Bt cotton story in global networks advocating restrictions on transgenic crops.

The narrative we seek to understand is one of gullible peasants and colossal failure. In Sadeque's (2008) article, we find, for example, that in 2002, farmers in Madhya Pradesh planted Bt seeds and "ended up with 100% failure." The seeds were too expensive, and, as the narrative goes: "How could farmers fail to see the figures that showed it really didn't make sense to grow Bt cotton? They were deceived by false claims." How do we know for sure that such large-scale miscalculation is plausible? The article relies on the authority of local studies: "the Deccan Development Society (DDS), an Indian grassroots NGO…found [that] those who grew non-Bt cotton made six times more profits than the Bt cotton farmers!" The terrain has shifted, from the state of Madhya Pradesh to the state of Andhra Pradesh, but the narrative is the same: farmers forgoing significant profits and encountering disaster by sowing Bt cotton seeds. The most obvious way to make sense of these numbers—perhaps the only way—is to assume peasant gullibility.

Peasants have a tragic role in history, a history of subordination and exploitation. Yet there is a romantic penumbra around the peasant as well: the evocation of a simpler time. In terms of behavior on the land, the evocation is one of traditional society in which the calculations of marginalist economics are largely irrelevant. Tradition rules among peasants. One of the more prominent international non-governmental organizations (INGOs) opposing transgenics in agriculture is *La Via Campesina*, which calls itself "the international peasant's voice."

Lacking in Marshallian logic, the peasant is constructed as vulnerable to crafty representatives of the market economy, as well as simple and gullible. The notion that cultivators in India continue to choose a technology that is self-destructive is consistent with this construction, but one must further assume that peasants are incapable of learning. In this narrative, over the last 10 years Indian cotton farmers have not figured out that they have been deceived—or are sufficiently innumerate that they cannot tell profit from loss and therefore do not know whether or not they are being duped. What is striking about this story is that the farmers of India—often branded as *peasants* in the narrative—have

survived so long with such a high level of incompetence.

I have repeatedly raised this puzzle of farmer behavior with opponents of Bt cotton in India: even if we accept the argument that all official data are tainted by corporate interests, or those of a government influenced by corporate affiliations and power, and officially committed to developing biotechnology, surely farmers are counting costs and returns in the fields. Even in official counts of acreage and farmer adoptions, which understate the extent of Bt cotton use because of the underground seed market, more than two-thirds of farmers growing cotton have now adopted some Bt hybrid. There is, so far as I know, no evidence of dis-adoption of the technology, though particular hybrids rise and fall in popularity, as always. Since farmer experience with Bt hybrids goes back to at least 1999, would farmers not by now be catching on to "disastrous" results and dis-adopting in droves? Why does the technology spread? Why does it persist in farmer choices?

In explaining the rapid and widespread adoption of Bt cotton in India, one prominent NGO opponent told me that Indian farmers are easily duped by corporate propaganda: "farmers in Europe are ten times more sophisticated than our farmers." It may not be widely known in opponent circles that eight European Union (EU) countries now have farmers growing transgenic crops, though acreages are small. Nevertheless, interests are clear. When the Sarkozy government banned one transgenic maize variety in January 2008, it was French maize farmers and the Spanish government that appealed the decision. The interest of maize farmers is obvious, but why Spain? The Spanish government did not want doubt cast on a cultivar widely grown by its farmers. Globally, 23 countries have officially approved transgenic crops growing in fields; many more nations—for reasons of global market pressures—deny that their farmers are growing unofficial, brown bag, or illicit transgenics (Herring, 2007b). Despite the political rhetoric of north versus south, the top 5 countries in acreage after the United States are Argentina, Brazil, Canada, India, and China.

Adoption of Bt cotton has been rapid and almost universal in many cotton areas of India. Stone's (2007) anthropological work in Warangal district found farmers adopting Bt cotton with such alacrity that it was "more than innovation adoption, more than a tipping point: it was a craze."

