

THE LIFE, DEATH, AND AFTERLIFE OF THE "TERMINATOR GENE":  
THE INTERSECTION OF BIOTECHNOLOGY,  
GLOBALIZATION, AND POLITICS IN INDIA

A Senior Honors Thesis

by

JOSHUA DEE SIEPEL

Submitted to the Office of Honors Programs  
& Academic Scholarships  
Texas A&M University  
In partial fulfillment of the requirements of the

UNIVERSITY UNDERGRADUATE  
RESEARCH FELLOW

April 2004

Major: Genetics

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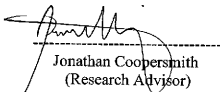
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ABSTRACT

The Life, Death, and Afterlife of the “Terminator Gene”:  
The Intersection of Biotechnology, Globalization,  
and Politics in India (April 2004)

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In March 1998, the United States government granted a patent for a new technology that allowed for the production of seeds that would grow for only one generation. The intent of the patent was to protect intellectual property and to prevent gene flow from genetically modified crops to other plants. Opponents of genetically modified organisms seized on the patent as a symbol of the danger of biotechnology, dubbing the new technology the “terminator gene.” News of the gene soon spread to the developing world, especially India, where angry farmers’ groups burned test plots of genetically modified cotton that did not contain the suspect gene. This controversy was one of the first flash points in the developing world in the global debate about agricultural biotechnology. In this project, I used contemporary news accounts and recent critical papers to examine the events in India, with specific focus on the reactions of major stakeholders to the controversy. The responses of government officials ranged from silence at upper levels of government to angry cries by state

ministers for the expulsion of all multinational corporations. Monsanto, which received the brunt of the protesters' anger, shifted its response from a cold, corporate message to a friendly perspective voiced by Indians. Non-governmental organizations fomented the controversy by providing the protesting farmers groups with media coverage. For most of the major stakeholders, the events in India proved to be a source of much negative publicity at the time, but ultimately became a learning experience that helped them to adapt to the unique political and social climate surrounding the introduction of biotechnology in the developing world.

### ACKNOWLEDGMENTS

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Finally, I would like to thank everyone who has provided me with support as I neurotically made my way through the project, particularly my family, who provided me with kind words and support when I spent the holidays working my way through this project. In addition, my friends have helped to keep me sane in these chaotic past few months; in particular, Bret, Jen, my Jordan exec team, and all the others who gave us these times.

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ABBREVIATIONS

<i>Bt</i>	<i>Bacillus thuringiensis</i>
D&PL	Delta & Pine Land Company
DBT	Department of Biotechnology (India)
GMO	Genetically Modified Organism
GRAIN	Genetic Resources Agriculture International
GURT	Genetic Use Restriction Technology
ICAR	Indian Council of Agricultural Researchers
IISC	Indian Institute of Science
IPR	Intellectual Property Rights
KRRS	Karnataka Rajya Ryota Sangha (Karnataka Farmers' Association)
MMB	Monsanto Mahyco Biotech Ltd.
NGO	Non-Governmental Organization
PBR	Plant Breeders' Rights
RAFI	Rural Advancement Foundation International
RGCM	Review Committee on Genetic Manipulation
SBCC	State Biotechnology Coordination Committee
USDA	United States Department of Agriculture
WTO	World Trade Organization

## INTRODUCTION

In the late 1990s, biotechnology was still in its developmental stages.<sup>1</sup> The first genetically modified (GM) food, a yeast, had been approved in the late 1980s. By 1998, GM crops were being grown in several countries, with the number steadily increasing. The most significant force behind the growth of agricultural biotechnology was the American agrochemical corporation Monsanto. It had been aggressively pushing biotechnology-derived crops for several years, and had had only middling success in navigating the regulatory systems in the countries where it had sought approval. The company was in an ill-fated push to aggressively introduce its products around the world.

In addition, activist groups concerned about the effects of globalization and the rise of multinational corporations were beginning to find a powerful new networking technique: the Internet. Suddenly, disparate groups around the world were able to communicate and keep abreast of developments in the issues they supported. One such issue was the rise of biotechnology. With many Europeans repulsed by the supposed impinging on their food supply and others worldwide suspicious of the motives of the large corporations like Monsanto, activists saw an opportunity to launch a global battle against biotechnology.

Meanwhile in India, the continued consequences of the Green Revolution, primarily the dependence on pesticides and fertilizers, had led many poor farmers into a cycle of debt. For some, the only escape from their situation was suicide. With the

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<sup>1</sup> This thesis follows the style and format of the *Chicago Manual of Style, Fifteenth Edition*.



Indian countryside full of stories of farmer suicides and with public opinion rife with unhappiness over the effects of globalization, the situation had the potential to explode.

The news that a company allied with Monsanto had patented a technology that would allow farmers to only grow one generation of seed would prove to be the spark that would ignite a firestorm. The events in India resulted in several test fields being burned and public confidence in biotechnology and the Indian regulatory system heavily shaken.

This project seeks to examine the events in India around the so-called “terminator gene” to construct a narrative and examine the reaction of the stakeholders in the controversy. In particular, this project will examine the three main stakeholders in the controversy: the national and state officials in India who created policy to react to the events, Monsanto, and the activist organizations (including non-governmental organizations and farmers’ groups) who led the protest. By understanding their responses to the situation, it is possible to gain a perspective on the ways in which the parties in future discussions over biotechnology can facilitate dialogue that is constructive and fair to both the issues and the citizens affected by the technology.

