

Title: COMMERCIALIZING ORGANIZATIONAL INNOVATION  
REQUIRES LOOSE COUPLING

Key Words: Loose coupling, Institutional theory, Biotechnology, Developing country

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**ABSTRACT**

In this article, we present an analysis of the interaction between an MNC and a mass movement organization in the Biotechnology sector in India. This interaction helps explain how 'illegitimate' organizations develop structural features that enhance their reputation and legitimacy. Using the arguments of Institutional Theory, we also describe how the institutional forces impinge on the key player of an evolving industry. We use an existing framework of impression management to understand how firms use impression management to legitimate their existence. We argue that structures which were functionally irrelevant gain prominence in the legitimacy process. Interestingly, the same structural features, which work for the underdog, become detrimental to the innovating firm. We argue that the innovating firm employ loose coupling to overcome legitimacy problems.

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## **1.INTRODUCTION**

The purpose of this paper is to understand how organizations respond to environmental threats that are not only ambiguous but also contradictory. We focus on how Monsanto India (MI) and Karnataka Rajya Raitha Sangha (KRRS) responded to the evolving dynamics of Biotechnology (BT) industry. This is interesting because the innovation in the BT industry is in the pre-paradigmatic stage with no dominantly accepted de-facto or de-jure solutions. The right to patents and protection of innovation is in direct confrontation with the accepted norms of seeds being transferred between the farmers. Given the long accepted practice and the attempt by MI to change this practice, this situation provides rich insights into institutional pressures and inter-organizational dependencies.

Monsanto India (MI) set up its state of the art Research Centre in 1998 in Bangalore, India. The parent company having launched a string of successful Genetically Modified Organisms (GMO) in US, the research was naturally in the field of BT. It started off with rice as a model crop. But, it faced problems from the very beginning from various quarters, the most prominent among them being KRRS. MI's efforts were mostly government focused, trying to get approval for the field trials and for the maiden product, Bt Cotton. There were encouraging signs from some quarters to the introduction of BT, like many institutes offering courses on BT and the corporate bodies like CII (Confederation of Indian Industry) endorsing the need for investment in BT. Given all these positive equations with the government, it still took about 6 years for the approval of the first BT product in the country, with the approval process being fine-tuned as MI went through the process as a pioneer in the field. Opposition from KRRS prevailed even after the approval, with KRRS attacking Monsanto premises, injuring the staff as well as research interests of MI. The role played by KRRS and MI's response to it and other opposition is explained in detail in the case study (Refer to Annexure1). We describe how some organizations which behave in an illegitimate way deploy features similar to that of the so called professional organisation to garner support for their legitimacy.

The paper is organized as follows: First, I did a literature survey of the conceptual groundings in IT, with specific focus on the concept of Coupling. Second, I used the IT lens to explain the functioning of MI. Third, I use the impression management framework to explain the structural features of KRRS and how the industry dynamics are being manipulated by MI. Fourth, I discuss the implications for organizations in extracting value from their innovations; and finally the direction of possible future research is discussed.

## **2.THE MECHANISM OF COUPLING IN THE CONTEXT OF INSTITUTIONAL THEORY**

Loose coupling as an important and deliberate organizational process, was a term coined by organizational sociologists who were attempting to study organizational processes in public schools in the 1970's. Ever since, the world view of the impregnable bureaucratic structure characterized by strong technical linkages and managerial control system, has been steadily diffused by the new institutional theory. Loose Coupling, as Orton and Weick (1990) elegantly argue, is the attempt to bring together a set of mutually opposing organizational structural forces – connection and autonomy.

The loose coupling thinking was used to challenge the then taken for granted notions – organizations working with intentional plans, well defined means-end goals, responsiveness, and coordination (Hallett and Ventresca, 2006). Loose coupling also helped better understand the polarized debate between two stylized organizational forms – mechanistic and organic. It is also symbolic of the balancing act which Institutional theorists have had to do in understanding the contradictions between the efficiency requirements of the technical organizations, legitimacy enhancement requirement as a source of resource access and the irrational or cultural context in which organizational forms developed. Before we delve into the role played by this thinking, let us first understand institutional theory.