The number of genetic events, firms, and farmers involved with Bt cotton in India increases sharply month by month, year by year. Monsanto gets all the press, but there were Bt cotton hybrids bred in "cottage industry" sites beginning in Gujarat in 2001, where the Navbharat 151 stealth transgenic had been growing for 3 years unknown to Delhi or Monsanto. Despite talk of 'monopoly' in virtually all oppositional narratives, by 2007 there were 137 officially approved Bt hybrids—up from 3 in 2002—involving four genetic events and dozens of firms, in addition to the vigorous illegal 'stealth seed' market of farmer-grown transgenics. Variously called 'indigenous Bt,' '*deshi* Bt,' or 'Navbharat variants,' farmer-bred Bt hybrids became a cottage industry, especially in Gujarat (Herring, 2005; Jayaraman, 2004). The reason for more rapid adoption of *illegal* versus *legal* transgenic cotton is primarily price, though some farmers believe stealth seeds are better-adapted to local conditions; new varieties are produced by hybridizing the transgenic with a local variety (Gupta & Chandak, 2005; Roy et al., 2007).

Stealth hybrids had robust names like *Maharakshak* and *Agni*, *Luxmi*, and *Kavach*. There are hybrids from the Chinese public sector via Nath Seeds. There are indigenous Bt hybrids both licensed from Mahyco-Monsanto and invented locally (JK Agri-Genetics Limited of Hyderabad). To code this outcome as a function of deception by clever agents of multinational corporations requires a doubly problematic assumption: not only do peasants not know their business, but neither do commercial firms that survive in a capitalist economy.

Biology: Confounding Plants and Traits

A second way the Bt failure narrative goes astray is lack of attention to or curiosity about basic plant biology. Some reports of Bt failure may be honest, but wrong. Others fail to distinguish plants from traits.

Shortages of Bt cotton seeds in the early period arose because of excess demand, regulatory restrictions, and farmer excitement; demand exceeded supply in many areas. As a result, uncertified seed stock of ambiguous heritage entered the villages and was sold as Bt; there was widespread fraud, the extent of which is indeterminate for obvious reasons. In Warangal, in the state of Andhra Pradesh, one duplicate called itself *Mahaco* to trick farmers into thinking it was *Mahyco* (Herring, 2008b). Seed certification for Bt cotton is not available in Andhra Pradesh; in the absence of certification, a farmer may honestly believe that she has planted Bt seeds but has in fact been victimized by hucksters responding to supply-demand gaps. To say decisively that a farmer's Bt cotton has failed requires a simple test—like the one developed by the Central Institute for

Cotton Research in Nagpur—to see if the plants' tissue actually contains the Cry protein. If not, the failure to control bollworms is not a Bt failure, but an informational and institutional failure in unregulated seed markets. Rural India has been awash in "duplicates" that claim to be Bt seeds but are not, as well as cloth-bag, farmer-generated, and F2 Bt seeds that *do* produce the Cry insecticidal protein but lack approval of the Genetic Engineering Approval Committee in Delhi.

Worse than agro-economic failure are horror stories of biological externalities, from bizarre skin irritations to dead livestock. Sadeque (2008) noted that after grazing on Bt cotton leaves, "[i]n just four villages in Andhra Pradesh, 1800 sheep died horrible, agonizing deaths within 2-3 days from severe toxicity" (paragraph 13). Other disaster reports find leaf wilt, root rot, increased drought susceptibility, and a wide variety of ills. Sadeque (2008) writes of "allergies not only among farmworkers but also itching and rashes in people wearing clothing made from Bt cotton" (paragraph 9). In the Bt-failure narrative, all evils of cotton production—from child labor to dead sheep and farmer suicides—are loaded onto a single Cry gene that produces one protein that kills some bollworms. Sadeque (2008) notes that

> Other reports have emerged from India on the ill health effects of Bt cotton on both people and animals. It is being held responsible for causing "untimely deaths, decline in milk quality and quantity, and serious reproductive failures." Many workers in cotton gin factories have to take antihistamines daily before they can start work. (paragraph 14)

Reports of sheep dying horrible deaths were followed by similar stories about cattle deaths. Both have proved impossible to verify; there is no biological mechanism to produce this outcome, and bio-safety testing by the Indian government explicitly tested the Cry1Ac protein for mammalian activity. The Bt plants have had, until recently, only one extra gene, coding for one protein, a crystalline pro-toxin that is cleaved in the gut of Lepidopterans to become an active insect toxin. Neither the acidity nor the receptors of gut cells in mammalian guts can produce these results. There are many uncertainties in genetic engineering, but this result is well-tested and biologically well-understood. Many things can kill a sheep; Bt is not one of them (Rao, 2007a, 2007b).