### LITERATURE REVIEW

The controversy over the genetic use restriction technology, or 'terminator gene,' took place over a period of eighteen months in 1998 and 1999. Because the controversy was only the first in a series of public debates over biotechnology, fairly little critical examination of the controversy and resulting policies has taken place, with the most relevant critical work published only within the past year.

To conduct a critical analysis of policy decisions relating to the controversy, a narrative is essential. The best initial source for narrative information remains the original Indian news accounts, especially from India's national and regional newspapers. Although the quality of the Indian media's coverage of the controversy ranges from excellent to highly dubious, Indian news sources on the whole provide a framework on which to base additional analysis. In some cases, the regional newspapers also provide useful insight into the perspectives and education levels of their readers; their lack of clarity and scientific perspective information provide an idea of the messages the average Indian citizen received during the controversy. In some cases, the specific voices of supporters and opponents to the technology did not receive adequate coverage. The works of biotechnology opponents, including the Rural Advancement Foundation International (now the ETC Group) and the author Vandana Shiva, help to compensate for that gap; likewise, publications by Monsanto and USDA provide the supporters'

perspective on the situation. For more factual information, perhaps the best reference is the original patent itself.<sup>2</sup>

Ronald Herring's 2001 lecture at Columbia University represents the first real overview of the biotechnology debate in India.<sup>3</sup> While his lecture focuses on biotechnology opponents' techniques and rationale more than political responses to the situation, it still provides a valuable tool for examining the public debate. In sharp contrast to Herring's political examination of activists' motivations, Visvanathan and Parmar present the biotechnology controversy as a sociological and mythological battle, in which the stakeholders fighting for victory represent a variety of classical archetypes.<sup>4</sup> Although their work is interesting, its usefulness is limited by the authors' desire to present political realities as abstract, archetypal dilemmas.

Shortly after the end of the political fight in India over *Bt* cotton in late 2001, a new body of research began to emerge. Ian Scoones, one of the foremost researchers in this new field, published two papers in 2003 and co-authored a third, arguing convincingly that the biotechnology debate represents an emerging political paradigm that is highly complex and based on a variety of political and social issues.<sup>5</sup> He argues

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<sup>2</sup> Oliver, M.J. et al. Control of Plant Gene Expression. United States Patent 5,723,765, filed June 7, 1995, and issued March 3, 1998.

<sup>3</sup> Herring, Ronald J. 2001. Promethean Science, Pandora's Jug: Conflicts Around Genetically Modified Organisms in India. 2001 Mary Keatinge Das Lecture, Columbia University, New York, December 3, 2001.

<sup>4</sup> Visvanathan, Shiv, and Chandrika Parmar. "A Biotechnology Story: Notes from India," *Economic and Political Weekly*. July 6, 2002, 2714-2724.

<sup>5</sup> Scoones, Ian. *Regulatory Manoeuvres: the Bt Cotton Controversy in India*, IDS Working Papers 197. Brighton, UK: Institute for Development Studies, 2003; Seshia, Shaila, and Ian Scoones. *Tracing Policy Connections: the Politics of Knowledge in the Green Revolution and Biotechnology Eras in India*, IDS Working Papers 188. Brighton, UK: Institute for Development Studies, 2003;

that biotechnology may be viewed as a window to changes taking place in Indian government and society. Scoones' assertion is challenged by Peter Newell, who argues that, despite the number of stakeholders, Indian biotechnology policy is primarily based on a close-knit group of well-connected individuals within the Indian biotechnology industry.<sup>6</sup> In their discussions of the development of Indian biotechnology policy, Herring, Newell, Scoones, and several others have emphasized the importance of knowledge to the political debate. Within their broad arguments, all have thus far neglected the curious phenomenon in which the 'terminator' technology lived on as a political idea far past its official discontinuation in October 1999. This project seeks to explore this question and the related issues surrounding policymakers' responses to the 'terminator' controversy. This information about knowledge and political response will help to frame future analyses of biotechnology policy in the developing world.

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Scoones, Ian. *Making Policy in the "New Economy": the Case of Biotechnology in Karnataka, India*, IDS Working Papers 196. Brighton, UK: Institute for Development Studies, 2003.

<sup>6</sup> Newell, Peter. *Biotech Firms, Biotech Politics: Negotiating GMOs in India*, IDS Working Papers 201. Brighton, UK: Institute for Development Studies, 2003.

## BACKGROUND

The events that transpired in India in 1998 and 1999 around the so-called “terminator gene” presented perhaps the first major public outcry over biotechnology in the developing world. The backlash surrounding the ‘terminator’ controversy tapped into a common fear of citizens of developing nations: that the looming influence of multinational corporations would create a new colonial situation in which farmers are beholden to faceless powers. By examining the events around the controversy, it is possible to observe the manner in which the stakeholders adapted their previous approaches to crises in public opinion to fit the case of biotechnology in the developing world.

### *Development of the Genetic Use Restriction Technology (GURT)*

Traditionally, the purchase of seeds granted the farmer the implicit permission to use the seeds produced by the crop for future years’ use. With the rise of value-added crops (like hybrids), the need to protect the knowledge behind these crops became evident. In the 1930s, the United States and Europe established laws and regulations protecting plant breeders, and giving them rights over their crops<sup>7</sup>. While these laws were helpful, the greatest asset for IPR (intellectual property right) protection was the development of hybrid seeds, which have strongly decreased yields if the second-generation seeds are grown.<sup>8</sup>

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<sup>7</sup> Visvanathan and Parmar, 2717-2722.

