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## A DISCOURSE PERSPECTIVE ON AGRIFOOD BIOTECHNOLOGY CONTROVERSIES: *BT* COTTON IN INDIA

By

Tomiko Yamaguchi

## A DISSERTATION

Submitted to Michigan State University in partial fulfillment of the requirements for the degree of

## DOCTOR OF PHILOSOPHY

Department of Sociology

### ABSTRACT

## A DISCOURSE PERSPECTIVE ON AGRIFOOD BIOTECHNOLOGY CONTROVERSIES: *BT* COTTON IN INDIA

By

Tomiko Yamaguchi

Over the past decade, agricultural biotechnology has become a contentious issue in India, as seen in a wide range of newspaper articles focused on farmers' protests against field trials of genetically modified cotton (GM cotton), farmers' suicides in cotton growing regions, and the spread of unauthorized GM cotton. When compared to other agricultural technologies, agrifood biotechnology generates much more controversy involving government agencies, industries, NGOs, scientists and farmers. It is in this context that this study examines controversies surrounding the commercial introduction of *Bacillus thuringiensis* (*Bt*) cotton in India. This study attempts to examine social conflict and compromise involving actors holding divergent views toward the commercial introduction of genetically modified crops by analyzing contested issues and the group dynamics between interested parties.

This dissertation deploys a discourse perspective in examining the controversy. A discourse perspective – consisting of actors, claims, strategies and outcomes – serves as an analytical framework. Framing literature and social

identity theories serve as the grounds for interpreting data.

This dissertation uses 390 English-language Indian newspapers articles, 77 articles from two Gujarati dailies and one farm newspaper, and 95 interviews with actors in government, civil society, industry, mass media, scientists, and farmers conducted in New Delhi, Mumbai, and Gujarat. For the analysis and interpretation of data, ethnographic content analysis was used to highlight emergent themes and patterns significant in Indian agrifood biotechnology debates.

The analysis suggests that the controversies surrounding *Bt* cotton in India reflect 1) a multiplicity of constantly changing views towards *Bt* cotton that go far beyond the simple dichotomy of support and opposition of GM cotton, 2) constant shifts in the nature of relations between groups involved in the controversy, and 3) a complex pattern of strategies that actors deploy in maintaining interpretive control over the issues involving *Bt* cotton. The dominant frame has shifted from governmental processes to economic needs, while power has shifted away from government and toward farmers. Strategies include claimsmaking activities in public fora, strategic use of framing, and anchoring strategies in establishing the credibility of claims and claimsmakers. The conclusion argues that seemingly passive participants in the discourse such as farmers have tremendous influence upon the ways in which GM crops are deployed.

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## **CHAPTER 1**

### INTRODUCTION

#### Introduction to the Study

Over the past decade, agricultural biotechnology has become a contentious issue in India, as seen in a wide range of newspaper articles on farmers' protests against field trials of genetically modified cotton and against government regulations, farmers' suicides in cotton growing regions, and the spread of unauthorized genetically modified cotton (GM cotton). It has also caught the attention of farmers, a major consuming sector, with rumors in various villages about the effects of GM cotton on soil quality, livestock mortality, and allergenicity of cotton fibers, none of which have been substantiated. Further, farmers' unions and non-governmental organizations, regardless of whether they support or oppose the technology of genetically modified crops (GM crops), have engaged in public relations campaigns, creating additional confusion about GM crops and inspiring public mistrust of government. It is in this context that this study examines the dynamics of discourse surrounding the commercial introduction of *Bacillus thuringiensis* (*Bt*) cotton<sup>1</sup> in India.

This research attempts to explore the processes of arriving at social understandings and collective decisions about newly available science-based

<sup>&</sup>lt;sup>1</sup> Bt cotton has been genetically engineered to produce a toxin that protects the plants from the larva of Lepidoptera and related forms. The inserted genetic material has been taken from *Bacillus thuringiensis*, a bacterium that occurs naturally in the soil and is widely used to control insect pests.

agricultural technologies by examining processes of social conflict, resonance, and compromise involving actors holding divergent views toward the commercial introduction of transgenic crops. The study will especially focus on *Bt* cotton disputes in public fora by identifying contested issues and the interaction of stakeholders. The study will also examine strategies actors use to maintain interpretive control of *Bt* cotton so as to argue that group dynamics drive the processes by which GM crops are deployed when conflicting views exist.

## Agrifood Biotechnology Controversies: A Discourse Perspective

### **Theoretical Basis for a Discourse Perspective**

While studies using a discourse analysis share the assumption that discourse influences the ways in which meaning is brought to a situation, analytic approaches vary from discipline to discipline, involving studies of the forms and functions of language, social and cultural influences on language use, and institutionalized ways of thinking. Within the sociological literature, approaches are primarily derived from the work of Foucault (e.g., Foucault 1982). Discourse analysis in sociology essentially relates discourse to concepts such as power, the state, and knowledge to explain how discourses define social reality, and how social reality in turn influences what can be said about a specific issue or object. This project's analytic emphasis is on how social dynamics created by claims, claimsmaking activities, and intergroup relations of interested actors define social reality when there are visible conflicts among interested parties. Emphasis is also placed on understanding how actors negotiate among themselves to control

interpretations about an object by raising the issue of GM crops in the social, economic, political and environmental milieu.

To this end, this project's discourse perspective deals with the concepts of actors, claims, and strategies. It is useful to view social reality as an ongoing dynamic produced and re-produced by actors (Berger 1966), involving actors, interpretations of a specific issue or object, and claims about an object. Social reality also involves strategies that actors use to influence the interpretations of others. Social phenomena involving the adoption of *Bt* cotton are defined in ongoing social processes generated by actors, their actions, and their interactions with others. Each of these key concepts is described further in subsequent sections; here I will set out the theoretical foundations for a discourse perspective and enumerate its conceptual analytical strengths in providing an account of the agrifood biotechnology controversy in India.

Key theories underlying the discourse perspective here are drawn primarily from three sets of literature: literature on the social constructionist approach to social problems, framing, and social identity. The social constructionist approach to social problems provides a theoretical foundation for an overarching framework leading to a phenomena where a particular condition is defined as problematic (Best 1995; Kitsuse and Spector, 1973). What these studies share is the idea that numerous realities form a society, so that a seemingly objective condition is actually only one of many perceived realities. These studies suggest that perceived social problems are social constructs of actors with distinct goals and aspirations. Therefore, the emphasis is on how

actors interpret and define problems, rather than describing the conditions of a problem. What matters is understanding the discourse created by and for an interpretive community and the ways is in which discourse around a particular issue is developed and maintained. Thus, the focus of this study is on the actions and interactions of an interpretive community (Blumer 1971; Gusfield 1984).

Such interpretive processes leading to a particular understanding of a social condition involve frames. Drawing on Goffman (1986), I will employ the notion of frames as a foundation for analyzing the content of interpretations of *Bt* cotton, at the same time using it as the basis for examining strategies and interactions among actors. Frames are principles of organization of the objects and events around us. People compartmentalize their everyday experiences via frames. Thus by exploring the frame of reference actors use, I will be able to learn how actors are involved subjectively in social phenomena that take place around an object which they must define, act upon, and seek consensus among fellow actors.

Frames can be used to examine interactions among actors as well. As demonstrated by Snow and Benford (1988), some actors use frames to mobilize other actors. This concept will allow me to characterize interactions and negotiations in the race to define key issues in the deployment of GE crops. For instance, a purposeful selection of frames results in two different interpretations of modern biotechnologies. On the one hand, by applying a technology-oriented frame to agricultural development, agrifood biotechnology becomes a useful tool

for solving the problems of production and cultivation of crops; on the other hand, when emphasizing the importance of sustainable agriculture, agrifood biotechnology becomes a hindrance to such efforts. As an example, some argue that the scientific approach to agriculture is the best one for an arid region of India, where crops are vulnerable to natural calamities related to weather and pests. Others argue that Western science will compete with traditional knowledge for the cultural and ecological resource base, subverting indigenous agricultural knowledge and adversely affecting biodiversity. Moreover, actors could adopt a strategy of influencing mass media frames to reach out to a larger number of people. Recognizing that lay interpretations of controversial technology tend to closely relate to how the story is framed in the newspapers (Friedman, Dunwoody and Rogers 1999; Gamson and Modigliani 1989; Mazur 1981), actors could use mass media to influence and manipulate public opinions. In short, the underlying message of framing literature is that by using frames in a strategic manner, actors may be able to manipulate the perception of others to achieve their goals and aspirations.

Finally, in order to grasp the nuances of the *Bt* cotton controversy dynamics, I draw on social identity theory, which provides deeper insights into the nature of interaction between groups involved in the *Bt* cotton controversy and into how such interactions influence the course of the controversy over time. In particular, it can shed light on the social processes wherein actors establish their identity in their relations with other groups as they strive to maintain a coherent explanation of social phenomena involving the *Bt* cotton controversy. In this

dissertation, social identity refers to the label that individuals use to present themselves as eligible and credible actors supporting a particular claim about *Bt* cotton, and refers also to labels applied to others to present coherent narratives.

A synthesis of framing, social identity theories, and the social constructionist perspective of social problems, into a discourse perspective will enable me to characterize the dynamics of the *Bt* cotton controversy. Instead of limiting the analysis to the content of debates, a discourse perspective can illuminate actions and interactions of interested parties as well as reveal processes leading to a particular framing of a problem. Further, a discourse perspective will capture changing patterns of perception towards GM crops.

### Understanding the *Bt* Cotton Controversy in India: Sociological Insights

Actors in India have made claims regarding a range of issues pertaining to the commercial introduction of *Bt* cotton, and have engaged in a range of claimsmaking activities supporting or opposing its adoption. Their key arguments and concerns parallel research questions investigated by sociologists interested in agriculture, science and technology, and international development. On this basis, it is useful to review the literature, primarily from the sociology of agricultural development and from science and technology studies, to gain insights into the content of claims involving *Bt* cotton in India.

### **Unequal Economic Relations**

Based on the assumption that agricultural development is fundamentally capitalist in character, some emphasize the unequal relations between the First and Third Worlds, arguing that the agricultural development path for the Third World is structurally determined. In discussions related to the consequences of genetically modified organisms (GMOs) in India, some actors emphasize the hierarchical economic relations created between India and the U.S. through the activities of multinational agrichemical companies selling seeds and pesticides to farmers in India. The overwhelming dominance of these multinational corporations in the global transgenic seed and agrichemical markets is seen to systematically generate an unfair distribution of benefits. In addition, the international division of labor, combined with unequal terms of trade, are found to provide more profits to a privileged few and less to the marginalized (Friedmann 1991). Indeed, the history of how India produced cotton for textile industries in Britain and how textiles were sold back to India to the profits of British industrialists is a familiar one. Kloppenburg's (1990) study suggests that developing countries have experienced similar dynamics during the Green Revolution, through having germplasm extracted and transferred to developed countries without due compensation.

These historical experiences explain why some actors in India feel that the nation needs to be cautious about introducing *Bt* cotton and should be concerned with integration into the global agrifood system. Further, global mergers and acquisitions of agribusinesses raise additional concerns about the current

concentration of economic power into the hands of a few corporations (Marsden and Whatmore 1994). The observation made by an opponent of agrifood biotechnology that seven agrichemical companies presently dominate 80% of the agricultural inputs market (ETC Group 2001) leads some actors to believe the adoption of agrifood biotechnology will have a negative influence on people in India.

A common thread among these studies is the assumption that agricultural development in India is taking place in the context of increasing interconnectedness with other nations across social, economic, and political realms. Regardless of resentments expressed by non-governmental organizations (NGOs) about India's integration into the global economy, phenomena taking place in India can no longer be understood in isolation from transformations taking place in the global arena. Global forces shape the role of government, reorganize social, economic, and political conditions that surround Indian farmers, and facilitate or limit the activities of scientists, industries and NGOs. This suggests that every step taken by the Indian government is inevitably influenced by forces such as the global biosafety regime, the biosafety regimes of other nations, and international bodies. Indian companies need to compete with multinational corporations for a share of their own market. Indian scientists and farmers are expected to abide by guidelines set forth in the global biosafety regime in carrying out their work. Activities of Indian NGOs need to be fine-tuned to the politics of GM crops taking place outside India.

### Implications of Advances in Agricultural Sciences

Advances in agricultural sciences are commonly understood as responding to the need for improved productivity, and the need to remove or alleviate conditions that impede enhanced productivity, such as adverse biotic and abiotic conditions. Rather than taking these assumptions for granted, some actors have questioned whether agricultural technology such as transgenic crops are truly an advance in agricultural sciences and are beneficial to Indian agriculture.

Faith in the benefits of transgenic crops assumes that humans can manipulate, control, and conquer the natural environment by suppressing or removing undesired conditions of the natural environment. Some view modern biotechnological techniques as based on objective and universal scientific knowledge, superior to other forms of knowledge. Such an idea was the basis of the Indian government's announcement of technology transfer from Monsanto (a multinational agrichemical corporation) in 1992. For some actors, such as government officials working for biotechnology promotion agencies, obtaining the results of scientific research from abroad for the development of Indian agriculture is the most efficient approach for jump-starting a stagnated cotton industry. Assuming technological change will benefit Indian agriculture, some actors in Indian government are most concerned with the effective diffusion of technologies. This diffusion model (Rogers 1995) has also been influential in

international agricultural development efforts, as evidenced by the many international agricultural development projects of a wide range of agencies.<sup>2</sup> These projects address the effective utilization of agrifood biotechnology for the social, economic and ecological well-being of people in developing countries, emphasizing the processes of adoption and diffusion of technology, the speed of diffusion, and rate of adoption while continuously ignoring the question of whether the use of agrifood biotechnology is the best way to address issues facing developing countries at present.

Some actors predict that the introduction of agrifood biotechnology will negatively impact local knowledge systems (Bebbington 1994; Richards 1985; Sharma 2001). They argue that such technology will compete with traditional knowledge for the cultural resource base, and will subvert local agricultural knowledge (Boef *et al.* 1993; Perlas 1994; Shiva 1993). The key idea is that indigenous knowledge can play a far better role in "advancing" Indian agriculture because local knowledge is generated through years of peasant research and development, and adapted to local social, cultural and environmental conditions (Dahlberg 1994).

Even accepting that there are many historical examples that show Western scientific technique has had a positive impact on agriculture, agricultural achievements of developed countries have been closely linked to the

<sup>&</sup>lt;sup>2</sup> Including multilateral and bilateral development agencies, international research centers, agricultural universities, philanthropic organizations, and agribusinesses.

underdevelopment of less-advantaged nations (Frank 1967). For instance, biotechnological processes can create crops with new plant characteristics that can substitute for existing crops. The same processes can also produce synthetic substitutes of plants or their components. These techniques might offer more or even better choices to the consumers and farmers in developed countries; however, these technologies can potentially harm farmers in developing countries by displacing the need for some plants previously grown in these areas (Goodman *et al.* 1987). When we consider aspects of modern seed technology such as genetic use restriction technology (sterile seeds popularly known as "terminator technology"), it may be that benefits will accrue to industries, while the users in developing countries may be put at a disadvantage for having been interlocked with a system built to serve the interests of businesses (Gooeschl and Swanson 2003; Van Wijk 2004).

Studies on U.S. farms (Flora and Rodefeld 1978; Hightower 1973) and of the Green Revolution (Dahlberg 1990; Harriss 1982; Pearse 1980) attest to the fact that mindless adoption of agricultural science and technology works against farm laborers and small farmers to the benefit of larger growers, and against developing countries to the benefit of developed countries. Although we cannot completely ignore that some parts of the world benefited from high yield varieties during the Green Revolution, if the benefits are defined in terms of productivity (Rigg 1989), the concerns raised by opponents of GM crops have been based on historical evidence which indicates the detrimental effects of technological transfer.

#### Science in Policy-Making

Literature that examines science in policy-making provides insights into why some actors view Bt cotton as a controversial technology. First, studies suggest that science has become a subject for public scrutiny (Nelkin 1992), reflecting the public's ambivalence toward science and its perception that science is unable to give determinate answers regarding their concerns. Decisions based on scientific evidence are therefore seen as inevitably social and political. Further, public policy debates about agrifood biotechnology reveal a breakdown in the purported boundary between science and politics. Such debates reveal that seemingly objective scientific facts may reflect the political interests of some actors. Consequently, Western science is losing its power as a tool for legitimation in public fora such as public hearings and courts (Cambrosio, Keating and Mackenzie 1990; Garrety 1998; Jasanoff 1995). At the same time, public policy debates reveal that scientists are losing their autonomy through being asked to assume the role of legitimators of a particular public policy (Jasanoff 1990; Kendall 2000). Actors have realized that scientists are often commissioned by government agencies to conduct research that will lead to a particular public policy or government regulation (Salter et al. 1988). The public has also become aware that scientists' activities are constrained by the politics of funding, such as the priorities of funding agencies and interests of scientific organizations (Mukerji 1989).

Second, transgenic crops are viewed as controversial because it is extremely difficult to identify where the risks lie, or even to determine appropriate

methods of risk assessment and management, especially given the relatively short period of time the technology has been in open field use (The Royal Society 2001). With specific reference to India, transgenic cotton has been in open field use only since 2002 and only in selected cotton growing regions, thus making it extremely difficult to explain the likely ecological, social and economic consequences. Under these circumstances, scientists have a great potential to influence discourse. For instance, Indian scientists could use data from the U.S. transgenic cotton situation to argue that the scientific data prove that *Bt* cotton is a promising tool to alleviate pesticide stress on soil. Without mentioning possible methodological problems arising from the application of U.S. data to the Indian situation, they can make a strong case by saying that particularly in India, where much of the problem with cotton relates to excessive use of pesticides, *Bt* cotton with its built-in pest resistant traits will be a promising crop management solution to these problems.

Other scientists may argue that the introduction of such crops should not be allowed in India on the grounds that there are no science-based protocols and techniques to identify and assess their risk in the Indian context. These two statements demonstrate how the same conditions are interpreted differently, leading to different positions towards *Bt* cotton. Under these circumstances, where science cannot substantiate risks or where a scientific community is not in complete agreement over the ecological impacts of transgenic crops, social factors such as culture, individual beliefs and values play a significant role in the

ways in which risks are defined (Douglas and Wildavsky 1982; Krimsky and Golding 1992; Sjöberg 2000).

### Strengths of a Discourse Perspective

While these studies deriving from the sociology of agricultural development and science and technology studies lend insight into the issues debated in the Bt cotton controversy in India and also shed some light on the root of the controversy, there are some areas that are important for understanding the Bt cotton controversy that this literature is unable to explain. It is useful to delineate the areas unexplored by these studies and to outline how a discourse perspective might illuminate these neglected areas. Studies that view agricultural development in developing countries structurally, particularly with reference to political and economic relations, tend to ignore the diversity of people across developing countries. A discourse perspective, instead, employs a methodological and theoretical orientation to illuminate the multiplicity of views toward Bt cotton deriving from the heterogeneity of Indian society, views that go far beyond the simple dichotomy of support and opposition of GM crops. Using empirical data and pursuing an inductive mode of inquiry, this perspective surveys the diverse claims raised by actors involved in the *Bt* cotton controversy.

The multiplicity of views emerging from the heterogeneity of Indian society can best be understood by avoiding essentializing concepts and surveying claims. Triangulation, or using multiple types of data, including newspapers articles, interviews, and other printed materials, will enable me to uncover perspectives

which might otherwise be neglected or unnoticed. Interview data, in particular, will allow me to focus on natural language and the meanings that actors assign to their experiences. In this way one can uncover the subjective aspects associated with the life experience of those in the fields and elsewhere in Indian society and their relation to a newly available technology. Indeed, heterogeneity is an accepted fact in India, home to hundreds of dialects and diverse religious groups including Hinduism, Islam, Christianity, and Buddhism. In addition, social heterogeneity deriving from caste, ethnicity, gender, and educational background adds yet another layer. Such heterogeneity that exists in Indian society will not fit into a rigid typology nor can it be reduced to some aggregate level.

The concept of frame is particularly useful in exploring the interpretations of *Bt* cotton in India. It serves as the prism through which actors organize issues involving *Bt* cotton in light of their needs and interests, through which the rank ordering of issues as seen by actors in India might be empirically identified, instead of imposing an outside perspective of the "real" issues. For instance, this research may uncover a greater perceived irrelevance of long-term ecological concerns raised by some of the environmentalists due to pressing economic issues among farmers.

Another strength of the discourse perspective derives from its triangulation of theories. The discourse perspective presented here brings together a diversity of literature, and combines these to address the intersection of agricultural development and science and technology. Efforts to synthesize literature consisting of multiple perspectives will enable me to describe not only actors'

views towards *Bt* cotton but also actors' life-worlds consisting of tensions and emotions they feel in their relation to the social structures that impinge upon their lives.

By conceptualizing the *Bt* cotton controversy in terms of actors' claims and strategies, one may better understand actors' ability to resist and change the environment in which they are embedded. Seemingly powerless actors at the local level become active creators of their social reality by accommodating or rejecting the influences of social structure. Actors may negotiate with a social structure that surrounds them (Long 1992), and actors may participate in networks of people to alter their milieu (Latour 1993). Peasant movements might not be the only means by which farmers resist the constraints placed on them. They might engage in alternative forms of resistance to change the structure (Scott 1985: 32).

Finally, the use of multiple methods such as in-depth interviews and direct observations of actors will shed light on social dynamics before and during the deployment of biotechnology. Using an empirical framework to uncover what has been said about putative consequences of the adoption of agrifood biotechnology, who has said it and in what context, will help us see the likely threats and opportunities related to the introduction of transgenic crops. Thompson (1997:163) writes, "Perhaps the nature and impact of biotechnology in developing countries was so speculative in the 1980s and early 1990s that useful empirical and theoretical work was impossible, and perhaps studies are currently underway that will rectify the situation." As he accurately points out, given the

early stage of deployment of agrifood biotechnology in India, there are numerous challenges in conducting a study, especially one situated at the field and village level. However, a discourse perspective which brings together a range of sociological literature, methods, and data will help us gain insights into social processes that take place prior to the actual adoption of a technology. Looking directly into actors, claims, actions and outcomes involved in the introduction, control, and implementation of *Bt* cotton seems to be an effective means of accounting for complex ongoing processes preceding technology adoption.

### The Significance of Studying in India

India presents some unique opportunities for researching the *Bt* cotton controversy. It is an open society based on the principles of democracy; it has a fast-growing economy, yet with a huge economic disparity between states and at the same time, significant social and economic disparities within a range of communities and groups (i.e., caste, ethnic groups, and gender). Cotton reflects various contrasts for India as well. Though it constitutes the core of the Indian economy, the cotton industry faces various problems ranging from productivity to quality. Cotton growers face economic, and consequently social problems, some having committed suicide after accumulating a large amount of debt. Further, agricultural laborers are said to have experienced health problems after applying pesticides without proper protection.

Gujarat, located on the western coast of India, is indicative of these many paradoxes. Gujarat is one of the most developed industrial states in India,

enjoying a higher per capita income than other states; however, there are some areas left behind – areas prone to drought, flooding, and other natural calamities. It is an open society having in and out migration of people, and is the largest earner of foreign exchange from expatriates. It is a society whose members value a sense of equality, in a state which never had a feudal system in the past. It is the birthplace of Mahatma Gandhi, who left his mark there, a place where people value cooperation and tolerance. However, mounting communal tensions in Gujarat are characterized by communal carnage between the Hindu majority and the Muslim minority. The core value of equality has never been realized by some sectors of the population, who barely survive the strife and are exposed to unpotable drinking water.

The cotton industry in Gujarat faces contradictions as well. Having a long history of cotton cultivation and being known as India's cotton capital, Gujarat has seen the cotton industry play a prominent role in its economy. The advent of hybrid cotton in Gujarat has made some farmers wealthier, but not all. During the Green Revolution, government subsidies to farmers led to indiscriminate pumping of groundwater for farming. Such exploitation of groundwater has caused salinity problems in many areas, reducing land for farming and water sources. Excessive use of pesticides for cotton cultivation has harmed laborers, contaminated ground and surface water, and harmed wildlife. In short, these great challenges facing India and Gujarat beg for the help that *Bt* cotton might bring to Gujarat, but many may also be unsolvable, and the introduction *Bt* cotton may not bring all the beneficial consequences promised. Many of these social

realities in India and Gujarat have intensified the *Bt* cotton debate, and brought in a range of actors including Indian government, industries, scientists, NGOs, and farmers.

#### **Background to Fieldwork**

I conducted fieldwork from July through September 2000 and from August 2002 through May 2003 in India. During the three months in 2000, my focus was to gain an understanding of issues of significance related to *Bt* cotton in India while observing the ways in which people engaged in discussion. My activities were primarily collecting policy documents and attending seminars, conferences, and workshops to locate interested and key actors. I conducted interviews with a few individuals whom I had met at the seminars and conferences who were prominent opinion-makers in agrifood biotechnology to gain insights into their interpretations of the commercial introduction of *Bt* cotton. In addition, I paid several visits to villages in Gujarat to explore the extent of their awareness of debates over *Bt* cotton. To my disappointment, during my first visit, none of the farmers indicated that they were aware of such seeds, much less did they know about the debates taking place in New Delhi.

On my second visit to India, I spent seven months in Gujarat and three months in New Delhi. The time in Gujarat was devoted to interviewing a range of actors in the cotton commodity chain, and to collecting and analyzing Gujarati language newspapers. The situation surrounding *Bt* cotton controversies had changed dramatically in 2002 since my last visit to Gujarat, as evidenced by

numerous seminars and workshops on *Bt* cotton organized by the state government, NGOs, and farmers' unions. I interviewed people in state government offices, cooperatives, local seed companies, a state seed corporation, scientists in universities, local NGOs, farmers' union leaders, and farmers, most of whom were eager to talk about controversial episodes that surrounded Bt cotton. For seven months, I was based in Anand, Gujarat as a visiting fellow at the Institute of Rural Management (IRMA), where I received academic and logistical support. I commuted from Anand to cities in Gujarat such as Gandhinagar, the capital of Gujarat, Ahmedabad, and Vadodara, which are important commercial centers in the region, to interview non-farmers. I also commuted to a village in south Gujarat to talk to farmers about the situation. I chose to stay at a facility offered by IRMA rather than in a village because its central location gave me relatively easy access to sites for fieldwork. It was particularly important to stay at the facility to avoid any chance of being subjected to communal tensions, which were volatile at the time. Further, I gradually came to realize that identifying myself as a visiting fellow at a well-respected educational institute in Gujarat was central to demonstrating the neutrality of my position with respect to the commercial introduction of *Bt* cotton. In some cases, non-farmer actors declined interviews out of their discomfort concerning research findings which would be submitted to a U.S. educational institute through which U.S. industries could potentially benefit. However, I was generally viewed as a neutral and passive observer of Indian discourse, which was key in accessing all sides of the debate.

My initial entry point to farmers' discourse was in north Gujarat. I quickly realized that many of the cotton growers I met drew their incomes from crops other than cotton (e.g., chilies and groundnuts), or from other income sources such as remittances from family members who had immigrated to the U.S. These farmers did not have much to say about *Bt* cotton, nor did they participate in public debates over it. It was after visiting villages in several cotton districts in Gujarat that I came to learn about a farmer leader whose name had been mentioned in Gujarati newspapers in connection with *Bt* cotton. We (a research assistant and myself) were invited into his village and taken to his house, his neighbors' houses, and their fields. Thereafter, I commuted to the village for a period of six months, approximately twice a week, for interviews.

My identity did not seem to matter so much to farmers in the village when requests for interviews were made because of the initial introduction by a farmer union leader of the village. On the one hand, having been introduced to a village through a farmer leader played a significant role in putting me in touch with a range of actors in the local arena in a relatively short period of time. On the other hand, this limited my access to other types of farmers who were not necessarily in agreement with the opinions and positions of the farmer leader. For instance, he put me in touch with employees of co-operatives, seed dealers and farmers in the south of Gujarat who broadly shared his perspective, but we had to make extensive efforts to find individuals and organizations in Gujarat who may not necessarily have favored the adoption of GM crops. Even when we succeeded in contacting such people, they tended to be reluctant to be interviewed. Further,

we could not get access to women. In most occasions, it was men who met us and reacted to our requests and never women. As a result, the interview data we collected inevitably reflect biases arising from the attributes of people we managed to get to know. 18

During my three months in New Delhi, I revisited and interviewed people that I had interviewed in 2000 and also conducted interviews with people across categories of actors. While I admit that conducting interviews in cross-cultural settings imposed analytical challenges, such as not being able to understand subtle nuances and messages that interviewers were communicating to me, extensive efforts were made prior to the interviews to build both the academic and practical foundations required for subtle understanding in intercultural settings. In addition to researching the characteristics of organizations and institutions that interviewees belonged to, efforts were made to participate in public and social events should invitations be given so as to observe actors in action and to learn more about Indian cultures. In fact, being seen as "a foreigner" and "a guest from abroad" did help expand my activities rather than limiting them in some sense. There were several instances in which I was able to interview people such as high-ranking government officials, a parliament member, and managing directors of seed companies, whereas Indian researchers who wanted to conduct interviews with a similar range of people were unable to do so. The explanation given to me was that in some cases people in India can be more accepting of foreigners than other Indians belonging to different regional, religious, and/or caste backgrounds. This is not to say that

access to people is more important than the cultural sensitivity; however, the analytical challenges were at least partially compensated by such norms.

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I.