Organizational theorists for long conceptualized (or probably ignorantly perceived) organizations as rational and tightly bound systems; and this often contradicted empirical evidence where many irrational (or probably non-rational) practices continued to thrive long after the rule has outlived its functional utility. The institutional rules function as myths which organizations (pretend to) follow and thereby gain legitimacy and resources (Meyer & Rowan, 1977). This highlighted the fact that in addition to the efficiency norms (driven by economic rationale), myths and rituals also play a key role in how organizations should be structured and how they work. These taken for granted values drive organizations. Since these myths ensure organizational legitimacy, they tend to make organizations behave similarly and also facilitate long-term organizational survival.

Selznick (1996, pp273) summarized the new institutionalization theory's pet theme of legitimacy thus - "Legitimacy is seen as an organizational imperative that is both a source of inertia and summons to justify particular forms and practices. The justifications encourage institutional mimicry or mimesis which means that the organization is highly sensitive to the cultural environment within which it lives."

There are three transmission mechanisms that force organizations to morph into similar structures (DiMaggio & Powell, 1983). Coercive isomorphism is the mechanism through which regulatory institutions and key stakeholders impose certain pressures or expectations which organizations follow so as to acquire legitimacy. Mimetic isomorphism is a result of organizations imitating (other) successful organizations given the ambiguity in understanding the cause of success. Normative isomorphism is a result of the professionalization process where members of an occupation prescribe norms in order to establish their own legitimacy. Institutional rules are sustained through the educational systems, legal mechanisms and public opinion, which over a period of time become taken-for-granted.

The formal structures therefore reflect the expectations of the institutional environments and are not necessarily synchronized to the needs of the daily work environment. In such institutionalized organizations the efficiency requirements of the day-to-day activities could be in conflict with the prescriptions of the generalized myths thereby leading to inconsistencies. In order to resolve these inconsistencies organizations employ decoupling and logic of confidence (Meyer & Rowan, 1977). Decoupling enables organizational participants to use means that are based on real time considerations even when they are not in consonance with the espoused formal structures. Despite the absence of technical validity of the formal structure, the rituals of confidence espoused by both the internal and external stakeholders sustain organizational stability and prevent organizations from plunging into anarchy.

The central focus on legitimation and taken-for-granted nature of institutional rules has significantly biased research against the process of deinstitutionalization. Oliver (1992) has created an important foundation for such a research by providing the conceptual framework of the antecedents of deinstitutionalization. Political, social and functional pressures drive the erosion of old norms and provide impetus for the creation of new norms. The argument that organizations are excessively constrained by social norms and unquestioned conventions thereby leaving little to managerial discretion has often been cited as an important shortcoming of IT (Oliver, 1991). Works in IT have tended to include strategic behaviour of firms in order to enlarge the scope of institutional theory. Most of these works have been influenced by Oliver (1991), who proposed five types of strategies (ranging from passive conformity to active resistance) that organizations exercise in their response to institutional pressures.

### **3.UNDERSTANDING MI**

In tune with popular wisdom of gaining legitimacy for its innovations, MI has used Joint Venture structures, support from Scientists, approvals from Technical bodies, demonstrated superior product and spread the word through its marketing efforts; and yet the opposition to Bt Cotton or MI (or rather a US MNC) was widespread. Herein lay the problem. A superior technical product backed by the financial and technical muscle of an MNC, could not easily attain legitimacy. The fundamental problem was that the R&D centre was seen as a unit which was primarily driven by the interests of the parent American company. Moreover, it was also seen as an organization trying to break age-old policy of transfer of seeds amongst farmers, where the intellectual property was treated more as a public good rather than as a private right.

In order to understand why MI found it difficult to extract value from its innovation we go back to Weick's (1976) classic. We use Weick's definition of loose coupling - weak or infrequent interdependence - to understand the notion of coupling but use his different imageries of "loosely coupled systems" to understand the functioning of MI. The imageries as envisioned by Weick are - slack times (excessive resources relative to demand), multiple means to produce one end, richly connecting networks in which influence is slow to spread, lack of co-ordination (or co-ordination that is being dampened), relative absence of regulation, planned unresponsiveness, actual causal independence, poor observation capabilities, infrequent inspection of activities within the system, decentralization, delegation of discretion, absence of expected linkages, observation that organization's structure is not co-terminus with its activity, result remaining the same irrespective of different actions taken, and the number of prerequisites.

MI's tight coupling where the R&D, Marketing, and Communications department were working with well defined roles and mutually exclusive responsibilities meant that the official position taken by the Communications department was the be all and end all. Technical seminars were seen as propaganda and means of communicating with fellow scientists rather than future customers; and worse still the communication was one sided. It was seen as an attempt to demonstrate the superiority of their innovation rather than understand what is required to address the concerns of the customer.

