

# Seeds of Knowledge, Seeds of Being

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## Abstract

Using textual analysis this paper presents the debate between proponents and critics of the use of genetically modified (GM) Bt cotton seeds in India. Epistemological positions of traditional ethnobiological knowledge and Western scientific knowledge are contrasted, as are the ontological implications of these respective positions. The developers of GM seed ontologically prioritize the commodification of seeds within agriculture. The proponents of GM seeds place such seeds hierarchically above small landholding farmers such that farmers must abandon traditional methods of agriculture in service to this product. Moreover, an analysis of statistical data regarding farmer suicide in India suggests a correlation between it and the widescale introduction of GM seeds. This correlation emphasizes the vital importance of traditional ethnobiological knowledge and practices for communities and individuals. In contrast to the proponents of GM seeds, advocates of traditional farming methods have supported organic farming practices, biodiversity, and seed development and trading between farmers. Central to this paper is the work of scientist and activist Vandana Shiva, who espouses that not only does biodiversity support vibrant life in society, but that the converse of this is also true: monoculture is destructive of human life and social belonging as it destroys the social network through which seeds have been developed and distributed for generations. Solutions to farmer suicide must address ontological issues and involve traditional ethnobiological knowledge.

**Keywords:** *Ethnobiological research, traditional ethnobiological knowledge, genetically modified seeds, biodiversity, India, small landholding farmer, farmer suicide*

This paper explores the interconnection between seeds, knowledge, and the lives of farmers on small land holdings in India. It exposes the effects of Monsanto's marketing and distribution of GM (genetically modified) monocrops in India from the perspective of subsistence farmers and their activist supporters, such as Vandana Shiva, and examines the opposing perspective of Monsanto, the corporate developer of the patented Bt cotton seed. As will be seen, there seems to be an unfortunate connection between capitalistic interference with seeds, traditional knowledge, and life through the advent of patent controls and the rising incidence of suicide by farmers on small land holdings in India and loss of biodiversity. This connection is revealed through analysis of statistical reports produced by the Indian government's monitoring of imported GM seed monoculture.

### **Methodology**

Research for this study primarily involves the textual analysis of articles, books, and websites concerning ethnobiological knowledge and Western empirical and ontological approaches to the introduction of genetically modified Bt cotton seeds in India. This culminates into two diametrically opposed perspectives regarding the use of GM seeds: that of the proponents of GM seeds, such as Monsanto, and its critique by its opponents, such as Navdanya, a non-government organization founded by Vandana Shiva in 1987 with the purpose of promoting organic farming, bio-diversity, and farmers' rights.

Statistical data from the Accidental Death and Suicide in India (ADSI) report a pattern of suicide among small landholding farmers in India that suggests a correlation between rising rates of suicide and the introduction of GM seeds. Furthermore, an analysis of the anti- and pro-GM response to this data reveal additional related connections between controlled monoculture, biodiversity, and the value ascribed to human life.

## Literature Review

A review of the literature on GM Bt seeds indicates that the interpretation of results from qualitative and quantitative studies of GM agriculture in India is contentious and strongly influenced by the observer's political point of view. The prolific scholar and notable activist Vandana Shiva is here the main representation of the anti-GM perspective, while Monsanto, particularly via its website and *Ag Bio Journal*, represents the pro-GM perspective. The books, websites, and newspaper articles referred to in this paper are readily available online or through mainstream book distributors. Such easily found discourses indicates how both corporate agricultural entities and farmers and their advocates strive to communicate their views, philosophy, and approaches to the general public. This paper frequently consults *ADSI's* statistical reports, which are produced by India's Ministry of Home Affairs.