Throughout the time of my fieldwork in Guiarat, I had two female research assistants who spoke Gujarati, Hindi and English. They helped me to interview non-English speakers and to translate Gujarati newspapers and other printed materials. Interviews with farmers were divided into three separate phases. At the outset, I conducted a series of group farmer interviews with the help of a research assistant who translated my questions and the farmers' responses. This was to investigate the perceived major issues and opportunities associated with the advent of *Bt* cotton. These group sessions were later used to design and develop an interview guide for semi-structured, one-on-one interviews with farmers. During the second phase, one of two research assistants conducted the interviews in Gujarati using the interview guide (Appendix A), as I did not want to interrupt the flow of the interviews. The other person took notes so that I was able to broadly follow their conversations. During the third phase. I again conducted a series of group interviews to follow up on issues we had not understood in the one-on-one interviews (Appendix B). This final round of interviews explored what farmers had to say about their experience with Bt cotton. as well as their interpretation of what others had said about this new technology. because the third phase coincided with the months during which growers harvested cotton.
### Organization of the Study

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This dissertation consists of three independent manuscripts, written at various stages of this project: Chapter 2 was written between my first and second visits to India, Chapter 3 at the end of fieldwork, and Chapter 4 after returning from the field. Thus reflecting stages of the work, the overall focus of the dissertation will move from concept, to analysis, to interpretation, while underlying materials for each chapter will move from secondary (literature and newspaper articles) to primary data (interviews and field notes from nonparticipant observations). An earlier version of Chapter 2 appeared in Science, Technology & Society in 2003 and Chapter 3 is forthcoming in Discourse and Society. The second chapter sets out a conceptual model for this research and maps the contours of the Bt cotton debate in India. The third chapter compares and contrasts discourse on the national and local levels to examine the types of frames used for interpretations of *Bt* cotton and the kinds of strategies actors deployed in advancing their interpretations. I will focus in particular on contested issues and the ways in which actors engaged in debates. Chapter 4 analyzes group relations in the Bt cotton controversy by exploring non-farmer and farmer discourses. The chapter will illuminate two different interpretive processes in non-farmer and farmer discourses and resultant social phenomena. In Chapter 5, I summarize findings from each chapter and suggest theoretical contributions to the sociology of agricultural development and science and technology studies, as well as empirical contributions to policy makers. I close this dissertation by presenting areas for future research based on these findings.

### References

- Bebbington, Anthony. 1994. "Theory and Relevance in Indigenous Agriculture: Knowledge, Agency and Organisation." In *Rethinking Social Development*, edited by D. Booth. Harlow Essex: Longman Scientific & Technical.
- Berger, Peter L., and Thomas Luckman. 1966. *The Social Construction of Reality*. NY: Doubleday.
- Best, Joel. 1995. Images of Issues: Typifying Contemporary Social Problems. NY: Aldine de Gruyter.
- Blumer, Herbert. 1971. "Social Problems as Collective Behavior." *Social Problems* 18: 298-306.
- Boef, Walter de, Kojo Amanor, Kate Wellard, and Anthony Bebbington. 1993. *Cultivating Knowledge: Genetic Diversity, Farmer Experimentation and Crop Research*. London: Intermediate Technology Publications.
- Cambrosio, Alberto, Peter Keating, and Michael Mackenzie. 1990. "Scientific Practice in the Courtroom: The Consturction of Sociotechnical Identities in a Biotechnology Patent Dispute." *Social Problems* 37: 275-293.
- Dahlberg, Kenneth A. 1990. "The Industrial Model and its Impacts on Small Farmers: The Green Revolution as a Case." In *Agroecology and Small Farm Development*, edited by M. Altieri and S. Hecht. Boston: CRC Press.
- —. 1994. "A Transition from Agriculture to Regenerative Food Systems." *Futures* 26: 170-179.
- Douglas, Mary, and Aaron B. Wildavsky. 1982. *Risk and Culture: An Essay on the Selection of Technical and Environmental Dangers*. Berkeley: University of California Press.
- ETC Group. 2001. "Globalization, Inc.: Concentration in Corporate Power," *ETC Communiqué*. September 5. [Online]. Available at: http://www.etcgroup.org/. Accessed June 1, 2004.
- Flora, Jan, and Richard. D. Rodefeld. 1978. "The Nature, Magnitude, and Consequences of Changes in Agricultural Technology." In Change in Rural America: Causes, Consequences, and Alternatives, edited by R. D. Rodefeld, J. Flora, D. Voth, I. Fujimoto, and J. Coverse. Saint Louis: The C.V. Mosby Company.

- Foucault, Michel. 1982. The Archaeology of Knowledge and The Discourse on Language. NY: Pantheon Books.
- Frank, Andre Gunder. 1967. Capitalism and Underdevelopment in Latin America: Historical Studies of Chile and Brazil. NY: Monthly Review Press.
- Friedman, Sharon M., Sharon Dunwoody, and Carol L. Rogers. 1999. Communicating Uncertainty: Media Coverage of New and Controversial Science. Mahwah, NJ: L. Erlbaum Associates.
- Friedmann, Harriet. 1991. "Changes in the International Division of Labor: Agri-Food Complexes and Export Agriculture." In *Towards a New Political Economy of Agriculture*, edited by W. Friedland, L. Busch, F. Buttel, and A. Rudy. Boulder: Westview Press.
- Gamson, William A., and Andre Modigliani. 1989. "Media Discourse and Public Opinion on Nuclear Power: A Constructionist Approach." *American Journal of Sociology* 95: 1-37.
- Garrety, Karin. 1998. "Science, Policy, and Controversy in the Cholesterol Arena." *Symbolic Interaction* 21: 401-424.
- Goeschl, T., and T. Swanson. 2003. "The Development Impact of Genetic Use Restriction Technologies: A Forecast based on the Hybrid Crop Experience." *Environment and Development Economics* 8: 149-165.
- Goffman, Erving. 1986. Frame Analysis: An Essay on the Organization of Experience. Boston: Northeastern University Press.
- Goodman, David, Bernardo Sorj, and John Wilkinson. 1987. From Farming to Biotechnology: A Theory of Agro-Industrial Development. NY: Basil Blackwell.
- Gusfield, Joseph R. 1984. "On the Side: Practical Action and Social Constructivism in Social Problems Theory." In *Studies in the Sociology of Social Problems*, edited by J. W. Schneider and J. I. Kitsuse. Norwood: Ablex Pub. Corp.
- Harriss, John. 1982. Capitalism and Peasant Farming: Agrarian Structure and Ideology in Northern Tamil Nadu. Bombay: Oxford University Press.
- Hightower, Jim. 1973. Hard Tomatoes, Hard Times: A Report of the Agribusiness Accountability Project on the Failure of America's Land Grant College Complex. Cambridge, MA: Schenkman.

- Jasanoff, Sheila. 1990. *The Fifth Branch: Science Advisers as Policymakers*. Cambridge, MA: Harvard University Press.
- —. 1995. Science at the Bar: Law, Science, and Technology in America. Cambridge, MA: Harvard University Press.
- Kendall, Henry Way. 2000. A Distant Light: Scientists and Public Policy. NY: AIP Press.
- Kitsuse, John, and Malcolm Spector. 1973, "Toward a Sociology of Social Problems." Social Problems 20: 407-441.
- Kloppenburg, Jack Ralph. 1990. First the Seed: The Political Economy of Plant Biotechnology, 1492-2000. NY: Cambridge University Press.
- Krimsky, Sheldon, and Dominic Golding. 1992. Social Theories of Risk. Westport: Praeger.
- Latour, Bruno, and Catherine Porter. 1993. *We Have Never Been Modern*. Cambridge, MA: Harvard University Press.
- Long, Norman, and Ann Long (Eds.). 1992. Battlefields of Knowledge: The Interlocking of Theory and Practice in Social Research and Development. London: Routledge.
- Marsden, Terry, and Sarah Whatmore. 1994. "Finance Capital and Food System Restructuring: National Incorporation of Global Dynamics." In *The Global Restructuring of Agro-food Systems*, edited by P. McMichael. NY: Cornell University Press.
- Mazur, Allan. 1981. "Media Coverage and Public Opinion on Scientific Controversies." *Journal of Communication* 31: 106-115.
- Mukerji, Chandra. 1989. *A Fragile Power: Scientists and the State*. Princeton: Princeton University Press.
- Nelkin, Dorothy. 1992. Controversy: Politics of Technical Decisions. Newbury Park: Sage.
- Pearse, Andrew. 1980. Seeds of Plenty, Seeds of Want: Social and Economic Implications of the Green Revolution. Oxford: Clarendon.
- Perlas, Nicanor. 1994. Overcoming Illusions about Biotechnology. Penang, Malaysia: Third World Network.

- Richards, Paul. 1985. Indigenous Agricultural Revolution: Ecology and Food Production in West Africa. Boulder: Westview Press.
- Rigg, Jonathan. 1989. "The New Rice Technology and Agrarian Change: Guilt by Association." *Progress in Human Geography* 13: 374-400.

Rogers, Everett M. 1995. Diffusion of Innovations. NY: The Free Press.

- Royal Society. 2001. "Call for Evidence: Royal Society to Update 1988 Statement on GM plants." London: The Royal Society.
- Salter, Liora, Edwin Levy, and William Leiss. 1988. *Mandated Science: Science and Scientists in the Making of Standards*. Boston: Kluwer Academic Publishers.
- Scott, James C. 1985. Weapons of the Weak: Everyday Forms of Peasant Resistance. New Haven: Yale University Press.
- Sharma, Devinder. 2001. "The Introduction of Transgenic Cotton in India." Biotechnology and Development Monitor 44/45:10-13.
- Shiva, Vandana. 1993. *Monocultures of the Mind: Perspectives on Biodiversity* and Biotechnology. Penang, Malaysia: Third World Network.
- Shrum, Wesley, and Yehouda Shenhav. 1995. "Science and Technology in Less Developed Countries." In *Handbook of Science and Technology Studies*, edited by S. Jasanoff. London: Sage.
- Sjöberg, Lennart. 2000. "The Methodology of Risk Perception Research." Quality and Quantity 34: 407-418.
- Snow, David A, and Robert D. Benford. 1988. "Ideology, Frame Resonance, and Participant Mobilization." In *From Structure to Action: Social Movement Participation across Culture*. edited by B. Klandermas, *et al.* Greenwich: JAI.
- Thompson, Paul B. 1997. Food Biotechnology in Ethical Perspective. London: Blackie Academic & Professional.
- Van Wijk, J. 2004. "Terminating Piracy or Legitimate Seed Savings? The Use of Copy-Protection Technology in Seeds." *Technology Analysis & Strategic Management* 16: 121-141.

### **CHAPTER 2**

# AGRIFOOD BIOTECHNOLOGY DISCOURSE IN INDIA<sup>1</sup>

#### Introduction

#### Cotton and Science-based Agriculture in India

Cotton has been an important crop for Indian society since prehistoric times. India is where it was first domesticated, and India was the first civilization to develop spinning and weaving techniques. Cotton still plays an important role in Indian economy, society, and culture. The cotton textile industry is the largest organized industry in India; it provides enormous employment opportunities, is the largest contributor to GDP, and earns significant foreign exchange. Cotton is also an important cash crop for small farmers. In addition, cotton carries strong cultural meaning, as seen in Mahatma Gandhi's use of the spinning wheel as a symbol for the independence movement.

Despite its economic and social importance, the Indian cotton industry is currently facing problems with regards to quality, productivity, and production cost. According to the Cotton Corporation of India (2000), the quality of India's cotton is far from satisfactory for the world market because of its large number of contaminants and inconsistent thickness and length. Although India ranks third globally in cotton production, following China and the U.S., cotton yield per hectare is one of the lowest in the world. Furthermore, the cotton crop consumes approximately half of all the pesticides used for agricultural purposes in India

<sup>&</sup>lt;sup>1</sup> This chapter is a revision of a manuscript co-authored with Craig K. Harris and Lawrence Busch, which appeared in *Science, Technology & Society: An International Journal Devoted to the Developing World*, 2003, 8(1): 47-72. Sage Publications.

even though it occupies only some five percent of the total cultivated area in the country (CCI 2000; ISCI 1999).

Against this backdrop, the dominant view is that science-based plant research will enable growers to better manage crops against pest attacks and adverse climatic conditions. It is further believed that agrifood biotechnology will produce new varieties that will allow growers to make better use of inputs and their natural resource base, especially compared to traditional varieties. As one part of this dominant science-based approach, there has been a proposal to introduce *Bt* cotton in India. Science-based plant technologies such as *Bt* cotton are seen by some in India as having great potential to solve the problems of quality, productivity, and production costs. However, not everyone agrees with this perspective, and debates over agrifood biotechnology have become hotly contested. These debates are discussed in the next section.

#### The Bt cotton Controversy

While the Indian government approved the commercialization of *Bt* cotton in 2002, debates concerning genetically engineered cotton continue. In 1998, when newspapers began to cover stories on *Bt* cotton, the issue was about the procedures for carrying out the open field testing of *Bt* cotton (one step before the commercialization of the new variety). Over the years, however, issues have expanded beyond narrowly focused governmental processes and broadened to impinge upon Indian ethics and values – whether and how the benefits of biotechnology will reach a developing country like India, how the prospective

benefits would manifest themselves among growers in different social and economic strata, and how the environmental and/or health risks should be distributed and mitigated. The Indian government and agrifood and pharmaceutical industries have begun to meet strong social opposition from NGOs addressing issues related to the global agrifood system, environment, food and population. Debates have arisen both in the national arena, involving people affiliated with government agencies, international and Indian NGOs, farmers' unions, and industries, and in the local arena, involving people in state government agencies, local seed industries, local NGOs, and farmers.

I will first present a brief overview of the events in the controversy that have been reported in the English-Indian newspapers, and then proceed with the body of the study. Towards the end of 1998, a farmers' group – Karnataka Rajya Raitha Sangha (KRRS) – began protesting field trials conducted by a joint venture firm. They uprooted the crops, set fire to the trial fields, and popularized the slogan "Cremation Monsanto" (*The Hindu*, November 29, 1998). Subsequently, the Andhra Pradesh (AP) government halted the field trials of *Bt* cotton undertaken by the joint venture firm. The AP government claimed that the decision was made because farmers were agitated over the activity of the company, which was said to have been testing the "terminator gene" under the guise of *Bt* cotton seed trials (*Business Line*, December 5, 1998).<sup>2</sup> The leader of KRRS. MD Nanjundaswamy, claimed that the gene incorporated in *Bt* cotton had

<sup>&</sup>lt;sup>2</sup> Monsanto was part owner of the company that had acquired a concept patent for terminator technology, a genetic way of producing second-generation sterile seeds. While a concept patent implies no seeds using the genes have been produced, groups in India nevertheless claimed that Monsanto was testing the terminator technology in India.

contaminated all crops in the vicinity of the field trial plots and was jeopardizing the biodiversity of the area. He also claimed that the company had undertaken trials without obtaining government permission and that they had been carried out secretly (*Business Line*, January 11, 1999). Parallel with KRRS' actions and the AP government's decision, various claims surfaced in the newspapers. An editorial in *Business Line* (December 3, 1999) strongly criticized such vandalism and condemned KRRS' activities as "anathema to civilized society." It pointed out that such activities and the government's inability to control them would send a negative signal to prospective investors in India.

In response, the Ministry of Agriculture imposed a ban on the import of terminator seeds into India. At the same time, the Director General of the Indian Council of Agricultural Research (ICAR), an agency with tremendous influence upon the course of agricultural development in India and upon public opinion about matters related to agriculture, announced that the government would be "gearing up for a single-point entry for all imports of seeds" (*Business Line*, January 14, 1999). This was the first time the public was informed that the Indian government would take careful steps for introducing genetically modified crops commercially.

In July of 2000, the Maharashtra Hybrid Seed Company (Mahyco) was granted permission for large scale trials to generate environmental safety data on genetically modified cotton (GM cotton) by the Genetic Engineering Approval Committee (GEAC), the interministerial committee evaluating biosafety aspects of transgenic crops. Although the Indian government expected the open field

trials to be completed by mid-2001, the Committee decided to require an additional year for the open field trials under the supervision of the ICAR (*Hindu Business Line*, June 21, 2001). Supervision by ICAR meant a significant shift in the culture governing the field trial by transferring the responsibility from the technology promotion agency, Department of Biotechnology (DBT), to the agricultural research agency, which is viewed as representing the interests of farmers. Meanwhile, some ten thousand hectares of unauthorized GM cotton were found in the state of Gujarat. Farmers had purchased the seeds from a local seed company in Gujarat, who had allegedly sold GM cotton seeds as a new variety resistant to bollworm (*Times of India*, October 8, 2001).

Subsequently the GEAC ordered the destruction of GM cotton grown in Gujarat (*Times of India*, October 19, 2002). In March of 2002, the GEAC approved the commercial cultivation of *Bt* cotton (*Economic Times*, March 27, 2002). Since the Bollgard varieties had become available to cotton growers, farmers in cotton growing regions such as Gujarat, Maharashtra and Andhra Pradesh began to use them.

Against this background, the central themes of this paper are to identify the actors whose voices were heard in public discourse about agrifood biotechnology, and to explore framing used by actors to interpret social phenomena surrounding *Bt* cotton. The following subsection will outline the conceptual model and then describe the methods used in this study. After the presentation of the results, I briefly discuss implications for future work.

### **Conceptual Model**

## **Discourse** Perspective

The discourse perspective here consists of actors, claims, strategies and outcomes. Underlying this approach is the idea that language, meanings and interpretations held by actors play a significant role in driving social processes involving Bt cotton controversy. Thus, analysis of discourse provides an analytical framework for examining a social reality consisting of diverse meanings and perspectives. It has been used inter alia in the study of environmental problems (Dryzek 1997; Hajer 1995; Litfin 1994) and in the study of the social construction of scientific knowledge (Latour 1987; Latour and Woolgar 1979; Yearley 1981), as well as in analyzing social movements in developed (Gamson 1993; Williams 1995) and developing countries (Nanda 1999). While these studies share the assumption that the language used and the meanings held towards an object or an issue are instrumental in producing and reproducing social structure and institutions, the analytic emphasis varies from researcher to researcher. Some emphasize interpretations of an issue or an object, while others shed light on ongoing social processes that lead to a particular social phenomenon. Preliminary to examining social processes leading to collective decisions, this chapter emphasizes identifying interested parties and understanding their claims and claimsmaking activities using the concept of actors and frames.

The second assumption of this dissertation is the idea that the eruption of controversy in public fora reflects social processes where people come to define

the rapid introduction of *Bt* cotton as problematic. Drawing on the theoretical framework of the social constructionist approach to social problems (Best 1995; Kitsuse and Spector 1973), the chapter will demonstrate the processes whereby Indian people came to learn that the commercial introduction of *Bt* cotton would entail a range of consequences, both positive and negative. People came to learn there were social, economic, and political consequences which might run counter to what government officials and industry employees had claimed. Thus, the chapter emphasizes how people define problems for themselves or others through actions and interactions.

## Actors

India is characterized by enormous societal diversity, i.e., the coexistence of modern and traditional social structures and social values, rich and poor, elite and non-elite, urbanites and rural residents. India's historical diversity was reinforced by the Mogul period, British colonialism, and more recently by the impact of emerging capitalism, industrialization and globalization. The diverse norms, values, and cultures of contemporary India, a democratic political system, combined with a newly-emergent partly-Western biological technology, have created social spaces where actors, both as individuals and as groups, can put forth and debate various issues of agrifood biotechnology. Rather than remaining passive and accepting scientific explanations given by experts, actors construct situational meanings through processes of interpretation and interactions with others (von Glasersfeld 1991). Actors are capable of reworking and revising

societal values, norms, and cultural orientations in accordance with values, norms and cultures of their own, and then of disseminating these revised understandings through their actions and social interactions with other actors (Touraine 2000). Debates surrounding the consequences of agrifood biotechnology in India and the resistance to its commercial application (e.g., the demonstrations of farmers' groups, public relations campaigns by NGOs) reflect actors' capabilities, efforts, and struggles both to apply their own values, norms and cultures when making societal decisions about *Bt* cotton, and to bring about revisions in societal values and norms different from their own.

The conceptual scheme used for this dissertation encompasses four major groups of social actors:

- 1. social actors in civil society (e.g., NGOs, farmers' groups)
- 2. industries and commercial organizations
- 3. government
- 4. scientists (whether situated in the public research system, the private sector or civil society)

For the present chapter, I did not include mass media as an active participant in the discourse. I acknowledge that the media are hardly neutral observers. Journalists decide both what to report and how to report it (Nelkin 1987). They have to decide which points of view will be presented and which ignored (Stocking 1999). However, for the purposes of this chapter, I only examine reports on various actors as presented by the press to the exclusion of opinions of the journalists writing the articles. I assume that although a particular mass media actor may support a particular stance on an issue, the press as a whole is broad enough in scope that no particular view is likely to be systematically unreported (Gamson 1992).

## Frames

The processes of interpretation involve "frames" that give meaning to issues and provide bases for making sense of complex issues involving agrifood biotechnology. Interpretive processes of an issue or an object involve a cognitive schema that helps actors understand complex and ongoing events unfolding in front of them. Through such organization of complex and dynamic social phenomena, actors generate ideas and opinions about an object. What is important and relevant for this dissertation is the idea that framing processes involve the subjective engagement of individuals, and that individuals have the ability to gain or maintain interpretive control over an issue or object through the strategic use of frames. In some cases, a frame embracing certain values and norms becomes a basis for identifying allies and opponents in the disputes. In other cases, it serves as a template for collective actions of allies (Gamson and Modigliani 1989). Frames, therefore, can be strategically used by activists to mobilize potential allies or to demobilize opponents (Snow and Benford 1988).

For example, some scientists, journalists, and actors in civil society portray *Bt* cotton as the *Gene Revolution*, trying to associate the new technology with the alleged success of the Green Revolution. Some of the farmers' groups and NGOs, on the other hand, deny this characterization and suggest that the new technology will lead to domination by foreign corporations through the loss

of indigenous agriculture and a return to colonialism. Broadly stated, there are two kinds of strategies actors use involving frames. First, while staying within the same frame an actor tries to counter the claims of other actors. This can be done in two different ways. First, one may simply challenge the facts claimed by other actors; for example, within the environmental benefit frame there is disagreement about whether or not the application of *Bt* cotton in the U.S. has led to reduced pesticide use. Second, actors may put forward alternative claims; for example, still within the environmental benefit frame, actors may respond to the claims of reduced pesticide use with the claim that the integrated pest management approach will be better for the environment than using transgenic plants. Alternatively, one may try to shift the discourse from the initial frame to a completely different one; for example, one may respond to the claim which suggests economic benefits of *Bt* cotton with the claim that the application of *Bt* cotton of *Bt* cotton of *Bt* cotton is contrary to the laws of nature.

To influence policy processes, to set the policy agenda (Dearing and Rogers 1996), or to steer the situation in the direction that they envision (Benford and Snow 2000), actors resort to purposeful action. Actors enroll or enlist other actors to gain support for their interpretations (Callon 1986). Once claims are supported by other actors, these claims become recognized as facts – shared understandings of reality (Latour 1987). Actors then forge alliances with others to mobilize larger pools of resources so as to have the power to bring about particular social, political and economic outcomes (Long and Long 1992; Zald 1996).

### Methods

The methods to be used for this project stem from the theoretical perspective that social life consists of processes of communication and interpretation (Blumer 1969; Schutz 1972). This perspective views social scientific analysis and understanding as grounded in the empirical observation of social processes of communication and interpretation by actors. Using an ethnographic content analysis approach (Altheide 1996), data were coded and analytic categories generated from the data in an attempt to represent actors' interpretations.

Data used for this paper came primarily from English-language Indian newspapers collected through Lexis-Nexis, an online database of leading newspapers and other information sources from around the world. I selected *Bt cotton* and *India* as key concepts to examine and added *field trials* and *terminator technology*<sup>3</sup> because these two themes have played significant roles in the agribiotechnology discourse in India. Keyword searches for those terms yielded 390 articles from 1992 through December 2002. I supplemented these data with exploratory interviews (Douglas 1985) with actors whose names appeared in the newspaper articles so as to draw out more stories about their publicized claims.

Newspaper articles do not reflect the perceptions of the entire population of India. Rather, they indicate what the educated strata have been exposed to, what they have been expressing and experiencing, and their interpretations of

<sup>&</sup>lt;sup>3</sup> When inserted in plants, the terminator gene blocks the production of fertile seed. Use of the gene provides seed producers security against unauthorized use of new plant varieties. Critics say the terminator gene would compel farmers to purchase seed from patent holders who own the rights to new crop varieties.

how other social groups might perceive transgenic seeds. At the same time, as noted above, the educated strata are not unitary and homogeneous but are characterized by great diversity in ideology, class position, material conditions, and interests. In some cases, the diversity among the intelligentsia is based upon the diversity in other groups in society; for example, urban professionals may be hired spokespersons for peasant farmers or may claim to be spokespersons for rural women. Thus, I expect to see ranges of interpretations within the "elite" discourse, which is significant in understanding the totality of Indian agrifood biotechnology discourse and in carrying out comparative studies.

There are other types of sources which could have been used for analysis, e.g., Hindi-language national newspapers, local-language newspapers, national news magazines, local-language news magazines, specialized science magazines, or farm magazines. In addition, other types of analysis could have been conducted, for instance, focusing on the ways in which issues are selected, or focusing on sections where articles have appeared. No matter how comprehensive the sources of data or the selected methods, the narrative in any analysis is selective in some way. Therefore, I contend that the Englishlanguage Indian national newspapers provide legitimate data as long as we are aware that the story appearing in our account is not the only narrative. There are other stories which have been told.

Since this paper uses dynamically changing records from documentary analysis, interviews, and observations, software for qualitative research (NVivo) was used for keeping records and systematic retrieval of stored data. This

allowed linking one part of the data with any other part to identify the logic actors used to interpret observed social phenomena.

# **Findings**

## Bt cotton in the Mass Media

I will first present an overview of the mass media discourse on *Bt* cotton and then discuss actors and their claims in more detail. English-language Indian newspapers began to cover issues surrounding *Bt* cotton in 1992. As shown in Figure 2-1, a database search found two articles published in 1992 but no articles for several years after that. The first transgenic plant experiments in India, noted in the figure, used transgenic rape seed containing the gene constructs *Barnase* and *Barstar*<sup>4</sup> in a contained field and controlled environment in 1995 (Rai *et al.* 2000). However, there were no occasions for any major discussion in the mass media for several years. In 1998, 25 articles appeared, and since then the number of articles has risen steadily.

<sup>&</sup>lt;sup>4</sup> These genes were inserted into the vector construct for the purpose of pollination control.



Figure 2-1. Number of Relevant Articles Appearing in the Newspapers

In the early years, the Indian government was the only actor whose comments on *Bt* technology were reported in the newspaper articles. *Bt* cotton was portrayed as a harmless agricultural technology which would contribute to the agricultural sector and have a positive impact on cotton farming. Genetic engineering was framed as a tool to better manage the production processes:

India will have to pay about 4m dollars to Monsanto to get the gene transfer knowhow, which will be India's first import of technology for genetic engineering to create improved plant species. Incorporation of the *Bt* genes into major varieties of cotton will help cut down by half the use of insecticides and save cotton worth 5-10bn rupees [*approximately 100m to 200m U.S. dollars*] annually, the DBT [*Department of Biotechnology*] said in a report. (*BBC Summary of World Broadcasts*, October 14,1992)

By the end of 1998, uncritical acceptance of Bt technology had

disappeared and the issue had become highly controversial and contentious.

Many of the claims appearing in the newspapers were not related to technical or scientific aspects of *Bt* cotton. They were about the social impact upon the everyday life of farmers, concerns about the increasing presence of multinational corporations, and concerns deriving from the public's mistrust of public authorities and government agencies. Claims also emanated from concerns about the stagnating cotton yields, loss of competitiveness in the global cotton market, lagging behind in the agricultural revolution, and concerns about the future food supply. These morally, politically and economically-charged concerns became a significant element in news stories reporting *Bt* cotton.

# **Claims and Frames**

Broadly stated, actors anchored their claims in five frames: (1) science and technology, (2) the social, (3) governance, (4) economy, and (5) ecology. The scientific and technological frame includes claims such as those related to the latest scientific breakthrough, methods used for introducing *Bt* genes into local varieties, explanations about traits, and the impact of *Bt* on the environment and human health. The frame of the social encompasses wide-ranging aspects of biotechnology, and includes issues related to decision-making processes, the public's participation in rule-making and enforcing processes, the compatibility of *Bt* technology with Indian farming, the food security of India, the domination of Indian agriculture by multinational corporations, and the widening gaps between large and small land holding farmers.

Governance refers to any kind of regime which governs the *Bt* cotton commodity chain. This could include claims related to guidelines for field trials of GMOs, policies governing the agricultural sector, national or international laws governing technology transfer, an international regime for biosafety, or institutional arrangements for monitoring varying stages of research, development and application of transgenic seeds.

The frames of economy and ecology are more self-explanatory. The economy frame is related to such statistical information as the acreage of land planted with GMOs, yield increase after the introduction of *Bt* cotton, a decrease in production costs, the retail prices of transgenic cotton seed, and projected demand for transgenic seeds. Frames regarding ecology are mostly related to the environmental impacts of *Bt* cotton such as the possibility of the development of insect pest resistance to *Bt*, a reduction of environmental stress following reduced use of pesticides, the possibility of gene flow from transgenic to other plants, and the long-term impact of *Bt* on soil processes and biota.

A review of the 390 articles indicates that the discourse concerning agrifood biotechnology in India revolved mostly around issues within the frames of governance and society instead of issues hinging on the economic and ecological implications of agrifood biotechnology. Though these numbers alone do not tell the whole story, they give some picture of what occupied the minds of the people who were evaluating this new agricultural technology. As Table 2-1 shows, claims concerning governance constituted 33 percent of all claims, while those concerning society accounted for 23 percent. Claims concerning economy

and ecology were much lower, constituting 14 percent and 11 percent, respectively. Claims on science and technology accounted for 19 percent of the claims. These data suggest that actors whose claims were reported in Englishlanguage Indian newspapers were less concerned with the material implications of technology, such as how the technology would facilitate the development of the agricultural sector (economy) and the ecological impacts of *Bt* technology (ecology), and more concerned with either specific working of guidelines (governance) or generalized moral concerns (society). Unlike the discourse of social problems, for which much of its rhetoric derives solely from moral concerns (Best 1990), the discourse of agrifood biotechnology base its arguments on political, as well as moral, aspects of society.