The customer's concerns aren't just about the efficacy of the product but also about how it affects their existing social patterns. The structuring of R&D was based on preventing any loss of IPRs and the Marketing division used communication as a tool to propagate their own agenda. Given that the innovation from MI was disrupting existing social norms, it created environmental reactions which were detrimental to MI's attempt to successfully commercialize its product. In fact the disproportionately high and negative reactions were a result of MI's flawed organizational coupling mechanisms. That all external communication was centralized, the scientific team did not have slack resources, that instead of following diverse streams of communication MI followed a relatively unitary and deliberate model all implied a relatively tight coupling of the internal structure.

#### **4.UNDERSTANDING KRRS**

In order to understand the organizational structure and methods employed by KRRS, I used a framework suggested by Elsbach and Sutton (1992). Their model has five steps in the path of acquiring organizational legitimacy.

Step 1: KRRS activities like "direct action" which translates to illegally entering office premises, disrupting normal work and destroying organizations' assets, setting fire to experimental plots raising genetically modified seeds, "threatening" to throw the company out of India, destroying the company's research efforts by uprooting the plants in the company's greenhouse to name a few, brought it the desired attention of the public at large.

Illegitimate action of this kind can provide media recognition for social movement organizations and their goals. Media recognition is essential for organizations that are challenging social norms and attempting to influence public opinion. The resulting publicity may lead a wider segment of the society to know about the organization, creating a potentially larger segment that can provide endorsement and support. Yet the downside risk of extreme illegitimate action that violates social norms can damage legitimacy of such organizations (Elsbach & Sutton, 1992). Hence these actions are purported to be merely symbolic rather than destructive. The organization needs to maintain a careful balance between gains from using a threat (always threatening but never acting can lead to restlessness amongst its members) and the risk of using direct action (losing the sympathies of other important stakeholders). The quest to attain legitimacy is multi-edged since the process involves social judgment (Ashforth & Gibbs, 1990).

Step 2: KRRS makes a clear distinction between its frontline cadres and its spokespersons. The frontline cadres are responsible for doing the acts of vandalism ("direct action") and courting arrests. The spokespersons and their leader are usually never at the scene of the action. But press statements after the incidents are issued by either the President of KRRS, Prof. Nanjundaswamy, a lawyer by profession or by some other "farmer leader" in the organization.

The organization structure conforms to institutionally defined norms. The presence of well-defined roles and qualified people enhances the legitimacy of KRRS. The separation of roles of spokespersons and other members prevents role conflict. Since the

spokesperson is “unaware” of the actions of the frontline cadre, (s)he focuses on matters of principle.

Step 3: In the battle against MI, KRRS’s biggest stakeholder is the Indian farmer. They claim to espouse the farmers’ interests and are willing to take on all those organizations that infringe on the rights of farmers. They use emotional slogans (like Quit India) to call for direct action against MI, rallying farmers on August 9, (the day the Quit India movement was launched to drive away the British rulers in 1942) to mobilize an attack.

The use of symbolic slogans and events minimizes the impact of illegitimate actions. Moreover the argument that farmers’ interests need to be protected along with the need to protect domestic industry ignites a fundamental debate. The focus shifts away from the means to the ends. The debate sets stage for the next step.

Step 4: KRRS’s ire is against MI, because the company’s genetically modified seeds are seen as being harmful to the environment, making the farmers dependent on the company for repeated purchase of the seed, making them ever dependent on the MNC. Any press statement issued after an act of vandalism against MI interests, always starts off with the ill effects that their technology supposedly has and lists out why such an action is justified against the company. Thus it justified the reason for taking recourse to illegal actions on the part of KRRS.

The spokesperson tries to enhance members’ illegitimate actions by asserting that those actions ultimately benefited the larger society. They also talk about how favorable outcomes (like legislative changes) have come about because of such pressure tactics.

Step 5: The President of KRRS, Prof Nanjundaswamy, is always seen (when the media is reporting) with the top politicians of the state, submitting memoranda or charters of demand. The politician, because of the seemingly large clout Prof Nanjundaswamy enjoys with the largest section of the society, the farming community, would like to keep the latter in good humor so that he is seen as being on the side of the powerful farmer lobby. So the politician gives a tacit endorsement of KRRS and its President, making it legitimate in the eyes of the beholder. Because KRRS is seen as a farmers’ haven, more and more seem to join its ranks, lending it the mass support that is the hallmark of legitimacy. Whether the numbers swell because they see it as a legitimate entity with the farmers’ interest at heart or KRRS seeks legitimacy by invoking the large numbers of its members is to be seen, but each has a reinforcing effect on the other. Also, what cannot be ruled out are the other interests that KRRS purportedly holds at heart, that of the powerful pesticide lobby which does not want the Bt Cotton to flourish to the death of its own industry and the covert support of International NGOs like Greenpeace which have similar interests at heart.