<sup>8</sup> Ibid.

This protection is not present in seeds that are genetically modified. GM seeds are more similar to seeds from non-hybrid plants, in that seeds from one generation are functionally equal to those from the generation before. The tremendous cost of developing new GM crops, combined with the lack of IPR protection, led a number of seed companies to research potential ways to protect their crops by limiting use of the GM traits to those who have paid the technology fee. At the same time, concerns about gene flow to non-GM plants had led some to call for the development of a technology that would prevent GM plants from passing on their genetic material. In response to these concerns, one seed company, Delta & Pine Land Company (D&PL) entered into a cooperative research agreement with the United States Department of Agriculture to develop a genetic mechanism for IPR protection.<sup>9</sup>

The technology that resulted from the collaboration was delineated in a US patent filed in March 1998. The proposed 'Technology Protection System' would allow a company to sell seeds that would grow successfully for one cycle, but that would not produce viable seeds.

#### *How the GURT Works*

In order to best understand the controversy, the mechanism of the technology itself should be explained.<sup>10</sup> The system consists of three genes. The first gene codes for a repressor protein. The second gene contains, in order, a promoter, a repressor binding site, and a gene that codes for a recombinase protein. (A recombinase will cut

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<sup>9</sup> *Intellectual Property Today*, "Delta and Pine Land Company and USDA Announce Receipt of Varietal Crop Protection System Patent," April 1998. <http://www.lexisnexis.com>

<sup>10</sup> More in-depth discussion can be found in Martha Crouch's article on the technology or on the excellent web site coordinated by Pat Byrne.

out a certain sequence of any other given gene or DNA sequence.) The third gene consists of a late promoter, a blocker sequence, and a lethal gene. Under normal circumstances, the repressor protein made by the first gene will bind to the repressor binding site in the second gene, preventing the transcription of the recombinase, thus allowing the blocker sequence in the third gene to prevent expression of the lethal gene.

The system is activated by treating the seeds with tetracycline, which competitively inhibits the repressor binding site in the second gene. Without the repressor, the recombinase gene is transcribed, producing a protein that excises the blocker sequence. The late promoter on the third gene then works to transcribe the lethal gene, which can work in a variety of ways.<sup>11</sup> The lethal gene will then stop the seed from developing any further.

#### *The Indian Agriculture Crisis and Biotechnology*

The GURT issue came at a time when several regions of India were seeing a wave of farmer suicides stemming from spiraling debt, often caused by sales of fraudulent seeds, rampant pests, and destructive weather.<sup>12</sup> This sensitive issue, in combination with a variety of other problems facing farmers, had given strength to militant farmers' groups like the Karnataka Rajya Ryota Sangha (KRRS), or Karnataka Farmers Association. While most farmers' organizations were normal participants in the political process, the KRRS had become a leading radical force in opposing

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<sup>11</sup> The patent states that "any" lethal gene can be used, a contention that was the source of much valid criticism. Critics point out that use some genes (such as diphtheria toxin) could modify the nutritional properties of the seeds or increase their toxicity.

<sup>12</sup> Lambrecht, Bill. *Dinner at the New Gene Café: How Genetic Engineering Is Changing What We Eat, How We Live, and the Global Politics of Food*. New York: Thomas Dunne Books, 2001.

globalization in India. Led by its charismatic leader, Dr. M. D. Nanjundaswamy, the group had cultivated a media-friendly image by such telegenic protests as the destruction of a newly opened Kentucky Fried Chicken restaurant in Bangalore and participating in the violent disruption of the Miss Universe pageant in India in 1996.<sup>13</sup>

Because the biotechnology industry was still in its infancy, there had been little controversy over the safety or utility of biotechnology. Since the late 1980s, Monsanto had been pushing for approval of its Bollgard cotton, a crop that is modified to resist the American bollworm, a pest that (despite its name) attacks cotton crops worldwide. Bollgard expresses the *Bt* gene, which comes from a soil bacterium that is lethal to the bollworm. The approval process for Bollgard cotton had begun in 1990, when Monsanto approached the Department of Biotechnology (DBT) seeking approval.<sup>14</sup> This was rejected in 1993, with DBT citing high technology transfer fees as grounds for the denial. However, in 1995 the Indian seed company Mahyco, which was in partnership negotiations with Monsanto, received permission to import 100g of Monsanto's cotton, which it used in the following years to backcross with Indian varieties. Mahyco was (and remains) the best-known seed company in India; its leader, B.R. Barwale, was one of the leaders of the Green Revolution and is seen as a hero of Indian agriculture. In 1998, Monsanto, seeking the business and reputation benefits from a partnership, purchased a 26% stake in Mahyco, and the two jointly created Mayhco-Monsanto Biotech (India), with the intention of using biotechnology to develop crops.<sup>15</sup>

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<sup>13</sup> Crossette, Barbara. "An India Less Than Congenial," *New York Times*, November 24, 1996. [www.nytimes.com](http://www.nytimes.com)

<sup>14</sup> Newell, 7-8

<sup>15</sup> *Ibid.*



### NARRATIVE

When the United States government granted a patent for the “technology protection system” to D&PL and USDA in March 1998, D&PL’s situation had changed. Since the joint research initiative had begun, Monsanto had begun negotiations to buy D&PL for its extensive holdings in cotton breeding.<sup>16</sup>