Quarter	Governance	Society	S&T	Economy	Ecology
1st 1992	0	0	1	0	0
4 <sup>th</sup>	0	0	0	1	0
1st 1998	0	0	2	0	0
4th	29	19	13	3	7
1st 1999	22	15	9	5	10
2nd	6	0	7	5	0
3 <sup>rd</sup>	0	8	6	3	0
4 <sup>th</sup>	7	0	0	6	0
1st 2000	8	7	7	3	4
2nd	20	12	8	5	8
3rd	22	16	23	7	4
4th	7	8	5	7	0
1st 2001	13	14	13	5	7
2nd	13	8	8	6	7
3 <sup>rd</sup>	24	20	7	10	8
4 <sup>th</sup>	0	5	0	0	0
1st 2002	25	10	5	3	11
2nd	8	15	5	3	4
3 <sup>rd</sup>	42	29	23	42	15
4 <sup>th</sup>	15	2	8	2	0
Total (n)	261	188	150	116	85

Table 2-1. Number of Claims by Frames<sup>5</sup>

An analysis of Table 2-2 suggests that while the correlation of claims among all of the frames are high, the correlation of claims between the frames of governance and ecology, and that between governance and society, are relatively higher than the others. This indicates that mass media tend to include discussion about ecological issues when covering issues concerning governance, and that they also tend to discuss moral aspects of *Bt* cotton in relation to issues of governance.

<sup>&</sup>lt;sup>5</sup> Times not reported did not have any articles.

	Governance	Society	S&T	Economy	Ecology
Governance	1				
Society	0.85	1			
S&T	0.72	0.75	1		
Economy	0.66	0.65	0.61	1	
Ecology	0.89	0.78	0.56	0.51	1

Table 2-2. Correlation of Frames

Focusing on the period from 1998 to 2002, the remaining section of this chapter elaborates on actors participating in the discourse and the issues addressed in their claims. The data indicate that the four conceptually-identified actors are by no means mutually exclusive. On the contrary, these categories overlap. For instance, there were cases in which a scientist was an advocate for a NGO as well as cases in which a scientist worked for a government agency or for an industry. There were other instances in which representatives of NGOs, farmers' unions and industry employees served as members of government committees. Even though these are not absolute boundaries, the four categories do represent distinct coordinates of actors useful for exploring discourse about *Bt* cotton in India.

I will analyze these data by first briefly describing the number of claims made by each group. Using these categories, we see tremendous differences in the frequencies of claims made by each group. Actors in government made the most claims (276), followed by industrialists (197), and then scientists (127). The voices of actors in civil society were quieter (95). Finally, I will link actors with issues within each frame.

Table 2-3 shows the proportion of claims in each of the five frames made by each of the four groups of actors. The data indicate that actors in government and industries were more concerned with issues in the frame of governance than with issues in other frames, while actors in civil society were more concerned with issues concerning society than with other frames. The claims of scientists tended to be relatively equally divided among the five frames. Actors in government have a higher proportion of claims in the frame of science and technology than actors in civil society and industries. I will now discuss the claimsmaking of each actor group in more detail.

Table 2-3. Proportion of Claims within the Five Frames by Social Actors (%)

	Govern	Society	S&T	Econ	Ecology	(n)
Civil Society	32.0	54.7	1.9	5.7	5.7	95
Government	40.8	25.2	14.6	12.6	5.0	276
Industries	61.7	28.0	6.3	4.0	0.0	197
Scientists	22.5	25.4	22.5	15.5	14.1	127

### Government

Actors in government predominated in agrifood biotechnology discourse appearing in newspaper articles. As described in the previous section, government officials made more than three times as many claims in newspapers as did actors in civil society (261 as opposed to 95). The preponderance of claims by government actors could be simply due to the overwhelming number of such actors representing government ministries involved in research and development on transgenics (i.e., the Department of Biotechnology, the Ministry of Science and Technology, the Ministry of Environment and Forests, the Ministry of Agriculture, Indian Council of Agricultural Research), public research institutes specializing in research and development of cotton (i.e., Central Institute for Research on Cotton Technology, Technology Mission on Cotton Cell), the parts of government involved in processing applications for permission for trials and commercialization of transgenics (i.e., Genetically Engineered Approval Committee, the state governments), people in judicial organizations, and parliament members. At the same time, two other factors may be involved. First, government actors took on roles as innovators with respect to agrifood biotechnology; in these roles, they were proactive in generating favorable publicity for the new technology. Actors such as spokespersons representing the Department of Biotechnology, the Ministry of Agriculture and state government officials sought interpretive control over the public's views of *Bt* cotton through a range of public relations activities including holding press conferences, organizing seminars and workshops across metropolitan areas, and issuing reports on transgenic crops to disseminate their views on the benefits of adopting transgenic crops. They sought to build public confidence in the technology by presenting themselves as credible speakers and as competent authorities to deal with controversial events, should such problems arise.

Second, government agencies and officials might have used the *Bt* cotton controversy as a vehicle for advancing their organizational and personal interests (Gunter and Harris 1998). For instance, actors working for the Department of Biotechnology would be expected to promote modern biotechnologies to fulfill their role within an organization. Since a favorable newspaper report about *Bt* cotton would help build the credibility of an organization, that might lead to a

future promotion or might at least lead to a situation where that particular person would be viewed as a competent individual. This is not to argue that civil society organizations do not do the same, but I would suggest that, in the case of agribiotechnology in India, earlier and greater awareness of the new technology enabled government actors to be more proactive in instigating and stimulating discourse for their own benefit. Two articles appearing in 1992, covering the press announcement by the DBT, demonstrate such attempts by government actors to take a proactive role in shaping the image of *Bt* cotton so as to steer the discourse in ways which enabled them to advance their own agenda.

Despite the larger number of claims, and the large number of claimants, overall claims by social actors in government tended to concentrate on issues of governance; more than 40 percent of the claims by government actors were about the governance frame related to the field trial methods, the laws that regulate research and development of transgenics, the institutional arrangements for monitoring processes of field trials and the screening of results, or the policies that govern issues pertaining to agriculture (cf. Table 2-2). The majority of these claims portray agrifood biotechnology issues as factual and easily identifiable, explained either by science, statistics or a description of the content of laws and regulations. The example below is part of an article written by the state government official of Andhra Pradesh that appeared in *The Hindu*, about how the politics and bureaucracy of the central government will mislead India. The official grounds his discussion in the *Bt* cotton controversy involving terminator

technology. As the example below shows, the article is analytical, though never going beyond the themes within the frame of governance:

In India, ministerial responsibility is clearly truncated as the field trials have been authorised under the Environment Protection Act by the Department of Biotechnology (DBT) which is concerned with the biosafety, not the agronomy, of the crop. Both these aspects are integrally related and, after all, the farmer, the seed and the crop are one. (*The Hindu*, February 28, 1999)

Societal issues in the claims of actors in government constituted the second largest among all the claims that they made. For example, a government actor emphasized the ethical aspects of the protracted decision-making by saying, "I cannot understand why farmers in this country have so far been denied legal access to *Bt* cotton" (*Inter Press Service*, March 18, 2002). Other claims attached to this frame include critiques of how media had sensationalized the issue, leading to negative images of *Bt* cotton (*Business Line*, December 24, 1998).

#### **Civil Society**

In other analyses, the voices of civil society tend to constitute a small fraction of the total discourse (Dryzek 1997). However, claims by actors in civil society regarding the *Bt* cotton controversy, have appeared constantly since the beginning of 1998, indicating their significant role in the birth of the controversy surrounding Indian agrifood biotechnology, despite the appearance of only a few people in newspapers. The majority of the civil society actors who have made comments on biotechnology have been vocal in other, past protests in India such as those against the globalization of agriculture or against the launching of

American food franchises. Through their experience they have built up the expertise to deal with the mass media and equipped themselves with strategies to advance their ideas using these tools (Nelkin 1987).

For example, by saying, "[*Monsanto*] is evolving technologies which ecologically threaten agriculture and make farmers totally dependent on Monsanto. This is not just the case with Terminator. It is also the case with 'Bollgard' cotton and Roundup Ready Crops" (*The Hindu*, December 26, 1998), a claimsmaker seemed to have succeeded in creating the impression that Monsanto is actually undertaking field trials of terminator technology. Indeed, in my preliminary fieldwork locating cotton growers, some farmers expressed concern whether *Bt* cotton seeds would incorporate terminator genes. The claim does not state that Monsanto is undertaking field trials of the terminator gene; however, using the words *Monsanto*, *Terminator*, and *Bollgard* in one statement creates the impression that the terminator technology is related to *Bt* cotton field trials.

Another reason civil society actors, particularly farmer groups, have been influential in the debates is that they have resorted to dramatic actions which were considered newsworthy. Though their claims did not appear in the news as much as the claims of policy makers and industrialists, their protests and demonstrations were covered in the news. In addition to indirect strategies such as electing members of the parliament to represent their interests, farmers' groups have chosen to resort to direct action as a means of informing the public about their views and of influencing public opinion and government decisions.

Some groups have engaged in acts of sabotage at the *Bt* cotton field trial sites in expressing their objections to the government's decision to allow open field trials of *Bt* cotton. One group has practiced civil disobedience, encouraging cotton growers to deliberately break the law by not obeying India's biosafety regulations.

In fact, the concept of civil disobedience connotes actions liberating India from colonialist rule, a tactic used by Mahatma Gandhi. This implies that individuals or groups resorting to such acts are going through great suffering for the well-being of the masses. Thus, if this strategy is used with the right timing and context, it creates solidarity and draws support from the public.

For actors in civil society, it was important to manage and manipulate the thinking of the public while *Bt* cotton was still being tested, when the public was not informed so much about GE crops and lacked clear views and positions toward *Bt* cotton.

For actors in civil society who opposed the technology, *Bt* cotton was associated with food and biosafety concerns, concerns about the Indian market being dominated by multinational corporations, lack of public participation in the decision-making processes, the erosion of farmers' right to choose, and the effectiveness of the regulatory framework. By contrast, for actors who supported the commercialization of *Bt* cotton, the major concerns were the right of the farmers to get access to the latest technology and the misrepresentation of farmers' needs by other actors in civil society.

Further, until the middle of 2001, when the Indian government (a representative of the GEAC) announced their decision to require Mahyco-

Monsanto to conduct another year of the open field trial, the claims of actors in civil society that appeared in newspaper articles were almost always against the commercial introduction of the technology. Up to that point, these actors had been successful in fostering an image of *Bt* cotton as having socioeconomic and ecological risks harmful to Indian society. However, after the announcement, these voices began to fragment. Some, who had been vocal from the outset of the controversy, maintained strong opposition against the commercial introduction of the new technology, while new voices supportive of the new technology began to be heard. When a negative portrayal of *Bt* cotton did not succeed in influencing government's plans, some actors in civil society attempted to appeal to the emotions of the public. An emotive comment by an anti-genetic engineering campaigner for Greenpeace India appeared in *The Hindu* after the government's announcement of their intention to continue field trials:

"Lack of transparency has been the fundamental issue right from the start of the Monsanto *Bt* Cotton issue. The non-transparent processes have increased suspicion and misgivings. We appreciated the holding of today's dialogue but were shocked to see the sure introduction of *Bt* Cotton..." Ms. Michelle Chawla of Greenpeace told *The Hindu* after the meeting. (*The Hindu*, June 19, 2001)

Voices of supporters, representing farmers became more prominent in

newspapers.

According to Mr P. Chengal Reddy, President of the Andhra Pradeshbased Federation of Farmers Associations, farmers were being denied their rights to experiment with new crops and seeds as the bureaucracy and advocacy groups prevented research from petering down to the farmers. He told *Business Line* that farmers should be allowed to decide what is good for them, rather than have 'urbanized' advocacy groups and lobbies to decide on what is good for them. (*Business Line*, 21 July 2001) Along with these short comments supporting the introduction of GM crops, commentaries on GMOs, written by the leader of the Kisan Coordination Committee, Sharad Joshi, appeared in *Business Line* (May 22, 2002; June 19, 2002; December 4, 2002). He made a strong case by not only couching GMO issues within the ideology of a free market economy but by re-establishing himself as a real voice of farmers.

As *Bt* cotton came closer to being introduced, multiple voices began to be heard in various public spheres, with a wave of oppositional perspectives giving way to more pragmatic interpretations of technology.

# Industries

Until *Bt* cotton was approved by the government, social actors in industry were a monolithic group both in the sense that they represented only three firms in India, and in that industry actors who appeared in the articles tended to make similar points using similar types of reasoning. Spokespersons for these three firms together made 162 claims. As noted above, actors in industries seemed to have been most concerned with issues of governance. It is interesting to note that these actors, the primary promoters of the technology, appeared less willing to promote the technology by discussing substantive issues of *Bt* cotton such as its economic benefits or its ecological benefits (cf. Table 2-3). Rather, they based their position on issues of governance, stressing the legitimacy of their actions. However, since March of 2002, spokespersons representing other firms, such as those involved in research on other GM crops such as GM mustard and

those firms planning to develop other varieties of *Bt* cotton, have begun to make explicit comments promoting the technology. Earlier emphasis on issues such as how scientific the methods of their field trials were and how they had not violated government rules, and how they had met all the statutory requirements, shifted towards specifics such as how *Bt* seeds would be marketed in various cotton growing states and the volume of seeds distributed for the 2002 cotton growing season.

In considering why the majority of industry claims were narrowly focused on points within governance rather than on promoting *Bt* cotton until it was approved, it may be helpful to contexualize the development of *Bt* cotton. Indian experiences of agricultural development such as the Green Revolution (Leaf 1983) and of developments in science and technology such as in the computer industry (Grieco 1974) suggest that it has always been the state which determined and negotiated the type of science and technology to be imported, and the type of research and development to be undertaken in India. Given these prominent roles that the state has played in introducing technologies in the past, for industries it makes sense to work closely with the government in promoting technologies rather than engaging in independent public relations programs.

Another reason for industrialists portraying themselves as subordinate to the government in promoting GE crops concerns the stigma placed on *Bt* cotton by farmers' demonstrations in the state of Karnataka. Once the crop is stigmatized as a controversial technology, it becomes wise to stay away from

claims which will relate industries directly to a technology, and let the government take the leading role in managing, negotiating and resolving problems arising from *Bt* cotton, to avoid having their corporate image stigmatized.

# Scientists

Social actors coded as scientists differ from the other groups described above. This group includes scientists working for public organizations, for the private sector, and people with science backgrounds who represent the NGOs. In situations where officials representing the government (e.g., the Department of Biotechnology) made comments citing their science backgrounds, they were coded as both scientist and government. Together, these three groups of scientists made 127 claims. Because of the range of positions held and organizations worked for, scientists' views vary across the GMO debate. This diversity may also account for the fairly equal distribution of claims across the five frames, with issues linked to the economy and ecology appearing slightly less frequently than others (cf. Table 2-3).

This also points to the phenomenon of scientific uncertainties of *Bt* cotton opening up broader social debates. As a result, the conventional division of labor between scientists and policymakers is no longer valid. Instead, individuals are expected to play multiple roles. Studies of scientists and policy-making in the U.S. suggest that science is becoming more and more integrated with society through scientists being asked to act as legitimators of government policies and regulations (Jasanoff 1990; Salter *et al.* 1988). Claims appearing in Indian

newspapers also suggest that scientists are being asked to participate in policy processes and politics involved in such processes.

A further point is that many vocal actors in the Indian public sphere, in government, and in the non-government sector have science degrees. A major difference between the U.S. and Indian situations is that while in the U.S. there is a clear division of labor between policy makers and scientists, where separate individuals make claims on policy and science, in India the same individuals make claims in both areas. In describing and discussing government policies or in expressing objections to government decisions, vocal actors brought in various scientific "facts" such as gene-flow, pollen drift, and better insect control to argue for their positions or against the positions of others. Having extensive scientific knowledge about Bt cotton, and being well-connected to government offices or the community of NGOs, these vocal actors, protagonists or antagonists, have tremendous power to influence public opinion. Like scientists in other studies (Friedman et al. 1999; Nelkin 1987), actors with science backgrounds who work in policy-making or for NGOs stand in a unique position where they can make use of scientific disagreements in speaking for their positions and against their opponents.

## **Disengagement of Discussion**

I will further examine the frame of governance so as to learn how actors in India interacted with each other in their negotiations for interpretive control of *Bt* cotton. Among various issues tied to governance, actors emphasized the issues

surrounding permission for the commercial introduction of the technology, and the institutional arrangements for monitoring the biosafety and food safety aspects of transgenic crops. On both of these fronts, the emphasis made by actors in government was on the existence of elaborate and institutionalized procedures that screened and regulated the various stages of research into and application of agrifood biotechnology. Government actors also emphasized the existence and availability of scientific and technological expertise within the nation, cited as a reason existing institutions would function well. The quality of current institutional arrangements and the quality of their functioning were rarely a subject of discussion. Actors in government attempted to influence the discourse by claiming that the existence of elaborate institutional procedures would take care of the safety concerns surrounding GMOs:

Allaying fears on the safety aspects of transgenic testing, Dr. Manju Sharma said a three-tier mechanism had been evolved in the country to ensure that the safety aspects of genetically modified organisms were fully taken care of...Dr. Sharma said the guidelines for the testing of transgenic plants had adequate safeguards and monitoring mechanisms built into them. (*Business Line*, January 14, 1999)

As noted above, claims by actors in industry echoed claims by those in government. They too emphasized the existence of the system, not the quality of its functioning. Industrialists frequently mentioned the clear division of labor among concerned government ministries and departments (the Union Ministry of Environment and Forest, the Department of Biotechnology, the Union Ministry of Agriculture) and the presence of clearly defined procedures for getting approval
based on the results of field trials.<sup>6</sup> In addition to following the lead of government actors, industry actors also emphasized that their field trials followed the rules, that their activities did not violate any rules or statutory requirements, and that the processes had been transparent:

The limited field trials for Bollgard<sup>TM</sup> (*Bt*) Cotton in India are being conducted...with necessary statutory approval from the Indian regulatory authorities at every stage and with total transparency...There is therefore no question of 'secrecy,' as you have observed. (*The Statesman*, December 31, 1998)

Along with this emphasis, another recurring theme of actors in industry

was the strong belief in modern science. Without touching upon the existence of

various scientific factions that dispute the benefits and costs of Bt cotton, actors

in industries asserted that the present governing system was trustworthy

because it relied on scientific data. These actors emphasized the authority of

science over trust in other forms of knowledge.

The problem is as long as the technology in this case is science based, in other words, as long as everything is involved in this is science and gone [*sic*] in a scientific way and the risk is assessed, and the cost benefit ratio is established, then I think the technology can always be tried positively. But before looking into it, there are lots of fears of unknown and many times, they are most unscientific...India has a lot of competence, scientific at the molecular level and all that. (Interview with an actor in industry)

These seeds have been fully tested for toxicity, environmental impact and agronomic characteristics. These experiments have been conducted in India and abroad, the results of which have been thoroughly examined by the Indian scientific community. Never in the history of agriculture have

<sup>&</sup>lt;sup>6</sup> Transparency is often explained through the extensive description of a three-tier system (the Institutional Biosafety Committee, the Review Committee on Genetic Manipulation and the Genetic Engineering Approval Committee), whose assigned roles include reviewing ongoing research and development of agrifood biotechnology, monitoring experimental facilities, devising policies for research and development in rDNA research, formulating safety guidelines for research, and tailoring the biosafety program for risk assessment and others. Numerous articles summarize the *1989 Rules for The Manufacture, Use/Import/Export and Storage of Hazardous Micro Organisms/Genetically Engineered Organisms or Cells* (Barwale 2001; Ghosh and Ramanaiah 2000; Ghosh 2001; Rai and Prasanna 2000; Rhoe *et al.* 2002).

plants been subjected to such exhaustive testing... In the last analysis, this is a debate about the benefits of plant biotechnology and you will agree that this has to be decided not by a mob on petrol-soaked fields, but by India's regulatory authorities on the basis of scientific data and analysis. Those with reservations about plant biotechnology should be making their point by force of evidence and argument, not by fire and slogan-shouting. (*The Statesman*, December 31, 1998)

In contrast to the actors in government and industry, actors in civil society chose to emphasize how the existing system functions. They did not disagree that an elaborate governing system exists; the issue for them was how the system was implemented. In the case of *Bt* cotton, the point contested by actors in civil society was the claim that the permission for undertaking a large-scale field trail was granted to Monsanto by a committee which did not have the authority to grant that permission. Their reading of the rDNA safety guidelines was that, "Field experiments need to be cleared by the Genetic Engineering Approval Committee since they take place in the open environment and their risks are not contained...the moment trials are conducted on the open environment, the GEAC governed by the ministry of environment and forests becomes active under the Environmental Protection Act 1986" (Shiva *et al.* 1999: 606). Based on this reading of the regulation, they concluded that the permission granted to Monsanto was illegal.

Within the frame of governance, another point of contention was the process for monitoring and controlling the field tests, and, therefore, the validity of the results of the field tests. An interviewee pointed out that the sowing of cotton for the field trial was done two months later than usual for traditional cotton varieties. That means, according to an interviewee's interpretation, that the

reports coming out of the field trials understated the level of insect attack. The apparent decrease in insect damage was said to be due to the fact that the cotton was planted two months late; therefore research results could be due to reduced pest loads and not to the benefits brought by the *Bt* gene.

Last year, the data, which Monsanto provided, the department of biotechnology is very happy. How can you have a normal data from a crop, which was sown two months later...it is not on sound science, you know. And I thought as a scientist myself, what we are talking today is sound science, a debate on the scientific principles, not this kind of maneuvering...You see, the crop has to be sown at a particular point of time. Yah? If you sow the crop two months late, you escape the attack of the insect first of all. Yes, and in the end result when you say that you know, oh, the insect attack was very less, the insect was not there. (Interview with an actor in civil society)

The content of the claims here suggest that actors talked past each other.

Social actors in government emphasized India's elaborate existing institutional arrangements. In contrast, actors in civil society emphasized the importance of how the system functions. Claims made by these actors were meant to convey their views and positions, not to deliberate consequences of *Bt* cotton for Indian society. Claims were made to market their views and positions, not for the sake of reaching an agreement. At first glance, an increase in the number of articles over the years seems to indicate the existence of extensive and intensive discussions about *Bt* cotton reflecting a democratic political system and institutions and organizations that represent the interests of the public, when in fact actors were avoiding meaningful exchanges.

## Conclusions

The analysis of the discourse concerning *Bt* cotton points to four conclusions. First, on a general note, actors in government and industry tend to be optimistic about the benefits of Bt cotton, envisioning the positive impacts of the technology while playing down its social and moral implications. Actors in civil society, on the other hand, tend to be less tolerant of the idea of trading possible economic or ecological benefits of *Bt* cotton for social risks. Second. the number of claims put forth by civil society were far outweighed by those of the other groups, while their participation in the discourse proved very intensive and effective. In contrast, the large number of claims and extensive involvement of diverse types of actors in government indicate that they have been proactive in generating favorable publicity for the new technology. Also in contrast. claimsmaking by actors in industry seems very passive. Third, the scientist aroups consisted of various types of social actors. In the discourse concerning Bt cotton in India, the roles of scientists intermingled with the roles of policymakers, industrialists, and activists.

Finally and perhaps most significantly, actors in government and industries expressed trust in the arrangements regarding the governing of biotechnology, while actors in civil society pointed out problems with the functioning of the relevant governing bodies. A disagreement as to the problems involving GMOs, and a lack of will to engage in meaningful deliberation of the technology are undesirable if India truly would like to explore a unique approach which does not follow developed countries but is well adapted to Indian society.

# References

- Altheide, David L. 1996. *Qualitative Media Analysis*. Thousand Oaks: Sage Publications.
- Benford, Robert D., and David A Snow. 2000. "Framing Processes and Social Movements: An Overview and Assessment." Annual Review of Sociology 26: 611-639.
- Best, Joel. 1990. Threatened Children: Rhetoric and Concern about Child-Victims. Chicago: University of Chicago Press.
- —. 1995. Images of Issues: Typifying Contemporary Social Problems. NY: Aldine de Gruyter.
- Blumer, Herbert. 1969. Symbolic Interactionism: Perspective and Method. Englewood Cliffs: Prentice Hall.
- Callon, Michel. 1986. "Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St Brieux Bay." In *Power, Action and Belief: A New Sociology of Knowledge?*, edited by J. Law. London: Routledge & Keagan Paul.
- CCI. 2000. "Indian Cotton: A Profile." Mumbai: The Cotton Corporation of India.
- Dearing, James W., and Everett M. Rogers. 1996. *Agenda-setting*. Thousand Oaks: Sage Publications.

Douglas, Jack D. 1985. Creative Interviewing. Beverly Hills: Sage Publications.

- Dryzek, John S. 1997. *The Politics of the Earth: Environmental Discourses*. Oxford: Oxford University Press.
- Friedman, Sharon M., Sharon Dunwoody, and Carol L. Rogers. 1999. Communicating Uncertainty: Media Coverage of New and Controversial Science. Mahwah, NJ: L. Erlbaum Associates.

Gamson, William A. 1992. Talking Politics. NY: Cambridge University Press.

- —. 1993. "Movements and Media as Interacting Systems." American Academy of Political Social Science: 114-25.
- Gamson, William A., and Andre Modigliani. 1989. "Media Discourse and Public Opinion on Nuclear Power: A Constructionist Approach." *American Journal of Sociology* 95: 1-37.

- Grieco, Joseph M. 1974. "Between Dependency and Autonomy: India's Experience with the International Computer Industry." In *Multinational Corporations and the Politics of Dependence: Copper in Chile*, edited by T. H. Moran. Princeton: Princeton University Press.
- Gunter, Valerie J, and Craig K. Harris. 1998. "Noisy Winter: The DDT Controversy in the Years before Silent Spring." *Rural Sociology* 63: 179-198.
- Hajer, Maarten A. 1995. The Politics of Environmental Discourse: Ecological Modernization and the Policy Process. Oxford: Clarendon Press.
- ISCI. 1999. "Handbook of Cotton in India." Mumbai: Indian Society for Cotton Improvement.
- Jasanoff, Sheila. 1990. *The Fifth Branch: Science Advisers as Policymakers*. Cambridge, MA: Harvard University Press.
- Kitsuse, John, and Malcolm Spector. 1973. "Toward a Sociology of Social Problems." *Social Problems* 20: 407-441.
- Latour, Bruno. 1987. Science in Action: How to Follow Scientists and Engineers through Society. Cambridge, MA: Harvard University Press.
- Latour, Bruno, and Steve Woolgar. 1979. Laboratory Life: the Social Construction of Scientific Facts. Beverly Hills: Sage Publications.
- Leaf, M.J. 1983. "The Green Revolution and Cultural Change in a Punjab Village, 1965-1978." *Economic Development and Cultural Change* 31: 227-270.
- Litfin, Karen T. 1994. Ozone Discourses: Science and Politics in Global Environmental Cooperation. NY: Columbia University Press.
- Long, Norman, and Ann Long (Eds.). 1992. Battlefields of Knowledge: The Interlocking of Theory and Practice in Social Research and Development. London: Routledge.
- Nanda, Meera. 1999. "Who Needs Post-development? Discourses of Difference, Green Revolution and Agrarian Populism in India." *Journal of Developing Societies* 15: 5-31.
- Nelkin, Dorothy. 1987. Selling Science: How the Press Covers Science and Technology. NY: W.H. Freeman.

- Rai, Mangala, and B.M. Prasanna. 2000. "Transgenics in Agriculture." New Delhi: Indian Council of Agricultural Research.
- Salter, Liora, Edwin Levy, and William Leiss. 1988. *Mandated Science: Science and Scientists in the Making of Standards*. Boston: Kluwer Academic Publishers.
- Schutz, Alfred. 1972. *The Phenomenology of the Social World*. London: Heinemann Educational.
- Shiva, Vandana, and Ashok Emani & Afsar H Jafri. 1999. "Globalisation and Threat to Seed Security: Case of Transgenic Cotton Trials in India." *Economic and Political Weekly* 34: 601-613.
- Snow, David A, and Robert D. Benford. 1988. "Ideology, Frame Resonance, and Participant Mobilization." In *From Structure to Action: Social Movement Participation across Culture*, edited by B. Klandermas, *et al.* Greenwich: JAI.
- Stocking, S. Holly. 1999. "How Journalists Deal with Scientific Uncertainty." In Communicating Uncertainty: Media Coverage of New and Controversial Science, edited by S.M. Friedman, S. Dunwoody, and C.L. Rogers. London: Lawrence Erlbaum Associates.
- Touraine, Alain. 2000. "A Method for Studying Social Actors." *Journal of World-Systems Research* VI: 900-918.
- von Glasersfeld, E. 1991. "Knowing without Metaphysics." In *Research and Reflexibity*, edited by F. Steier. Newbury Park: Sage.
- Williams, R.H. 1995. "Constructing the Public Good: Social Movements and Cultural Resources." *Social Problems* 42(1): 124-44.

Yamaguchi, Tomiko, Craig K. Harris, and Lawrence Busch. 2003. "Agrifood Biotechnology Discourse in India." *Science, Technology & Society: An International Journal Devoted to the Developing World* 8(1): 47-72.

- Yearley, Steven. 1981. "Textual Persuasion: The Role of Social Accounting in the Construction of Scientific Argument." *Philosophy of the Social Sciences* 11: 409-435.
- Zald, Mayer N. 1996. "Culture, Ideology, and Strategic Framing." In *Comparative Perspectives on Social Movements: Political Opportunities, Mobilizing Structures, and Cultural Framings*, edited by D. McAdam, J. D. JcCarthy, and M. N. Zald. NY: Cambridge University Press.

# **CHAPTER 3**

## THE ECONOMIC HEGEMONIZATION OF BT COTTON DISCOURSE IN INDIA<sup>1</sup>

#### Introduction

This chapter explores the social discourse that led up to the approval of Bt cotton by the Genetic Engineering Approval Committee in 2002 by comparing claims and claimsmaking activities in the national and local arenas. The chapter will demonstrate how the complexity of discourse surrounding Bt cotton led government officials in the national arena to lose interpretive control of *Bt* cotton, while actors in the local arena have succeeded in influencing others through vigilant control of local discourse and coordinated claims and claimsmaking activities. Consequently, actors in government have become subjected to numerous criticisms and growing opposition to their views and activities, while actors in the local arena, most significantly farmers, have received greater support from other actors, without having been accused of unlawful practices running counter to India's biosafety regulations. After a brief historical introduction regarding cotton in Gujarat, I will outline the conceptual and methodological approach for the study. I then present findings and conclude with some suggestions about the trajectory of discourse in the future.