How can this radical leap be made from a single trait to so Hydra-headed a catastrophe? There is no biological reason for this loading, nor verifiable empirical evidence. The Genetic Engineering Committee in Delhi has tested the technology and confirmed the theory in multiple trials. Skepticism about the externality claims would be the first response from a position of even the most basic biological literacy or attention to scientific literature. Willingness to believe biological horror stories depends on a prior narrative—not of gullible peasants but of unnatural acts. Sadeque (2008) folds the narrative of externalities into one of the unnatural nature of Bt plants, the "GMO":

> Genetically modified organisms (GMOs), including plants, make a compete departure from this safe, long and tested sustainable approach. In this case, man intervenes by altering the DNA structure of the plant by artificially introducing a gene cell from another organism, which may not necessarily be a plant. (paragraph 30)

The same website that posted Sadeque's piece included another element of the global narrative: 'Monsanto—Genetically modified Bt cotton 'terminator' seeds being introduced in Pakistan.' The terminator hoax in India joined a bio-cultural abomination—suicide seeds—to the tragic deaths of Indian farmers in one seamless narrative (Herring, 2006). The very coherence of this narrative creates a powerful cognitive consonance phenomenon: there is virtually nothing bad about any GMO that needs evidence or logic, as stories of extreme externalities resonate with—and reinforce—a schema of the great risks of unnatural acts.

Where the biological errors join the agronomic errors is in conceptualization of a single undifferentiated entity called Bt cotton. There are many cultivars with the Bt gene in India: official plus underground cultivars probably total close to two hundred, though the underground hybrids are losing popularity with the large price decreases of the officially-approved seeds from the major firms. Failures of particular cultivars within this very expansive range may have many causes; there is no biological reason for one gene to alter cultivar characteristics, such as susceptibility to drought or root-rot or production of human allergens. How the inserted gene affects the genome is the subject of much research, and uncertainties remain. Yet for all the risk assignment attached to transgenic techniques of plant breeding, it is not even clear that transgenesis as a means of modifying a plant's genetic material is more disruptive than mutagenesis (Batista, Saibo, Lourenço, & Oliveira, 2008). There is no global mobilization around mutagenesis or

other invasive and radical alterations of plant genetics, nor do demands for labeling extend to these other forms of genetic modification. "GMO" is a political framing of transgenic plants, but one now so ensconced in common parlance that few stop to ask precisely what it is about transgenesis that warrants a special category of risk and surveillance (Herring, 2008a).

The confusion of cultivar and trait is responsible for much of the spread of Bt disaster stories. The problem is that the means of insertion of a trait into the genome becomes a criterion for creating a whole category of phenotypic characteristics. For example, addition of an insect-resistant trait to cotton is charged with increasing susceptibility to drought, whatever the specific cultivar. Sadeque (2008) warns Pakistanis to learn from Indians:

> Bt cotton requires 20% more water than other hybrid cotton, which needs more water than traditional varieties to begin with. No one said anything about Bt cotton being drought resistant. The truth was that Bt cotton was unable to adapt to stress conditions. It was criminal to encourage Bt cotton in drought-prone areas—and not telling farmers about this drawback in Bt cotton. (paragraph 12)

Cotton is a risky crop; government agencies in India strongly advise against its cultivation in many drought-prone and marginal areas without irrigation. This agronomic caution applies whether the cultivar is Bt or non-Bt. Without water, cotton fails. In thin red soils without irrigation, the risks are very high. Farmers know this; the alternatives are often worse. Cotton is often the only cash crop that has real potential to change a family's financial circumstances, but at considerable risk. The lure of "white gold" is strong. But there is no reason that addition of the transgene for insect resistance would affect drought tolerance one way or the other; drought tolerance as a trait would be among the very first priorities of Indian cotton farmers if transgenesis could produce it, but to date they have only promises, not products.