On the day the patent was granted, the Canada-based NGO Rural Advancement Foundation International (RAFI) issued a press release dubbing the new technology “terminator” and warning of the effects of the technology in the developing world, where seed saving was much more common.<sup>17</sup> In India, the concerns about the “terminator” technology soon coalesced with the pending approval of Monsanto’s modified cotton and the general lack of public awareness about biotechnology to create a single issue, and reports began to spread that Monsanto was secretly testing the “terminator gene” in India. The tale grew taller as reports spread that Monsanto had a technology to kill plants and enslave farmers that was being tested in India. Despite efforts by top scientists to clearly delineate between the Bt and “terminator” technologies, the nuances of their explanations went largely unrecognized among the farmers.<sup>18</sup>

Any official concerns were amplified with the announcement by the KRRS on October 23, 1998 that it would begin protesting the technology in Karnataka, the group’s

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<sup>16</sup> The proposed merger between the two companies fell apart in late 1999 after antitrust concerns were raised by the U.S. Justice Department.

<sup>17</sup> RAFI. “US Patent on New Genetic Technology Will Prevent Farmers from Saving Seed,” <http://www.etcgroup.org/article.asp?newsid=64>

<sup>18</sup> It should be pointed out that the farmers had good reason to be concerned about multinational corporations, if for no other reason than India’s consistent exploitation by outsiders for the past several centuries.

home state, and elsewhere in the country.<sup>19</sup> The protests continued until November 27, when Nanjundaswamy issued an ultimatum to the Indian government to stop the trials of the Bollgard plants in Karnataka. The test plants, he claimed, were in violation of Indian law.<sup>20</sup> According to the *Hindustan Times*, when asked about Monsanto's assertion that the Bollgard and the "terminator" were two different technologies, and that only Bollgard actually existed, Nanjundaswamy replied that there was no difference between transgenic crops and "terminator" seeds, and again warned that the technology would hurt the environment and reduce yields.<sup>21</sup> He then accused Monsanto of being responsible for the spate of farmer suicides in Andhra Pradesh.

With the government unresponsive to his ultimatum, Nanjundaswamy's KRRS group gathered the next day in the village of Malladgudda. In front of members of the media, Nanjundaswamy and approximately forty other farmers<sup>22</sup> gathered at a test plot where the test seedlings were growing. With the farmer's permission, the KRRS burned the crop amid signs reading "Cremation Monsanto" and "Monsanto Quit India."<sup>23</sup> In the subsequent press conference, Nanjundaswamy claimed that that the seeds contained the "terminator" gene, which, he claimed, would also deplete the soils.<sup>24</sup> Furthermore, he claimed that Monsanto had distributed the seeds without government knowledge or

<sup>19</sup> *PTI*. "Karnataka Farmers Protest Against Multinational Corporation Monsanto," October 23, 1998. <http://www.lexisnexis.com>

<sup>20</sup> *Hindustan Times*. "Rythi Sangha Threatens to Burn 'Terminator' Saplings," November 27, 1998. <http://www.lexisnexis.com>

<sup>21</sup> *Ibid.*

<sup>22</sup> Although forty was the number reported in initial news reports, stories in the following weeks would report the count of farmers to be in the hundreds

<sup>23</sup> Seshia, Shaila. "Plant Variety Protection and Farmers' Rights in India: Law-Making and the Cultivation of Varietal Control." *Economic and Political Weekly*. 6 July 2002, 2741-47. Seshia discusses the context for the KRRS' actions and provides more historical background on its protests.

<sup>24</sup> *Hindu*. "KRRS Members Burn Monsanto's Crop." November 28, 1998. <http://www.lexisnexis.com>

permission. He then announced plans to burn cotton plots in six other locations around India.

After another crop burning in the Andhra Pradesh village of Urugaonda, KRRS announced its plans to burn additional crops in the village of Bannikallu on December 2. In a statement to *Business Line*, Nanjundaswamy listed his group's demands: to "stop genetic engineering tests; not to allow patenting on life forms and to banish Monsanto from the country and to withdraw from the WTO."<sup>25</sup> In addition, he announced his plans to file a criminal lawsuit against Monsanto, the state and national governments, the state agricultural minister, and the national Department of Biotechnology.

Shortly thereafter, the Andhra Pradesh government, bowing to legislative pressure, pulled all of test plots, instead requiring any testing of the *Bt* cotton to take place at the state's agricultural university, under the observation of agricultural scientists.<sup>26</sup> With the Andhra Pradesh tests discontinued but tests in other states continuing, the KRRS groups next targeted a plot in Haveri for burning in the next few days. The farmer who owned the plot, Shankrikoppa, was a former KRRS member who had rejected the group's ideology.<sup>27</sup> After initially being willing to acquiesce to the KRRS' plans, he changed his mind after receiving a request from a farm organization affiliated with the BJP (the ruling Hindu fundamentalist party) to prevent the burning. He asked for police protection, and the KRRS groups were prevented from burning the

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<sup>25</sup> Business Line. "To Continue Protest." December 2, 1998. <http://www.lexisnexis.com>

<sup>26</sup> Express News Service. "Monsanto Told to Stop Field Trials." December 3, 1998. <http://www.lexisnexis.com>

<sup>27</sup> Herring, Ronald J. 2001. *Promethean Science, Pandora's Jug: Conflicts Around Genetically Modified Organisms in India*. 2001 Mary Keatinge Das Lecture, Columbia University, New York, December 3, 2001.

field. After the cotton season had ended, he was able to grow plants from the *Bt* cotton seeds, disproving arguments of any gene protection technology in the plants.