India's western state, Gujarat, a region of western India near the border with Pakistan, has been a cotton growing area for hundreds of years. During the

<sup>&</sup>lt;sup>1</sup> This chapter is a revision of a manuscript co-authored with Craig K. Harris, in *Discourse and Society*, 2004, 15(4): 467-491, courtesy of Sage Publications.

18<sup>th</sup> century. Guiarati farmers began to use American cotton introduced by the East India Company (Patel 1994). In the early 1970s, hybrid cotton was introduced in combination with tractorization, irrigation facilities, and credit schemes. These components of cotton growing were part of the Green Revolution, which in turn facilitated rapid socio-economic changes in the region. Over the three decades since, hybrid cotton has enabled Gujarati farmers to achieve better yields than with traditional varieties, and to receive higher prices for their cotton by being able to pick and sell cotton earlier than with the traditional varieties (Rajaram 1999). Recently, however, farmers in Gujarat have been faced with numerous problems including various pest attacks (Subramaniam et al. 2000), fluctuating prices of cotton, and increasing agricultural input expenses (Rajaram 1999). In southern Gujarat, where the fieldwork was conducted, cotton growers also face the problem of the flow of seawater into the groundwater that feeds irrigation wells, several decades of intensified agriculture having led to salinization of the soil (Bagchi 1991).

To deal with these multiple problems shared in cotton growing regions such as Gujarat, Maharashtra, Andhra Pradesh, and Karnataka, the Indian government decided to introduce *Bt* cotton – popularly known as *Zehri Kappas* (poisonous cotton) in Gujarat. In March 2002, the interministerial Genetic Engineering Approval Committee (GEAC) approved the commercial cultivation of several varieties of *Bt* cotton, developed jointly by Mahyco, the largest seed company in India, and Monsanto, the second largest seed company in the world. The decision was reached after six years of continuous testing of various

properties and effects of the genetically modified varieties. These tests were conducted to study concerns related to biosafety, agronomic performance, and socio-economic impacts, in accordance with the rDNA Safety Guidelines formulated and issued in 1990 (GOI 2002). The approval also followed six years of fairly contentious social discourse regarding the proposed introduction of Bt cotton. Over the years, actors with a range of agendas and interests have offered various views toward Bt cotton by defining problems associated with its commercialization. Some have argued that the problem the Indian cotton industry faces is productivity of cotton cultivation and expenses deriving from excessive use of synthetic pesticides (Barwale 2002), while others have claimed that the problem is the high retail price of seeds, not economically viable in the Indian context (Sahai 2002). Some argued that Bt cotton posed unacceptable risks to human and environmental health (Shiva 1999; 2002). Others responded that the safety guidelines in India would minimize such risks, rendering such concerns baseless (Ghosh 2000). Despite Prime Minister Vajpayee's advocacy of biotechnology in his published address to the National Science Congress, the public has come to view genetically modified organisms as a highly controversial technology.

#### **Conceptual Model**

In order to elucidate the complex and dynamic nature of discourse surrounding *Bt* cotton in two different arenas, I will look into these three elements:

(1) interpretations, (2) actors, and (3) the discourse process. These components enable us to understand the claims and claimsmaking activities of actors involved in maintaining, disseminating, and advocating a particular view of a new technology. Each component of the model is explained in greater detail below.

#### Interpretations

Interpretations involve the active efforts of actors in the construction of meanings of situations (von Glasersfeld 1991). When actors characterize an object or an issue, they interpret its meanings so that they readily fit the actors' needs and interests. In other words, actors have "... central organizing schemes that hold together and give coherence and give meaning to a diverse array of symbols" (Gamson et al. 1992: 384). In some cases, an organizing scheme can reflect attributes (e.g., modern/indigenous, hard/soft) of the categories (e.g., technology, law), and in other cases it can reflect the cultural backgrounds of the actors (e.g., religious, economic). It can also reflect the current local and/or global political and economic context (urban/rural, postindustrial/developing) or the longer-term historical context (imperial/colonial). When schemes that are presented in public fora contradict and compete with one another, the public sees that an object or an issue is politicized (Gamson 1992), and come to view it as controversial (Nelkin 1992). At the same time, when multiple schemes exist at one time, actors have choices to make from available schemes in accordance with their needs and interests. In the case of agrifood biotechnology in developing countries, the schemes available to actors not only pertain to the

socio-economic (Buttel and Barker 1985; DaSilva *et al.* 1992; Qaim 1998), ethical (De Greef 2001; Thompson 1997), and political (Woodhouse 1992) implications of the technology in question, but also reflect the colonial and postcolonial discourses of science and technology, agricultural development, food security, and the biophysical environment (Grove 1995; Gupta 2000). The existence of multiple interpretive schemes will, on the one hand, provide diverse choices to actors who can select them to construct a particular meaning of a particular technology in line with the actors' interests and needs, and, on the other hand, create ample opportunities for interested actors to devise strategies to influence the views of others.

# Actors

Indian society, characterized by "division and hierarchy" (Shah 1982), consists of actors with diverse norms, values, and cultures. This diversity, combined with the impacts of capitalism and industrialization, has divided actors in India into an enormous number of sub-groups in line with their socioeconomic and cultural backgrounds, their professions and positions, and their interests and agendas. In order to clarify the complex divisions and alliances of actor groups created in the discourse concerning *Bt* cotton, I will use five major categories of actors for analysis: (1) actors in civil society, (2) actors in industries and commercial organizations, (3) government officials, (4) scientists, and (5) farmers. Actors in civil society include individuals and organizations that specialize in advocacy activities related to such issues as the environment, agriculture,

population, public health and gender. These actors represent or claim to represent civic and social organizations that act for the interests of the public. Indeed, it is said that India's civil society has been playing a tremendous role, particularly since the1960s, by augmenting the government's efforts toward poverty alleviation and environmental protection. Among a range of civic organizations in India, farmers' unions are notable in having been successful in advancing farmers' needs and interests by influencing India's agricultural policies and the government's plans for rural development.

Industries and commercial organizations include seed companies and dealers, pesticide formulators and dealers, agrichemical companies, and associations of industrial or commercial organizations who perform economic activities for profit. As for the agrichemical sectors in India, considerable deregulation in foreign trade since the early 1990s has encouraged multinational agrichemical companies to come into the Indian market. Thus, the presence of products manufactured and formulated by multinational corporations have increased. In the seed sector, however, public sector organizations such as the National Seed Corporation and the State Seeds Corporation (e.g., Gujarat Seeds Corporation) have played a major role in the production and distribution of seeds in India, thus reducing the presence of multinational corporations.

The government category refers to elected officials and bureaucrats in various branches of both the central and the state governments, individuals working for organizations that maintain control of their territory in accordance with India's laws and regulations. As with many other developing countries, India's

public sector is marked by its size and the large number of administrative offices responsible for oversight. Particularly since the early 1990s, the government has come under fire for its inefficiency and red tape. Scientists are those people who are trained in biophysical science disciplines and who hold positions in the public research system, in the private sector, or in NGOs. Farmers include actors who engage in the cultivation of crops, and/or are members of farmers' unions and associations. These categories are not mutually exclusive, and fieldwork confirmed extensive overlaps between categories. For instance, the same individual could be both a scientist and an advocate for an NGO, or both a farmer and a government official.<sup>2</sup> However, these concepts are useful in more firmly examining the debates over *Bt* cotton.

# **Discourse Process**

The discourse process includes various elements of discourse such as actors, interpretations, and claimsmaking that drive discourse. It refers to the processes through which problems associated with *Bt* cotton are defined. The claimsmaking of actors may be in advocacy of a particular interpretation of a problem and/or in opposition to a specific interpretation of an issue (Cress and Snow 2000; Snow *et al.* 1986); claimsmaking may be undertaken for the purpose

<sup>&</sup>lt;sup>2</sup> For analytical purposes I wanted to separate actors into five conceptual groups. Because of the potential overlap among the categories, it was necessary to establish a hierarchical scheme for the allocation of social actors into groups. The assignment was in the following order: government, industry, farming, science and civil society.

of the enrollment of potential allies (Callon 1986) or for the demobilization of opponents (Snow and Benford 1988). Discourse related to introducing *Bt* cotton is a dynamic process involving actions and interactions of actors who use claims and claimsmaking activities strategically to influence others. Thus, such a discourse process will influence public opinion, steering social change in a particular direction. Often seemingly non-discursive processes and elements, including regulations and policies, involve discursive processes (Black 2002; Hay 1996).

This chapter uses the concept of frame as an analytical schema to understand both the problems defined by actors and the strategies used by actors. As characterized in Goffman (1986), a frame enables actors to understand an object or an issue around them; frames give different meanings to an object or an issue and help actors to organize their thoughts about, and experiences of, these things. Choices of frames often reflect values and norms of individuals and groups that individuals perceive they belong to (Touraine 2000). Therefore, people sharing similar social values and norms tend to share frames. In some cases, actors use frames strategically to maintain interpretive control of the public views toward an object or an issue. In other cases, actors use frames strategically to avoid open confrontation with others. In short, frames become not only the basis for interpreting and defining an object or an issue, but also a basis for action and interaction in maintaining relationships with others or in changing views and attitudes of others (Skillington 1997; Zald 1996). Frames enable actors to arrive at a consensus, but can become a tool for displacing and

challenging others (Benford and Snow 2000). Put succinctly, a frame, an embracing of values, norms, and interests, becomes a template for a range of views, positions and actions (Gamson and Modigliani 1989). Therefore, a single technology could be interpreted differently by using either different frames or the same frame. As discussed in Chapter 2, actors who emphasize the society frame tend to define the consequences of *Bt* cotton differently from those who consider governmental processes more relevant in defining problems. Even if actors share the same frame, for instance, governmental processes as a prime frame, they can define problems differently. Some can argue that cotton productivity is a major problem for India and view the commercial introduction of genetically engineered crops (GE crops) optimistically basing their arguments on the existence of elaborate governmental institutions. Others share a pessimistic view of GE crops on the grounds that governmental institutions are inefficient and incompetent.

#### Methods

In Gujarat many texts carry information about agriculture: specialized science magazines, farm magazines, and daily newspapers in Gujarati and other Indian languages. However, the English language dailies are the most important mass media in terms of influence upon significant actors (Jeffrey 2000). It was therefore decided to examine the major English language Indian newspapers together with two Gujarati language dailies and the major Gujarati farm newspaper as the main sources on national (India) and local (Gujarati) discourse

concerning *Bt* cotton. I excluded the Gujarati editions of English-language Indian newspapers because their contents mostly duplicate the English-language editions that were used.

Articles were collected from the major English language Indian newspapers in the Lexis-Nexis database by searching for the words *Bt cotton*, *India, terminator technology*,<sup>3</sup> and *field trials*. Articles from the three Gujarati newspapers were collected by visually searching for the same keywords and translating the relevant articles into English.<sup>4</sup> Articles were identified beginning in 1992 in the English language newspapers and coverage of *Bt* cotton was found beginning in 1999 in the Gujarati newspapers.<sup>5</sup> The keyword search in the Lexis-Nexis database found 390 articles between 1992 and 2002 in national English language Indian newspapers.

In addition, to obtain more information about the dynamics of the discourse process, in-depth interviews with 15 persons identified in the mass media coverage as significant actors, and semi-structured interviews with 15 cotton growers in south Gujarat identified by a farmer leader there as collectively

<sup>&</sup>lt;sup>3</sup> Terminator technology is a gene protection technology inserted in plants that blocks the production of fertile seeds. Use of the gene provides seed producers with security against unauthorized use of new plant varieties. Critics argue that the terminator gene would compel farmers to purchase seeds from patent holders who own the rights to new crop varieties. <sup>4</sup> In order to cross-check the accuracy of translation, two persons worked on the articles. One

person translated articles from Gujarati into English, and then a second person translated them back into Gujarati.

<sup>&</sup>lt;sup>5</sup> No article was found in the Gujarati language newspapers before 1999. As mentioned in the text, the article in 1999 features the speeches by the Prime Minister of India concerning India's policy on biotechnology. The content suggests that it is the first time issues related to biotechnology were reported in the regional language newspapers. Although no records prior to 1998 were available at the newspaper companies, consultation with the editors confirmed that there had been no articles in the Gujarati language newspapers prior to 1998.

representative of the farmers in the region were used to supplement the newspaper data. All the newspaper articles and interview transcripts were coded into categories representing elements of the discourse process – actors, actions and interactions, events, claims and frames related to the commercial introduction of *Bt* cotton. I then identified emergent concepts and categories for these elements. The concepts and categories which emerged from the analyses are discussed in detail below. A qualitative software package was used to facilitate the systematic storage and analysis of the extensive and constantly changing data and to facilitate the immediate retrieval of data in the form needed.

## Findings

# **Bt** Cotton Discourse in the National Arena

The analysis of this coverage reveals that several years before government approval of commercial distribution of any variety of *Bt* cotton, the idea of introducing transgenic seeds had stirred the hearts and minds of actors close to federal agrifood biotechnology policies. Figure 2-1 in Chapter 2 indicates that the mass media also took interest in the issues surrounding the commercial introduction of *Bt* cotton, as seen in the rise in the number of articles covering this topic. During the five-year period (1998-2002) preceding GEAC's approval of the sale of *Bt* cotton seeds, the English-language Indian newspapers covered various related episodes such as the many suicides of cotton growers in Andhra Pradesh, the protests of farmers in Karnataka against the field trials being conducted by a joint venture firm, the government's decision to ban the entry of seeds with terminator genes, and the harvesting of cotton from seeds

that had not been approved. The following sections will examine the discourse trajectories of the various individuals and organizations involved in this debate.

#### **Governance Frame**

The five conceptual frames of agrifood biotechnology used in the previous chapter have been held over to make sense of the data being used in this chapter. The five frames<sup>6</sup> include -(1) governance, (2) society, (3) science and technology, (4) economy, and (5) ecology.

As shown in Chapter 2, actors who actively participated in the national discourse and who were geographically and organizationally closer to policymaking on GMOs were most likely to use the frame of governance to identify the issues associated with the commercial introduction of *Bt* cotton; one-third of all the claims that were made concerned governance, the most commonly used frame. Actors seemed to have placed less emphasis on the issues in other frames, such as the development of insect pest resistance to *Bt* (science), the possibility of gene flow from transgenic plants to other plants (ecology), and the

<sup>&</sup>lt;sup>6</sup> To reiterate the dimensions of these frames, the frame of governance focuses on the regime that governs the research, development, production and distribution of *Bt* cotton seeds and *Bt* cotton. The frame of society includes moral and ethical concerns related to *Bt* cotton, as well as claims about decision-making processes, democratic participation in rule-making, and the compatibility of agrifood biotechnology with Indian farming. The frame of science and technology includes such topics as the methods utilized to develop *Bt* cotton, the scientific description of *Bt* genes, and the scientific explanation of *Bt* cotton's resistance to bollworms. The frame of economy relates to claims about the acreage of land planted with *Bt* cotton, the increase/ decrease of agricultural inputs and yield, and the projected areas where *Bt* cotton will be planted in India. The frame of ecology refers to such issues as the long-term impact of *Bt* cotton on the biophysical environment.

socioeconomic benefits and costs of the use of *Bt* cotton (economy), all of which tended to receive more focus in academic journals. As an NGO spokesperson noted in an interview, antagonists in the national arena make "conscious efforts to attack against the existing system and the structure which governs the GMOs in India" because pointing out the shortcomings of the governmental system and policies is an effective strategy for displacing the arguments of their opponents. Many of the interviewees of other types, such as actors in industry, also pointed out that they view issues in the governance frame as important. In promoting agrifood biotechnology the majority of the government and industry actors who were interviewed reflected this view by offering elaborate and extensive explanations of the existing guidelines, the government committees, and the division of labor among concerned governing bodies.<sup>7</sup>

Although different types of actors held different views of *Bt* cotton governance, policy is the primary frame for evaluating GMOs in the context of India, as discussed in Chapter 2. It was the dominant frame in terms of the number of claims and the most contentious. In the national arena, in the early years of the *Bt* controversy, many of the reported claims concerned the open field testing of *Bt* cotton. One of the major contested issues hinged on the question of

<sup>&</sup>lt;sup>7</sup> Actors frequently mentioned a three-tier system (the Institutional Biosafety Committee, the Review Committee on Genetic Manipulation, and the Genetic Engineering Approval Committee), the assigned roles of which are to review ongoing research and development of agrifood biotechnology, to monitor experimental facilities, to devise policies for research and development in rDNA research, to formulate safety guidelines for research, to design the biosafety program for risk assessment, and to decide whether to approve the commercial distribution of seed for crop production.

who would be involved in the monitoring and evaluation of data generated through the field testing of *Bt* cotton. Actors in civil society, who were very much outside these evaluation processes, were demanding that the system for evaluating *Bt* cotton not be external to their spheres of influence. An actor in civil society argued that,

... the system should become more open so that independent organizers like us can scrutinize the real risks and benefits of GMOs...we have the right to know what criteria have been used when it is approved. We have been asking to share the data...[*we have been asking*] why the data on gene-flow is not publicly available.

Claims such as these reflect frustrations felt by the actors who were not given a role in the decision-making processes involving transgenic crops. The Freedom of Information Act, enacted in January of 2003, could provide a legal basis on which excluded actors could demand the disclosure of information which would enable them to participate in the evaluation processes; however, it is too soon to observe what kinds of impact the Act will have. Consequently, actors in civil society prefer to engage in activities that would result in quicker changes of the system such as direct actions and lobbying.

The divisions between proponents and opponents derived from two sources. First, actors who supported the technology tended to claim that the existing system and structure governing genetically modified organisms (GMOs) in India would address the moral, scientific, economic and ecological concerns raised by other actors. In contrast, actors who opposed the technology claimed that the existing system was inadequate to deal with environmental and social concerns. In other words, whereas the actors in civil society emphasized that the

system was loose and required improvement, the advocates in government and industry were attempting to dismiss the claims that society had to cast a critical eye on the existing system and structure. While some actors in civil society saw sloppiness in the system because they perceived conflicts among actors in government, other civil actors were of the opinion that system and structure of any kind were generally sloppy, based on their past interaction with actors in government.

The second element that distinguishes the positions of actors from one another derives from three fundamentally different ways of thinking about the ideal agricultural development model. The first model emphasizes governmentled agricultural development. Actors in innovating roles, such as those in biotechnology promotion agencies, seed industries, and those scientists involved in research on transgenics in the public agricultural system emphasized that India was one of the first few developing countries to have recognized the importance of biotechnology as a tool with which to advance the growth of the agricultural sector. As exemplified in the following passage, they emphasized India's uniqueness in having a high-level department that specifically dealt with biotechnology:

India is the first country in the world to establish an independent "Department of Biotechnology" under the Ministry of Science and Technology...This has helped in the promotion of biotechnology research and the establishment of many foci in the country to do research in modern biotechnology, medicine and rDNA technology. (Tripathi 2002:15)

The second model emphasizes market-led agricultural development, with little involvement by a relatively small government. Actors outside the system,

whether for or against the introduction of *Bt* cotton, tended to support this second model because they felt that the governance suggested by the first model, and exemplified by the Indian government, was not conducive to the kind of society that they desired. Actors in civil society who supported Bt cotton expressed distrust of the public authorities and government bodies. They raised concerns about the ability of government bodies to fully reap the benefits from a potentially useful technology, and suggested that India must therefore allow the market to engage the financial and human resources and scientific expertise in the private sector. On the other hand, actors in civil society who opposed Bt cotton supported the second model because they guestioned whether government bodies should be the sole actors with authority over the deliberative procedures concerning GMOs. Some actors questioned whether government personnel were capable of examining the environmental and socioeconomic consequences following from the implementation of GMOs, especially given that many of environmental and socioeconomic impacts were unknown. They felt that civil society should have access to the data generated through the field trials so as to inform their decisions.

The third model emphasizes bottom-up development. Social actors who supported this model and who opposed the implementation of *Bt* cotton were against the modernization of agriculture itself, or had a different vision of how agriculture needed to be improved. These actors emphasized such elements as "science and technology based on local resources," "science and technology which gives independence to farmers," and "innovation of farmers." "There are

no ecologists and sociologists involved in the committee [*GEAC*]..." a civil society actor pointed out. These claims embody less materialist and utilitarian thinking, which runs counter to the agricultural development model that has prevailed in India since the 1960s. It is not a coincidence that these elements echo the principle of *swadeshi*<sup>8</sup> envisaged by Gandhi (1937) more than half a century ago.

These three approaches to agricultural development prevailed in many other types of claims. For instance, some pointed out that, because financial, human, and other types of capital were limited in India, the country ought to use market mechanisms to reap the benefits of cutting-edge technology. These actors claimed that the Chinese government had swiftly reaped the economic benefits of Bt cotton by tapping resources from the private sector and becoming a major player in the global cotton market. Other actors in civil society raised concerns about opening the door to multinational corporations (MNCs) in the agricultural sector; historically, India had a policy of national self-sufficiency in agricultural science and technology. These actors went on to claim that the state could lose control over the national agricultural research system to the powerful MNCs, when instead the Indian government should maintain the power to steer agricultural development in a direction that serves the well-being of the people. If the research and application of transgenic crops are left to market mechanisms. the development and realization of the crops that could truly benefit the majority of Indian society could lag behind. According to these claimants, for instance,

<sup>&</sup>lt;sup>8</sup> This is a doctrine that envisages every village of India as self-sufficient, using local resources.

rather than introduce a cash crop like *Bt* cotton, the public research system should use available resources to research and develop such areas as yield improvements of legumes.

#### Actors

In the early years of the controversy, the Department of Biotechnology (DBT) in the Ministry of Science and Technology was the only visible actor in the national public fora. Government optimism surrounding Bt technology is reflected in various comments appearing in the newspapers. Then, from the end of 1998 onward, a variety of actors concerned with research, development, and implementation of agrifood biotechnology – from both within and outside the government – brought various competing interpretations of issues associated with Bt cotton into the national public fora. These new voices included people representing various parts of the government, scientists working within the national agricultural research system, industry and NGOs, cotton growers, and spokesperson of NGOs. Speaking for the government, for example, officials from the DBT were joined by officials from the Ministry of Agriculture, the Ministry of Textiles, and the Ministry of Environment and Forests. At the same time, the representatives of environmental and food policy-related NGOs, as well as spokespersons of various farmers' unions, made visible declarations related to Bt cotton. Scientists making claims about Bt cotton included plant breeders and geneticists, as well as persons trained in physics or engineering.

#### Fragmentation of Government Voices

The emergence of a range of actors in the discourse and resulting continual change in the discourse on GE crops made it increasingly difficult for the national actors to follow who said what and in what context, and for actors to be consistent and coherent with claims and claimsmaking activities of their allies. In addition, the discourse of individuals representing various branches of the same organization revealed that perceived monolithic groups such as the government actually consist of numerous sub-groups with a diversity of values and norms.

Particularly for actors in government who had taken the role of innovator of agrifood biotechnology more so than industries, effective claimsmaking activities became increasingly difficult due to the increasing complexity of the discourse. As demonstrated by many instances in which both the Indian Council of Agricultural Research (ICAR) and DBT jointly worked on various agrifood biotechnology related projects, ranging from constructing safety testing facilities for large scale transgenic seed production to participation in the International Rice Genome Sequence Project (IRGSP), the ICAR and DBT have typically been viewed as allies in promoting the application of science to agriculture:

Another important contribution that GM can make is enhancing the nutritional value of crops and India is soon going to try the development of Vitamin-A rich rice. DBT along with the Indian Council of Agricultural Research (ICAR) is negotiating with the Swiss-German scientists and their governments for transfer of this technology, Dr. Manju Sharma said. 'We plan to introduce the golden rice as the vitamin-A injected rice is called technology into common Indian rice varieties and not Basmati. We hope, in another 5-6 years, seeds of popular Indian cultivars capable of producing beta-carotene would be made available to the farmers,' she added. (*Business Line*, March 30, 2001)

In some cases, ICAR and DBP were criticized for being allies in promoting

agrifood biotechnology for multinational corporations.

It has now become apparent that the Department of Biotechnology (DBT) and Indian Council of Agricultural Research were in league with the multinationals in pushing in a faulty technology into the country, Sharma alleged. (*Business Line*, June 5, 2000)

However, the following comment made by the Director of ICAR demonstrates

that ICAR would excise caution in considering the adoption of transgenic crops:

At the recent Science Congress, the ICAR Director General, Dr. R. S. Paroda, cautioned that the country could play into the hands of the developed countries, unless it has a strong intellectual property rights regime. (*Business Line*, January 29 1999)

Subsequently, a newspaper article covered a story about how ICAR and DBT

became adversaries in the Bt cotton controversy, revealing fragmentation of

government voices:

The quarantine department of the Ministry of Agriculture, alerted by the Indian Council of Agriculture Research, has already banned the Terminator gene in foreign seeds. However, it is the DBT and not the ICAR which has been made the nodal department for dealing with field trials. Given the compartmental administration and the recent history of turf war between the ICAR and the DBT, the public may not hope for an easy resolution of inter-ministerial wrangles which, in this case, could be fraught with dangerous consequences. Could one hope for a response, even at this late stage, from the DBT clarifying its position in regard to the ongoing controversy? (*The Hindu*, February 28, 1999)

Government officials representing different parts of the government began to

voice their thoughts on issues related to Bt cotton.

*Bt* cotton could not be the panacea for total pest control in cotton, but definitely could be one of the effective integrated pest management tools in minimising pesticide use in cotton eco-system, according to scientists at the Central Institute for Cotton Research. (*The Economic Times,* June 6, 2000)

The eight-day study in 11 villages undertaken by Abdul Qayoom, former Joint Director in the Andhra Pradesh Government's agriculture department, and Sakkhari Kiran, an agriculture scientist, estimated that the farmers growing *Bt* cotton would earn 40 per cent less than non-*Bt* farmers. It found that the pesticide sprays have not come down and safety protocols have been ignored. 'In view of these findings, we wonder if Bt cotton is worth it at all, given the environmental and ecological costs', P. V. Satheesh, convener of the Coalition, said, demanding action against the multinational company for its 'reckless promises and absolute lack of concern for safety aspects of Bt farming.' The study observed the performance of *Bt* cotton and documented the experiences of the farmers. The Bt yields appeared to be less than that by hybrids currently grown by farmers, the study showed. Current yields from both Bt and non-Bt have recorded 4-5 guintals per acre, which meant no difference between them. In fact, as non-Bt has a life of 2-3 months more than Bt, it is expected to yield another 3-4 guintals or 30 per cent more. (The Hindu, December 8, 2002)

Hearing of several different approaches to GMOs, it would be understandable if

the public came to doubt the optimistic outlook expressed by an official of the

DBT when the technology was publicly introduced for the first time. The entrance

into the discursive process of diverse actors and their equally diverse

interpretations and positions suggest that government voices have fragmented,

leaving space for other actors to offer their interpretations of an issue and to

displace the government's influences in discourse.

## The Emergence of Local Actors in the National Discourse

Recent (2001-2002) discourse in the national arena has been characterized by the emergence of new claims advocated by actors closely associated with the state of Gujarat. In the early years of the *Bt* cotton controversy in India, national actors did not associate issues of *Bt* cotton with the state of Gujarat, nor Gujarati farmers. Neither news reports in English-language Indian newspapers from those years nor informants interviewed in New Delhi in 2000 grounded *Bt* cotton controversies in the context of Gujarati farmers. Rather, actors associated issues with three other places – New Delhi, where most of the policy-making concerning *Bt* cotton was taking place, the state of Andhra Pradesh, where many suicides of cotton growers had occurred, and the state of Karnataka, where farmers had damaged private property to demonstrate their opposition to the commercial introduction of *Bt* cotton.

It was only towards the end of 2001 that the coverage in the national newspapers began to associate *Bt* cotton with the state of Gujarat, when large-scale cultivation of an unapproved variety of *Bt* cotton occurred. Various types of actors in Gujarat became visible in the national discourse. For instance, the headline of the *Economic Times* (October 13, 2001) began, "Gujarat government in the dark on *Bt* cotton issue;" the accompanying article reported claims by two officials from the Gujarat state government. Similarly, other types of actors – people representing the Gujarat State Seeds Producers' Association, representatives of the Gujarat Pesticides Formulators' Association, scientists in the state agricultural universities, and farmer leaders of Gujarat, inter alia – have all surfaced in the English- language mass media.

The emergence of new actors from Gujarat has been accompanied by a range of new issues. One of the significant issues that has emerged as a problem in recent discourse relates to concerns over what will actually happen on the ground once various genetically engineered crops – not only *Bt* cotton but also food crops – enter the Indian market commercially. The discourse is

frequently framed in terms of who would, and who should, be accountable for any social, ecological and/or ethical consequences of the implementation of *Bt* cotton. The question of accountability has been raised in various contexts: who would be accountable if negative environmental effects occurred (*Financial Express*, October 25, 2001)?; who should be accountable for the compensation of farmers if and when the government uproots standing crops of unapproved GMO varieties (*Financial Express*, October 25, 2001)?; and who should be held accountable for the mass cultivation of unapproved GMO varieties (*Hindu Business Line*, October 20, 2001; *Economic Times*, October 29, 2001; *Business India*, November 23, 2001)? These and other concerns related to the implementation of GMOs have led actors in civil society to convincingly argue their positions by criticizing public policies related to GM crops, the functioning of government institutions, and the capabilities of government officials involved in decision-making involving *Bt* cotton:

From our point of view, we feel that India is [*not*] yet ready to adopt GMOs. We have no clear policy, and no particular legislation. Everything is carried out in the ad hoc basis. You know that GEAC is headed by the IAS [*Indian Administrative Services*] officer, who does not know about science. He will not know how to address contradicting claims and so forth. Mahyco has pointed out that *Bt* has 30% higher yield than the conventional hybrid but who can address and validate these claims. (Interview with a civil society actor)

Although the problems related to an unauthorized variety of *Bt* cotton arose from a combination of factors that existed outside governmental processes, the central government has been subjected to numerous criticisms ranging from its inability to devise a plan for monitoring compliance with biosafety regulations to the inability of government on all levels to undertake damage control following the controversy which erupted over the wide-spread use of unapproved GMO varieties. Much of the criticism appeared in local newspapers, as set forth in the following section.