### Two Diametrically Opposed Perspectives:

#### Anti-Genetically Modified and Pro-Genetically Modified Crops

In the mid-1990s, Monsanto developed Bt cotton seed by implanting a bacterial gene that made the cotton toxic to the bollworm, a persistent pest in Indian cotton fields. The ensuing discussion concerning Bt seeds forked into two conflicting narratives: an anti-GM narrative and a pro-GM narrative. These narratives interpret the history and use of GM crops in India through their own lenses. The introduction of genetically modified seeds met with opposition from those concerned about the effect of such seeds on soil, biodiversity, and traditional knowledge and lifestyle. However, GM seeds were welcomed by those who saw them as the answer to India's agricultural challenges (Sadashivappa & Qaim, 2009). While these two narratives are diametrically opposed to each other on several levels, both narratives position plant seeds as central to human activity and existence. Following is a discussion of each perspective.

#### *The Anti-GM Narrative*

The anti-GM narrative of groups such as Navdanya is based on the understanding that food security is necessarily founded on biodiversity, organic farming methods—such as crop rotation and organic pest control, freedom for farmers to develop their own seeds according to local micro-

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climates, and free seed exchanges between farmers. According to the anti-GM narratives, Western capitalists of the 1950s saw India as an underdeveloped country without an organized and unified system of agriculture, and failed to recognize that Indian farmers had thousands of years of collective experience in developing seeds adapted to local salinity and micro-regional climatic cycles of drought and monsoon. Rather, Western capitalists saw India solely as a prime market in which to sell their hybridized and, later, GM seeds. The anti-GM narrative interprets the domination of farming by pro-GM companies as a recolonization of India by the West (Shiva, 2005).

According to Vandana Shiva, Indian farmers use traditional ecological knowledge to develop and plant biodiverse combinations of crops. Biodiversity assists farmers in ensuring that they have a harvest: even when pests or weather conditions deplete one crop, the others survive. Biodiversity also ensures that nutrients are not depleted from the soil and are not artificially added; in biodiverse fields, some crops return nutrients to the soil which others use. Shiva also relates that farmers trade seeds with one another and thus assist each other in a collegial manner that builds community and a mutual support network. In the quotation below, Shiva links seeds, traditional ecological knowledge, and life at an ontological level:

Seeds are not just the source of life, they are the very foundation of our being. For millions of years seeds have evolved freely, to give us diversity and richness of life on this planet; and for thousands of years farmers, especially women, have bred seeds freely, in partnership with each other and nature, to further increase the diversity of that which nature gave us and adapt it to the needs of different cultures. Biodiversity and cultural diversity have mutually shaped one another. (Shiva, 2016)

For Shiva, biodiversity supports vibrant life in society and the monoculture of crops destroys human life as well as the social networks by which seeds have been developed and distributed for generations in traditional Indian culture. Below Shiva quotes the nineteenth-century Bengali writer and philosopher Rabindranath Tagore on the complex nature of Indian society and identity.

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India's best ideas have come where man was in communion with trees and rivers and lakes, away from the crowds. The peace of the forest has helped the intellectual evolution of man. The culture of the forest has fueled the culture of Indian society. The culture that has arisen from the forest has been influenced by the diverse processes of renewal of life, which are always at play in the forest, varying from species to species, from season to season, in sight and sound and smell. The unifying principle of life in diversity, of democratic pluralism, thus became the principle of Indian civilization.<sup>1</sup>

According to Shiva, the seventeenth-century British colonizers failed to perceive that India was a highly culturally complex and socially diverse land. The British colonizers saw India through a Eurocentric lens of expectation for one ruling elite, one main religion, and one prominent culture for the entire nation. For Shiva, the monoculture of crops is a continuation of the societal monoculture the British imposed on India (Shiva, 2016). Thus, according to Shiva, the presence of Monsanto (which was purchased by Bayer in 2018), GM crops in India and monocrops are a continuation of colonialization that began with Britain in the seventeenth-century.<sup>2</sup> For example, Monsanto's introduction of Bt cotton in India in 1998 began without official approval. Indeed, while Monsanto began growing Bt cotton in India in 1998 they did not receive official clearance to test the seeds until 2002. Government agencies were obliged to sue Monsanto for planting the unapproved crops as there was concern they contained unknown microorganisms that could contaminate the soil. Activists reacted even more negatively to the GM crops and burned them (Shiva, 2005).