The Handmaiden State

Sadeque's (2008) article, like many in global advocacy networks, assumes the worst about the state. Government approval of Bt cotton in Pakistan is explicitly called an "imposition" of the technology on the nation. To the question of why any government would approve a technology already proved "disastrous" in 40 countries, the answer is corruption. The immediate case cited for this argument is usually Indonesia:

> Later, Monsanto's own records revealed that between 1997 and 2001, it paid some $700,000 in bribes to at least 140 current and former government officials and their family members. In 2002, it was caught red-handed paying $50,000 to a high-level official in the Indonesian environment ministry. It was disguised as a consulting. (paragraph 19)

The assumption that the Pakistani government operates on the basis of bribes will resonate widely. The notion that the major question about adoption of transgenic crops is in the hands of multinational firms and states seems curiously at odds with the real experience of Bt cotton in India, which involved "Robin-Hood" tactics, "cottage industry" production, and significant illegal spread of cultivars and technology among farmers (Gupta & Chandak, 2005; Herring, 2005; Roy, 2006). Embedded in the government's announcement of official approval was tacit recognition that Bt cotton had already arrived in farmers' fields, via the common stealth routes. No one doubts that corruption is pervasive, but in the case of Pakistan, approval was more a recognition of a *fait accompli* than a decision requiring mobilization of power. As in much of the oppositional literature, all power seems to rest with corporations and states; the agency of cultivators to operate beneath the radar of both state and firm is somehow missing, despite clear evidence of its pervasive character (Herring, 2007b).

The Meaning of Numbers

The first diagnostic in this narrative is the loose use of numbers, itself indicative of a casual approach to the empirical world. I've come to believe that in oppositional literature the numbers do not matter; they are semiotic devices, not outcomes of counting exercises. Their function is rather to provide motivation via shock value, as in the dead sheep story discussed above. Moreover, numbers carry credibility; they lend an air of precision to generalizations that have no basis in empirical studies. It is not "several" countries with disasters, but "40;" not some increase in drought susceptibility but 20%; not some dead sheep but "1,800." The use of pseudo-precision indicated by hard numbers is a concession to the power of arguments that are being countered—the many empirical studies by scientists and

social scientists, but even more importantly the numbers generated by farmers in their fields. Those numbers are made not to count by introducing contradictory numbers; the rhetorical premise is "where there is smoke there must be fire." Pseudo-precision is a concession *in form* to the growing hegemony of science-based policy in the global "GMO debate." As in attacks on the accumulating evidence on climate change and the role of human activity therein, a rear-guard action is meant to justify delay and caution. In practice, pseudo-precision is meant to keep controversy alive by preventing closure.

Interests in Contentious Narratives

This article has suggested several propositions from close empirical observation of India. Much disinformation has been diffused, with political effects (Herring, 2008b). Colleagues sometimes reject my conclusion on the Bt cotton controversy with disbelief: how could such smart people get it so wrong? Why are there so many like Najma Sadeque willing to believe the worst about anything transgenic?

One could simply conclude that misinformation, spin cycles, misdirection, and dubious numbers are fundamental to political praxis. Publication of the number of "weapons of mass destruction" in Iraq leant credibility to the narrative of threat before the number turned out to be zero. But it seems that there are conditions in transnational advocacy networks around the GMO that select for diffusion of some kinds of knowledge over others, reciprocally. Misinformation has to be generated in the first place, requiring some labor on someone's part; and it has to be accepted into a global chain of knowledge claims. The Bt cotton case in India suggests that one element critical to this dynamic is the existence of hinges between local NGOs and INGOs. Opposition to GMOs in particular depends on Janus-faced brokerage influenced by (1) local advocacy network characteristics and (2) international coalition dynamics.

Advocacy Network Characteristics and Knowledge Flow

Social relations in advocacy networks in India are highly asymmetric and hierarchical, both in terms of traditional social relations (class and standing, or "caste") and modern stratifications (education, language). Social relations within networks are meaningfully characterized as *neta-chamcha*—or leader-sycophant (with much harsher connotations). *Chamchas* (literally "*spoons*") do not disagree with *netas*, but rather say what they think *netas* want to hear. What *netas* want to hear is confirmation of the larger mobilization narrative (e.g., catastrophes from GMOs). This social asymmetry and incentive structure jointly produce communicative incapacity within networks. Together these factors prevent confrontation with empirical findings even within the national network and simultaneously reinforce diffusion of a consistent narrative to the international advocacy network. *GM Watch* learns that there are GMO catastrophes in India from the *Deccan Development Society.* These networks of course have deep interests in promulgating their findings to journalists so as to broaden communication. Through these flows, a reciprocal authenticity dynamic develops: ex-colonial powers and their press authenticate global narratives for local networks; local reports legitimated by indigeneity provide confirmation for global narratives. The concreteness of local stories finds credibility where abstract numbers fail.