The endorsement and support from farmers, government, international organizations, research institutes and (chemical) industry creates a spiraling mechanism of enhancing legitimacy. It is just this legitimacy that is sufficient to provide KRRS with the resources that it needs.

## 5.DISCUSSION

We argue that in the early phase of an industry it is imperative that organizations do not decouple R&D departments from the external environments thereby making the internal coupling between the various departments tighter. Organizations need to ensure that their internal techno-economic environment is constantly engaged with the external institutional forces so that the organization can either influence the environment or instead the organization itself can be influenced. Decoupling often leads to the internal research departments developing an antagonistic attitude towards the environment. Hence the internal organizational setups expend unduly high resources in the confrontation rather than understand the institutional environment and make a sustained effort to reduce the friction. At the same time by coupling themselves with the external environment, organizations can enhance their learning mechanism and adapt themselves to ensure sustainable growth of the economy at large.

MI initiated its efforts to seek approval for the launch of Bt Cotton in India in the year 1995. Despite seemingly positive responses from the government regulatory agencies, the commercial launch of Bt Cotton was delayed considerably, with the approval process itself being fine-tuned many a time. The approval process faced problems from the very beginning from various quarters, the most prominent among them being KRRS (Karnataka Rajya Raitha Sangha). Apart from KRRS, MI had to face the opposition from the scientific community which was relatively reticent, environment protection organizations that feared genetic pollution, general critics who used labels like 'terminator technology,' 'gene pollution' & 'sterile plants' and regulatory pressures to prove the efficacy of Bt Cotton seeds. The role played by KRRS and MI's response to it and other opposition is explained in detail in the case study. Subsequent to the approval, MI continues to face regulatory pressures for subsequent approvals, pricing pressures from local governments and the constant threat of counterfeit seeds. This case highlights how not to mis-manage regulatory environment and institutional pressures in developing countries.

The technical structuring of MI in its attempt to commercialize its innovations wasn't very different from that of the KRRS; and yet the ability of KRRS to stall (or possibly delay) MI was surprising. This is even more surprising given the resource advantage which MI had. In feudal democracies (a term I use to define countries which have a political system founded on democratic principles but do not have strong, autonomous and impartial institutional setup) the ability of firms like MI to successfully commercialize their products is likely to get increasingly more difficult.

The increasing role of media and telecommunication networks in percolating technology products is likely to make it even more difficult for firms like MI in commercializing their technology, if MI continues using tightly coupled organizational structures. Acceptance of the larger public, including non-users is an important part of ensuing product success in anarchic/democratic media. Traditional methods like planting stories and managing information flow in public domain are increasingly becoming irrelevant. In the current context impression management works well for the underdog; for the so-called resource advantaged (like MI) who communicate through corporate spokespersons this is becoming a disadvantage.

In order to overcome these issues, loose coupling can definitely be an important tactical ploy. Weick (1976) lists seven advantages associated with loose coupling. These are – allows some portion of an organization to persist without having to react to every change in the environment, provides a sensitive sensing mechanism, a good system for localized adaptation, preserves identity uniqueness and separateness of elements thereby enabling greater number of mutations, seals off different organizational systems thereby prevents breakdown in one portion affecting the whole system, increases the sense of self efficacy and finally reduces the cost of co-ordination.

Loose coupling for the various functional departments of MI, during the phase when it's attempting to commercialize innovations would provide it the ability to adapt itself to the context in which it is embedded. Such embedding can happen if organizations encourage heterogeneity and identity uniqueness. We theorize that destabilizing products increasingly face very strong support or opposition. If the support is strong marketing costs are very low. On the other hand if the opposition is high then marketing efforts and other symbolic gestures will only increase the height of the wall of resistance making it more expensive for the firm in commercializing its products.