Shankrikoppa would later refer to the entire display as a “cheap publicity stunt.” He soon found new employment, as Monsanto hired him shortly after he harvested his first *Bt* crops to preach the virtues of GM cotton and biotechnology.<sup>28</sup>

Shankrikoppa’s refusal helped to cool the fires of public opinion. With their momentum disrupted, the KRRS’ enthusiasm waned. As the issue faded, the controversy became old news, and it seemed to slip from the public consciousness just as alarm was beginning to rise in developed nations. As debates began in Europe and the United States, Monsanto and the USDA came under more and more fire, with condemnations coming from governments and organizations around the world. The most stinging criticism came from Gordon Conway, president of the Rockefeller Foundation and a strong supporter of biotechnology, who publicly chastised the Monsanto’s Board of Directors for not dropping the technology.<sup>29</sup>

With opposition rising and the entire situation quickly becoming a public relations disaster, Monsanto CEO Robert Shapiro announced on October 4, 1999, that the company would not commercialize the technology.<sup>30</sup> This news was met with a mixture of joy and reservation by those who had expressed concern about the technology. While the overall reaction, especially in India, was that of relief,

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<sup>28</sup> Newell, 20.

<sup>29</sup> Lambrecht, Bill. “Foundation Chief Urges Monsanto to Go Slow on Gene-Altered Foods,” *St. Louis Post-Dispatch*, June 30, 1999.

<sup>30</sup> Shapiro, Robert B. Open Letter from Robert B. Shapiro to Gordon Conway. October 4, 1999. <http://www.monsanto.com/monsanto/gur/index.htm>

environmental groups (especially RAFI) made clear their discontent that Monsanto had not disavowed all potential IPR-protection technologies.<sup>31</sup>

With this announcement, the 'terminator gene' was dead, at least officially. The idea that the 'terminator' gene still existed as a threat continued for a number of years, largely because of the assumption that *Bt* technology and 'terminator' technology were the same thing. One reason for the idea's persistence was that about a week after the last field had burned, news broke that a patent application for the GURT had been submitted in India by the USDA (as the lead applicant) and D&PL.<sup>32</sup> The application was one of 85 applications made around the world. Because a patent claim was filed, some later sources would use the existence of the application as irrefutable proof that the technology was in existence in immediately applicable form.<sup>33</sup> The patentability of the technology was clarified from the *Ex Parte Hibbard* ruling of 1985, which allowed biotechnology methods, even conceptual ones, to be patented.<sup>34</sup> This added yet another nuance to the general public's confusion about the technology, and enabled the fears about the 'terminator' to outlast the GURT itself.

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<sup>31</sup> Monsanto was known at the time to be developing a second-generation GURT in which the plant would only express its transgenic qualities if treated with a chemical purchased from the company. This technology is still in development; see RAFI "Suicide Seeds on Fast Track to Commercialization," February 25, 2000. <http://www.etcgroup.org/search.asp?page=3&theme=7>

<sup>32</sup> Business Line, "USDA Seeks Patent in India," December 14, 1998. <http://www.lexisnexis.com>

<sup>33</sup> Mistry, Sharad, "Pressure Mounts Against Terminator Gene" Financial Express, December 21, 1998

<sup>34</sup> Fisher, William W. "The Impact of "Terminator Gene" Technologies on Developing Countries," Report to United Kingdom Department for International Development, December 1999.

<http://www.law.harvard.edu/faculty/ffisher/terminator.html>

## STAKEHOLDER ANALYSIS

### *National and State Governments*

With the patenting of the “terminator” technology by D&PL and USDA in March 1998 and the resultant attention from NGOs such as RAFI and GRAIN (Genetic Resources Agriculture International, an anti-GMO group based in Spain), the Indian Council of Agricultural Researchers (ICAR), a leading panel of agricultural experts, issued a statement expressing concern about the technology.<sup>35</sup> In July, on further recommendation from ICAR, the directorate of plant protection for quarantine and storage of the Indian Department of Agriculture announced a ban on importation of seeds containing the “terminator” gene. Under the new measure, import authority was to “confirm” that incoming seeds did not contain the gene in question before authorizing the importation.<sup>36</sup>

One issue that would emerge as key in the decision-making process was the murky circumstances that resulted the test plots of Bollgard plants. The Indian Review Committee on Genetic Manipulation (RCGM) granted approval on July 27 and August 5 for MMB to test the Bollgard plants. Tests were planned in forty locations in nine states. However, Shiva et al report that tests were actually taking place starting in mid-June and early July, which would clearly have been a violation of DBT regulations.<sup>37</sup>

The approval by DBT also included notification of the state governments in states where the testing was to take place. Once the controversy began to erupt, the

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<sup>35</sup> *Asia Pulse*. “India Bans Imports Containing ‘Terminator Gene,’” July 20, 1998. <http://www.lexisnexis.com>

<sup>36</sup> *Ibid*.