The Monsanto model involves establishing contractual distribution networks such that distributors and farmers are forced to purchase Monsanto GM seeds only. Patents ensure that trading and growing seeds not purchased directly from Monsanto are illegal acts. This was reinforced in 1994 when the World Trade Organization established standards for the protection of ownership of intellectual property amongst member countries. For example, companies could

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<sup>1</sup> <http://www.navdanya.org/earth-university>

<sup>2</sup> <http://vandanashiva.com>

ensure that they had copyright protection over GM plants, or ‘new plant varieties’ as they are referred to in the agreement.<sup>3</sup>

Farmer advocates such as Shiva object to the patenting of seeds. In 2012, The Express Tribune carried an article detailing the conflict between Monsanto and the regional government of the Punjab state within India. The Punjab government objected to Monsanto’s demand that GM seeds sold in Punjab be protected by patents which required royalties to be paid to Monsanto. Farmers who trade in patented GM seeds could be sued for intellectual property theft. The Punjab government interpreted Monsanto’s request to protect intellectual property rights as a conspiracy to position the corporation as the sole provider of all seeds (Bhutta, 2012). Monsanto prevailed. India’s patent laws were amended and by 2016, 95% of the cotton planted in India was Monsanto’s GM Bt cotton (Shiva, 2016).

As mentioned above, Vandana Shiva founded Navdanya in 1987 as a non-government organization with the purpose of promoting organic farming, biodiversity, and farmers’ rights. Navdanya’s mission statement partially reads thus:

[We strive to] protect seed diversity in India and safeguard farmers’ right to save, breed, and exchange seed freely, in the context of emerging threats by the Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement of the World Trade Organization (WTO) which opened the door to the introduction of GMOs in our country, and patents on seeds, and consequently to the collection of royalties. (Shiva, 2016)

For Shiva, traditional ecological knowledge and ontological survival are intimately connected. She links existence and human rights with such knowledge:

Knowledge sovereignty is based on the recognition of diverse knowledge systems to be respected, recognized, and honoured. The knowledge of our grandmothers and farmers is knowledge that comes from centuries of experience and practice. The knowledge of indigenous cultures comes

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<sup>3</sup> [http://www.who.int/medicines/areas/policy/wto\\_trips/en/](http://www.who.int/medicines/areas/policy/wto_trips/en/)

from centuries of experimentation and relationship with biodiversity and ecosystems. The biopiracy of indigenous knowledge is a violation of human rights and knowledge sovereignty.<sup>4</sup>

Shiva relates that she was inspired to create Navdanya as a response to increased farmer poverty and suicide which Shiva links to the Green Revolution (the precursor of GM seeds), and GM seeds (Shiva, 2005). Through education and advocacy Navdanya seeks to institutionalize traditional ecological knowledge in a way that respects and sustains the farmer, farming communities, and the environment. Navdanya's mission and vision are stated as:

Navdanya means nine crops that represent India's collective source of food security. The main aim of the Navdanya biodiversity conservation programme is to support local farmers, rescue and conserve crops and plants that are being pushed to extinction and make them available through direct marketing...Navdanya is actively involved in the rejuvenation of indigenous knowledge and culture. It has created awareness on the hazards of genetic engineering, defended people's knowledge from biopiracy and food rights in the face of globalization... We promote knowledge democracy, knowledge sovereignty and scientific research on biodiversity, agro-ecology and climate change highlighting the contribution of diverse species to our agriculture production and food security.<sup>5</sup>