# **Bt** Cotton Discourse in the Local Arena

A keyword search of the Gujarati language newspapers found 77 articles between 1999 and 2002. The issues surrounding *Bt* cotton became more visible in the local public fora beginning late in 2001; 96 percent of the articles over the four years were concentrated in 2001 and 2002. Not only the frequency of claims, but also the content and emphasis of discourse have changed since 2001, when the issues of *Bt* cotton began to enter into the local discourse of Gujarat. I will first show the frequency of claims and describe the content of the local discourse. Finally, I will examine issues raised by farmers in connection to the economy frame.

## Frames

Table 3-1 shows the quarterly number of claims by frames appearing in the three Gujarati newspapers between 1998 and 2002. As shown, local discourse emphasized three frames – governance, society and economy. Issues in the frame of governance include the state government's refusal to support the central government's decision to uproot standing crops of Nb151, unauthorized *Bt* cotton, and politics within the membership of GEAC. Issues within the frame of society include Gujarati farmers' disappointment with the central government's

decision to approve only the variety connected with Monsanto and not that of a local seed company, and the social injustice and inequity leading to the suicides of cotton growers. Issues in the frame of economy include how the yield of Nb151 has been far better than Bollgard, and how *Bt* cotton offered greater production volume and benefits than conventional varieties. The two frames of ecology and of science and technology arose relatively less frequently. Issues in the frame of ecology were mostly related to the use of GM seeds in connection with soil fertility.<sup>9</sup> Issues related to scientific and technological aspects of *Bt* cotton have constituted only a small fraction of the Gujarati discourse.

Quarter	Governance	Society	S&T	Economy	Ecology
1st 1999	1	0	1	0	0
1st 2000	0	2	0	0	0
4 <sup>th</sup>	28	20	2	7	4
1st 2002	12	15	0	10	3
2 <sup>nd</sup>	5	5	0	2	0
3 <sup>rd</sup>	0	0	0	0	0
4 <sup>th</sup>	5	3	1	1	0
Total (n)	51	45	4	20	7

Table 3-1. Number of Claims by Frames in Gujarati Newspapers

Table 3-2 compares the proportion of claims by frames between English-

language Indian newspapers and Gujarati newspapers. The claims appearing in

<sup>&</sup>lt;sup>9</sup> Although social actors did not relate the use of GM seeds to soil fertility in the national discourse, the impact on the soil from the use of GM seeds was the most salient issue raised in the local discourse. The view most commonly shared among cotton growers is that the continuous use of GM seeds on the same plot will diminish the levels of nutrients in the soil thus resulting in harder and dryer land. Although the growers express this view, no growers report that they have actually experienced such phenomena yet.

the English-language newspapers and the Gujarati newspapers reveal a similar pattern – governance was the most frequent followed by society; economy was mentioned roughly 15 percent of the time in both the national and Gujarat newspapers.

S&T Governance Society Economy Ecology Ν National 32.6% 23.5% 18.8% 14.5% 10.6% 800 Gujarat 40.2% 35.4% 3.1% 15.7% 5.5% 127

 Table 3-2.
 Comparison of Proportion of Claims by Frames

# Content of the Local Discourse

The mass media's association of *Bt* cotton with the state of Gujarat resulted from a coincidence of several rather unlikely circumstances. A variety called Navbharat 151 (Nb151) had been marketed in the state of Gujarat since 1998. Initially the seeds were marketed as a new hybrid variety which was later found to contain Cry1Ac,<sup>10</sup> a microbial gene construct for which Monsanto controlled the usage rights. Not many growers or other actors in the downstream segments of the cotton commodity chain had noticed the nature of Nb151 until 2001, when climatic conditions caused a massive bollworm eruption all across Gujarat. In interviews in Bhadharpur,<sup>11</sup> the majority of the farmers said that they

<sup>&</sup>lt;sup>10</sup> Cry1Ac is a particular form of the *Bt* gene.

<sup>&</sup>lt;sup>11</sup> A pseudonym is used here to maintain the anonymity of the village where fieldwork was conducted.

had never experienced such heavy bollworm attacks in their lifetimes. Despite the efforts to control the pests by the frequent spraying of pesticides, those who did not plant Nb151 in 2001 were unable to control what was happening. Some farmers spent Rs.4,000 to 5,600 (approximately US \$90 to US \$125) per acre on synthetic insecticides, a sum three to four times greater than what they spent during normal seasons, and yet they reported that pests had not been controlled. Other farmers simply stopped spraying and uprooted the plants in the middle of the season, since keeping the plants did not make any economic sense and the plants would provide habitat for future generations of the pests.

After such a bad experience, a farmer who owned fifty acres of land (a large farm in the context of south Gujarat) and who had twenty years of experience in growing cotton decided not to continue cotton cultivation. The cultivation of cotton on 80 acres of land (50 acres of his own and 30 acres of rented land) in 2001 brought him a financial loss of Rs.800,000 (approximately U.S. \$18,000). His loss was so tremendous that he remains convinced that discontinuing cotton cultivation was the right decision. In the village, virtually all of the hybrid cotton, except Nb151, was wiped out. At that time, no one, including the growers themselves, was fully aware of what Nb151 was and how and why Nb151 had survived the heavy pest attacks; but the stark contrast between the productivity of Nb151 and that of other hybrid varieties revealed that Nb151 had similar traits to Bollgard, the *Bt* variety developed by Mahyco-Monsanto. It was only a matter of time until both fellow farmers in the vicinity and

other actors such as seed dealers, pesticide dealers and extension agents learned about the seeds that produced the "miracle."

The central government stepped in following a complaint by Mahyco and ordered the surviving plants to be destroyed after it had been proven that Nb151 had the Cry1Ac gene.<sup>12</sup> Strong objections to the central government's directive were raised by various actors involved in the cotton commodity chain of Gujarat, such as cotton growers,<sup>13</sup> a farmer leader,<sup>14</sup> a cotton cooperative,<sup>15</sup> the Union Textiles Minister from the central government,<sup>16</sup> and the Chief Minister of Gujarat,<sup>17</sup> all of whom claimed that the order was impractical and unethical. Parallel to these claims, the Gujarat state government indicated that the destruction of the plants should take place only after farmers were compensated (*Business Standard*, October 24, 2001), which essentially meant that no interventions would be made before the lint from Nb151 would get to the market.<sup>18</sup> Farmers continued to pick cotton and to sell it to the cotton traders and cooperatives. The extent of the area where Nb151 was planted within the state of Gujarat is said to have involved between 60 and 80 percent of the hybrid

<sup>&</sup>lt;sup>12</sup> Deccan Herald, October 12, 2002; Economic Times, October 12, 2001; Gujarat Samachar, October 25, 2001; Times of India, October 9, 2001.

<sup>&</sup>lt;sup>13</sup> Asian Age, October 23, 2001; Western Times, October 25, 2001.

<sup>&</sup>lt;sup>14</sup> Economic Times, October 25, 2001; Gujarat Samachar, November 13, 2001; Times of India, October 25, 2001.

<sup>&</sup>lt;sup>15</sup> Business Standard, October 24, 2001.

<sup>&</sup>lt;sup>16</sup> Asian Age, October 26, 2001; Gujarat Samachar, October 27, 2001.

<sup>&</sup>lt;sup>17</sup> Sandesh, October 27, 2001.

<sup>&</sup>lt;sup>18</sup> The cotton season in south Gujarat begins around May and June and farmers begin to pick cotton and sell it from October onwards until January and February of the subsequent year. Nb151 is said to be an early variety, which means that farmers pick it and sell it earlier than they do other hybrid varieties.

cotton growing area, and the number of farmers who used *Bt* cotton seeds was somewhere around 13,000; however, there are no official figures available concerning the extent to which Nb151 was used. In Bhadharpur, some farmers had been using Nb151 for the past four seasons, whereas others only began using it during the 2002 season. Babubhai Patel<sup>19</sup> – a large farmer in Bhadharpur who is an economically, socially, and politically influential person in the village – indicated that more than 80 percent of the cotton growers in the village had used various generations of Nb151. Despite the central government's directive, none of the standing plants were destroyed in Bhadharpur. According to the farmers in the region, the state government did not even come to any of the villages in their vicinity to implement the directive of the central government.

Parallel to the reports in the national English-language Indian newspapers, Gujarati newspapers began to report on *Bt* cotton in October 2001, when controversies erupted in Gujarat. Various types of actors in national fora began to appear in the local discourse. Social actors whose claims were previously mentioned only in the English-language newspapers, such as the chairman of GEAC (*Sahakar Saurabh*, April 2, 2002) and the Union Minister of Textiles (*Sandesh*, October 27, 2002), began to appear in the local newspapers. Because Gujarati language newspapers began to cover the issues of *Bt* cotton, a wider group of actors in Gujarat came to learn about national actors who were involved in controversies but who were previously known only to English-

<sup>&</sup>lt;sup>19</sup> A pseudonym.
language newspaper readers. At the same time, cotton growers emerged in the discourse stating their support of *Bt* cotton (*Gujarat Samachar*, November 28, 2001; *Sahakar Saurabh*, November 19, 2002).

### Maintaining Interpretive Control

The discourse in the local arena is characterized by claims concerning the central government's directive to uproot the standing crops of Nb151 and by claims deriving from the use, misuse and abuse of Nb151. Parallel to these claims were those that growers made concerning yield improvement, a decrease in the use of synthetic insecticides, and an increase in profits. Based on their positive experiences with Nb151 and newspaper articles reporting the positive experiences of other cotton growers, farmers became determined that they would obtain seeds. Not surprisingly, growers attempted to make their voices heard through various means so as to achieve their goals of central government approval of Nb151 and of obtaining support of their efforts from other actors. Cotton growers who were interviewed in Bhadharpur very happily shared their "success" stories of the current cotton season -- "success" was often defined as economic profits. A farmer leader in a position to carry out a public relations campaign was most willingly invited by news reporters and researchers for interviews. According to these stories, both Hindu and Muslim farmers, as well as small, medium, and large farmers,<sup>20</sup> all had positive experiences with Bt

cotton, and the majority of them said they would plant it again next season. These types of claims appeared in both English-language Indian newspapers and Gujarati newspapers. Except for a few claims made by vocal farmer leaders and their supporters in opposition to the field trials of multinational corporations (*The Hindu*, November 29, 1998; *Business Line*, January 11, 1998), there were virtually no claims by cotton growers reported in the newspapers between 1998 and 2000. However, more articles about cotton growers have appeared since those years, with most of these reporting that farmers have had positive economic experiences with *Bt* cotton (*Gujarat Samachar*, October 16, 2001; *The Hindu Business Line*, October 21, 2001; *The Indian Express*, October, 21 2001; *Sandesh*, November 1, 2001; *Gujarat Samachar*, November 30, 2001; *Deccan Herald*, October 22, 2002).

By combining and synthesizing these issues raised in the Gujarati newspapers, one can see the underlying story line in Gujarati discourse of how farmers have been pushed to the unjust situation where they are denied legal access to the very seeds that have enabled them to profit economically, and all this despite the apparent absence of negative consequences for the biophysical environment. Gujarati farmers have succeeded in obtaining consent across a range of actors in the local arena by dominating the media coverage of *Bt* cotton,

<sup>&</sup>lt;sup>20</sup> According to India's census of agriculture, farmers are categorized into four groups: small and marginal (below 5 acres); semi-medium (5-10 acres); medium (10-25 acres); and large (above 25 acres). For the purpose of examining the variations of discourse among different land-holding groups, I made use of three categories: small (below 5 acres); medium (5 to 25 acres); and large (above 25 acres). Farmers who were either landless or laborers were excluded from the analysis, because two pretests conducted in west Gujarat and south Gujarat suggested that they have less say than the other groups in determining which kinds of seeds are used and are less aware of *Bt* cotton.

steering and manipulating the local public opinion of the Nb151 controversy. A person occupying a high-ranking policy-making position in the state government at the height of the Nb151 controversy pointed out to me that, "If *Bt* cotton is harmful, block the production of *Bt* cotton itself. Why do we punish farmers by uprooting the standing crops of Nb151?" He was most proud of the fact that he did not give in to pressure from the central government and that his decision has protected cotton growers in Gujarat; many other local actors echoed his comments.

Contrary to the arguments made by Herman and Chomsky (2002), who suggest that mass media, government and businesses depend on each other in their activities for their own survival so that it is rare for harsh criticism about the government and big corporations who sponsor mass media to appear in the newspapers, in the Indian context farmers seemed to attract mass media attention. Sympathies were always with the farmers and harsh criticisms was generally directed toward the government. Thus, cotton growers were relatively better off than other actors in the controversy for having been able to utilize opportunities offered by news reporters.

### Economy Frame

Economic issues have begun to hegemonize the Indian discourse, particularly since 2002. In the national newspapers, for instance, 43 percent of all claims in 2002 were framed as pertaining to economic issues while the ratio in other years ranged from nine to 19 percent. Similarly, 65 percent of the total

economy claims appeared in 2002 in the Gujarati newspapers. These numbers show that it is not only in Gujarati newspapers but also in national newspapers that economic issues became prominent over time. This is not only because news reporters took an interest in reporting the claims of farmers, but also because farmers themselves began to be proactive in keeping their issues in both national and local public fora. The activities of the farmers' association based in southern Gujarat constitute just one example of how farmers enhanced their presence and maintained their issues in local and national discourse. Ever since the *Bt* cotton controversy in the state of Gujarat erupted, this group has been making deliberate efforts to voice its claims. To this end, group members have organized various types of activities such as farm visits, seminars, and consultations with policy-makers. Information about these activities is generally sent to the newspaper companies via fax and telephone calls.

In coordination with such efforts by farmers in Gujarat, an article by the leader of the national network of farmers appeared in newspapers, showing support for Gujarati farmers' demands for the approval of Nb151:

Most of them sowed at least five months before the KCC [*Kisan Coordination Committee*] offered its protection to the *Bt* varieties frowned upon by the GEAC and the Union Government. The print and the electronic media maintained a strict and deafening silence about the marvellous results of the impugned seed. This latter is not available in the normal agro service centres and seed shops. Somehow, the word went round that it was good and the largely illiterate tribals managed to get the seed from a virtually underground circuit. (*Business Line*, December 4, 2002)

When a seminar on the performance of varieties of *Bt* cotton was held in southern Gujarat, the group sponsored several news reporters from New Delhi,

as well as news reporters from Gujarati newspapers, to attend the seminar. Afterwards, these newspapers published several articles on the proceedings, generally showing sympathy to the plight of cotton growers. Moreover, the articles reported the excellent performance of Nb151 in comparison to varieties supplied by Mahyco-Monsanto, without reproaching Navbharat Seeds for selling unauthorized seeds:

Reports have already come in citing some success stories of *Bt* cotton cultivation at some places. There are reports of cases where *Bt* cotton has not fared well in terms of the expected yield and returns to the farmers due to high cost of seeds and more application of fertilisers and water. Some reports say that the seeds 'illegally' distributed by Navbharat have given more promising results in terms of yield and more returns than the legally approved seeds of Mahyco. (*Financial Express*, December 8, 2002)

Both farmers whose views appeared in the newspapers and those whom I interviewed emphasized issues in the frame of economy first and foremost – less expense for pesticides, less expense for labor costs for applying pesticides, more yield with *Bt* cotton, and lower prices for purchasing Nb151 in comparison to Bollgard – in describing how they interpreted the commercialization of *Bt* cotton. Farmers, and farmer leaders in particular, muted the moral aspects of the use of an unapproved variety. They attempted to black-box (Latour 1987) the ethical issues involved in the marketing of Nb151 and made conscious efforts to gain the support and sympathy of other actors by emphasizing how *Bt* cotton had contributed to agronomy. While actors in government and in civil society whose voices appeared in the national newspaper saw the moral aspects involved in Nb151 as a major issue, farmers claimed that the distinctions between the legal and illegal varieties were relatively minor. Some argued that there was no such

thing as illegal seeds and felt that they were completely free to choose the seeds that they wanted to use. They argued that the two varieties did not differ in their environmental impacts and that because the government had already given approval to the Mahyco-Monsanto *Bt* cotton, the biosafety aspects of Nb151 had already been tested. They even argued that by giving approval only to Mahyco-Monsanto, the government was fostering a monopoly and thus putting the growers who buy the seeds at an economic disadvantage.

Claims concerning issues in the economy frame are much more empirically credible and salient (Benford and Snow 2000) than claims in other frames such as governance (e.g., evaluative procedures governing *Bt* cotton, democratic representativeness of the evaluating committee), or ecology (e.g., gene-flow, pollen drift). Claims made by cotton growers tended to resonate with the real life situations of farmers and farming in the society, while claims such as gene-flow and pollen drift, or claims about procedures, were salient only to a much smaller segment of Indian society, such as those with specialized knowledge and who hold professional, academic, or technical positions.

A large farmer who owns 80 acres of land in Bhadharpur said that he does not understand why people in Delhi were cautious in introducing *Bt* cotton:

People in government point out that *Bt* cotton is potentially harmful to the environment. Most of the farmers in the village have used pesticides so much during past decade or two that all the earthworms are gone from our soil. So why all of a sudden does the government wake up and make a big deal about environment? I used *Bt* F1 this season and I sprayed less. Doesn't it mean that it is better for environment?

He not only discussed the issues in the economy frame, but also dismissed the government's claims in the ecology frame. These types of claims made by an

economically and socially prominent farmer of the village would appeal to his neighbors and would likely be heard by farmers in other districts because these types of farmers tended to be well-connected beyond their villages. Moreover, these claims would have a broader appeal to people in general. In the rural Indian context, the most valued and influential information that people use is that coming from other farmers (Glendinning et al. 2001; Malhotra et al. 1983). When people viewed as progressive farmers make these types of claims, it is more likely that farmers within the same village and vicinity will accept their claims and adopt their ideas and agricultural practices. It is also true that actors in general, and not merely cotton growers, can probably relate themselves to the claims made by cotton growers because they can supply their own anecdotal "evidence" (Benford and Snow 2000: 619). As a result, such actors will harbor greater sympathy for the growers. In India, where more than 70 per cent of the population is in some way engaged in agriculture, the influence generated by these types of claims is tremendous.

### Conclusions

The complexity of agrifood biotechnology discourse has prevented government actors from being consistent and coherent in their claims and claimsmaking activities, thus forcing government actors to lose interpretive control of issues raised in the debates. Government officials were subjected to criticism and were questioned about the credibility of governmental organizations involved in the evaluation of GMOs. The same complexity allowed farmers to

voice their views and demands. They have rarely been subjected to criticism for not abiding by biosafety regulations nor have they been held responsible for the Nb151 controversy. Instead, they received greater sympathy and support, particularly from a range of actors in the local arena.

Further, the study suggests that the governance frame was initially the most significant frame used by actors in India in evaluating the commercial application of Bt cotton, both nationally and regionally. In particular, actors were aware of how the system and the structure laid out by the government for testing transgenics would determine the ways in which the new technology would be implemented. In other words, actors scrutinized the strengths and limitations of existing public policies governing transgenic seeds. However, when farmers entered into the discourse, the economic frame gained momentum both nationally and locally. Indeed, the example of Gujarat indicates that in the upstream portion of the cotton commodity chain, economic issues not only gained currency, but hegemonized the discourse by displacing issues in the governance, society, and ecology frames. The analysis presented in this chapter demonstrates the existence of multiple discourses in the Bt cotton controversies - national and local, government and farmers, pre- and post Nb151. This is evidence that the evaluation of a new agricultural technology involves both a material conflict over how food and fiber will be produced, and a symbolic contest over which understanding of reality will prevail. My analysis also demonstrates how, at the same time, the prevailing understanding is constantly revised to accommodate new interpretations and new events.

# References

- Bagchi, Kathakali S. 1991. "Drought-prone Western India: Gujarat." In *Drought-prone India: Problems and Perspectives*, edited by K.S. Bagchi. New Delhi: Agricole Publishing Academy.
- Barwale, Raju. 2002. "Transgenic Cotton: A Case Study." In *Transgenic Crops* and Biosafety Concerns, edited by G.J. Randhawa, R.K. Khetarpal, R.K. Tyagi, and B.S. Dhillon. New Delhi: National Bureau of Plant Genetic Resources.
- Benford, Robert D., and David A. Snow. 2000. "Framing Processes and Social Movements: An Overview and Assessment." *Annual Review of Sociology* 26: 611-639.
- Black, Jilia. 2002. "Regulatory Conversations." *Journal of Law and Society* 29: 163-96.
- Buttel, Frederick H., and Randolph Barker. 1985. "Emerging Agricultural Technologies, Public Policy, and Implications for Third World Agriculture: The Case of Biotechnology." *American Journal of Agricultural Economics* December: 1170-1175.
- Callon, Michel. 1986. "Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St Brieux Bay." In *Power, Action and Belief: A New Sociology of Knowledge?*, edited by J. Law. London: Routledge & Keagan Paul.
- Cress, Daniel M., and David A. Snow. 2000. "The Outcomes of Homeless Mobilization: The Influence of Organization, Disruption, Political Mediation, and Framing." *American Journal of Sociology* 105: 1063-1104.
- DaSilva, E. J., Ratledge, C. and Sasson A. (Eds.). 1992. *Biotechnology: Economic and Social Aspects Issues for Developing Countries*. NY: Cambridge University Press.
- De Greef, Willy. 2001. "Agricultural Biotechnology and Moral Imperatives." *Vitro Plant* 36 (5): 309-311.

Foucault, Michel. 1972. The Archaeology of Knowledge. NY: Pantheon.

Gamson, William A. 1992. Talking Politics. NY: Cambridge University Press.

- Gamson, W.A., D. Croteau, W. Hoynes, and T. Sasson. 1992. "Media Images and the Social Construction of Reality." *Annual Review of Sociology* 18: 373-393.
- Gamson, William A., and Andre Modigliani. 1989. "Media Discourse and Public Opinion on Nuclear Power: A Constructionist Approach." *American Journal of Sociology* 95: 1-37.
- Gandhi, M.K. 1937. "Harijan." In *Panchayat Raj*, edited by R.K. Prabhu. Ahmedabad: Navajivan Publishing House.
- Ghosh, P.K. 2000. "Indian Experiment on Bt Cotton." Agro India: 28-30.
- Glendinning, A., A. Mahapatra, and C.P. Mitchell. 2001. "Modes of Communication and Effectiveness of Agroforestry Extension in Eastern India." *Human Ecology* 29: 283-305.
- Goffman, Erving. 1986. Frame Analysis: An Essay on the Organization of Experience. Boston: Northeastern University Press.
- GOI. 2002. "Recombinant DNA Safety Guidelines 1990." New Delhi: Department of Biotechnology, Union Ministry of Science and Technology.
- Grove, Richard. 1995. Green Imperialism: Colonial Expansion, Tropical Island Edens, and the Origins of Environmentalism, 1600-1860. NY: Cambridge University Press.
- Gupta, Akhil. 2000. Postcolonial Developments: Agriculture in the Making of Modern India. Oxford: Oxford University Press.
- Hay, Colin. 1996. "The Discursive Construction of the 'Winter of Discontent'." Sociology 30: 253-277.
- Herman, Edward S., and Noam Chomsky. 2002. *Manufacturing Consent: The Political Economy of the Mass Media*. NY: Pantheon Books.
- Jeffrey, Robin. 2000. India's Newspaper Revolution: Capitalism, Politics and The Indian-language Press 1977-1999. New Delhi: Oxford University Press.
- Latour, Bruno. 1987. Science in Action: How to Follow Scientists and Engineers through Society. Cambridge: Harvard University Press.
- Malhotra, S.P., D.K. Saha, and G.V.S.R. Krishna. 1983. "Factors Influencing Information Sources: A Study of Causal Relationship." *Annals of Arid Zone* 22: 313-317.

- Nelkin, Dorothy. 1992. *Controversy: Politics of Technical Decisions*. Newbury Park: Sage.
- Patel, U.G. 1994. "Research Highlights: Cotton." Surat: Gujarat Agricultural University, Main Cotton Research Station.
- Qaim, Matin. 1998. "Transgenic Virus Resistant Potatoes in Mexico: Potential Socioeconomic Implications of North-South Biotechnology Transfer." ISAAA Briefs No. 7. NY: ISAAA.
- Rajaram, N. 1999. "Politics and Cotton Co-operatives in Central Gujarat." Economic and Political Weekly 34: 2095-2103.
- Sahai, Suman. 2002. "The Bt Cotton Case." Mainstream: 15-17.
- Shah, A.M. 1982. "Division and Hierarchy: An Overview of Caste in Gujarat." Contribution to Indian Sociology 16: 1-33.
- Shiva, Vandana. 2002. "Biotechnology and Biosafety: Bioterrorism Makes Regulation of Genetic Engineering a Security Imperative." *Resurgence* 211: 42-3.
- Shiva, Vandana, Ashok Emani, and Afsar H. Jafri. 1999. "Globalisation and the Threat to Seed Security: Case of Transgenic Cotton Trials in India." *Economic and Political Weekly* 34: 601-613.
- Skillington, Tracy. 1997. "Politics and the Struggle to Define: A Discourse Analysis of the Framing Strategies of Competing Actors in a 'New' Participatory Forum." *British Journal of Sociology* 48: 493-513.
- Snow, David A, and Robert D. Benford. 1988. "Ideology, Frame Resonance, and Participant Mobilization." In *From Structure to Action: Social Movement Participation Across Culture*, edited by B. Klandermas, *et al.* Greenwich: JAI.
- Snow, David A., Burke E. Jr. Rochford, Steven K. Worden, and Robert D. Benford. 1986. "Frame Alignment Processes, Micromobilization, and Movement Participation." *American Sociological Review* 51: 464-481.

Subramaniam, V.R., and A.V. Dhake. 2000. "IPM in Cotton." Agro India: 13

- Thompson, Paul B. 1997. *Food Biotechnology in Ethical Perspective*. London: Blackie Academic & Professional.
- Touraine, Alain. 2000. "A Method for Studying Social Actors." *Journal of World-Systems Research* VI: 900-918.

- Tripathi, K.K. 2002. "Bio-technology: Government of India Initiatives." SAKET Industrial Digest: 13-21
- von Glasersfeld, E. 1991. "Knowing without Metaphysics." In *Research and Reflexivity*, edited by F. Steier. Newbury Park: Sage.
- Woodhouse, Edward J. 1992. "Biotechnology and the Political Sociology of Risk." Industrial Crisis Quarterly 6.
- Yamaguchi, Tomiko, and Craig K. Harris. 2004. "The Economic Hegemonization of *Bt* Cotton Discourse in India." *Discourse and Society* 15(4): 467-491.
- Zald, Mayer N. 1996. "Culture, Ideology, and Strategic Framing." In *Comparative Perspectives on Social Movements: Political Opportunities, Mobilizing Structures, and Cultural Framings*, edited by D. McAdam, J. D. McCarthy, and M. N. Zald. NY: Cambridge University Press.

### **CHAPTER 4**

## THE BT COTTON CONTROVERSY: INTERGROUP RELATIONS

### Introduction

#### Background

The controversies over *Bt* cotton constitute what Gieryn (1999) refers to as "boundary work," which involves the competition for credibility and trustworthiness among claimsmakers with opposing points of view. As shown in preceding chapters, discourse about *Bt* cotton involved an extensive drawing of boundaries by actors including the government, industries, NGOs, scientists and farmers. The issues raised ranged from governmental processes to moral and ethical implications, from environmental consequences to global competition and agricultural development. Throughout much of these discussions, the ideals of farmers and farming were frequently used to create or maintain boundaries, and possible anchor points, for Indian actors in the contest over agriculture and development. This chapter will focus on this anchoring strategy to shed some light on the social dynamics that led India to take a precautionary approach<sup>1</sup> to genetically modified organisms, while fragmentation of identities at the local level

<sup>&</sup>lt;sup>1</sup> The phrase is generally used to characterize a type of biosafety policy. However, in this paper it is used in more general terms referring to India's overall approach to agrifood biotechnology including biosafety policy toward genetically modified organisms and as intellectual property rights policy. Paarlberg's (2000: 22) characterization of Indian biotechnology policies suggests that apart from public research investment policy pertaining to genetically modified organisms, biotechnology policies across a range of policy domains in India are either precautionary or preventive. Other authors also conclude that India's agrifood biotechnology policies, particularly biosafety policies, are precautionary for various reasons including regulations which cover a broad spectrum of activities and India's risk assessments involving evaluation of socioeconomic factors (e.g., Gupta 2000; Scoones 2002).

has led to non-compliance with such a governmental approach. The thesis here is that the *Bt* cotton controversies reflect national actors' attempts to appeal to a shared social identity at a time when farmers are experiencing the fragmentation of their own social identity. The chapter argues that actors in New Delhi, whose voices are frequently heard outside India, attempt to create and recreate a sense of unity as a nation by anchoring their claims and claimsmaking activities in the notion of farmers. At the same time, cotton growers in Gujarat are struggling to reformulate their social identities, and may be decoupling from their social groups (Indian and their village) after having had their identity fragmented by three decades of a market economy.

A burgeoning number of studies have dealt with genetically modified crops (GM crops) in Indian society, including issues of social concern (Rhoe *et al.*; Sahai 2003a; Wakeford and Pimbert 2003), economics (Jenkins 2003; Qaim and Zimmerman 2003; Qayam and Sakkhari 2003; Sahai 2003a), and political motives (Newell 2002; Scoones 2003). While these studies have contributed to an understanding of the conditions surrounding GM crops in India and arguments that decisions about the future of agrifood biotechnology cannot be based upon scientific knowledge alone, the studies tend to emphasize the objective conditions related to GM crops. These studies rarely attribute tensions over introducing *Bt* cotton to actions and reactions of individuals who view existing or putative social conditions as problematic. In understanding *Bt* cotton in India, however, we need to explore the subjective engagement of individuals and groups, because many of the social, economic, political and ecological conditions

discussed in other studies are putative or have yet to become firmly institutionalized, allowing actors to alter conditions. In addition, analysis presented in the foregoing chapters suggests that the claims and deeds of actors have driven much of what happened with the adoption of *Bt* cotton. This paper analyzes corpora related to *Bt* cotton in India, with the assumption that interactions among actors play a significant role in shaping problems related to agrifood biotechnology and hence the governance of GM crops through regulations and institutional arrangements. The argument here is based on the premise that the communicative behavior of actors creates a particular interpretation of *Bt* cotton, which in turn imposes a particular boundary which works to define what is appropriate governance for GM crops in India.