<sup>37</sup> Shiva, Vandana. *Stolen Harvest: The Hijacking of the Global Food Supply*. Boston: South End Press. 2001.

states' response to farmers' anger demonstrated either political calculation or poor organization. On November 18, Karnataka Agriculture Minister C. Byre Gowda claimed angrily that he knew of the trials, but had not been informed of the locations where the trials were taking place.<sup>38</sup> The government did not release the locations of the test plots until November 24.<sup>39</sup> These announcements fueled news reports that the state government had not been notified at all. This notion, and even the notion that the locations of the tests were completely unknown, were refuted to an extent when Byre Gowda admitted on November 25 that MMB had followed all DBT guidelines and that DBT had indeed notified the Karnataka government.<sup>40</sup> Subsequent reports would explain that DBT had notified the secretaries of state in those states where the tests were located, as well as district collectors in those districts where tests were taking place.<sup>41</sup>

At the press conference where he acknowledged that the state government had been notified by the DBT, Byre Gowda made his key announcement. In response to continuing reports of "terminator" seeds planted in Karnataka, the state would create a state oversight board. The State Biotechnology Coordination Committee (SBCC) would have authority to "inspect, regulate and take punitive action in case of violations of statutory provisions" on all matters involving agricultural, biomedical, and industrial biotechnology.<sup>42</sup> When asked about the panel, Monsanto leaders expressed support for the SBCC. The creation of the committee was authorized under the Central

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<sup>38</sup> *Indian Express*. "Seeds of Controversy," November 18, 1998 <http://www.lexisnexis.com>

<sup>39</sup> *Hindu*. "Monsanto Defends Trials of Cotton Plant," November 26, 1998 <http://lexisnexis.com>

<sup>40</sup> *Hindu*. "Panel to Check Field Trials of Terminator Gene Technology," November 25, 1998 <http://www.lexisnexis.com>

<sup>41</sup> *Hindu*. "Monsanto Defends Trials of Cotton Plant" See 36.

<sup>42</sup> *Hindu*. "Panel to Check Field Trials of Terminator Gene Technology" See 37.

Environmental Protection Act of 1986. The Karnataka SBCC eventually served as a model for other Indian states' biotechnology oversight panels. These committees have come to play active roles in states' regulation of biotechnology.

The brewing controversy also appeared in the Andhra Pradesh state assembly in November, shortly before the KRRS' first action. In a discussion about current growing conditions, assembly members began to discuss the reports from farmers' groups that the crops being grown were actually tests of the "terminator." Despite assurances from state agriculture minister K. Vidyadher Rao that the technology did not exist, the assembly passed a unanimous measure accusing Monsanto of camouflaging the seeds as Bollgard seeds, and urging the central government to ban the "terminator."<sup>43</sup>

Similar outcry about the purported secrecy in Karnataka spread to the Indian parliament's upper house, the Rajya Sabha. On December 1, the body discussed the issue, with a broad spectrum of legislators supporting a ban on the technology.<sup>44</sup> Minister of Agriculture Som Paul assured lawmakers that the government had taken steps to prevent the gene's entry into India. He described the technology as a "global threat" to farmers, but professed confidence in his ministry's ability to keep the situation under control through careful monitoring of imports.<sup>45</sup> His confidence was not shared by other Rajya Sabha members, who described the technology as part of a "diabolical

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<sup>43</sup> *Statesman* "Andhra house asks Centre to stop 'Terminator' seed," November 26, 1998. <http://www.lexisnexis.com>

<sup>44</sup> *Hindustan Times*. "Govt. to keep door shut on terminator seeds," December 1, 1998. <http://www.lexisnexis.com>

<sup>45</sup> *Ibid.*



plot” and as a means to “biological warfare.”<sup>46</sup> Seven lawmakers joined to urge Som Paul not to allow the seeds to enter the nation through official or “backdoor” methods, through which the supposed ‘terminator seeds’ had presumably passed.<sup>47</sup>

As political pressure to take action increased, the Andhra Pradesh state government relented on December 2. Vidyadher Rao announced that, in consultation with chief minister N. Chandrababu Naidu, the decision was made to pull all of MMB’s Bollgard test crops in the state.<sup>48</sup> Vidyadher Rao was quoted as saying that the decision was at least partially in response to the actions of KRRS, which had burned a field in the village of Urugaonda the day before. The announcement stopped tests in eleven villages. Monsanto India’s director, M. K. Sharma, would later claim that he had not been notified by the government, a claim that Andhra Pradesh officials would deny.<sup>49</sup>

With the trials in Andhra Pradesh stopped (although Sharma’s comments suggest that they may not have stopped immediately after the press announcement because of confusion over the official letter), the national parliament continued to debate the issue. In the lower house, officials from the Communist party called for a ban on any future Monsanto tests involving cotton and urged the government to withdraw from the IISC-Monsanto joint research agreement.<sup>50</sup> In the upper house, a motion was passed unanimously demanding a ban on importation of the seeds. Agriculture minister Som Paul assured the legislators that such a measure was already in place, repeating his

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<sup>46</sup> Ibid. First quote by K. R. Malkani, second by S.M. Krishna

<sup>47</sup> *Hindu*, “Terminator seeds not to be allowed, December 2, 1998. <http://www.lexisnexis.com>

<sup>48</sup> *Indian Express*, “Monsanto told to stop field trials,” December 2, 1998. <http://www.lexisnexis.com>

<sup>49</sup> *Business Line*, “No setback for trial data, says co. December 5, 1998. <http://www.lexisnexis.com>

<sup>50</sup> *Agence France Presse*, “Opposition demands ban on ‘terminator gene’ tests in India”, December 4, 1998. <http://www.lexisnexis.com>

assurances from two days before, while also pointing out that the *Bt* tests had been approved and would continue.<sup>51</sup>

With the end of the KRRS protests, the debate calmed, and much of the angry rhetoric stopped. The notion of the 'terminator' continued, even past the announcement that technology would not be commercialized. One ongoing effect of the 'terminator' controversy was the impact of the trade restrictions placed on seeds that might contain the gene. Because of the perceived importance of keeping the gene out of India, seed importers have been required to affirm that their seeds do not contain any genes with 'terminator' technology.