## **6.DIRECTIONS FOR FUTURE RESEARCH**

Instead of the current structure where R&D organizations are sealed off from external pressures, influences and leakages, a more long term and regular interaction process with the stakeholders is necessary. Not only will the technology thus developed be more likely to incorporate customer requirements but more importantly it will not be perceived to be inimical. Orton & Weick's (1990) article rightly says that "To assert that a system is loosely coupled is to predicate specific properties to the system, rather than an absence of properties." Herein lies the challenge for future researchers.

The parts (functional departments) will have to evolve their distinctiveness and not be submerged under cohesive whole as captured under the MI umbrella, under the MNC umbrella or as an American firm. What is required from a research perspective is a microanalysis of the various processes and the interdepartmental linkages. Such process level analysis will help us understand the extant of responsiveness and distinctiveness.

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## ANNEXURE-1

### MI VS KRRS – THE EMERGING DYNAMICS IN THE INDIAN BIOTECHNOLOGY INDUSTRY

Monsanto India (MI) is a 56-year-old company headquartered in Mumbai. A subsidiary of the 1901 established Monsanto Company in US, it started in the chemical herbicides business. In 1996, the parent company acquired Cargill Seeds business worldwide, and with that the Indian arm of Cargill Seeds was also merged with Monsanto Company. With this acquisition, MI got a shot in the arm in the hybrid seeds industry, with some successful products in Corn and Sunflower. In the same year, emphasis was placed on Biotechnology in India. Efforts paid off and in 1998, a state-of-the-art research facility was set up in the Indian Institute of Science (IISc) campus in Bangalore. It had experienced scientists, most of them Post Doctorates, in the areas of Molecular Biology, Biochemistry, Genetics and other allied life sciences. The research centre started work in the area of functional genomics with rice as a model crop for cereals.

A hostile environment prevailed when a close vigil was set up by environment groups, agricultural associations and sections of the press when IISc refused to make public the contents of the Memorandum of Understanding with the company, even after a year of signing it<sup>3</sup>.

At the same time, the parent company formed Monsanto Mahyco Biotech (India), MMB, a 50:50 joint venture with Maharashtra Hybrid Seeds Company (Mahyco), to market its biotech products in India. With this, the company signaled its interest to launch Bt products in India, buoyed with the success of the products in US. In US, the first genetically modified organism (GMO) for cotton by the name of Bollgard was already released in 1995 and proved to be a huge success story (with a dramatic reduction in the usage of pesticides an increased realization of yield due to control of damage by cotton boll weevil pest). In India too, Cotton crop is the largest consumer of pesticides amongst all crops. With the express belief in the technology, and also with the gnawing need to reap the benefits of the technology in the Indian scenario where there was a growing demand on the agricultural resources of land and water being in short supply, MMB started efforts to launch Bt Cotton in India. The government, under the aegis of the Department of Biotechnology, gave permission for trials and they were started in 1996 by MMB.

Even though the permission came from the Central government (of India) for MMB to undertake the trials, there was discontent from various quarters, scientific quarters included. Some scientists believed that the company could exploit the farmers while some farmers were agitated that the government gave permission to a private company and not to agricultural universities, even though the Director of Monsanto Research Centre said that they would release the seeds only after getting an approval from the Department (of Biotechnology).

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<sup>3</sup> *Scepticism about MoU with IISc unwarranted, says Monsanto* The Times of India, Wednesday, December 8, 1999

At about the same time, the World Trade Organization (WTO) Ministerial Conference was happening in Seattle. At the conference, Indian government opposed the creation of the working group to study various issues related to Biotechnology<sup>4</sup>. In the same connection, activists of Karnataka Rajya Raitha Sangha (KRRS), a group active locally in the state of Karnataka, staged a demo against the WTO talks, vowing to launch a movement against MNCs in the country and demanding that action be initiated against MNC Monsanto and IISc for carrying out tests of genetically altered seeds. It issued a notice to MI saying it should vacate India or face “direct action,” charging that the company was destroying basic agricultural practices and meddling with biodiversity. It also asked the IISc not to allow MI to work in its campus, saying it was genetically modifying seeds against laws of nature.

Parallel efforts were on at Central Institute for Cotton Research (CICR) to produce an indigenous variety, seeds of which can be used for three to four years, as against Mahyco’s Bt cotton which compels farmers to buy seed every year. In this context came a positive boost to Biotechnology investors in general in the form of Bangalore Bio.Com, an exhibition to showcase Karnataka’s potential to become the leading investment destination for the Biotech sector in India and abroad. Attended by industrialists, venture capitalists, biotechnologists and students, this forum provided scope for strategic business alliances and partnerships<sup>5</sup>. The clarion call came from the State Chief Minister who emphasized the need for an increased use of biotechnology in day-to-day activities, making agriculture more scientifically oriented to increase “productivity” and make it “cost effective.”