### The Notion of Farmers

The notion of *farmers*, referring to a cluster of concepts related to farmers and farming, has been a recurring theme in the agrifood biotechnology debate in India, as shown in preceding chapters. The basis for the importance of the notion lies in India's economic and political conditions. With approximately 60 to 70 percent of one billion Indians making a living from agriculture, contributing 30 percent of the gross national product (GNP) at present and having the second largest arable and permanent cropland in the world – following only the U.S. – India's economic life revolves around farming (CIA 2003; ILO 2003; Rao 2000). Despite the sector's decline in contributions to India's GNP relative to other sectors such as modern industries and services, particularly since the adoption of

economic liberalization policies in 1991, agriculture still plays a significant role in India's economy. This in turn translates to a degree of political influence of farmers over local, regional and national politics. Further, India's democratic political system, which assures civil and political liberties of its nationals, will help farmers to influence and become involved in policy-making processes at all levels. Indeed, farmers' unions have always been the crucial political force outside normal governmental institutions (Brass 1994; Gupta 2002).

Further, the notion is a significant rhetorical tool used by political and spiritual leaders to create a sense of unity among people with differing ethnic. linguistic, religious, and cultural backgrounds. In fact, creating unity within diversity has always been a significant social agenda shared by Indian political leaders. The notions of agriculture, farmers and farming recur in public speeches, sermons, political manifestos and other public oratory in describing India's core values and roots. The notion is also used to call into guestion the validity of the current development path that emphasizes industrialization and integration into the global economy. For instance, the political manifesto of India's Congress Party lists reinvigoration of agriculture as a key element of its platform. The party relates agriculture to their political slogan of "Back to Basics," which derives from India's philosophy of self-reliance, self-governance, and self-sustaining economic and political development. Their political manifesto implies that farming is an important means of achieving a development path reflecting such a philosophy (Congress Party 2004). Even in day-to-day

conversation, the expression "simple village life" reflects a general fondness for rural communities.

The notion of farmers also impinges upon India's ideologies of development, which serve as a frame of reference for actors establishing and/or re-establishing views towards *Bt* cotton. Throughout its history, and particularly since independence in 1947, India's approach to development has reflected tensions between modernity and tradition, secularism and religion, modern scientific knowledge and indigenous knowledge (Devy 1998). Some suggest that modernization requires a break from history, traditions and religions, reflecting Nehru's philosophy (Khilnani 1997), while others interpret modernity in India as openness to Western ideas while maintaining independence and self-rule in all spheres (economic, political, and spiritual lives) a position following Gandhi. In much the same way, interpretations of *Bt* cotton reflect these fundamental attitudes towards development. That is to say, the introduction of *Bt* cotton involves not only a consideration of the technical and scientific specificity of Bt cotton, but also reconsideration of the elements deriving from the other end of the continuum of development ideology, such as traditions and Indianness. Therefore, interpretations of *Bt* cotton inevitably involve redefining the whole range of issues deriving from endogenous, not exogenous elements, such as indigenous farming methods as opposed to the Western scientific methods for agriculture, the roles of the agricultural sector as opposed to the industrial sector in India society, and the roles of farmers as opposed to the roles of scientists in adopting Bt cotton.

#### **Concepts and Methods**

### **Social Identity Theory**

Bt cotton controversies have forced various actors to reshape their identities in relation to Indian agricultural and governmental processes. Social identity theory offers insights into these dynamics and provides a conceptual tool for understanding how identities are (de)coupled. The theory of social categorization suggests that individuals hold a collective awareness of themselves as a social group with a distinct social identity. Actors determine which groups they belong to and who belongs to their social groups, then draw boundaries between actors within ingroups or outgroups (Turner 1987: 1). This distinct social identity gives actors a sense of belonging to a particular social category, from which they draw norms and values when interpreting a situation. When evaluating the validity of their own or others' interpretations of an object or an issue, actors compare their views with those of others in the same social category or in other categories, then calibrate their own views based on these observations, keeping cognitive dissonance at bay. Seen in this light, the questions of who said what, and whether to trust him/her become more salient in interpreting the consequences of Bt cotton than substantive consequences of Bt cotton use. In other words, views on Bt cotton and subsequent actions are determined by the boundaries of ingroups and outgroups that actors draw.

To understand the social dynamics embedded in the controversy, one must address the question of where actors draw their values and norms. As suggested in Chapter 3, even when holding the same position on *Bt* cotton,

whether for or against, or emphasizing similar issues they consider important in terms of *Bt* cotton's impact (issues in governance), actors in the national arena differ greatly from actors in the local arena in their interpretive processes. While actors in the national arena look to institutional arrangements such as biosafety regulations and environmental laws in making judgments and arguments about the costs and benefits of adopting *Bt* cotton in India, actors in the local arena such as state government officials, local NGOs, and farmers depend upon their experiential knowledge in determining what is right and wrong. In other words, actors in the national and local arenas base their decisions on different inputs, suggesting that the local/national distinction influences them more than other factors when formulating their views towards *Bt* cotton. It seems actors in the national arena identify with other actors in the national arena, while actors in the local arena identify with other local actors, despite differences in their social categories (e.g., government, industries, farmers).

The amount of polemic which has arisen around the *Bt* cotton issue highlights the need for understanding how this debate has reshaped (or entrenched) identities. In cases where actors have a strong emotional attachment and commitment to their group, individuals attempt to embed their own values and norms within those of a group (Hogg and Abram 1988) so that their claims will reflect its values and norms. Such parallels in values and norms make the group more cohesive and unite the claims and actions of group members. On the other hand, when group membership imposes constraints upon individuals, actors decouple themselves from the group so as to seek

control of the conditions that surround them (White 1992). In this way a group loses its cohesiveness and breaks into smaller sub-groups.

A discourse perspective – consisting of actors, claims, strategies, and outcomes – provides the analytical framework for understanding the social dynamics generated among interested actors. Critical to this perspective and relevant to the discussion of this chapter is the view that a perceived social reality can be analyzed through examining actors (Touraine 2000), claims, and claimsmaking activities (Benford and Snow 2000). A discourse perspective is particularly helpful when exploring interviewees' opinions of an object or a new idea and their interpretations of the opinions of others because it will conceptually delineate who said what and what the consequences were of these claims. Analyzing discourse and discourse processes in this manner focuses the research on the competition among actors struggling to maintain a presence in society by creating and claiming a particular identity in relation to other actors.

#### Methods

To analyze actors' anchoring strategies, three types of data relative to the discourse on genetically engineered cotton in India were collected. First, 95 interviews,<sup>2</sup> both structured and semi-structured, were conducted from July through September 2000 and from August 2002 through May 2003, in New Delhi,

<sup>&</sup>lt;sup>2</sup> Ninety-five interviews consisting of 22 interviews with actors in government, 20 in civil society, seven in industries, eight newspaper reporters, 38 cotton growers, and 15 scientists. All the scientists interviewed have primary affiliations, such as in government ministries and in industries, so they are counted both in terms of their affiliation and as scientists. Subsequent interviews are not included in the cumulative number because the stories tend to be sequential.

Mumbai and Gujarat. Respondents included actors in government, civil society. industry, mass media, scientists, and farmers. The social actors in the sample were identified first from coverage in the English-language Indian newspapers and subsequently using a snowball sampling method. Some interviews lasted nearly two hours while others lasted only ten to fifteen minutes, depending on the availability of the interviewees and their willingness to be interviewed. In cases where interviews did not provide sufficient data. I attempted to pay several visits to the same person, to interview other people in the same category, or to collect other information such as fliers, leaflets, and brochures as supplements, if available. Interviews with actors in government, civil society, industries, and mass media, including scientists, were semi-structured and mostly done in English, and were taped and transcribed. Interview questions were geared towards the social locations of actors, interpretations of the commercialization of Bt cotton, their perceptions of the views of other actors, and perceived social outcomes.

Interviews with growers were slightly different in nature and more challenging than the other interviews. First, growers did not generally feel comfortable being interviewed alone, with the few exceptions of farmers who were village authority figures, so interview sessions tended to be in a group setting. In order to ensure the correct association of interview context with individuals, we made sure that questions were directed to the individual being interviewed and that the individual would respond; then each individuals are asked the same set of interview questions. Because I was concerned about

taking time out of their schedules and about their willingness to participate in an interview which could involve long periods of waiting, we made sure to hold interview sessions on the days that they told us to come, generally after lunch or evening hours. On occasions where others who were not being interviewed interjected information, a translator at the interview sessions made notes for me to identify who said what in the recording. Second, interviews were done in Gujarati with two research assistants (one using the interview guide to ask questions and the other taking notes in English so that I could broadly follow what was being discussed). Finally, the grower interviews were also taped and subsequently translated and transcribed by one of the two field translators.

The second data type used in this paper consists of articles collected from the major English-language Indian newspapers in the Lexis-Nexis database and from several major Gujarati newspapers collected manually, so as to supplement interview transcripts and to provide contextual information. These data were discussed in depth in the preceding chapters. Finally, field notes based on observations of actors were utilized in the analysis and interpretation of data. These include notes from seminars relevant to agrifood biotechnology organized by industries, government, NGOs, academic institutions, farmers' field days, and field notes taken when I accompanied journalists interviewing other actors.

All interviews were transcribed, stored, and coded using the qualitative data analysis program NVivo. Similarly, all of the newspaper articles and field notes have been stored and coded in NVivo. Analysis and interpretation of data uses ethnographic content analysis (Altheide 1987) so as to discover emergent

themes and patterns that are significant in understanding actors, their claims, and activities related to *Bt* cotton.

#### Findings

#### Talking about Bt Cotton: A Sketch

Following the classical content analysis method (Stempel and Westley 1989), I conducted a preliminary study of the interview transcripts prior to beginning an in-depth analysis. Appendix C presents the relative frequency rankings, by actors, of key terms in the domain of this study. Words not substantively relevant or of lower frequency are not included. The list provides a larger picture of the issues and concerns articulated by the six types of actors, and more importantly shows that the category of farmer was established as a distinct and significant social category across the six types of actors interviewed.

First, the significance of the category of farmer is reflected in the fact that the word *farmer(s)* is used relatively more frequently than other words. Interview content differs from that of agrifood discourse in English-language Indian newspapers (Chapter 2), where actors in government appeared to have played the central role in discussions represented in newspaper articles. Second, comparison of the words used by actors in government, industries, civil society, mass media, and scientists with those used by farmers show striking differences. It was found that many of the higher frequency words used by farmers are either not present or are ranked low in the columns of other actors. Conversely, many of the higher frequency words used by the other actors are not present in the

column for farmers. For example, the words *land* and *water* are often used by farmers but not by others. The words *pesticide(s)* and *pest(s)* also rank high in the farmers' column, but low in the columns of others. The words *Bt* and *government* rank high elsewhere but are not present or rank low in the farmers' column. In short, the table suggests that actors across categories view the notion *farmer(s)* or the label *farmer(s)* as significant in discussing *Bt* cotton, and that they associate the label with a significantly distinct social identity.

### **Discussion in the National Arena**

Even a cursory examination of the content of interviews reveals that the notion *farmer(s)* receives an enormous amount of attention in Indian agrifood biotechnology discourse in comparison to other social categories such as government or scientists. This section will elaborate further by describing how actors used the notion in their discussions about *Bt* cotton. First, among the several characteristics of claims involving the notion of farmer(s), the most salient are actors' attempts to project a particular image of farmers in relation to the societal changes that the commercial introduction of *Bt* cotton will bring about. Establishing a social identity of farmers is important for national actors because the image of farmers, a major consuming sector of *Bt* cotton, is an important element in crafting claims about agrifood biotechnology. In other words, in order to gain public support for their claims and claimsmaking activities, they relate their arguments to the notion of farmers in such a way as to be accepted by the public. Second, by invoking the notion of farmer(s), national actors attempted to

demonstrate how their identities relate to the social identity of farmers. In some cases actors embedded themselves in the farmer identity, while in others cases actors used the farmer label in their discussions. Third, actors used their versions of farmer identity and their relation to farmers within a narrative about a particular event that actors had observed or experienced related to *Bt* cotton controversies. By telling stories about a particular experience, actors emphasized values and norms that they considered important for India.

### Social Identities of Farmers

Despite the opposing views towards genetically modified organisms (GMOs), the various organizational affiliations, and the many roles assigned within an organization, predominantly non-farmer actors in the national arena portrayed Indian farmers as powerless and vulnerable. Actors in government who supported GMOs and some actors in civil society who opposed GMOs had emphasized the helplessness and economic vulnerability of farmers. As a government official noted,

For the Mahyco-Monsanto people, if the market rate is a hundred rupees, they may charge a thousand rupees. People will have no choice. So, anything that is in demand, farmers will have to pay for it. So this is the second fear I have in mind, that Mahyco-Monsanto will charge anything. They will exploit the weaknesses. They will exploit the helplessness of our Indian farmers. They, the farmers, again will lose out.

This government official was expressing his concern about the overwhelming dominance of a multinational life sciences company whose vital contributions to the global seeds and pesticides market would result in the systematic exploitation of Indian farmers. The following comment by an actor in civil society also emphasized the existence of systematic exploitation of farmers. He noted that the current political economic system had forcefully locked farmers into the competitive global market.

As I said earlier, we have 550 million farmers. Out of that, 70 percent are small and marginal farmers. What is important is the entire agreement [*of the WTO*] on agriculture – the way we have agreed upon – is going to break down barriers and open up markets. So we are now going to have cheaper imports coming into our country. When the cheaper imports start coming in, what will happen? The marginal farmer will be thrown out of agriculture. What will happen when he is made jobless?

Observing the economic changes that took place in India after the inception of

India's economic liberalization policy in 1991, these actors suggested that

farmers would never benefit from Mahyco-Monsanto varieties.

Other actors suggested that the policy created a rather absurd market

situation in which there were far too many agricultural input suppliers, both in

public and in private, and too many types of varieties available to farmers,

supplied by companies of Indian and international origin. As a result, farmers

were increasingly unsure which varieties and agricultural inputs to use:

In India, more than 200 varieties are sown. Among these 200 varieties, 22 varieties are GOI [government of India] supported varieties. Various seed multiplication programs have been carried out by private companies...no restrictions are imposed upon the private sector...The same situation applies to pesticides and fertilizers. There are an unlimited number of pesticides and fertilizers marketed in India. (Interview with a government actor)

These actors pointed out that liberalization of the agricultural inputs market has been a mixed blessing to farmers. While they seem better off for having a range of seeds and pesticides to choose from, the farmers have lost their bearings on their farming methodologies by having been forced to learn about these new products. Farmers find it increasingly difficult to decide which seeds and pesticides to use, and thus need to depend on experts such as scientists and extension agents to figure out how to manage farms. In short, these actors interpreted "farmers" as alienated from agricultural knowledge, which used to be adequate for the managing of their farms. Consequently, farmers are constructed as disempowered, that is, to depend on other actors.

Actors in civil society, who also portrayed farmers as powerless, drew a much more pessimistic picture of farmers. An adamant opponent of *Bt* cotton. and one whose claims have frequently appeared in English-language Indian newspapers, described farmers' vulnerability by identifying farmers as "slaves of seeds." He, like many other interviewees in civil society, touched upon an episode concerning cotton growers' suicides in the states of Andhra Pradesh, Karnataka, Maharashtra, and Punjab. The extent of the problem (in terms of the number of cotton growers who committed suicides) and the direct causes of the large number of grower suicides are unclear. Therefore, the story about these incidents, which occurred in the cotton growing regions of India, has been used by both sides as factual evidence supporting or opposing the commercial introduction of *Bt* cotton (e.g., *Times of India*, February 11, 2001; *Economic* Times July 6, 2001). For instance, an actor in civil society who opposed GM crops pointed out that pesticide suppliers were to be blamed for recommending that farmers use "cocktails" of synthetic pesticides should farmers begin to notice pests developing resistance. He also blamed bankers and money lenders, who

had humiliated farmers by taking away tractors and buffaloes when loans were not repaid on time. He went on to say that under the present circumstances (wherein somebody else is in control of farmers' lives and the economic problems that farmers face are too serious and widespread), the introduction of several varieties of *Bt* cotton would not be a solution to the crises that threaten farmers.

Contrary to the image of farmers being powerless, there are characterizations of farmers holding great power. Of all actors, news reporters were most explicit in associating farmers with the image of a powerful actor and enumerated why they perceived farmers to be influential in decision-making involving GM crops. The portrayal of farmers as powerful and proactive has been common in news reports. Between 1992 and 2002,<sup>3</sup> 27 articles covered stories about demonstrations, rallies, and other movements organized by or for farmers. A range of stories appeared in the newspapers, including accounts of farmers burning field trial sites, demonstrating against *Bt* cotton cultivation, opposing the sale of transgenic seeds, protesting the initial decision of the Genetic Engineering Approval Committee (GEAC)<sup>4</sup> not to approve *Bt* cotton seeds, and demanding the scrapping of the GEAC. All of these stories portrayed farmers as extremely proactive and, ultimately, successful in their efforts to influence the outcomes of the central and state government decisions pertaining

<sup>&</sup>lt;sup>3</sup> A Lexis-Nexis online keyword search for *Bt cotton*, *India*, *field trials*, and *terminator technology* yielded 390 articles. Details are given in Chapters 2 and 3.

<sup>&</sup>lt;sup>4</sup> The GEAC is one of three committees that oversees biosafety aspects of transgenic crops, along with the Institutional Biosafety Committee, and the Review Committee on Genetic

to the introduction of Bt cotton seeds into India. The following passage is from a

report that came out in December 1998, when India's mass media began to pick

up on the *Bt* cotton story:

'Farmers,' it is said, led by Prof. Nanjundaswamy of the Karnataka Rajya Raitha Sangha, attacked the Monsanto seed farm near Malaldguda in Raichur district and destroyed the cotton crop in order to protect Indian farmers from the dreaded Terminator Gene. The campaign was repeated in Bellary district and other "farmers" in Andhra Pradesh did the same thing. Speaking in the name of all of them, Prof. Nanjundaswamy has vowed to repeat it in Maharashtra and Punjab (*The Hindu*, December 14 1998).

Beginning in January 2002, newspapers began to cover stories about

farmers' groups supporting Bt cotton. Again portraying farmers as proactive and

powerful, the story reports on a rally that took place in New Delhi before the

GEAC had authorized the commercialization of *Bt* cotton:

Just a day before the Genetic Engineering Approval Committee gave its conditional clearance to the cultivation of *Bt* cotton on March 26, 2002, farmer representatives led by Sharad Joshi – who formed part of the Kisan Coordination Committee - threatened to launch a civil disobedience movement if the approval didn't come through...KCC representatives from all the cotton growing states in the country like Gujarat, Maharashtra, Punjab and Andhra Pradesh firmly supported the introduction of *Bt* cotton in the current kharif season<sup>5</sup> itself. Interestingly, tough questions were then posed to Mr. Joshi and company by the journalists – notably, regarding the credentials of the foreign-funded platform they were speaking from, right down to why they were pressuring the GEAC to approve *Bt* cotton. But the farmer representatives defended themselves stating that they had the right to check out the latest technology as their cotton crops were severely affected by bollworm attacks. (*Financial Express*, April 3 2002)

Reporters pointed out that the sheer number of farmers in India would fully

account for their power and influence, as farmers constitute the majority of India's

Manipulation. These committees have been criticized for their inefficiency and ad hoc nature. An expert panel was established in February 2004 to review the need to revamp the system. <sup>5</sup> Wet season.

population. Rural votes, one interviewee said, translate into the election of fully two-thirds of the members of India's legislative bodies. Thus, the close cooperation of the government and farmers' unions is a useful strategy whereby farmers, as well as politicians and policy-makers, can gain political clout.

### **Relating to Farmers**

The interviews indicate that national actors either embedded their identity in the social identity of farmers or frequently used the farmer label in describing their views on *Bt* cotton. Indeed, actors emphasized their farming background and experiences or their close relations to farmers. Assertions such as "I myself come from a farming family," "I have lots of experience of farming," and "my organization is keen on working with farmers" were expressed often and with enthusiasm. In New Delhi, even actors such as research scientists or technocrats in New Delhi, who typically do not appear to have frequent interactions with farmers in their daily activities, mentioned the importance of being in touch with farmers and farming experiences in understanding their work on modern biotechnology:

Scientists used to be very happy if we could publish papers in the magazine *Nature*. We used to be on top of the world. We were not bothered by whether our findings reached farmers or not. But today, I feel that there should be no barriers, no walls, between the research laboratory and the farmer. I feel it is the responsibility of us scientists to take our message to farmers. (Interview with a scientist)

... [*the farm-level demonstration of Bt cotton*] is going to play a very important role because poor farmers whose livelihood depends on their produce from a hectare of land will not like to try a new technology blindly. (Interview with an actor in government) As suggested in Chapter 2, the claims and the claimsmaking activities of actors in industry have been relatively subdued in comparison to those of other actors, so it is difficult to describe fully how actors in industry see themselves in relation to farmers. However, a page-long ad that appeared in *The Financial Express* (December 8, 1998), entitled "Monsanto's commitment to the Indian farmers" shows that industries wished to portray themselves as being at the service of farmers. Representatives of seed companies who made several other claims in other major daily newspapers cast a similar tone. This again shows actors in industries attempting to demonstrate their close allegiance to farmers by frequently invoking the farmer label every so often in their public relations efforts.

In contrast to actors in other categories, those in mass media rarely expressed their views on *Bt* cotton even in face-to-face interviews. Indeed, they appeared to take extra care not to give the impression that they were choosing sides on the *Bt* cotton controversy. Despite such ambiguities in their positions on *Bt* cotton, news reporters made it clear that farmers have the highest stake in these disputes. Thus, news reporters, too, embedded their identities in the identity of farmers, their comments emphasizing the high priority of farmers' needs. Although journalistic norms drove news reporters to report and to claim a range of views, rather than emphasize a specific point of view (Ten Eyck 1999), all the news reporters who were interviewed for this research showed their emotional investments in the notion of farmers.

All of these phenomena indicate that actors in the national arena believe that anchoring their identities in social identities of farmers or using the farmer

label in their talk confers a real advantage in the formulation of persuasive arguments for or against *Bt* cotton. Non-farmer actors believe such anchoring strategies will help to create an image of them as credible claimsmakers representing the interests of farmers. This phenomenon also suggests that the values and the norms of Indian society at large encourage non-farmer actors in New Delhi and Mumbai to carefully follow both the roles that farmers play in the adoption processes of *Bt* cotton and the context that surrounds farmers when non-farmer actors describe their positions for or against *Bt* cotton. If actors are unable either to relate themselves to the notion of farmers or to use the farmer label in their discussion of *Bt* cotton, these actors' claims and claimsmaking activities will not be trusted in the Indian context. While deliberation over agrifood biotechnology in the non-Indian context may involve consideration of the roles of both scientists and scientific knowledge, in the Indian context, the notion of farmers plays a significant role in actors' negotiations with other actors.

Actors believed to have overused or misused an anchoring strategy were subject to criticism. The following example shows that civil society actors who oppose GMOs criticized other civil society actors in the same camp by pointing out the misuse and abuse of such strategies.

I feel that farmers are misrepresented here and there. This [farmers'] movement in Karnataka [*in opposition to GMOs*] has no impact in India...much of the questions raised are flagged from the Western perspective. Claims made by these people have submitted to the Western influences. Therefore, government can easily dismiss their claims. Whatever the claims made by these people, the claims will end up being only counter productive. (Interview with an actor in civil society)

A news reporter, critical of GMOs made a similar observation:

Now, right before the GEAC has approved *Bt* cotton, the NGO, Central Institute<sup>6</sup> has convened a press conference. I was there with many other people, both from India and from abroad. Suddenly, how can the people who are not farmers enter into discussions like that? They are trying only to influence the decision-making processes. It is not ethical to try to represent farmers like that.

Another news reporter shared his view that one leader of a farmers' union is not

a legitimate voice for farmers:

There is the farmer leader called Suresh Yadav,<sup>7</sup> who was very much in the limelight about 15 years ago. He was successful in influencing the policies in a way that favored onion growers. But now he has less influence over farmers. The number of followers has decreased. The problem is that Mr. Joshi sits in various government committees and has become a part of the system, whereas the farmers are not part of the system. (Interview with a news reporter)

In an effort to counteract such criticism, a farmer leader again reiterated his

farmer identity and drew a clearer boundary between himself and other actors in

civil society who had taken part in the Bt cotton controversies:

I started to hear about other NGOs during the last two years or so. I did not hear about them or see them when the Indian farmers were really suffering from government policies. It is only after the WTO came in, and when there was an air of liberalization and globalization, that these NGOs suddenly developed an interest in farmers. Their basic interest is in opposition to liberalization and globalization, not in farmers.

These stories that characterize the vulnerability and powerlessness of

farmers reflect a strong sense of shared national identity, built around the social

identity of farmers and around non-farmers' responsibility to protect farmers.

<sup>&</sup>lt;sup>6</sup> Not the actual name.

<sup>&</sup>lt;sup>7</sup> This is not the actual name. Although this news reporter's observation might accurately reflects his experiences, conversations with farmers not only in the village where fieldwork was conducted but also in other villages in other districts gave me a sense that farmers viewed Mr. Yadav as their

# Outcomes

A news reporter indicated that India needs to take a precautionary step in

considering the adoption of *Bt* cotton to make sure that farmers are protected

from any negative consequences:

In and around the time that the GEAC approved *Bt* cotton, farmers demanded that they want seed...the State Minister of Punjab also made the statement that farmers were demanding seeds...you know but farmers are not aware of scientific dimensions...there were such incidents like those involving the cotton growers in Andhra Pradesh who committed suicide because of the spurious seeds and the spurious pesticides...who can be held accountable to these problems. I feel that we ought to take a precautionary approach...and use our own scientific community to test technology.

Comments by a scientist working for a public research institute echo such

sentiments:

In the first instance, Indian people or Indian farmers are not only illiterate and poor, they are foolish also. If one farmer says it is a good one, OK I will do without caring what will happen. They are not concerned with the results. If he has done it, I will also do it. In that system, if one variety covers a large area, and if something happens to that one variety, maybe due to environmental conditions or weather conditions or rainfall...maybe an area is not suitable for such a variety, entire area will be just lost. A scenario like this will be hard for Indian farmers to bear.

The process leading to the enactment of a national bill, the Plant Variety

Protection and Farmers' Rights Act, plainly demonstrates the significant role that

the relations between non-farmers and farmers play in shaping the type of

agrifood biotechnology policies that India adopts. Indeed, among the laws and

the regulations that govern the various stages in the adoption of transgenic

seeds, the Act, passed into law in 2001, is an explicit demonstration of the kinds

leader. Indeed, throughout the time that my fieldwork was conducted, Mr. Yadav, whose primary residence was in Maharashtra, was in various villages in Gujarat, interacting with farmers there.

of relations that non-farmers have with farmers. This act, which includes a separate chapter on farmers' rights, is the first legislation in the world to confer onto farmers the right to sell seed to other farmers (Sahai 2003b). The Act's emphasis on farmers' rights demonstrates that Indian policies pertaining to agrifood biotechnology accord prominence to the farmer. This privileging of the farmer reflects how many Indians conceive of the relations between non-farmers and farmers. Indeed, prior to the Act, members of the joint parliamentary committee on the Protection of Plant Varieties and Farmers' Rights Bill consulted extensively with farmers in deciding its nature and content (*Business Line*, August 26, 2000).

### **Discussion in the Local Arena**

## Social Identities of Farmers: Presenting the Self

Interestingly, the self-image of farmers in Gujarat who support *Bt* cotton confirm the national actors' characterization of farmers as vulnerable. Farmers in Bhadharpur<sup>8</sup> in Gujarat recounted various episodes confirming vulnerable and powerless states. Farmers indicated that their vulnerability derived from their having been caught up in a range of economic problems including the ever-increasing costs of synthetic pesticides (especially those manufactured by MNCs), the combination of an increase in the wages of laborers and a worker shortage, and the fluctuating prices of lint:

Nowadays, labor charges are high, fertilizer and pesticides are expensive, and prices of lint are very low. Last year, I ended up purchasing so many

<sup>&</sup>lt;sup>8</sup> Not the actual village name.

pesticides. I have purchased them on credit and used a ridiculous amount of pesticides. In the end, I scared pesticides dealers...I suppose that they were scared because I wouldn't be able to pay. And I suppose they thought I am going mad...my advice to other farmers was that if you are willing to build the debt, go ahead and grow cotton but otherwise don't. It is like asking for trouble. (Interview with a cotton grower)<sup>9</sup>

One reason farmers view themselves as vulnerable hinges on their perceived

integration into the liberalized market. The following comments by a farmer

indicate their lottery-like situation in the sale of cotton. The success or failure of

the deal depends uniquely on market conditions:

In last season, the sales prices of chili was far more attractive than prices of cotton in the market. Chili is good because hard work translates into a good yield. Cotton is just like the lottery. You may win, but may lose. You never know what to expect....

However, farmers attributed their economic problems, such as the

accumulated debt from the purchase of expensive pesticides, to government

processes, not to the price of pesticides. Therefore, many farmers believed that

they must request government assistance in order to bring about the best

solution to their economic woes:

Some years ago, we organized a movement that targeted the government and that demanded the cancellation of our interest-bearing debts. The government has agreed to cancel the interest from these debts, but we still have to repay the principal. If, someday, representatives from the society come to ask me to repay my debt immediately, I will tell them to kill me if that's what they want, because I am unable to pay it back. My entire family leaves the house early in the morning and goes to the farm and comes home around noon. Again, we go to the farm around three and work till seven. We are working extremely hard but we never see the profits.

Farmers are clearly aware that market mechanisms determine the patterns of

their work and finance. They see that economic problems such as the

<sup>&</sup>lt;sup>9</sup> The remaining quotations are interviews with farmers, unless otherwise noted.
accumulation of debt stemming from the purchase of pesticides are created through such market mechanisms.

