THE INDIA FORUM
A JOURNAL-MAGAZINE ON CONTEMPORARY ISSUES

January 12, 2023

Regulating GM Crops in India

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A new history shows how the trajectory of biotechnology in agriculture created spaces for greater democratic engagement in formulating policy on GM crops in India. But will this state of affairs last?

Aniket Aga's *Genetically Modified Democracy* is a timely reminder of what is at stake in light of the Genetic Engineering Approval Committee's (GEAC) approval for the environmental release of genetically modified (GM) mustard in India.

The book traces the history of biotechnology in relation to agriculture in India, bringing forth the perspectives of biotechnologists, bureaucrats, politicians, activists, seed companies, and farmer-intermediaries in the input supply chain. Aga challenges the familiar global narrative of genetically modified crops where corporations like Monsanto have monopolised markets and exploited farmers for their own profits. He argues that the western or rather, the American, narrative about GM crops must be provincialised (Chakravarty 2000), and that trajectories of technology must be understood in their own specificity and historical context.

Biotech in agriculture

The revision of the historical trajectory of biotechnology research in India clarifies the role of biotechnology in agriculture. Earlier work had placed the gene revolution after the green revolution (and in the same time frame as the information technology revolution) (Scoones 2006). Aga places the two concurrently.

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Given the intensive capital requirements for biotechnology research and its lack of immediate practical applications in agriculture, such research was funded and incubated outside the agricultural research system in independent labs under the Department of Biotechnology (DBT) in the 1960s and 1970s. Aga shows how plant breeders and biotech researchers remained two completely different communities, with no engagement at a formal level.

In these initial years, state-led investments in biotechnology remained far removed from plant varietal development, despite being justified in the name of national development and agricultural productivity. It was only when specific genetic modification technologies like Bt (*Bacillus thuringiensis*), Ht (herbicide tolerance) or the hybridisation platform (bar-barnase-barstar) became available globally, that Indian scientists were able to work on incorporating these traits into seed varieties, and offer potential crops like GM mustard to farmers.

Unlike in the United States, where GM seeds have been driven by an academia-corporate partnership, Aga shows that it was state investment in biotechnology and the domestic seed sector that has shaped the history of GM crops in India. Public sector biotechnology along with liberalisation of India's seed industry in the 1980s created conditions for domestic research and production of seeds. In the last two decades, this created competition for Monsanto and diluted its stranglehold on the Indian market.

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By harnessing support from state governments and even the central government, domestic seed companies successfully challenged Monsanto's royalty fees and pricing structure in the Indian courts to their own benefit. This has made a significant difference to how Bt cotton has played out across different geographies in India and will also shape the market and pricing of any future GM crop that may be released.

A home-grown challenge

Despite challenging global monopolies over technological innovation and offering the promise of cheaper GM seeds, public sector biotechnology has faced severe regulatory challenges. Monsanto's Bt cotton was approved in 2002, but it is only now, after a gap of 20

years, that the first GM food crop has been given approval for environmental release by the GEAC. This is unlike in the US where, despite some public opposition, GM has become mainstream. In India, concerted opposition raised by civil society actors, farmers groups, and scientists, has influenced even political leaders to speak out against GM crops.

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This is the second major arc of *Genetically Modified Democracy*. Aga argues that the challenge to GM crops in India was not simply a result of or an imitation of the fight put up in the Global North. Earlier research has characterised the movement against GM crops in India as driven by international and national activists under the logic of the Cartagena Protocol on Biosafety (signed in 2000) and focusing on the monopolisation of technology and uncertainties in the science (Herring 2010, 2015). In contrast, Aga provides thick description of a struggle rooted in domestic peculiarities.

The earliest challenge to GM crops was a legal petition by Vandana Shiva in 1999, a few years before the Cartagena Protocol came into effect (2003). Further, much of the debate has been fought by activists on the terrain of regulatory and technical procedures for the use of genetically modified organisms and not around the Cartagena Protocol. Rather than the uncertainty associated with such crops, activists like Suman Sahai, Vandana Shiva, and Aruna Rodrigues raised more mundane issues, such as following scientific procedure, due diligence, and transparency of data - all within the same regulatory and risk assessment frame as that propounded by the state (state science).

At the same time, efforts have also been made to broaden the terrain and include issues beyond those recognised by state science. One of the points raised during the Bt brinjal controversy was that India was a centre of origin for brinjal and the biodiversity of brinjal would be threatened with the entry of Bt brinjal. Further, activists strategically engaged with the courts by including the Ministry of Health and Ministry of Consumer Affairs as respondents in the petition on Bt brinjal, leaving out the Department of Biotechnology.

The nature of regulation

In one of the book's best chapters, 'Regulating GM Crops', Aga describes the back-end working of the regulatory process for GM crops. It shows how activists have used the scientific register to make claims for their position rather than using the law or principles of social justice. Yet, instead of responding to activists on scientific grounds, the regulatory authority has rejected their claims on procedural grounds, such as lack of a receipt of purchase of GM seeds.