Freedom of expression is a fundamental right but the KRRS activists took it a bit too violently. The activists did not let down their guard despite the approvals for trials coming from the government itself. Despite the company proceeding legally on the field trials, they burnt some of the trial fields in and around Karnataka. It is believed that most of the activists had nothing to do with biotechnology and even less to do with the ground realities of agriculture in the Indian context<sup>6</sup>. They continued their agitation against these efforts by threatening the company as well as the JV partner Mahyco against these efforts. MI in a way was a witness to this violent streak earlier, when KRRS ransacked the office of Cargill Seeds before it merged with MI. The President of KRRS, Prof. Nanjundaswamy, was a well-known figure in Bangalore, having led the ransacking of Kentucky Fried Chicken (KFC) outlet in Bangalore a few years earlier.

MI, in an attempt to reach out to various sections of the society, the farmers and scientists in particular, organized seminars and farmer meetings to talk about its technology. The seminars showcased the positive support the company and the technology enjoyed in the scientific community to the attending members of the local state government. The farmer meetings concentrated on a whole gamut of issues – why repeat purchase of seed, why the huge cost compared to local seed, why the need for planting refuge crop, what is the benefit of the technology ..... The company officials were too glad to answer these questions as this highlighted the interest shown by farmers in the technology. They explained the need for repeated purchase of seed from the company, emphasizing the loss of hybrid vigor if the same seed were to be used for next crop. The cost was for the

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<sup>4</sup> **India opposes working group on biotech** Deccan Herald, Friday, December 3, 1999

<sup>5</sup> **Bio.com comes to an end. Biotechnology gets big boost.** Deccan Herald, Wednesday, April 18, 2001.

<sup>6</sup> **Bt Cotton: A Needless Controversy,** The Hindu, Sunday, Aug 4, 2002.

technology that went into the seed. The seed for refuge crop was a part of the package and the farmer need not buy it separately. It ensured that the pest did not become resistant to the new technology. By cutting down on loss due to pest damage, the yield and hence the revenue increased for the farmer.

Despite all the protests and burning of field trials, MMB continued its efforts and produced data before various committees involved in the approval process like the Regulatory Committee for Genetic Modification (RCGM) and Genetic Engineering Approval Committee (GEAC) as per protocol of the Government of India. Even while this was going on in full swing, Navbharat Seeds, an outfit based in Gujarat, started selling Bt Cotton, without any approval whatsoever. It was like a blessing in disguise for MI since the product was a huge success, with farmers flocking for the seed on hearing about its success initially. The government had already got its verdict about Bt Cotton, even before it approved. Finally, on 26 March 2002, the Central Government gave permission to Mahyco to commercialize six of its hybrids with Bt Cotton in India, only in Southern and Western regions of India, covering the six cotton growing states of Maharashtra, Gujarat, Madhya Pradesh, Andhra Pradesh, Karnataka and Tamil Nadu.

With the stage set for cultivation of Bt Cotton in India, Prof. Nanjundaswamy of KRRS continued to be up in arms against this approval, saying that genetic engineering will lead to monopoly of seed companies and farmers will have to depend on them for seeds. What is not understood is whether he is against the technology or against the MNCs in India. True to his word, some activists under his leadership, threatened to agitate against Bt Cotton even after the approval given by the Central Government and burnt Bt Cotton seeds in Davanagere (a small town in the South Indian State of Karnataka) to protest against its use<sup>7</sup>.

Soon there were reports from China that there were serious pest attacks on Bt Cotton during commercial production. Following these reports, there was an immediate appeal by some NGOs to the government to review the decision to commercialize Bt Cotton in India<sup>8</sup>. Anti globalization campaigns also were getting attention, just preceding the food summit to be hosted by the UN Food and Agriculture Organization (FAO), which was to be attended by leaders from developing countries.

But at the same time, other areas were gearing up to meet the demands for Biotechnology in all its forms. The education system was gearing itself to cater to the demand for biotechnologists. Recognizing the need to offer study opportunity to students in the ever-growing field of Biotechnology and allied Biosciences, a group of entrepreneurs from the city of Bangalore have established the Reva Institute for Science and Technology under the banner of Beemaneni's Educational Systems Trust<sup>9</sup>. All India Council for Technical Education (AICTE) has given its go ahead for 22 engineering colleges to offer courses in biotechnology from 2002 academic year<sup>10</sup>. Confederation of Indian Industry's (CII) biotech mission identified enormous opportunities for partnering and outsourcing

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<sup>7</sup> **Photo Feature**, The New Indian Express, Monday, June 24, 2002

<sup>8</sup> **Govt urged to review decision on Bt Cotton**, The Hindu Business Line, Monday, June 10, 2002.