### *Pro-GM Narrative*

The pro-GM narrative is based on the understanding that food security is founded on modern Western agricultural science reflecting principles of rationalism and efficiency. The pro-GM narrative maintains that monoculture promotes organization, unity, and food security. GM seeds are developed when the gene of one organism is input into another organism so that the host organism develops a desirable trait. Thus, to develop cotton seeds that are resistant to the bollworm pest, Monsanto introduced a gene from the soil bacteria *Bacillus thuringiensis* such that the cotton would become toxic to bollworms (Abdullah, 2010). Monocrop seeds are planted in large rectangular fields to ensure maximum efficiency and control with respect to planting, cultivating, and harvesting. From the pro-GM viewpoint, prior to the introduction of their agricultural

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<sup>4</sup> <http://www.navdanya.org/site/2017-03-29-07-54-50/knowledge-sovereignty>

<sup>5</sup> <http://www.navdanya.org/site/component/content/article?id=2>, <http://www.navdanya.org/site/2017-03-29-07-54-50/knowledge-sovereignty>

practices of using hybridized seeds of the Green Revolution and GM seeds, India's farming practices were disorganized and unproductive. The pro-GM narrative places GM seeds at the centre of the government's and the corporation's ability to monitor farmers, crop production, and food distribution. Through GM seeds, agricultural corporations can maximize profits while governments maximize information of and control over the farming population

During the period following World War II, researchers in the West developed high yielding varieties (HYV) of crop seeds through cross breeding in response to the social chaos and food scarcity following the war. These hybrid HYV plants were the precursors to genetically modified seeds and were heralded as a key element of the Green Revolution for which agronomist Norman Borlaug was awarded the Nobel peace prize in 1970 (Fitzgerald-Moore & Parai, n.d.). Scientists of the Green Revolution, such as Norman Borlaug, developed hybrid seeds to produce high yields on smaller more pest-resistant plants. Thus, it was thought that inputs such as fertilizers and water would be used efficiently by the plant to develop wheat, corn, barley, etc. on a shorter stalk. A shorter stalk was more desirable as the nutrients for growth would go to the grain and not the stalk, which served little purpose (Conway, 2012). Corporations such as Monsanto and Dupont were the driving force behind the Green Revolution.

However, the HYV seeds required increased amounts of water, pesticides, and fertilizers leading to infertile land and drought (Fitzgerald-Moore & Parai, n.d.). Farmers were forced to invest in drilling expensive and deeper wells which drew water from heavily salted underground pools which, in turn, destroyed crops in the field. Farm debt soared due to the continual need for more fertilizers and pesticides as well as the ever-increasing search for water (Zwerdling, 2009). In response to the issues of extensive pesticide and water use required by HYV seeds, Monsanto, and related companies such as Dupont and Syngenta, developed and patented genetically modified seeds that were engineered to be pesticide or drought resistant. To maximize profit, Monsanto et al. had to ensure that farmers switched from traditional seed exchanges to the GM varieties.

Farming is central to India in terms of the economy, employment, and culture: 55% of the Indian population is involved in farming (ADSI Report, 2015). When seed exchanges by farmers at the local level are eliminated by patents, the traditional farming process is marred. Seed patents



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force farmers to buy seeds from capitalist distributors only as part of a reductionist approach to agriculture that engenders increased control and surveillance of the population by governments and corporations as they implement the value of private property rights. The pro-GM position assumes that such control and surveillance are positive outcomes in a country as vast and complex as India—the logic being that it is through control and surveillance that medical, educational, and infrastructural needs can be best determined and met.