In addition, when referring to the major causes of their vulnerability, farmers pointed out multiple agronomic problems such as water scarcity, soil degradation, and pest infestations. The district where the village of Bhadharpur is located, indeed, has been facing several soil-related problems such as water erosion and soil degradation from saline water (Gujarat Ecology Commission 1997). Moreover, in 2002 (a year before interviews were conducted), the village saw a catastrophic bollworm attack. Then, in 2002, my interviews coincided with the most severe drought conditions since 1987 (*Encyclopedia Britannica* 2002):

In normal cases, we spray only once every 15 days or so...last year [2001] we, farmers, sprayed pesticides every three to four days.... These pesticides are high dose pesticides like *Avant*.<sup>10</sup> They are about Rs.10,000/liter, very expensive.

A majority of the farmers whom I interviewed shared stories about serious pest attacks in 2001. Some who could afford to purchase pesticides that were manufactured by MNCs used them in large amounts. Farmers who could not afford to buy the imported pesticides used ones that, available locally, were considered inferior to the MNCs products. Farmers believed that their vulnerabilities stemmed from two related problems: pest infestations and exorbitant pesticide prices. Interestingly, farmers rarely assigned blame to the MNCs that manufactured and sold these pesticides. From the farmers' point of view, MNCs were the actors that developed quality pesticides and put them on the market without any intention of exploiting farmers. However, pesticide dealers were perceived as profiteers that interacted, not always scrupulously, with farmers.

A major issue for farmers was their inability to control and manage their farms in ways that adhered to the farmers' wishes:

Actually last year pests were not controlled by any kind of the pesticides Green bollworm was the major problem for us, and, after November, *lashkan*<sup>11</sup> harassed us no end. I constantly sprayed pesticides to control them, but I couldn't succeed.

When describing the pest attacks of the previous year, the farmers whom I interviewed, particularly those in their thirties and forties, emphasized a decline in their capacity to control their farms. Throughout their lives, they had been familiar only with high-input agriculture, which typically involves large amounts of synthetic pesticides and fertilizers. To their minds, farming had always been a business-like enterprise that required proper control and management. Thus, interviewees noted that a situation in which farmers were unable to control their enterprise, regardless of their investment that they make, was a situation that rendered them vulnerable.

# **Relating to Other Actors**

In addition to the economic and agronomical problems that farmers deal with, perceived vulnerability derives from the social dynamics arising from

<sup>&</sup>lt;sup>10</sup> Not only this farmer, but many other farmers being interviewed, pointed out that they find pesticides such as Avant, Confidor, and Endosulfanare expensive but they have no other choice but to use them to save their plants.

interactions between farmers and those actors in the cotton commodity chain who have become integral to farmers' lives. In dealing with the range of actors around them, including traders, pesticide dealers, and government representatives, farmers felt "cheated." For instance, when selling their lint, farmers interact with traders, co-ops, or people at government-run corporations. Farmers took issue with all three of these actors.

Muslim people own their trucks, so they do not have to rent a car to collect lint from my village...besides they give us less weight for lint. It is usually the case that traders get one quintal extra each day by collecting extra lint from each one of us.

Farmers who interacted with traders accused the latter of unfair practices.

To the farmers' minds, traders are economically prosperous because they benefit

from a range of material resources such as trucks and scales. Thus, farmers

have concluded that those persons who are materially prosperous (the haves)

ought to help others who are not (the have not). Consequently, a commonly held

belief is that exploitative practices undertaken by the haves are immoral.

Farmers also complained of unfair practices typical of the representatives of co-

ops and the CCI,<sup>12</sup> which market the farmers' cotton. The co-ops and the CCI,

according to the farmers, work little and profit a great deal while farmers work a

great deal and profit little:

Their role is to exploit...we don't feel the need to have a co-op. It was initially the government's plan to set up the cotton union [*co-op*] for the sale of our cotton. But it is not working well. People at the co-op have never been present when they purchase lint from us nor do they sell lint to

<sup>&</sup>lt;sup>11</sup> A popular term used to describe armyworm, a major pest in the area, which defoliates young cotton plants.

<sup>&</sup>lt;sup>12</sup> Cotton Corporation of India, a government affiliate specializing in cotton marketing.

the market...If we deal with these people, we have to pay them a commission.

Most of us farmers are cheated by everybody. If we sell our lint to the CCI...we feel cheated. We have no way of knowing which prices to offer when we sell cotton to them...Say if the market price is Rs.22,000/bale, well, we ended up selling Rs.18,000/bale...I tell you, these people are corrupt.

None of the farmers were sure whether their claims accurately reflected

reality,<sup>13</sup> though the situation leaves them wary. Indeed, cotton prices vary

substantially over time because prices are generally highly sensitive to domestic

and international market situations. Under circumstances in which the

importation of cotton is fully liberalized and there are no government subsidy

programs for cotton growers, remuneration to cotton growers in India tends

(unlike the remuneration to cotton growers in the U.S.) to fluctuate with market

prices more than in countries with a price support system. This tendency

suggests that perhaps Muslim traders and the CCI were paying less because the

market prices happened to be low on the day they collected cotton.

Farmers frequently shared their bitter feelings toward the government because

they resent government agricultural policies and government management of

those areas of international trade concerning the exportation and the importation of cotton:

I heard that in America farmers get 95 percent subsidies...but in India we farmers never get any support from our government.

In Israel, government has a direct contact with farmers...so that farmers get benefits directly from the government; no commissions are taken by middlemen, whereas we in India always have dealings with middlemen who get commissions.

<sup>&</sup>lt;sup>13</sup> Farmers who made these types of claims were predominantly owner cultivators and Hindu.

The examples of other countries that farmers brought up almost always

concerned how some governments protect their farmers while the Indian

government stridently opposes such protections. In addition, a common

pronouncement made by farmers was that the government is incapable of

handling the range of trade negotiations that global market mechanisms call for:

This year we are using *Bt* and we are expecting good yield from it, but you know what is happening to us? The government has decided to import cotton from other countries...and this liberalization of the cotton market will lower the prices of cotton in India and put us in a situation in which we profit a good deal less from the sale of cotton. Government officials have a vested interest in the import of cotton: they probably get some kinds of commission in the process....

We are exporting cottons to other countries, like Japan...I heard that a Japanese delegation came to India to purchase lint from the *H6* variety. They have asked the Indian government how long India can supply cotton to Japan. Because our government could not provide them with a clear answer, the Japanese delegation decided not to purchase cotton from India. We have many opportunities like this, but, because of the incapable politicians, we suffer.

For farmers, industry primarily refers to pesticide dealers. Beyond seed

dealers and pesticide dealers, farmers have few major interactions with sales

representatives of major seed and agrichemical companies. A seemingly

monolithic actor, such as an industry, is actually a loose aggregate of individuals,

consisting of a web of social relationships. This web of social relations can

create conditions where illegal activities are socially accepted (Denzin 1977).

Farmers voiced strong resentment of the ways in which dealers make profits at

the expense, so to speak, of farmers:

Dealers of pesticides tell us that they are selling pesticide 40%-50% less than the MRP [*maximum retailer price*]...What are the manufacturing costs of these pesticides? We do not know the manufacturing cost for

sure but, even if they reduce the prices by half, they would probably squeeze some impressive profits out of them. I sometimes wonder what it would be like if the prices of pesticides were at the MRP...how much profit would the pesticide manufacturer reap?

Industry names such as Mahyco, Monsanto and Navbharat, and the

names of their varieties such as Bollgard and Nb151 are mentioned frequently in

interviews. However, to farmers, these companies are not active agents who

would negotiate or interact with them. Thus, farmers described the poor

performance of several varieties of Mahyco-Monsanto or excellent performance

of a Navbharat variety, but rarely blamed Mahyco-Monsanto or praised

Navbharat for supplying such varieties; instead the farmers generally came back

to government incompetence:

I feel that the government made a terrible mistake...in banning Navbharat varieties. The government did this because of pressures introduced by the pesticide companies. You see, the business viability of pesticide companies will be at stake if we do not have to use pesticides. I used to spend Rs.25,000 for pesticides but this year I only spent Rs.250 for pesticides. I have only had to spray once, so far.

We think that the government has been influenced by pesticide companies...so they banned the use of Nb151. I feel that people in the government listen to them more than to us farmers. Politicians need to raise funds from these people in an election year...I don't think there is any formal union of pesticides firms in the pesticide industry but there must be an informal group that influences government. After all, why did the government approve the Monsanto varieties, the ones that do not perform well? We want to ask the government whether officials have been bribed by Monsanto.

Farmers take a rather less pessimistic view of scientists and news

reporters, characterizing them as potentially reliable sources of information,

particularly information pertaining to the impact that the use of Bt cotton has on

pest resistance, soil quality, and the yield deterioration that accompanies a shift

from F1 to F2 (first, and second generations of the original seed). However, a problem is that these actors, viewed by farmers as reliable information sources, are rarely accessible.

I see that newspapers and scientists are reliable sources of information for us, but they don't come to our villages...so I'll need to go to other farmers if I want to learn about new seeds.

Generally, I am going to the progressive farmers if I need some information about farming. Mostly, I farm according to my method, so I rarely go to other people like other farmers, extension agents, or scientists. But I like to hear what they have to say.

Indeed, on an occasion where I was invited to participate in a seminar

organized by Panchayat, a village council, I felt that farmers were eager for

information concerning the technical and scientific aspects of Bt cotton. Intensive

interactions arose between farmers and a range of speakers including district-

level government officers, scientists from a cotton research station, and scientists

from an agricultural university who gave lectures on the agronomy of Bt cotton

throughout the day.

By describing problems that arise from their interaction with others,

farmers were demonstrating that there is a clear boundary between farmers and others. In my interviews, farmers expressed a conviction that people belonging to outgroups were clearly different. It was often stated or implied that their values and norms are different from those of farmers; thus, in the eyes of farmers, their behavior sometimes appeared immoral. In short, farmers had difficulty in establishing a rapport with people whose social identities were different from theirs.

#### Decoupling

Among the many incidents associated with the *Bt* cotton controversy, one involving the spread of Nb151, an unauthorized variety of Bt cotton, greatly influenced and changed interactions between farmers. Two types of *Bt* cotton had become available for village farmers. One was the Mahyco-Monsanto variety called Bollgard, which had been tested under the supervision of the Indian government's interministerial committees, charged with the responsibility of overseeing the biosafety aspects of *Bt* cotton. The other, Nb151, had been sold by Navbharat Seeds, a seed company based in Gujarat. Recognizing the extent of the spread of unauthorized *Bt* cotton seeds, the GEAC issued a recall of Nb151 seeds from the markets and farmers' houses, of lint harvested from Nb151 seeds, and ordered the burning of standing crops of this variety. Being strongly in favor of Nb151, farmers resorted to all forms of counteractions, including storing F2, F3, and F4 of Nb151 (second, third, and fourth generations of the original seed), the mobilization of available social networks that might open up access to Nb151, the articulation of provocative claims critical of the government and their dissemination in newspapers, and the deployment of farmers' leaders to New Delhi for consultation with government officials. All of these coordinated claimsmaking activities were meant to persuade the central government not only to reverse or revise its decision but also to issue immediate approval of Nb151.

While engaging in these activities and regaining their sense of collective identity, farmers were nevertheless undergoing a fragmentation of their social

identity following unpleasant negotiations and interactions with their fellow farmers. At the time the interviews were conducted in 2002, Bollgard varieties were not abundantly available in the market, and the availability of Nb151 was low because the central government had banned sales of the seed during the previous cotton growing season, so the social competition for access to seeds was intense. The threat of not having access to these seeds had driven farmers to remove themselves from an existing social group and to reasign themselves to a smaller social category, such as their immediate family, that acted as the primary place for social interaction and a privileged source of information about access to Nb151. Comments such as "He [a farmer leader] said he would bring us back F1 on his next trip to Andhra Pradesh but he'll probably try to profit out of it," and, "I am not worried about the availability of Nb151 for the next season because my brother is planning to make a trip to Andhra Pradesh to get seeds." reflect why and how farmers felt that decoupling from a group was a better strategy than group membership, especially when the decoupling was thought to maintain a farmer's economic well-being. Skinner (1992) suggests that maintaining control of one's surroundings is an important element for individuals in relating to groups. Actors seek to gain control of a situation by resorting to numerous actions. For example, they seek knowledge that will explain or predict the course of events. If alternative choices are not present, actors decouple themselves from a group so that their social and economic well-being will not deteriorate further as a consequence of membership (White 1992).

The farmers whom I interviewed had chosen to decouple themselves from a social group whose boundary was otherwise parallel to the administrative border of a village, because access to Nb151 involved competition with fellow farmers. This trend became evident in the ways in which farmers brought up a range of labels to differentiate themselves from others. Instead of describing themselves as a farmer, a generic social category, or a farmer in Bhadharpur, a label that other people had given to them, the farmers interviewed were explicit in describing their differences from other farmers in the same village. Farmers perceived numerous social categories in their village and pointed them out, including, "rich and poor farmers," "farmers who own tubewells and who don't," "farmers who have big land and who do not," "Hindu and Muslim farmers," "farmers who own electric pumps and who don't," "farmers who have contacts with farmers outside village and who don't" and "farmers who belong to the farmers' union and those who don't." These are just a few among many distinctions farmers identified and discussed. The anchor that farmers used was still the notion of farmers, similar to the actors in the national arena. However, farmers found heterogeneity among the people who have been generally bracketed in this category.

As manifested in the confrontational comments of farmers regarding public policies on *Bt* cotton and government reactions to controversial events, farmers have had trouble with government appeals for unity in the national arena, and have resisted these appeals at every step. Farmers' efforts have gradually influenced other types of actors in the local arena, spreading values and norms

that created a background leading to a societal consensus on accepting continuous planting of unauthorized seeds. After the Nb151 controversy erupted in Gujarat, I observed a bifurcation in discourse at the national and local levels. At the national level, actors in government and some actors in civil society saw the illegality of Nb151 as a major issue because using the seeds violated India's biosafety regulations. They pursued the case by suing the owner of the local seed company. At the local level, on the other hand, the interpretations of farmers, seed companies, and some actors in state government were more practical, based on the immediate needs of farmers. These actors pointed out that they did not see any major distinctions between Bollgard and Nb151 and argued that Bt cotton had already been tested by the government for biosafety. Therefore, all the varieties using the same gene would, these actors concluded, have the same impact on the environment, regardless of their names. In the local arena, actors in both industry and state government chose to reformulate their values and norms in order to side with farmers, considering it more important to be identified with the values and norms of farmers than those of officials in the central government. This attempt by local actors outside the farm community to align themselves with farmers strengthened the power and momentum of the claimsmaking activities of farmers. Indeed, farmers began to claim that their activities complemented the interests of India as a whole. For example, farmers claimed that government decisions had been not for the common good but for the good of a privileged few. It was further argued that the government had made arrangements to foster a monopoly market for MNCs.

This line of interpretation has prevailed in Gujarat and influenced the ways in which the Nb151 incident was viewed locally. State government officials began to make claims in newspapers that were sympathetic to farmers and that portrayed them as the victims of, not as the culprits behind, the *Bt* cotton controversy. Such an interpretation ultimately translated into the Gujarat state governments' decision not to conform to the central government's plan to burn the standing Nb151 crops. This aggressive step by the state government meant that, at the local level, the central government had no apparatus through which it could implement its plan.

#### Conclusions

Given the various attitudes toward *Bt* cotton and the diversity of affiliations and interests of those involved, it becomes important to understand what, if any, common linkages have been formed among those involved in the controversy. Non-farmer actors who were interviewed share several underlying values and norms that bind them together as a coherent group. First, in describing their views on *Bt* cotton, non-farmers placed importance on characterizing the social identities of farmers. Actors in government, civil society, industries, and scientists characterized farmers as vulnerable and powerless, a characterization which served their political purposes. On the other hand, news reporters enhanced their role of communicating controversial stories to the public by characterizing farmers as powerful, setting the stage for conflict between two powerful groups. Second, non-farmer actors related themselves to farmers and the farming experience as a way of presenting themselves as credible claimsmakers. In the

case of *Bt* cotton in India, prevailing social values and norms in India require that actors who are not farmers establish a collective identity that includes farmers as a part of their group. Non-farmer actors felt it was important to embed their identities in the social identity of farmers in making persuasive arguments for or against *Bt* cotton.

In the local arena, however, farmers placed an emphasis on self-definition in conveying and justifying attitudes towards *Bt* cotton. While characterizing their social identity in the same way as non-farmer actors, local actors witnessed their social groups shrinking and their membership becoming much more exclusive than inclusive. The advent of *Bt* cotton has accentuated some of the existing social boundaries, such as those between Hindu farmers and Muslim traders, owner cultivators and laborers, and agricultural users and suppliers. Further, social competition for access to *Bt* cotton seeds has redrawn boundaries between those with and without access to Nb151. Second, farmers share the view that government actors are the ones to negotiate with if they are to handle changes generated by the introduction of GM crops. Farmers seem to agree that confrontation with the government is an important tactic in dealing with changes taking place around them triggered by the introduction of GM crops. Farmers did not see actors in industries, scientists, NGOs, or news reporters as active participants in the controversy, instead viewing actors in government as key.

Two contrasting dynamics manifested in the national and the local arenas have shaped the social phenomena surrounding the process of adopting *Bt* cotton. In the national arena, the perceived social identities of farmers in

combination with their strategies of appealing to a broader audience laid the foundation for shaping government actions and public policies pertaining to GE crops. In the local arena, the social identities of farmers and their strategies of decoupling, and of confronting government, influenced the situation to the point that the noncompliance of farmers with government regulations is socially acceptable in the local arena. Thus, examining intergroup relations, we can adequately explain the reasons behind controversial social phenomena.

### References

- Altheide, David L. 1987. "Ethnographic Content Analysis." *Qualitative Sociology* 10: 65-77.
- Altieri, Miguel A. 1987. Agroecology: the Scientific Basis of Alternative Agriculture. Boulder: Westview Press.
- Benford, Robert D., and David A Snow. 2000. "Framing Processes and Social Movements: An Overview and Assessment." Annual Review of Sociology 26: 611-639.
- Brass, Tom. 1994. New Farmers Movements in India. London: Frank Cass.
- Chambers, Robert. 1997. Whose Reality Counts?: Putting the First Last. London: Intermediate Technology.
- CIA. 2002. CIA World Fact Book. Washington D.C.: Central Intelligence Agency.
- Denzin, Norman K. 1977. "Notes on the Criminogenic Hypothesis: A Case Study of the American Liquor Industry." *American Sociological Review* 42(6): 905-920.
- Devy, G. N. 1998. *Between Tradition and Modernity: India's Search for Identity.* Walnut Creek: Altamira Press.
- Encyclopaedia Britannica. 2002. *India Book of the Year*. Gurgaon, Haryana: Encyclopaedia Britannica (India) Pvt. Ltd.
- Gieryn, Thomas F. 1999. *Cultural Boundaries of Science: Credibility on the Line.* Chicago: University of Chicago Press.
- Gujarat Ecology Commission. 1997. "Ecological Degradation around Gulf of Khambhat, Gujarat: A Status Report." Vadodara: Gujarat Ecology Commission.
- Gupta, Aarti. 2000. "Precautionary Decision-Making for Biosafety in India." Cambridge: Harvard University Center for International Development.
- Gupta, Dipankar. 2002. "Farmers' Movements in Contemporary India." In Social Movements and the State, edited by G. Shah. London: Sage Publications.
- Hogg, Michael A., and Dominic Abrams. 1988. Social Identifications: A social Psychology of Intergroup Relations and Group Processes. NY: Routledge.

- ILO. 2003. *Economically Active Population: 1950-2010*. [Online]. Available at: http://www.laborsta.ilo.org/. Accessed June 1, 2004.
- Indian National Congress. 2004. Manifesto: Indian National Congress 2004. [Online]. Available at: http://www.congresssandesh.com/. Accessed June 1, 2004.
- Jenkins, Rob. 2003. "International Development Institutions and National Economic Contexts: Neo-liberalism Encounters India's Indigenous Political Traditions." *Economy and Society* 32: 584-610.

Khilnani, Sunil. 1997. The Idea of India. London: Hamish Hamilton.

- Macleod, Roy M., and Deepak Kumar. 1995. *Technology and the Raj: Western Technology and Technical Transfers to India, 1700-1947.* New Delhi: Sage Publications.
- Newell, P. 2002. "Biotechnology and the Politics of Regulation." *IDS Working Paper, Biotechnology Policy Series*. Brighton: Institute of Development Studies.
- Paarlberg, Robert L. 2000. "Governing the GM Crop Evolution: Policy Choices for Developing Countries." Washington D.C.: International Food Policy Research Institute.
- Qaim, Matin, and David Zimmerman. 2003. "Yield Effects of Genetically Modified Crops in Developing Countries." *Science* 7(299): 900-902.
- Qayam, Abdul, and Kiran Sakkhari. 2003. "The *Bt* Gene Fails in India." *Seedling* 13-17.
- Rao, Sambasiva B. (Ed.). 2003. *Agriculture in India*. New Delhi: Serials Publications.
- Rhoe, Valerie, Sivramiah Shantharam, and Suresh Babu. 2002. "Institutions and Institutional Capacity for Biotechnology: A Case Study of India." In *Economic and Social Issues in Agricultural Biotechnology*, edited by R.E. Evenson, V. Santaniello, and D. Zilberman. NY: CABI Publishing.
- Sahai, Suman. 2003a. "The *Bt* Cotton Story: The Ethics of Science and its Reportage." *Current Science* 84: 974-975.
- 2003b. "India's Plant Variety Protection and Farmers' Rights Act, 2001." Current Science 84: 407-412.

- Scoones, Ian. 2003. "Science, Policy and Biotechnology Regulation." In Democratising Biotechnology: Genetically Modified Crops in Developing Countries Briefing Series. Brighton: Institute of Development Studies.
- Skinner, E.A. 1992. "Perceived Control: Motivation, Coping, and Development." In Self-efficacy: Thought Control of Action, edited by R. Schwarzer. Washington, D.C.: Hemisphere.
- Stempel, Guido Hermann, and Bruce H. Westley. 1989. Research Methods in Mass Communication. Englewood Cliffs: Prentice Hall.
- Ten Eyck, Toby. 1999. "Shaping a Food Safety Debate: Control Efforts of Newspaper Reporters and Sources in the Food Irradiation Controversy." *Science Communication* June (20): 426-47.
- Touraine, Alain. 2000. "A Method for Studying Social Actors." *Journal of World-Systems Research* VI: 900-918.
- Turner, John C. 1987. *Rediscovering the Social Group: A Self-categorization Theory*. NY: Blackwell.
- Wakeford, Tom, and Michel Pimbert. 2003. "Power Reversals in Biotechnology: Experiments in Democratisation." In *Democratising Biotechnology: Genetically Modified Crops in Developing Countries Briefing Series.* Brighton: Institute of Development Studies.
- Warren, Dennis M. 1991. Using Indigenous Knowledge in Agricultural Development. Washington D.C.: The World Bank.
- White, Harrison C. 1992. Identity and Control: A Structural Theory of Social Action. Princeton: Princeton University Press.

# CHAPTER 5

#### CONCLUSION

#### Summary of Findings

This research has explored agrifood biotechnology discourse in India from the beginning of the controversy in 1998 through 2002, the year the Indian government first gave approval for transgenic crops. It has looked into processes of social conflict, resonance, and compromise among groups holding divergent views towards the introduction of these crops. I have focused especially on mapping the issues contested by six types of actors – government, industries, civil society, scientists, mass media, and farmers, studying discourse in national and local arenas and examining relations between groups, particularly the group dynamics between farmers and non-farmers. I have proposed the development of a discourse perspective consisting of actors, strategies, claims, and outcomes to describe and analyze social processes leading up to the Indian government's approval of the first transgenic crops.

This project used 390 articles from Indian newspapers, 77 articles from two Gujarati language dailies and one major Gujarati farm newspaper, and 95 interviews conducted in New Delhi, Mumbai and Gujarat. In analyzing, interpreting, and describing the contours of debates, I have also used policy documents such as biosafety guidelines, national agricultural policy, and annual reports and pamphlets obtained from organizations to which interviewees belonged. Field notes were used to reconstruct the context wherein interviews were conducted. In order to accomplish the objectives stated above, this

research has followed a series of methodological steps drawn from an ethnographic content analysis approach (Altheide 1996).

Beginning with 1998, I have highlighted processes of conflict and compromise involving negotiations among a range of actors with vested interests in *Bt* cotton. I have particularly focused on those actor groups influential in federal policy-making, and on, farmers, a group which is the major consuming sector of *Bt* cotton seeds. Central is the argument that the *Bt* cotton controversy involves ongoing conflict and compromise among interested actors attempting to redefine issues related to the commercial introduction of this crop. As shown in the foregoing chapters, in many ways the controversy has been a symbolic contest over whose understanding and interpretations of a newly available technology will prevail. Actors with divergent values, holding a range of views in respect to genetically engineered crops (GE crops) and to what India should become, confronted one another to redefine what it means to introduce *Bt* cotton to India and to influence public's views of *Bt* cotton. These intensive interactions

For instance, initial optimism towards GE crops faded when a farmers' group burned *Bt* cotton field trial sites in protest against Mahyco-Monsanto. *Bt* cotton, initially introduced as a promising agricultural technology to help alleviate a range of cotton industry-related problems, had suddenly become a problem itself entailing negative economic, ecological, social, and political consequences. In particular, a controversy involving the spread of unauthorized *Bt* cotton seeds in Gujarat and other cotton growing states marked a turning point in how issues

were framed, from the frame related to governmental processes to one related to the livelihood of farmers. The focus of debates turned from discussions of biosafety policies, the three tier-mechanisms for assessing biosafety aspects of transgenic crops, and field testing procedures, to *Bt* cotton yields, farming, pests, soil fertility, drought, and seeds. At the same time, ownership of the issues shifted from the national actors, groups in New Delhi and Mumbai close to agrifood biotechnology policy-making, to farmers and other actors directly tied to farmers in the local arenas. This shift forced groups in the national arena to modify stand on *Bt* cotton and to surrender to the views of actors in the local arena, primarily strong supporters of farmers.

The second premise I developed in my argument was the assertion that the *Bt* cotton controversy reflected negotiations of interested actors attempting to control the agrifood biotechnology discourse through various strategies. Actors expressed their views towards *Bt* cotton through newspapers, seminars, workshops, and other media, as well as through communication networks with other actors, with the goal of enlisting support for their views. Actors not only communicated their ideas through claims but also developed new concepts which they acted upon creatively to achieve their own goals. The complex pattern of actions and reactions among actors were partly intentional and partly unplanned, sometimes direct, sometimes indirect. The tactic actors used in their confrontation and negotiations with others in the controversy most often was that of claimsmaking in news reports. Actors in government proactively generated favorable publicity for *Bt* cotton by having a range of actors within government

make a large number of claims which were duly reported in the newspapers. In contrast, although the number of claims made by actors in civil society and reported in the newspapers were small, this group has been very focused and effective in their claimsmaking activities, having provocative claims or dramatic stories reported in newspapers. In many ways the strategies employed by scientists overlapped with the strategies of other actor categories, because in the Indian context, the division of labor between scientists and government officials, scientists and activists, and scientists and industries is not always clear. Thus, those holding biophysical science degrees were versatile in being able to shift their identity from that of a government official to one as a scientist, or as an activist to a scientist, as needed.

Although farmers might not have had the same level of strategic intent to be reported in the newspapers as did other groups, the direct actions that farmers resorted to, such as demonstrating against a field trial and burning cotton fields, were reported heavily in the newspapers and thus substantially influenced subsequent debate. Among many stories reported in the newspapers, an event involving the spread of unauthorized *Bt* cotton from the state of Gujarat into other cotton growing states most tellingly demonstrated how powerfully the collective actions of farmers could override not only the claims of other actors but also existing social structures, such as biosafety regulations. Though individual actions were spontaneous, common problems and interests brought farmers together. The collective that emerged operated powerfully in controlling discourse.

A less explicit and yet effective strategy employed by actors is the use of rhetorical tactics in dealing with emerging threats and opportunities in discourse. As outlined in the discussion of frame theory in Chapter 2, actors in India used frames in two different ways. The first related to a strategy of countering the claims of others while maintaining a frame. The analysis indicated that actors in the national arena used this option of not deviating from an established frame already used in making claims so as to create an impression that they were engaging in a discussion, instead of avoiding direct engagement in discussions of the issues. A typical example given in Chapter 2 relates to how civil society and government actors talked past each other. While civil society actors complained that relevant governing bodies were inadequate in addressing biosafety issues, government officials declined to engage in debates, instead reiterating the existence of elaborate biosafety policies as key elements in considering whether India was ready to adopt Bt cotton or not. The same use of frames relates to the strategy of o//verriding the claims of others by promoting the importance of an alternative frame. An episode in Chapter 3 illustrated the adoption of this strategy by farmers. Instead of employing frames used by nonfarmers, farmers used a completely different frame that was significant and relevant for their lives. Many of the issues raised by farmers follow from their own experience or from the observation and testimony of others, not from theories nor a priori knowledge. Such claims, which have been empirically validated, tend to be more influential than conceptually-based claims, as evidenced by the strong support that their claims have received.

Third, actors in India engaged in boundary work (Gieryn 1999) in establishing the credibility of their claims. Chapter 4 demonstrated how nonfarmer actors used an anchoring strategy to convince others that they were credible claimsmakers who could stand for the social and economic well-being of farmers, while farmers rejected such presentations by asserting their own social identity in conveying and justifying their attitudes towards Bt cotton. While both non-farmer actors and farmers used these strategies as a means of validating their claims, closer examination of the content of interviews suggest that nonfarmers tried to project the image of trustworthy claimsmaker, while farmers, not needing to create a public image, emphasized the credible nature of their own claims. What these dynamics suggest is that non-farmers were under great pressure to conduct themselves properly as compared to farmers, who were free to behave in more sensationalist ways. In other words, impression management was more important for non-farmer actors than for farmers in their claimsmaking activities. This finding runs counter to Goffman's notion of stigma (1963), which suggests that such pressure to assimilate is generally placed upon marginalized groups. Non-farmers in India would not be considered a marginalized group. They are in fact an educated urban elite enjoying privileges in many different ways. However, the ways in which these groups of people emphasized idealized and normative identity, and behaved to achieve full acceptance of others in Indian society, indicate that non-farmers were cognizant that they would be marginalized in agrifood biotechnology discourse unless they were able to gain acceptance by a majority of the Indian population. Government officials were

particularly under social pressure to present themselves in a way that would show that they were representing the interests held in common by the members of India society. Thus, such social pressures influenced the nature of their claims and claimsmaking activities, and hence the process of establishing their social identity in their interaction with others.