<sup>9</sup> **Entrepreneurs open institute for Biotechnology**. Deccan Herald, Wednesday, June 26, 2002

<sup>10</sup> **22 colleges to offer biotech course**. Deccan Herald, Tuesday, July 9, 2002.

opportunities in contract research, drug development and clinical trials and in bioinformatics between companies in India and North America. The chairperson of CII national Committee on Biotechnology said that the acute funding constraints faced by US biotech sector has created a real need for outsourcing lower costs R&D to countries like India<sup>11</sup>.

In the Asia Pacific region, China has been very aggressive in obtaining funding and grants, with its emphasis on Biotechnology. Corporate India, with its three million English speaking graduates, seven lakh Post graduates, 1500 PhDs qualified in diverse science and engineering fields, has not been fully exploiting its potential to attract contract research. With the global spend on clinical trials in excess of \$8 billion, India has a large opportunity to tap. It is only a few companies like Bangalore based Avestha Gengraine Technologies and Strand Genomics that are in talks with US and Canadian companies for working together in areas of Bioinformatics and future tie-ups.

Amidst the need for emphasis on stronger tie-ups with companies abroad to attract more research work to India, KRRS launched a fresh offensive against MI, threatening to storm IISc premises and drive out scientists supporting MI<sup>12</sup>. He timed it to coincide with the anniversary of Quit India Movement in India, on August 9. In response, prohibitory orders were clamped within a radius of one km of IISc to ward off the threat posed by KRRS. On the designated day, nearly 1000 activists took out a procession against the sale of GM seeds. Police prevented them from reaching Monsanto's Research Centre. A small group was subsequently allowed to meet the Director of the Research Centre<sup>13</sup>. Soon after, the State government decided to temporarily stop the sale of Bt Cotton till experts gave it a clean chit<sup>14</sup>. They were also ready to send a proposal to the Centre to ban Bt Cotton if the experts' findings say it is harmful. This was seen as a victory by the activists.

In the meantime, Proagro Seed Company sought clearance from GEAC for its three GM mustard hybrids, trials for which started in August 2001. This decision was deferred since there were different perceptions about the data emanating from the trials conducted by Proagro and ICAR<sup>15</sup>. Some NGOs demanded more stringent measures to introduce a food crop like mustard and wanted the government to revoke the approval for Bt Cotton since it failed to live up to its claims. Dr Swaminathan, the father of Green Revolution in India, called for a revamp of the approval process for GM crops, suggesting that the GEAC be scrapped and be replaced by a more representative national commission, having representation from all sections of the society. Mr S R Rao, the Director of Department of Biotechnology, said that the transgenic crops were time-tested for their safety and referred to the six-year duration taken for approving Bt cotton seeds in India<sup>16</sup>.

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<sup>11</sup> ***CII's biotech mission identifies opportunities*** The Economic Times Bangalore, Friday, 28 June 2002

<sup>12</sup> ***Threat to storm IISc***. The Times of India, Monday, July 15, 2002

<sup>13</sup> ***KRRS protests against Monsanto***. The Hindu, Saturday, August 10, 2002

<sup>14</sup> ***No Bt Cotton for market till experts give clean chit***, The New Indian Express, Wednesday, August 14, 2002

<sup>15</sup> ***Decision on GM mustard deferred*** The Hindu Business Line, Friday, November 8, 2002

<sup>16</sup> ***No harm from GM crops***. The Hindu Business Line, Wednesday, November 27, 2002

There were conflicting reports about the success of Bt Cotton in various areas it was introduced in. A study by two agricultural scientists in Andhra Pradesh, covering 11 villages of a district in the state, showed that the product was a failure on all three measures it promised – reduced pesticide usage, increased crop yields and enhanced earnings of the farmers<sup>17</sup>. Similar reports were received from some other areas in Karnataka and Maharashtra. Brushing aside such reports, a senior official of Mahyco asserted that Bt Cotton was able to cut down pesticide consumption for bollworm by about 65% in Karnataka<sup>18</sup>. This was backed up by the Union Environment Minister who informed the Rajya Sabha that the performance of Bt Cotton has been satisfactory on counts of higher number of cotton bolls, reduced number of sprays and higher yields.