One instance in which the 'terminator' idea returned to prominence came in 2000, when a small controversy briefly erupted when a *Times of India* news article went out to wire services questioning whether Punjab had the ability to test for 'terminator' genes.<sup>52</sup> Professors at Punjab Agricultural University and officials with the Punjab State Council for Science and Technology replied to inquiries by pointing that little was known about the gene and that consequently there was no ability to test for the gene.

In response to this and other concerns, the Indian Department of Biotechnology (DBT) sought to allay fears about any lack of 'terminator' testing facilities by promoting a new biocontainment facility that was nearing completion.<sup>53</sup> The facility, supported by the Rockefeller Foundation and located in New Delhi at the Indian Agricultural Resource Institute, was opened in September 2000 as a portal to develop and use

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<sup>51</sup> *Asia Pulse*, "Terminator seeds not be [sic] allowed in India: Minister", December 3, 1998. <http://www.lexisnexis.com>

<sup>52</sup> *Times of India*, "No Facility to Test Terminator Genes" April 8, 2000. <http://www.lexisnexis.com>

<sup>53</sup> *Business Line*, "Transgenic Test Facility Soon" June 22, 2000. <http://www.lexisnexis.com>

molecular probes to check for transgenes on all genetic material coming into India. In a statement, Dr. Manju Sharma, the director of DBT, claimed that the opening of the facility would ensure that “all the fears of the entry of terminator technology into India can be forgotten”. Indeed, the presence of the facility seemed to calm at least some fears about the technology.

This concern about keeping ‘terminator’ seeds out of India remained strong as the ongoing debates about plant breeder rights and approval of *Bt* cotton continued. Both laws ended up with anti-‘terminator’ provisions. The PBR bill contained a requirement that each plant breeder sign an affidavit that the variety being protected did not contain any ‘terminator’ technology.<sup>54</sup> In addition, before *Bt* cotton could be approved, Mahyco was required to have the seed tested for the ‘terminator’ gene by an Indian lab.<sup>55</sup> While the location of the testing is unclear, it was implied that this is the type of testing for which the DBT New Delhi facility was built.

With PBR in place and *Bt* cotton cleared for use, the issue finally died, although it seems that any future moves by plant biotechnology companies to protect their IPR through genetic means would likely re-ignite the passions of those who opposed the ‘terminator’ the first time.

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<sup>54</sup> Mehra, K.L. “Plant Variety Bill Does Safeguard Farmers’ Rights,” *Economic Times* December 16, 2000. <http://www.lexisnexis.com>

<sup>55</sup> *Times of India*, “Open Dialogue on GM Crops Is a Shut Case,” June 16, 2001. <http://www.lexisnexis.com>

*Monsanto*

In its initial dealings in India, Monsanto had largely worked alone in seeking approval of its Bollgard cotton. After being stymied in its 1993 attempts to seek approval, the company decided to work more closely with respected Indian agricultural agencies and corporations. One key aspect of this new approach was its purchase of a 26% of Mharashta Hybrid Seed Company, or Mahyco, one of India's leading seed companies. Mahyco president B.R. Barwale is a hero of Indian agriculture, a winner of the World Food Prize who pioneered the introduction of several hybrid strains. The Mahyco collaboration instantly gave Monsanto a degree of credibility, which was enhanced again when it entered another joint research project with the Indian Institute of Science.<sup>56</sup>

Further, Monsanto had also begun a public relations campaign to promote positive images of the company. It began to sponsor religious festivals and other events around India, and also made an ultimately ill-fated effort to contribute to a World Bank micro loan program in Bangladesh.<sup>57</sup>

As Monsanto learned about the power of local partnerships in its regulatory endeavors, it did not apply similar lessons in its public relations in the midst of the 'terminator' controversy. In its initial response to the public outcry, the company's top officials spoke about the company's perspective on the situation. Initially, these officers were primarily American or British. This approach (whether intentional or not) changed

<sup>56</sup> Rai, Sharita, "Seeds of Controversy," Indian Express. November 18, 1998. <http://www.lexisnexis.com>

<sup>57</sup> Times (London). "Monsanto's Bangladesh Partnership Is Scrapped. July 29, 1998. <http://www.lexisnexis.com> The organization in Bangladesh with which Monsanto sought to work ultimately terminated the cooperation agreement after receiving many threats and protests from environmental and social organizations.

as communications were shifted to native Indians within the organization, notably Meena Vaidyanathan, the communications director for Monsanto India. As the controversy began to escalate in November 1998, a more conscious effort emerged to portray Monsanto with an Indian face.

It appears that Monsanto did not initially believe the situation in India to be as serious as it ultimately became. Knowing the untruthfulness of the claims that the test plots were actually 'terminator' test plots, it was likely easy for Monsanto to disregard the KRRS at first. As the rhetoric turned more militant, it appears that Monsanto officials began to realize, slowly, that action needed to be taken. This action did not come until mid-December, 1998, when the company began to run full-page advertisements in national newspapers explaining the company's perspective on the issue.<sup>58</sup> By that point, most of the damage had been done: the angry farmers' protests had been displayed on news stations around the world.