Communicative incapacity is reinforced by two additional characteristics of NGOs on the ground: the distance of middle-class activists from agriculture and agriculturalists on the one hand, and the competition for recognition and resources on the other. Urban cultural bias resists crediting farmer skill and agency. For example, the rural cottage-industry production and diffusion of dozens of illegal transgenic cotton varieties under the radar of Delhi and Monsanto implies a very different view of the farmer than that of the gullible and hapless peasant. The international oppositional narrative selects for supine peasants and monopolistic multinational corporations with patents. Class matters; the radical freedom of movement leaders from the dull compulsion of economic facts means there is no penalty for getting it wrong. Farmers operate in precisely the obverse of these conditions: getting seed choice wrong could be disastrous. In the NGO business, competition selects for extreme claims. Extreme claims facilitate being heard in the global cacophony. Volker Heins' book *Nongovernmental Organizations in International Society* (2008) is meaningfully sub-titled *Struggles for Recognition*. A nuanced claim about variable results across different Bt hybrids will not be recognized in global advocacy fora; "complete failure" and dead sheep are certain to gain recognition and circulation. Finally, extreme claims are made more credible by the celebration of local knowledge that dovetails with global skepticism about Enlightenment values—and science in particular—that undergirds the epistemology of protest.

In the contention business, there are authenticity rents to be garnered—some large, some meager—for

producers of contention who walk the fine line: indigenous enough, but fluent in English. "Third-world" intellectuals play an especially important role; their authenticity rents are accordingly high. Because of the extra-local nature of knowledge consumption, facticity itself retreats from salience; as the audience shifts to global fora, local confirmation is not critical for success. Cotton farmers in Gujarat do not know what Vandana Shiva is saying about "genocidal" Bt cotton seeds in Curitiba, Brazil—or even who Vandana Shiva is. If one sensibly asks, how did the terminator-suicide-seed narrative survive in India so long after being proven so decisively wrong, one answer is that production of claims is mostly for international networks, and certainly not for farmers (Herring, 2006).

Audience is critical to the strategies of advocacy organizations. Amnesty International or Human Rights Watch could not relay dubious or sensationalist information without fear of undermining their legitimacy in circles that count. Legitimacy of these INGOs depends on credibility. It is difficult to document the horrors that both organizations expose, and there is intense pressure to go with less rather than more documentation; but the credibility concern remains a powerful counterbalance. For local NGOs active in the Bt cotton controversy, it is almost impossible for their consumers and funders to disconfirm even the most incredible accounts. As Heins (2008) has noted, the very lack of grassroots connections that prompts reliance on local NGOs in the first place renders international funders dependent on them for epistemic mediation. If HIVOS (Netherlands) had grass-roots support in Warangal district (India), they would not have to depend on the regional Centre for Sustainable Agriculture (Secunderabad), which in turn relies on reports from the village-level CROPS (Jangaon).

Manufacturing contention then constitutes a highly specialized mode of production. The means of production are owned by relatively few leaders, whose rewards are significant; relations of production critically determine the objective veracity of accounts. Production is in part for domestic consumption, but mostly for international networks. Contentious knowledge claims represent an interactive effect of the characteristics of the domestic network and international coalitions.

International Coalition Dynamics and Hinges

Coalitions seek to broaden support by weaving seemingly incongruent strands together: "Code Pink Says No to GMO," but so does the Pesticide Action Network (and not unimportantly, the pesticide industry). International networks facilitate flows of reciprocal but asymmetric authoritative knowledge; "Monsanto's terminator gene" as settled fact moves center-periphery; farmer suicides and dead sheep move periphery to center, then back to periphery with the added credibility of reports published in Europe. A reciprocal authenticity dynamic develops: ex-colonial powers and their press authenticate global narratives for local networks, and local stories with authenticity based on indigeneity provide confirmation for global narratives. Authenticity rents are enhanced by the celebration of local knowledge that dovetails with the skepticism about science that underlies the epistemology of protest and simultaneous valorization of participatory development. There is no reason, for example, for a global advocacy network to know that there are no patents on Bt cotton (or other plants) in India, but the global narrative requires patents as a mechanism for enforcing both corporate power and peasant exploitation.