In the pro-GM narrative, Monsanto positions itself as bringing new solutions to India's food challenges. Excerpts from Monsanto's website provide examples of the rhetoric used to promote Bt cotton seed. The following paragraphs reveal that Monsanto creates the illusion that prior to Western intervention in Indian agriculture, Indian farmers did not have the ethnobotanical knowledge to cultivate seeds according to the needs of the micro-climates of their specific areas. This passage shows how Monsanto et al. refuses to acknowledge, let alone build upon, the traditional farming methods in place prior to the Green Revolution or the development of GM seeds:

Innovation in Indian agriculture is the need of the hour. India needs breeding efficiency and modern tools like genomics and biotechnology. The benefits of science are already visible. The positive impact of switching to insect-protected Bt cotton has led to higher yields, savings on pesticides and higher income for farmers. ([www.monsantoblog.in](http://www.monsantoblog.in))<sup>6</sup>

Segments from Monsanto's website further reveal that a possible motivation for their involvement in India is the potential demand for their products. Their main concern is the importance of agriculture in the Indian economy and its opportunity for a tremendous and continuous stream of revenue:

While more than half of India is engaged in agriculture and allied professions, its contribution to the gross domestic product (GDP) was just 14.2%, as per the Economic Survey of 2010-2011 ... agriculture must become a viable occupation and this can only be achieved [sic] through modern technology. (Ibid)

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<sup>6</sup> <http://monsantoblog.in/index.php/science-is-the-answer-to-indias-farm-woes-2/>

However, in this pro-GM narrative, high agricultural revenues can only be realized if people buy into Monsanto's premise that:

Of all the technology available, breeding and plant biotechnology are important because they could provide a comprehensive answer to food inflation. Genetically modified seeds are resilient to drought, heat, pests and disease. They also use less water and their per-acre yield is higher than conventional seeds. (Ibid)

Before Bt cotton, crops were heavily infested by two main groups of insects: biting and chewing ones, known as the bollworm complex, and sucking pest insects. As a result, farmers were heavily dependent on insecticides. However, with Bt cotton, they increased yields and incomes substantially (ibid).

Not only does Monsanto ignore and deny traditional ethnobiological knowledge, it also defines success in farming as measured in Western material terms such as larger houses, insurance, farm equipment, and automobiles. The cohesiveness of a small farming community, the interaction between farmers in developing and trading seeds are not considered within the measurement of success:

Over the past decade, insecticide savings, higher yields and incomes have elevated farmers' standard of living – from purchasing automobiles to building structurally sound and bigger houses. Their children enjoy a higher standard of education; they are also investing in life insurance and farm equipment like tractors (ibid).

### **Conflicting Results: Crop Success and Crop Failures**

Parallel to the contrast of the pro- and anti-GM narratives is the interpretation of the failure or success of GM seed crops. This interpretation is integral to how the two sides of the debate view the sociological problem of suicide by farmers on small land holdings. A good example of the politically-interpreted narrative is Ahsan Abdullah, from the Foundation University Islamabad, who presents charts and peer-reviewed data on this matter, in support of the pro-GM narrative, in his articles published by *The Journal of Agrobiotechnology Management and Economics* to

indicate the success of Monsanto's Bt cotton in decreasing pesticide use and increasing crop yields (Abdullah, 2010). *AgBioForum* states its purpose as follows:

By publishing timely, novel and insightful articles, AgBioForum enhances the ongoing dialogue on agbiotech management and economics. Leading the way to socially responsible and economically efficient decisions in science, public policy, and commercialization is the very purpose of AgBioForum

However, the AgBioForum is funded by the Illinois Missouri Biotechnology Alliance (IMBA), whose stated purpose is to support research promoting the commercializing and profit of biotechnology.<sup>7</sup> Such a stated purpose, i.e., to fund research that supports commercial activities, raises questions about the transparency and neutrality of the articles published on the AgBioForum.

In the same year (2010) that Abdullah's afore cited article was published on AgBioForum, a related article appeared in *India Today*, a popular newspaper in India. In it, Dinesh Sharma of India Today reports that Monsanto officially admits that Bt cotton has failed in producing higher yields and has failed at effective pest control:

The ongoing debate on biotechnology crops took a turn on Friday when American seed company firm Monsanto disclosed that the cotton pest – pink bollworm has developed resistance to its much touted Bt cotton variety in Gujarat. The company has reported to the regulator, the Genetic Engineering Approval Committee (GEAC), that pink bollworm has developed resistance to its genetically modified (GM) cotton variety, (Sharma, 2010).