Monsanto's collaboratory approach did lead to a significant unintended consequence in the middle of the media furor. With agreements with the IISC and Mahyco in place, any statements against the protests by Barwale or IISC scientists or their collaborators were instantly dismissed as 'tainted' by Monsanto's money.<sup>59</sup> Complicating matters more was the assumption that IISC was working on the 'terminator' gene. This put IISC in the delicate position of defending their interests while maintaining friendly ties with Monsanto.

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<sup>58</sup> Mistry, Sharad, "Monsanto on the Defensive, Kicks Off Ad Campaign," December 8, 1998.

<sup>59</sup> Asia Pulse, "No Work on Terminator Genes for Indian Monsanto Project," August 19, 1998.

After the controversy had ended in India, another ten months elapsed before Monsanto announced that the technology in question would not be commercialized. This is commonly attributed to the widespread criticisms of the technology, as well as the June 1998 speech given by Dr. Gordon Conway, president of the Rockefeller Foundation. After being invited to speak to the Monsanto Board of Directors, Conway shocked the members by offering a stinging rebuke of the company's business practices, including its continued support of the GURT. Conway then went public with his charges, putting the onus on Monsanto.

This also came shortly before the public announcement of troubles with the proposed Monsanto-D&PL merger. The merger fell apart in December 1999, when, after numerous delays, the company announced that it could not reach an agreement with the US Department of Justice over the antitrust issues in the case.<sup>60</sup> In October, when Monsanto President Robert Shapiro wrote his letter announcing that the technology would not be commercialized, the numerous complications with the merger also were likely to have contributed to the decision.<sup>61</sup> That fact, combined with the enormous negative publicity that Monsanto was receiving for a technology it did not technically own, must have made the trouble of continuing much greater than any difficulties in discontinuing the technology.

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<sup>60</sup> See Lambrecht 1999.

<sup>61</sup> Reuters. "Seed Company Aims Protest at Monsanto," *New York Times*, December 22, 1999. [www.nytimes.com](http://www.nytimes.com)

*NGOs and Farmers' Groups*

The manner in which nongovernmental organizations and farmers' groups worked together to fight the 'terminator' provides an early and useful example of the new synergy among activist groups. The initial alarm from RAFI in Canada made its way to India, where word got to the KRRS. The field burnings were witnessed by members of GRAIN and other groups who also seem to have liaised with the media who covered the burning.<sup>62</sup>

An interesting insight to the experiences of the protesters can be gained by examining Visvanathan and Parmar's paper discussing the KRRS' participation in an anti-globalization caravan in Switzerland.<sup>63</sup> They point out that the only farmers who participated in the protests were those who could afford to do so; most of them had gained their middle- or upper-class status as a result of the Green Revolution. As such, Visvathan and Parmar suggest that they may not have represented the voices of the farmers as much as the mainline farmers' groups who largely condemned the burnings, and whose counsel to the farmer and former KRRS member Shankrikoppa likely prevented additional burnings.

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<sup>62</sup> While not covered in this paper, the manner in which the information was spread could prove to be a fascinating area for additional research

<sup>63</sup> Visvanathan and Parmar, 2718-2723.

### CONCLUSION

In examining the events in India around the “terminator gene,” the historical significance of the controversy is rather unclear. Was it a freak occurrence, devoid of meaning, or part of a larger, more widespread trend? The answers lie within Indian history and changes in the global political situation. The burning of the crops was indeed the first time citizens in the developing world had taken destructive actions against biotechnology, but the protests also fell within the tradition of Indian anti-globalization protests dating to the early 1990s. The farmers and activists who fought the technology used slogans, like “Quit India,” that harked back to India’s independence movement. These phrases had been used before in previous anti-globalizations campaigns to great success, and their use in the ‘terminator’ controversy provided continuity among the protest actions. The activists were able to bring their message to a wide audience though their media savvy.

Although the techniques used by the activists were not new, the parties responding to the controversy had not been in similar situations before. Prior to the events in India, Monsanto had never faced protests in the developing world. Further, Monsanto never had actually possessed the technology in question, which was still owned by D&PL. Because of this, Monsanto seemingly set itself up for the problem to be magnified by ignoring it until the controversy had already exploded. Likewise, the Indian agriculture infrastructure had not yet dealt with the collective might of NGOs and farmers’ groups, and these groups’ allies in the political arena were able to make the agriculture officials uncomfortable with the calls they were forced to make.



As a result of the media drubbing both the Indian government and Monsanto received over their handling of the situation, both developed their ability to work in the context of similar protests. This ultimately served both as *Bt* cotton made its way through the regulatory system, receiving its final approval in late 2001. Ironically, the final legislative approval was rushed through the Indian parliament amid news that thousands of farmers throughout India had obtained uncensored, illegal *Bt* cotton seed (the unauthorized seed that the GURT was designed to prevent from being used), and had already begun to grow it, paying no heed to the deliberate debate taking place in the parliament.<sup>64</sup> In the end, it seems that the KRRS did get its wish in that disenfranchised farmers ultimately did end up holding the power, but these farmers' choices reflected their desire for a better life, rather than fears about the technology.

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<sup>64</sup> Newell, 8-11.

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