Behind these processes of interaction lies India's emphasis on building consensus in the name of a larger cause. Consensus building has been particularly important for government officials in matters related to agrifood biotechnology, as every interested group is responsible for acting upon what has been decided collectively. Not only actors from government, science, and industry who are stakeholders in the traditional sense, but also farmers typically viewed as passive participants in the discourse and subjected to the consequences of a public policy decision will play a significant role in determining how well a decision is implemented. For instance, without the support of farmers, biosafety policies are not feasible.

#### **Contributions**

A major contribution of this dissertation is its analysis of social processes involving the acceptance or rejection of agrifood biotechnology in developing countries. Integrating theories and concepts deriving from the sociologies of agricultural development and science and technology, this project detailed perceptions towards transgenic crops in developing countries and the kinds of actions and interactions that people engage in to gain acceptance and support

for their positions. A discourse perspective is well-suited to understanding the social landscape of agrifood biotechnology in India, providing a scheme for understanding the complex and constantly changing social reality by untangling claims, actors and actions, by relating claimants to subsequent events, and by comparing and contrasting claims across actors and over time. Conditions in India during the period of the study were particularly complex and in a state of influx due to uncertainties deriving from a range of factors, such as unknown risks and benefits of transgenic crops, unstable government institutions evaluating the biosafety aspects of transgenic crops, and complex biosafety policies.

In addition, several other factors contributed to the increasing dynamism of this social landscape, stoking the controversy since its eruption in 1998. First, the Indian government displayed a lack of firmness in pursing their intended plans, and lacked consistency in their claims, creating an open space for other actors to express their opinions about government plans and policies. Second, the farmers' unions, being highly organized, had the capability to take direct and militant action in pursuit of their social, economic and political goals. Finally, a whole network of NGOs proved adept at pulling in domestic and international funding, which allowed them to actively participate in public discussions. Moreover, being articulate speakers, spokespersons of Indian NGOs have had significant influence on public opinion.

Second, this dissertation demonstrates the power of the social constructionist approach to social problems to lend insight into areas well beyond

social problems *per se.* The topic here is one in which the social problem literature has rarely been engaged. The literature generally deals with topics of relevance in the U.S., such as mental illness, homelessness, alcoholism, and crime (Best 1990; Conrad and Schneider 1980; Goffman 1961; Gusfield 1996; Snow and Anderson 1993; Wierner 1981), but rarely addresses topics related to agricultural technology nor issues taking place in developing countries. However, I see substantial parallels in terms of purpose (to understand the ways in which a problem is defined by actors and to explore actors' awareness that the particular conditions are a threat to their values and norms) and conceptual framework (viewing social reality as an ongoing process involving actors, claims, and claimsmaking activities).

Third, this project has demonstrated the significant analytic utility of the framing literature in understanding agrifood biotechnology discourse by virtue of its system for analyzing the content of claims in relation to interested actors. Framing theory has helped me engage in a substantive analysis of agrifood biotechnology discourse by providing an analytic scheme to organize a range of claims, experiences, and events reported in newspapers and obtained in interviews. It has allowed me to track a sequence of events over a span of five years, as well as events connecting actors situated in different geographical and social locations. Drawing on Goffman's (1986) idea of how individuals' interpretive processes of events and interactions with others involve a cognitive schema (which he labeled *frames*), I organized the content of claims about *Bt* cotton into five different frames at the outset of this research, obtaining results

which later became a basis for understanding actors' framing strategies and for understanding the nature of interactions among actors.

Goffman's (1959) concerns for actors' cognitive schema have been subjected to numerous criticisms. I will elaborate on two such criticisms: exclusion of activities that fall outside individual interaction, and neglect to address the relations between actors and social structure (Gouldner 1971). This dissertation has in part been an effort to respond to such criticisms by demonstrating the utility of frames in understanding interpretive processes that take place among groups, processes which may have been outside Goffman's concern with face-to-face interactions between individuals. Indeed, viewing actors as holding collective interpretations and awareness is more culturally appropriate in analyzing group interactions in the Indian context.

Observing the interactions within India and in the U.S., I have come to understand and appreciate that Indian cultural values and norms place much more emphasis on groups, collectivism, and conformity to group values and norms than in the U.S., where Goffman's fieldwork took place. People have never been prohibited from expressing their views and opinions in either country; however, what has been expressed as individual opinion in India frequently mirrors what others in her/his group have said. This has particularly been the case with government officials, industries, and farmers. Voices in government and industry tended to be monolithic because their claims reflected the roles that they were expected to play. Claims of farmers were also homogenous because they shared similar experiences with cotton cultivation and *Bt* cotton. Thus, the

concept of frames was highly applicable in analyzing and explaining group interaction. The second criticism of Goffman's work, that it fails to account for how actors relate to structure, has been addressed in work examining social movements, public opinion, and mass media discourse (Gamson and Modigliani 1989; Snow *et al.* 1986). By using framing literature that extends Goffman's concept, this dissertation has demonstrated how the use of frames can effectively mobilize and counter-mobilize opinions and thus influence social phenomena, and how domination of a particular frame in mass media discourse can influence the collective view of a technology.

Finally, although the focus of this dissertation is to develop a theoretical and conceptual framework in understanding and describing social processes involving the adoption process of *Bt* cotton, this project lends insights into achieving better enforcement of existing biosafety policies. The first practical step will be to collect qualitative data in varying geographical locations through focus groups and interviews with farmers so as to gain better understanding of the issues and concerns in relation to the implementation of biosafety regulations. The example of cotton growers in Gujarat suggested that they had concerns over the ecological impact of planting *Bt* cotton, though they were not following biosafety regulations partly because of the shortage of accurate information, and partly because of the difficulties in accommodating the rules stipulated in the regulations. Qualitative data collected from varying geographical regions will uncover unexpected concerns and issues with current regulations, and reasons for regulations not being met. Second, a body such as the GEAC will need to

use these qualitative data to consider not only the wider policy implications and social and moral dimensions of GM crops, but to reexamine the question of the extent to which the existing guidelines match the reality on the ground.

#### Limitations and Future Work

In spite of the explanatory power of this study, more empirical work is needed to clarify the ways in which specific claims and actions have led to particular social outcomes and vice versa. Such work will help us address the larger theoretical question of how the actions of individuals and groups influence and shape society, and how these processes then relate back to individual opinions, attitudes, and behaviors.

Activities involving agrifood biotechnology in India are intricately connected to activities in the global arena. This suggests the importance of incorporating a global dimension in studies of biotechnology controversies in India. The scope of this work, local and national agrifood biotechnology discourse within India, has limited my analysis to claims and claimsmaking activities within India. However, phenomena in India are inevitably influenced by global factors, including claims made and actions taken in the global arena. At the same time, phenomena in the global arena are shaped by claims, claimsmaking activities, and events taking place in India. Incorporation of a global dimension would lend insight into how the actors, claims, claimsmaking activities and events in the global arena impinge upon controversies in India and how claims and claimsmaking activities in India shape agrifood biotechnology

discourse in the global arena. By delving into linkages and interactions of discourses at the local, national and global levels, we may gain a clearer understanding of the complex situation that developing countries face in considering the adoption of agrifood biotechnology.

Second, it would be useful to undertake comparative studies of two or more different nations to account for the variety of public reactions to GM crops, and also account for the variety of ways in which transgenic crops are introduced (whether through the careful approach of Kenya, Brazil and India in allowing the commercial introduction of GM crops, or China's bold spearheading of commercialization). Cross-national comparisons would enable researchers to gain a better understanding of how claims and actions relate to outcomes.

Finally, this study has revealed that actors in India view their government as having played a key role in controlling access to and adoption of *Bt* cotton. In coming years, as more people use transgenic cotton, and other transgenic crops are developed and introduced, it is easy to imagine that the implementation mechanisms of Indian agrifood biotechnology policies at the state level (e.g., implementation of biosafety guidelines, and labeling) will become highly contentious. This study can serve as a reference point as the situation evolves, but only if future snapshots are available for comparison.

Actors inform, modify and recreate the social reality connected to agrifood biotechnology. Therefore, actors and their deeds are a significant part and parcel of the social dynamics surrounding agrifood biotechnology. It is my hope that this dissertation has contributed to a better understanding of such social processes.

Only through the insights into such processes can we know what the future may hold for agrifood biotechnology in developing countries.

## References

- Altheide, David L. 1996. *Qualitative Media Analysis*. Thousand Oaks: Sage Publications.
- Best, Joel. 1990. Threatened Children: Rhetoric and Concern about Childvictims. Chicago: University of Chicago Press.
- Conrad, Peter, and Joseph W. Schneider. 1980. *Deviance and Medicalization: from Badness to Sickness*. St. Louis: Mosby.
- Gamson, William A., and Andre Modigliani. 1989. "Media Discourse and Public Opinion on Nuclear Power: A Constructionist Approach." *American Journal of Sociology* 95: 1-37.
- Gieryn, Thomas F. 1999. *Cultural Boundaries of Science: Credibility on the Line.* Chicago: University of Chicago Press.
- Goffman, Erving. 1959. *The Presentation of Self in Everyday Life*. NY: Doubleday.
- —. 1961. Asylums: Essays on the Social Situation of Mental Patients and Other Inmates. NY: Anchor Books.

- Gouldner, Alvin Ward. 1971. The Coming Crisis of Western Sociology. NY: Avon.
- Gusfield, Joseph R. 1996. Contested Meanings: The Construction of Alcohol Problems. Madison: University of Wisconsin Press.
- Snow, David A., and Leon Anderson. 1993. *Down on Their Luck: A Study of Homeless Street People*. Berkeley: University of California Press.
- Snow, David A., Burke E. Jr. Rochford, Steven K. Worden, and Robert D. Benford. 1986. "Frame Alignment Processes, Micromobilization, and Movement Participation." *American Sociological Review* 51: 464-481.
- Tripp, R. 2001. "Can Biotechnology Reach the Poor? The Adequacy of Information and Seed Delivery." *Food Policy* 26: 249-264.

Wierner, Carolyn L. 1981. *The Politics of Alcoholism: Building an Arena around a Social Problem*. New Brunswich: Transaction Books.

# Appendix A

# <u>A Preliminary Guide for Undertaking Semi-structured Interviews</u> with Gujarati Farmers

Through undertaking semi-structured interviews, I am attempting to identify and understand 1) the actors involved in agrifood biotechnology debates in Gujarat, 2) their views toward agrifood biotechnology in general and *Bt* cotton more specifically, 3) their experience with the *Bt* cotton controversy, and 4) their strategies in influencing the views of other actors.

When conducting interviews, one should remember that interviews are meant to facilitate an understanding of respondents' points of view. Therefore, the interviewer should listen carefully to what respondents have to say and exhibit a supportive and understanding disposition toward the respondents' voiced concerns. The interview situation should approximate everyday social conversation. An interviewer who is unclear about the meaning of an interviewee's statement should ask the interviewee to expand on his or her meaning.

The questions listed below constitute a preliminary guide for an interview. I have inserted my notes, which are in italics, in between the questions. The flow of the conversation is more important than the order of the questions, as long as all the questions are covered.

I. Actors

Land and Crops

- 1. What is the size of the agricultural land you own? Is it a woodlot or forested land agricultural land?
- 2. Do you farm (plant crops on, raise animals on) all of the land you own, or do others farm some of it? In addition to the land you own, do you operate any land that you do not own? You've told me that you own and operate xxx acres; how many fields are those xxx acres divided into?
- 3. Out of all the land you operate, what is the proportion of the land on which you planted or are planting cotton for the two previous seasons and for the current season? What other crops did you plant for each season? What is the proportion of the land on which you plant each of these other crops? Can you tell me the proportion of each crop in relation to each season? Why do you grow each of the crops that you grow (e.g., for household consumption, for sale in a local market, for sale to a processor, for sale to a co-operative,

for animal consumption)?

Irrigation/Source of Water Supply

- 4. How much of the land is irrigated and how much is rainfed? Can you tell us this plot by plot (field by field)? Is irrigation year round or only part of the year?
- 5. Do you always have a sufficient supply of water? If not, how often do you not? On how much of the land that you operate do you not have a sufficient supply of water? When does this happen?; what causes this to happen (e.g., monsoon rains do not come, other users take water from canals, wells go dry)?

Inputs

- 6. What are the inputs (e.g., seeds, pesticides, fertilizers, labor, etc.) that you use for cotton? How much do you pay per acre for each input? Are the inputs the same each season and each year? If different, could you tally the costs for the last three years (previous two years and the current one)? For example, are seeds purchased some years but not others, and are fertilizers purchased some years but not others?
- 7. What was or is the yield-per-acre for cotton for 2000, 2001 and 2002?

Subsidies and Credit Availability

8. What kinds of support do you get from the government in purchasing agricultural inputs, in cultivating cotton, and in selling cotton? For example, are fertilizers and pesticides given or offered in subsidized prices? Are there monetary subsidies given for the cultivation of crops? Are there loans available? Where do you get the loans?

Availability of the Seeds and the Use of Seeds

9. What kinds of cotton seeds are available to you to plant?

This question is for identifying the types of cotton varieties that farmers have used and use in the village (e.g., Nb 151:F1/F2, Bollgard, Desi, Certified seeds, research varieties).

I would like to identify farmers' experiences with Bt cotton in comparison to other types of varieties. The farmers may see the types of cotton as differing on several dimensions, such as cost, yield, labor requirement, profit, safety, and legality. Some farmers may mention other differences between the types of cotton. The important thing is to obtain as clear and as complete an understanding of the farmers' perception of the differences as possible.

- 10. Which varieties of cotton seeds have you been using for the two previous seasons and the current season?
- 11. Why have you used each of these types of seeds? Why did you switch from xxx to xxx in [2000/2001/2002]?
- 12. What are the advantages and disadvantages of the seeds you have used for the two previous seasons and the current season?

If yield is an issue, I want to know the average cotton yield per acre. If cost is an issue I would like to now how much they cost. If labor is an issue, I would like to know how much labor each requires. In other words, raise additional questions in their responses to question number 12 to understand the advantages and the disadvantages that, as they see them, correspond to the particular seeds that were used.

- 13. Out of the land planted with cotton, what is the size of the land on which each type of seed (A/B/C/D) was planted in 2000, 2001, and 2002? (A/B/C/D refers to the types of the seeds that the farmer named in Question 10.)
- 14. Where did you get each type of seed?

## Pest Attacks

Questions 15 through 17 are for understanding farmers' experiences of pest problems.

- 15. Can you describe for me the situation regarding pest attacks as you experienced it in 2000 and 2001, and as you are experiencing it in 2002? How severe have been pest attacks? Have the bollworms been the only pests that you have had a problem with? Have there been other pests that you have had problems controlling?
- 16. How have you been controlling bollworms? How many times have you sprayed in 2000, 2001, and 2002? What chemical(s) have you used? How much chemical treatment do you apply to your crops in each spray? How many acres does each spray cover?
- 17. What was the estimated crop loss for the last *Kharif* (winter) season? What did you do to cope with the crop loss?
Others

- 18. How many years have you farmed? How many years have you cultivated cotton?
- 19. Demographic Information: age, education, the number of people in the household.
- II. Views on *Bt* Cotton & Experiences with the Controversy

Questions 20 and 21 are meant to facilitate an understanding of farmers' views on Bt cotton. Question 22 is about their experiences with the Bt cotton controversy. I would particularly like to learn what they consider to be controversial in regards to Bt cotton and why.

Awareness of and Views on Bt Cotton

*If a respondent has not previously indicated any awareness of Bt cotton, then ask Question 20A:* 

20A. Are you aware of [*Bt* cotton]? What have you heard about [*Bt* cotton]? Do you remember how or where you heard that, or from whom you heard that?

Go to Question 21

*If respondent has indicated awareness of Bt cotton but has not discussed it in detail, then ask Question 20B:* 

20B. A few minutes ago, you mentioned *Bt* cotton (insert the names of *Bt* varieties of cotton seeds that the interviewee has mentioned in response to the various questions above).

Now I would like to ask you some questions about [*Bt* cotton varieties]. What have you heard about *Bt* cotton? Do you remember how or where you heard that, or from whom you heard that? *After exploring the response* to the "what have you heard, and how" question thoroughly, ask, "What are the most important attributes of [*Bt cotton varieties*]?"

Go to Question 21

*If a respondent has already discussed some important attributes of Bt cotton, then ask Question 20C:* 

20C. A few minutes ago you mentioned that [*Bt* cotton varieties] are [*whatever the respondent said*]; now I would like to ask you some more questions about [*Bt* cotton varieties]. I would like you to think back to when you were

first hearing about [*Bt* cotton varieties]. What were you hearing about [*Bt* cotton varieties]? Do you remember how or where you heard that, or from whom you heard that? After exploring the response to the "What have you heard, and how" question thoroughly, ask, "In addition to what you mentioned before, are there other important attributes of [*Bt* cotton varieties]?"

Go to Question 21

- 21. The Planting of GMOs
- a) If respondents have indicated that they have not planted Bt cotton varieties, then ask,

A few minutes ago you indicated that none of the cotton you planted during the previous two years and the current season was *Bt* cotton. Can you explain why have you not used it? Would you like to use it? If so, what keeps you from using it? What would be the disadvantages <u>for you</u> of using *Bt* cotton in comparison with [non-*Bt* cotton varieties]?

b) If respondents have indicated that they have planted Bt cotton varieties, then ask,

A few minutes ago, you indicated that you have planted [*Bt* cotton varieties]. And you said that you planted this variety (or these varieties) for [*these reasons* – *whatever reasons the respondent noted*] and that this variety (or these varieties) had [*these advantages and disadvantages* – *whatever advantages and disadvantages the respondent noted*].

Are there are any other reasons for which you decided to use them? Are there any other advantages that *Bt* cotton has over [non-*Bt* cotton varieties] for you? Are there any other disadvantages of [*Bt* cotton varieties] in comparison with [non-*Bt* cotton varieties] for you?

22. What issues do <u>people around here</u> talk about concerning *Bt* cotton? What issues have concerned <u>you</u> most?

It is very important to differentiate two sets of actors: <u>people around here</u> and the <u>respondent</u> by asking two separate questions about how the respondent understands what <u>people around his or her village</u> talk about and what <u>the</u> <u>respondent him- or herself</u> is concerned with. If a respondent is not too clear about what this question concerns, probe how he or she perceives the following issues:

- a) Can <u>people in this village</u> easily get access to the cotton seeds that you want to use? Is the supply of seeds sufficient?
- b) Can <u>you</u> easily get access to the cotton seeds that you want to use? Is the supply of seeds sufficient?
- c) Do <u>people in this village</u> talk about spurious seeds mixed in a *Bt* package?
- d) How was the quality of *Bt* seeds <u>you</u> used? Were some spurious seeds mixed in a *Bt* package you used?
- III. Relations with Other Actors
- 23. Government: Do you interact with people from government? Why? For which governmental department do they work?"
- 24. Government: Do you have a sense of what position(s) people in government take with respect to the current controversies over *Bt* cotton?
- 25. Government: Has the government in any way helped or intervened in your daily work?
- 26. Scientists: Do you interact with scientists? Why? For which organization do they work?
- 27. Scientists: Do you have a sense of what position(s) scientists take with respect to the current controversies over *Bt* cotton?
- 28. Scientists: Have scientists in any way helped or intervened in your daily work?
- 29. Industries: Do you interact with people from industries? Why? For which organization do they work?
- 30. Industries: Do you have a sense of what position(s) people in industries take with respect to the current controversies over *Bt* cotton?
- 31. Industries: Have industries in any way helped or intervened in your daily work?
- 32. NGOs: Are NGOs engaged in projects on agriculture around here? If so, what projects?

- 33. NGOs: Do you have a sense of what position(s) people in NGOs take with respect to the current controversies over *Bt* cotton?
- 34. NGOs: Have NGOs in any way helped or intervened in your daily work?
- 35. Farmers' Unions: Do you belong to any farmers' unions? Can you describe to me the activities that you are engaged in as a member of a union? Why do you belong to this or these farmers' unions?
- 36. Farmers' Unions: Have any of the groups to which you belong taken a position with respect to the current controversies over *Bt* cotton? If so, do you have a sense of what position(s) they have taken?
- 37. Farmers' Unions: Have these unions in any way helped or intervened in your daily work?
- 38. News Reporters: Do you interact with newspaper reporters? Why? Which newspapers are these reporters representing?
- 39. News Reporters: Do you have a sense of what position(s) people in mass media take with respect to the current controversy/controversies over *Bt* cotton? If so, what positions do they take?
- 40. News Reporters: Have they in any way helped or intervened in your daily work?
- 41. Do you feel that any of these groups represent your views? If so, which one(s)?
- 42. How do you think the <u>Indian public in general</u> feels about *Bt* cotton? What about <u>people in this village</u> and <u>people in this district</u>?
- IV. Strategies for Influencing the Opinions of Other Actors

Through the following questions, I would like to understand the strategies, such as direct actions and dialogues with journalists, that farmers use to influence the opinions of other actors.

In addition, I would also like to understand whether farmers are aware of the scientific and the technical aspects of Bt cotton. If so, where have they have obtained that knowledge and how do they utilize it?

Strategies

- 43. Why do you think your views make more sense than the views of other people? You said that *Bt* cotton will [*whatever impact claim*]; if someone challenged you, how would you justify your view?
- 44. What have you done or will you do to influence the opinions of others who do not hold views similar to yours?

What did <u>you</u> do to influence government officials? What did <u>you</u> do to influence other farmers? What did <u>you</u> do to influence (e.g., seed, pesticide, fertilizer) dealers? What did <u>you</u> do to influence NGOs? What did <u>you</u> do to influence news reporters?

For example, did you attend forums and seminars to talk about your experiences? Did you organize meetings? Did you talk to news reporters?

Appropriation of Scientific Knowledge

- 45. Have you heard of scientific findings concerning Bt cotton?
  - a) If the respondent says "no," then this is the end of the interview for that respondent.
  - b) If the respondent says "yes," then ask,

What scientific findings have you heard about? What do you know about those findings?

Where did you come to know about it?

Reply to the answers given by the respondent:

- a) If the respondent mentions the development of Bollworm resistance, then ask, "Can anything be done about the development of bollworm resistance? If so, what would <u>you</u> do?"
- b) If the respondent mentions a refuge area, then ask, "Would setting aside some land as an insect refuge be an economically viable option for <u>you</u>?"
- c) If the respondent mentions harm to non-target species, then ask, "Can anything be done about negative impacts on non-target species? If so, what would <u>you</u> do?"

- d) If the respondent mentions either harm to health or environmental hazards, then ask, "Can anything be done about negative impacts on health or on environmental hazards? If so, what would <u>you</u> do?
- e) If the respondent mentions his or her need to continue to spray for sucking pests and other types of pests, then ask, What did you or would you do to deal with sucking pests and other types of pests? Did you or would you spray for other types of pests?

This is the end of the interview for respondents who said "yes."

### Appendix B

## Memo for Translation: For a Group Session

In order to gain a better understanding of what farmers have shared with us in a semi-structured interview setting, we will meet with them in a group. The purpose of a group session is clarification of both some of the significant points that the farmers did not expand on and things that we are not familiar with.

The memo includes questions I will ask during a session. My spontaneous questions for farmers and these farmers' responses need to be translated at the session.

## I. Actors:

Land state of the second s

- 1. What is the condition of your soil?
- 2. When (i.e., which year) did you begin to observe the deterioration of soil quality?
- 3. Why do you think the quality of soil has deteriorated over the years?

- 4. When (i.e., which year) did people in Bhadharpur begin to grow cotton?
- 5. How many pickings of cotton per season are there in general? When do they take place?
- 6. Why is it detrimental to depend on one crop, instead of several crops?

Water Supply

- 7. Can you help me understand what exactly *Khadi* (ponds) is by telling me 1) how they are formed (man-made or naturally formed), 2) how the canal is connected to the ponds, and 3) how large the ponds are. Is it a catchment area or an estuary?
- 8. What is the distance from your house to the Khadi?
- 9. I would like to clarify both how many diesel engines are available and what the costs are for bringing in water from *Khadi* (i.e., Rs.60/hour). How many hours do the engines need to be used?

- 10. How many times do you supply water in each season to, respectively, Nb151 F1, Nb151 F2, *Bollgard*, H4, H6, H8, *Ajit* 11, *Arujun*, and others?
- 11. When did problems begin to affect the water supply? Have the problems been there ever since you began farming?

Seeds

- 12. How do you decide which seeds to plant and where to plant them? For example, where would Nb151 F1 be planted as opposed to H8 or F2? Would the location of *Khadi* have something to do with the allocation of seeds in each plot?
- 13. I'm seeking a clarification of the seeds needed for cultivation (e.g., 1 kg for 1 acre?).
- 14. Why don't you save seeds for the following year? Why do you prefer to go back to the market every year? Has this always been the practice?
- 15. How do you know whether the seeds you are using are F1 or F2?
- 16. Tell us the differences between the F1, F2, and *Bollgard* varieties in terms of the following issues:
  - maturation period (i.e., How many days?)
  - timing of pickings (i.e., Which month?)
  - frequency and timing of water supply
  - sizes of bolls
  - number of bolls for each plant
  - sizes of plants
- 17. Can you explain to us what *bali gayu* is? Do you experience it very often?

Climatic Conditions

18. During which month does the moist begin to set in? How does this timing affect cotton cultivation?

Pests and Pesticides

- 19. When did cotton pest problems begin in this village?
- 20. Besides bollworm, *lashkri*, *gervu*, and sucking pests, what other pest problems do you have?

- 21. Do you apply a pesticide for each of these pests? Or do you apply just one kind of pesticide for all the pests?
- 22. I would like to clarify 1) which types of pesticides are used in accordance with which varieties of seeds and 2) the methods (e.g., biological, mechanical, cultural) by which pests are controlled. I am most interested in the following seed varieties:
  - Nb151 F1
  - Nb151 F2
  - Bollgard
  - Certified varieties
  - Research varieties
  - Desi seeds
- 23. Why don't you use alternative pest controlling methods, for example the use of an integrated pest-management method, if you feel that the costs of pesticides are high?
- 24. Besides the problems stemming from a lack of water with which to dilute pesticides, the high labor costs of applying pesticides, and the high costs of pesticides, what other problems has the use of pesticides created for you?
- 25. When (i.e., which year) did people in this village begin to use synthetic pesticides?
- 26. It is true that 10 to 20 years ago, the majority of farmers used to grow *tuvel* but shifted to cotton cultivation because of the development of pest resistance?
- 27. Do you sometimes sprinkle powdered pesticides? For what purpose?
- 28. When exactly did the bollworm attacks begin last year?

Subsidies, Price Guarantees, and Credit Availability

- 29. Have you borrowed money for purchasing seeds, purchasing pesticides, renting diesel engines, or renting land?
- 30. Who finances your credit needs? Is it traders, *aditayo* (the commission agents), money lenders, relatives, friends, the pesticide dealer network, commercial banks, rural banks, or co-operatives?

Selling of Lint

31. To whom (i.e., CCI, co-operatives, industries) do you sell your lint?

32. Why do you prefer to sell lint to this buyer and not to the others?

## II. Views on Bt cotton and Experiences with the Bt Cotton Controversies

About Other Social Actors

- 33. Why do you think the government has banned the use of Nb151?
- 34. Do you know anything about how farmers in a minority community in Bhadharpur view *Bt* cotton? Do they support the use of *Bt* cotton seeds or do they oppose the use of *Bt* cotton seeds? Do you know if they use *Bt* cotton seeds?
- 35. Do you share your cultivation experience of cotton with farmers in a minority community? Do you visit their farms? Do you sit with them to exchange information?
- 36. When the village leaders go to the nearest town to purchase seeds and other inputs for farmers in Bhadharpur, do they also purchase inputs for farmers in a minority group?

# Appendix C

Government	Industries	Civil Society	Mass Media	Scientists	Farmers
seeds	seed(s)	farmer(s)	farmer(s)	farmer(s)	seeds
cotton	farmer(s)	India(n)	India(n)	India(n)	land
farmers	India(n)	technology	transgenic(s)	seed(s)	cotton
variety(ies)	government	government	seeds	research	pesticide(s)
Bt	cotton	people	technology	cotton	pest(s)
people	crop(s)	biotechnology	information	technology	farmer(s)
research	people	cotton	people	biotechnology.	H8
state	biotechnology	agriculture	agriculture	government	yield
government	food	Bt	Bt	Bt	water
crop(s)	Bt	farming	cotton	science	problem
technology	gene	issue(s)	Bollgard	gene	F2
agriculture	company(ies)	U.S.	crop(s)	GMOs	plants
market	technology	countries	government	plant(s)	fertilizer
ministry	committee	food	Navbharat	information	variety(ies)
problem	country	organic	need(s)	state	attack
public	transgenic(s)	need(s)	field	system	soil
Gujarat	research	information	money	crop(s)	government
private	public	market	system	Gujarat	F1
India(n)	agriculture	population	biotechnology	public	price
price	Mahyco	seed(s)	public	issue(s)	village
hybrid	production	small	research	transgenic(s)	farming
U.S.	Gujarat	interest	scientist(s)	variety(ies)	information
committee	GEAC	research	policy	agriculture	expenses
crop	state	science	yield	GEAC	plant
gene	variety(ies)	variety(ies)	GEAC	right	price(s)
production	laws	Gujarat	scientific	company(ies)	Bollgard
certified	system	water	variety(ies)	conference	crop(s)
department	hybrid	place	fact(s)	input(s)	bollworm
science	plant	right	hybrid	policy	Navbharat
ICAR	department	world	ministry	land	season
information	RCGM	problem	pesticide(s)	media	desi
country	right	economic	food	Monsanto	hybrid
central	industry	pesticide(s)	GMOs	need(s)	lashkari
development	consumer	public	land	discussion	spray
plant(s)	control	environment	country	field	input(s)

## Relative Word Frequency Lists by Actors (high to low)

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