While Monsanto's website continues to promote Bt cotton as a successful seed in terms of pest control and yield levels, reports from Indian media indicate they have failed at this, to such extent that even they deemed it necessary to report this to a regulatory agency. We may well ask how the conflicting narratives with respect to the success or failure of GM seeds affect the lives of small landholding farmers.

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<sup>7</sup> <https://portal.nifa.usda.gov/web/crisprojectpages/0213816-the-illinois-missouri-biotechnology-alliance.html>

### **Farmer Suicide: The Silent Victims of The GM Debate**

In 2014 the Ministry of Home Affairs began to track suicides by farmers. *The Accidental Deaths and Suicides in India (ADSI)* tracks suicides by province/territory, gender, socio-economic position, and occupation within India and is produced by the Indian government's Ministry of Home Affairs National Crime Records Bureau. The ADSI reports available online date back to 1967. From 1967 to 2013 farmer suicides in India were included within the overall data regarding suicide. However, by 2014, statisticians realized that suicides by farmers warranted singular study. In 2014 the Ministry of Home Affairs began producing a separate report on suicides by farmers. Even though a separate report regarding farmer suicides was not produced in 2013, the report for 2015 indicates that in 2013 suicides by farmers accounted for 8.3% of nationwide suicides, while in 2014 and 2015 suicides by farmers accounted for 9.4% each year respectively (ADSI 2015).

According to the 2015 ADSI report, agriculture is the main source of income for 55% of the population of India, even though agriculture continues to represent only 14% of the GDP. One may ask whether the GDP is an adequate assessment of subsistence farming outputs. Subsistence farmers' crop outputs may circulate outside the calculations of the GDP in traditional, non-capitalist ways. Indian subsistence farmers using traditional, non-GM methods on small land holdings trade seeds, produce, and labour amongst themselves without recording such goods in market reports, for example. Thus the 14% GDP may understate the actual output of subsistence farmers using non-GM crops and applying traditional ecological knowledge based on their ancestral lineages. Vandana Shiva relates that indigenous Indian farmers developed their own crops based on the climatic and environmental conditions of their specific regions:

Farmers' biodiverse, indigenous varieties are the basis of our ecological and food security. Coastal farmers have evolved salt-resistant seed varieties, Bihar and Bengal farmers have evolved flood-resistant varieties, farmers of Rajasthan and semi-arid Deccan have evolved drought-resistant varieties, and Himalayan farmers have evolved frost-resistant varieties. (Shiva, 2016).

According to the 2014 and 2015 ADSI, "small land holdings" is also considered to be a contributing factor to the increased suicide rate amongst farmers. However, ADSI reports do not provide an explanation as to the causal connection between small land holdings and the increased

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suicide rate. One may question whether the small land holding farmers are more prone to suicides as they are the ones who feel the most pressure from debt incurred by the purchase of GM seeds and pesticides, even when the GM seeds fail to be pest resistant. Not only would such farmers lack the financial resources to recover from crop failures in this case, they were also forcibly deprived of the traditional fallbacks of saved seeds and seed-exchange with colleagues. Increased debt and separation from traditional ecological knowledge and practice are already insurmountable pressures, but added to this has been the devastating disappointment of pest-resistance to Bt cotton seeds, meaning more debt is incurred by the farmer (Heinemann, 2014; Shiva, 2016).

The ADSI reports for 2014 and 2015 list the major cause of farmer suicides as ‘Bankruptcy or Indebtedness’ at 20.6% of farmer suicides in 2014 and 38.7% in 2015. In 2014 and 2015 marginal and small farmers, with farms under 2 hectares of land, accounted for 72.6% and 72.4% of farmer suicides respectively (ADSI 2014, 2015). The ADSI report for 2014 indicates that 965 out of 1163 suicides related to indebtedness were due to loans taken out with respect to crops. Such loans are often required when GM seeds are sold to small farmers under patent.