Normative Conclusion

The answer to our puzzle about farmers adopting disastrous technologies—perhaps the most rapid global adoption of any technology in history—is that the disasters exist entirely in the ideational imaginary of transnational advocacy networks. Nevertheless, the narrative of Bt-cotton catastrophe in India is coherent and globally distributed; it catches attention and compels action. It is also without any empirical or biological basis. The spread of molecular breeding technologies in India is rooted in precisely the agency and rationality of Indian—and other—farmers denied in global narratives of GMO opponents.

Rather than putting "peasants" at great risk, Bt cotton in India has proved a scale-neutral partial solution to a pressing agronomic problem: bollworm destruction of crops. Externalities seem, so far, to be positive, in the form of reduction of pesticide application. And there seems to be no evidence that even the labor-displacing effects once feared are materializing; larger harvests mean more work harvesting. India in this sense conforms to a more general pattern. There is now considerable evidence accumulated by authoritative institutional sources establishing the pro-poor potentials of genetic engineering in agriculture (Herring, 2007a). Caveats both real and imagined with regard to bio-property and bio-safety do not seem to obviate real potential for enhancing the developmental prospects of some of the world's most disadvantaged people (Herring, 2007c).

Given the risks rural people face from threats as different as rigged global markets and climate change, the ethical problem for opponents of transgenics is Rawlsian. That is, how does one justify blocking technologies farmers seek out?

Opposition is not really a politics of precaution or Luddism—all participants in international advocacy networks embrace advances in digital technologies, for example, and indeed depend on them. Nor is it a politics of risk. There are significant risks in common technologies accepted by the metropolitan middle classes, though one would recognize variation: cell phones are thought to be less risky than digitization of national accounts, stock ownership, medical records, air traffic control patterns, terrorist watch lists, and personal data of all kinds. The whole apparatus of digital technologies vulnerable to viruses and malicious hacking raises remarkably few fears (except among software professionals), but certainly no global movements. There is no comparable threat even conceivable from GMOs, which have spawned both fears and movements. Moreover, opposition is not a politics of opposing multinational capital, as often represented. Information technologies are not exactly free of concentration of power in multinational corporations. The same is true of pharmaceuticals, where there is both risk and concentration of power in intellectual property. Yet genetic engineering in that industry has become globally naturalized; there are no FrankenPills on posters. Nor are oppositional narratives rooted in a politics of economic democracy: virtually all modern technologies experience concentration of capital in large firms accountable to no one.

One must then ask about the interests and ethics of mobilization against technical change in agriculture. Crop transgenics has proved of interest to poor farmers, but not of high-income consumers; the Bt cotton case confirms this pattern. It would be impossible to argue from an original position behind Rawls' veil of ignorance that the preferences of the well-fed and comfortable should dominate those of the more numerous and vulnerable.

For conscientious citizens of the "first world," the first obligation is recognition that our political preferences have powerful influences on decisions in parts of the world where the options are fewer and less attractive. If European aid programs and global civil-society organizations are to press their preferences in low-income countries, they have an obligation to get the empirics right (Paarlberg, 2008). This obligation is most apparent when information about places remote from their experience is so inaccessible, filtered through frames that rely on brokers with strong ideological screening. Would the Pesticide Action Network be so opposed to GMOs if the evidence were widely available on pesticide reduction through Bt technology, for example? Given that farmers have adopted transgenic technologies in droves, how plausible are reports that they continue to replant seeds that failed them and are destroying their health and environments? Would they allow their sheep to feed on poisonous leaves? Who is going to find out? That extreme claims are so difficult to disconfirm and are buttressed by local interests in their promulgation goes a long way toward explaining the persistence of egregiously erroneous narratives. The "failure of Bt cotton in India" is among the most pervasive of these, but only one of many.

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