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In contrast, using a scientific register, the GEAC ordered the destruction of field trials of GM crops in Rajasthan by Deepak Pental, despite his status as an eminent biotechnologist and past member of the GEAC, and in spite of his efforts to intervene in the issue through the Prime Minister's Office.

The regulatory process, thus, cannot be dismissed either as elitist or as bureaucratic, or even as technocratic alone. The workings of regulatory science are deeply embedded in structures of everyday politics and can move in unexpected ways. At the interstices of different registers, claims can be made and thwarted. As Aga shows, this liminal space enables greater participation by a diverse set of actors in the process.

Fallacies of choice

The last two chapters, 'Profiting from Seeds' and 'Merchants of Knowledge', on seed companies and pesticide dealers, make important interventions in the debate on the legacy of Bt cotton - a thorny, unresolved debate till now (Rao et al. 2018, Kranthi and Stone 2020).

Proponents have used adoption data (over 96% across the country) and yield increases to argue that farmers have chosen GM seeds over others and that they have benefitted with higher yields and lowered pesticide costs. However, as Aga points out, in India, GM traits (Bt) have been bred only in hybrids, rather than in open pollinated varieties (OPVs) of cotton. This is a crucial point, which puts to doubt whether yield increases can be attributed to the Bt trait alone.

> The hit-or-miss expression of the Bt trait in Indian cotton hybrids has made pest resistance a matter of chance.

Hybrid seeds are designed to be higher yielding than OPVs but at the same time, need to be purchased year after year as their progeny do not express the same hybrid vigour. Any yield increases must take into account the effect of switching from OPVs to hybrids, as well as the impact of irrigation that hybrids perforce require. At the same time, the hit-or-miss expression of the Bt trait in Indian cotton hybrids has made pest resistance a matter of chance. This has, unsurprisingly, been reflected in the growing use of pesticides in the second decade of planting the crop.

Further, building on the work of farmer deskilling (Stone 2007, Stone et. al 2014) Aga shows the dependence of farmers on the figure of the intermediary, the pesticide dealer, who is the input supplier and knowledge broker all rolled into one. Decision making in terms of an informed 'choice' is absent given the imbrication of technological, social, ecological, economic and cultural factors all shaping and constraining the actions of farmers. Technology adoption cannot be translated into 'choice'.

Contesting developmental paths

The final and overarching argument in *Genetically Modified Democracy* is that the trajectory of biotechnology in agriculture in India has created spaces for greater democratic engagement in arbitrating truth claims and formulating policy over the last two decades - as the play of words in the title of the book suggests. This is in sharp contrast to earlier work on science, technology and development in India, which focused on the epistemic violence and great social cost arising from the imposition of a high modernist approach of modern science and technology (Vishvanathan 1997, Nandy 1988).

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Aga argues that unlike earlier environmental and livelihood movements like those against dams or logging, GM crops (especially food crops like Bt brinjal) allowed anyone to become a party to the issue and express an opinion by virtue of being a food consumer. Coalitions of otherwise disparate groups and individuals contributed towards imposition of the moratorium on Bt brinjal in 2010. This echoes the farmer protests of 2020-21, where a large section of urban society in Punjab (including NRIs) supported farmers in their demand for repealing the three farm laws, and staked a claim to speak, by arguing that everyone eats food.

Yet, I wonder how much of the particular ways of activism has to do with the specific nature of GM food crops in India as much as about the various ways in which democracy has played out in the country. The legal and judicial space used effectively by civil society petitioners in the case of GM crops was created by the very peculiar nature of the Public Interest Litigation and its link with judicial activism and environmental issues going back to the 1980s. The civil society coalitions, including the one for a GM-free India, trace their roots to broader activism related to struggles for the Right to Information Act, the Mahatma Gandhi National Rural Employment Guarantee Act and the Forest Rights Act, all of which came through in the 2000s. These civil society coalitions are a product of the spaces created in the political sphere in the 1990s with the arrival of coalition politics and the churn in the Indian polity linked to Mandal.

> The book's argument about democracy will be tested as we work our way through the fate of GM mustard, given that spaces for activism have shrunk.

I would also add a very important contingent factor in the case of the Bt brinjal moratorium - Jairam Ramesh as Environment Minister. His training in technology policy and experience at the World Bank in the late 1970s (Weiss and Ramesh 1979) and later in the Indian government gave him a unique position as an insider-outsider. This enabled him to push for broader public consultations and stand his ground against opposition from within the government and outside.

The book's argument about democracy will be tested as we work our way through the fate of GM mustard, given that spaces for activism (including judicial activism) have shrunk in the NDA regime that has been in power since 2014 and as the era of coalition politics seems long past. Moreover, although we have histories of three pioneers in the field, I was hoping to learn more about the public sector biotechnologists who have taken up the mantle of GM crops in India in the last two decades (like Deepak Pental, for instance). That would have helped us frame a better understanding of the GM mustard controversy.

Nonetheless, *Genetically Modified Democracy* is a fine book, accessibly written, that will be of interest to a wide range of scholars across development studies, science and technology studies, political science, history, anthropology as well as critical agrarian studies, not to mention journalists and the educated public.

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