Geneticist Dr. Mae-Wan Ho’s research into the relationship between Bt cotton GM crops and farmer suicide confirms the above findings that factors contributing to farmer suicide are: the loss of ability to freely exchange seeds, the high cost of GM crops, the failure of the crops to resist pests, the increased cost of pesticides, and the depletion of the soil caused by GM crops maturing at the same time rather than over a period of weeks. Dr. Ho attributes the increase in farmer suicides in 2009 not only to the drought that year but also to the fact that farmers had incurred new and significant levels of debt by purchasing GM seeds that left them unable to fall back on biodiversity which would have mitigated the losses from the drought. In the following passage from their website, Monsanto refutes the claim that Bt cotton is a leading contributing factor to farmer suicides on these grounds:

Farming in rural India brings with it a set of systemic and social issues that can lead to hopelessness among farmers and an unacceptably frequent occurrence of farmer suicides. Significant research has documented the problem is complex and disproved the claim that GMO crops are the leading cause. Monsanto is committed to helping improve the lives of farmers

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globally, and we have implemented several projects that have been recognized for positively impacting Indian farmers and their communities. ([www.monsanto.com](http://www.monsanto.com))<sup>8</sup>

Among the reasons given by Monsanto for farmer suicide are the following: difficulty in procuring credit at a reasonable rate, crop patterns, difficulties with providing irrigation for crops, and the fluctuating cotton market (*ibid*). Shiva and Robin address each of these points in their critique of Monsanto. Credit is necessary to procure as GM seeds are expensive and patent protected. (We may recall that 75% of seeds were previously traded amongst small landholders.) Small landholders would now be required to purchase GM seeds each year or risk severe financial penalties, whereas GM seeds are not required for farmers to practice crop rotation or, as Navdanya and other similar non-GM organizations promote, sustainable methods of replenishing the soil. Robin argues that the cotton market has fluctuated as the result of subsidies from American grants to globally drive down the price of cotton (Shiva, 2005, 2016; Robin, 2008). Thus, Indian farmers who do not receive subsidies on par with the US farmers, are at a severe disadvantage particularly after the significant investment they are required to make when purchasing patented seeds.

Increased debt, the required use of chemically-engineered products, and crop failure are the materially contributing factors to increased rates of suicide amongst small landowning farmers. However, it is the position of this paper that underlying these circumstances is the tragedy that the lives of small landholding farmers are ontologically deemed meaningless against the corporations and supporting governments who prioritize seeds, patents, and profits over traditional community-based agricultural methods. When traditional ethnobiological knowledge is outlawed and replaced by corporatized agriculture, communities and individuals supported by such traditional knowledge are undervalued. The cultural shift whereby Western methods supplant traditional practices entails the demise of those whose being is intimately linked to traditional practices and thus suicide is an unsurprising result.

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<sup>8</sup> <https://Monsanto.com/company/commitments/human-rights/statements/indian-suicides-by-gmo-not-responsible/>