According to studies carried out by CICR, Gujarat Agricultural University and Madhya Pradesh Agricultural University, sporadic cases of poor performance were due to physiological reasons such as poor soil conditions and successive bouts of drought and excessive rains. In the meantime, University of Agricultural Sciences (UAS), Bangalore, developed an indigenous variety of Bt cotton, stating the apprehensions expressed over Bt cotton is unfounded<sup>19</sup>. This can be seen as an endorsement of the technology from scientific quarters as well. MMB claimed that a comprehensive survey of the farmers who had completed their final picking of the crop showed that they had earned an extra income of Rs 7000/- per acre, thus showing that Bt Cotton is not a failure.

Despite reports of success, the protests did not abate. Former Union Agriculture Minister and Planning Commission member Mr Som Pal warned the farmers against going the whole hog for the new seed as it could lead to genetic contamination of other crops<sup>20</sup>. On the first anniversary of approval of Bt Cotton, Greenpeace India, a voluntary organization, staged a demonstration in front of MI's office in Bangalore, demanding the company to admit failure of Bt cotton and withdraw the seeds from the market. Greenpeace MD requested the government to blacklist MI and make it accountable for the losses suffered by the farmers<sup>21</sup>.

In a boost to the approval process of Bt Cotton, the National Environment Appellate Authority dismissed an appeal filed in December 2002 by the Research Foundation for Science, Technology and Ecology against the Union Government, Mahyco and Monsanto Mahyco Biotech, challenging the GEAC order granting conditional clearance for commercial release of three transgenic hybrid cotton seeds. The Authority highlighted the need for continued vigilance on the part of the authorities as quantum of work increased. It said that it could not be established that GEAC ignored the precautionary principle since the permission for commercialization of the three varieties was given after various studies and assessments conducted by various technical agencies over a period of 6 years addressed safety issues, with no adverse findings being reported. Hence it cannot be

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<sup>17</sup> ***Bt Cotton lets down AP farmers: Study*** The Hindu Business Line, Monday, December 9, 2002

<sup>18</sup> ***Bt cotton cut pesticide use by 65 pc, claims Mahyco***, Deccan Herald, Saturday, December 14, 2002

<sup>19</sup> ***UAS develops Bt Cotton***, The Hindu, Monday, December 23, 2002

<sup>20</sup> ***Shun Bt cotton, says Som Pal***, The Hindu Business Line, Friday, February 14, 2003

<sup>21</sup> ***Withdrawal of Bt cotton seeds demanded***, Deccan Herald, Thursday, March 27, 2003

established that GEAC ignored the precautionary principle or that such evaluations were unscientific and were outcome of commercial pressures to promote Bt Cotton<sup>22</sup>.

The six states permitted to grow Bt Cotton saw a varied increase in the acreage of the crop, ranging from 40% in Andhra Pradesh to 900% in Tamil Nadu. With Mahyco having licensed the Bollgard gene to seven other seed companies, it is expected that the farmers will have access to this technology in their preferred choice of cotton hybrids in the coming years<sup>23</sup>.

Activists of KRRS this time around made a direct violent attack on the greenhouse of MI located in IISc Campus, destroying all the plants and equipment and injuring two people in the process. They called for a ban on the sale of MI's goods. Twenty-three activists were arrested in this connection. As per the KRRS President, Prof. Nanjundaswamy, they timed this attack to draw attention of those attending the Cancun meet in Mexico<sup>24</sup>.

It was revenge time for the MNCs at the Biotech Awareness programme workshop organized by the Foundation for Biotech Awareness and Education to mark the 20<sup>th</sup> anniversary of modern agricultural biotechnology. Both Syngenta and MI made presentations at the seminar, calling for better inflow of objective information into the market<sup>25</sup>.

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<sup>22</sup> *Appeal against 'clearance' to hybrid cotton seeds dismissed*, The Hindu, Saturday, October 18, 2003

<sup>23</sup> *Bt Cotton continues to gain ground in six major cotton growing states*, The Financial Express, Monday, October 20, 2003

<sup>24</sup> *KRRS activists damage greenhouse at IISc* The Hindu, Friday, September 12, 2003

<sup>25</sup> *Companies lash out at NGO's campaigning against GM crops*, City Express, Saturday, June 21, 2003