## Conclusion

The pro- and anti-GM narratives both position seeds as the foundational need for food and security. However, in terms of outcomes for farmers, these narratives are diametrically opposed to each other. The anti-GM narrative links traditional ecological knowledge with flourishing biodiversity at the subsistence level, places seeds in the hands of the farmers who have developed those same seeds through their own means of hybridization according to traditional ecological knowledge developed over generations, and positions those seeds in an ontological partnership with humans where they can grow and engender growth. In such a partnership, humans and seeds co-create. The development of seeds in accordance with cycles of micro-climates and principles of organic farming techniques and biodiversity sees farmers and seeds form an ontological support network for each other. Farmers can develop and preserve biodiverse seeds which, in turn, feed them and their communities. Traditional ethnobiological knowledge of biodiversity, organic farming, and seed development can remain the basis of supportive peer networks among farmers. The work of Shiva and Ho indicate that losing such community support and becoming isolated through increased monetary debt leads to suicide. Furthermore, GM seeds are a means of recolonization (in the case of India by Western corporations) as farmers are forced to pay for and grow GM crops exclusively through a top down method of control by which all seeds are patented and distributors sell GM seeds exclusively. However, when political and corporate powers remove seeds from the farmer's control, the farming community loses its ontological foundation leading to despair and suicide. Shiva notes that from 1997 to 2016, 100,000 farmers committed suicide. She also notes that the highest level of farmer suicide has occurred within regions with the highest acreage of Monsanto's GMO Bt cotton. Monsanto's GM seeds create a suicide economy by transforming seed from a renewable resource to a non-renewable input which must be bought every year at high prices (Shiva, 2016).

While the pro-GM narrative also places seeds at the centre of food security, the pro-GM approach is based on a paradigm that positions hierarchical Western decision-making processes and Western epistemology as superior to traditional methods and traditional knowledge. The Western scientific method develops GM seeds in isolation from the traditional farming

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community, uses centralized distribution outlets to replace traditional community-based methods of distribution, and supports a hierarchical top-down decision-making process at the national and global level regarding issues involving farming and food security. The seeds in this narrative are positioned as ontologically superior to the small landholding farmers. The farmer's identity, future, and existence are in service to paying for seeds and related chemical fertilizers and pesticides. The pro-GM narrative ultimately places the farmer ontologically below the seeds as he/she lives in service to the debt incurred and is beholden to patent requirements.

The pro-GM narrative links Western empirical knowledge with Western measurements of success such as larger houses and automobiles. The pro-GM narrative would seem to overlook the value of a traditional community and its ancestrally-based knowledge of plants. While the ADSI reports suggest a statistical link between farmer suicide and increased debt associated with crops, the pro-GM narrative either denies or ignores this correlation. According to the pro-GM narrative small landholding farmer suicides are not linked to GM seeds and are a continuation of a pattern that predates GM seeds. However, as this paper has revealed, the suicide pattern among small landholding farmers has become more pronounced with the arrival of GM seeds and the resultant undermining of traditional knowledge. The textual analysis indicates that the ontological foundation of Western corporate agriculture supports the correlation between farmer suicide and GM seed development.

In order to address farmer suicide, the Indian government instituted a variety of crop insurance schemes as well as legislation prohibiting exorbitant interest rates on farm loans. However, such measures are generally ineffective as impoverished farmers would be forced to choose whether to allocate already scarce funds to seeds and related chemicals or to premiums for crop insurance for an event such as crop failure that may or may not occur. Farmers who make insurance claims are frequently accused of fraud and thus remain uncompensated, (Shiva & Jalees, n.d.). Expecting that farmers purchase crop insurance in order to protect themselves while removing community based traditional farming methods that did, in fact, previously provide a real form of 'crop insurance' through biodiversity, is aligned with a hierarchical approach that nullifies the ontological being of the farmer



Shiva and Jalees suggest that in order to decrease the rate of farmer suicide:

Organic farming should be promoted to avoid or minimize the cost of pesticides and fertilizers ...  
Biodiversity must be the basis of production to reduce vulnerability to climate and markets,  
...Agriculture policy needs to shift from its current bias of ‘corporates first’ to ‘farmers first’ (ibid).

Shifting from “corporate first” to “farmers first” involves the restructuring ontological privilege away from a GM-supportive paradigm which puts farmers in service of corporate entities. A ‘farmers first’ paradigm recognizes the mutually supportive relationship between farmers and seeds. Potential solutions to farmer suicide must be analyzed to ensure that such solutions promote the development and use of ethnobiological knowledge and protect the ontological priority of the farmer.

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