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### **India: Seeds and Suicides**

In recent decades, a new scientific process known as genetic engineering has been taking the agricultural world to the next level in food production across the globe. Although this new form of creating or modifying plants is highly beneficial in most aspects, it has become the blame for many problems. One such problem is the overabundance of suicides, over 270,000 in the last twenty years, among Indian farmers. Many believe that these suicides can be linked back to Monsanto. Monsanto is an American international agrochemical and agricultural biotechnology corporation that is the leading producer in GM (genetically modified) crops. Many argue that these Indian farmers take their lives once they realize that the GM crops, which Monsanto provides the modified seeds for, have failed. The assumed reason why the farmers take their lives is that they have become overwhelmed by the mounting debt of acquiring the GM seeds. Indian farmers wanted these modified seeds because they require fewer pesticides, ultimately saving the farmers money. To commit suicide, many of the farmers drank toxic pesticides, leading the media to believe that these were acts against Monsanto. Others argue that the real reason for this occurrence is the banking practices in the states with more suicides. Once word spread through the media of the possibility of Monsanto being involved, thousands of people from several countries rallied to protest in the March Against Monsanto. However, current studies have shown that Monsanto's modified seeds for several types of crops have been increasing in use throughout India and other parts in Asia, such as China. So, if these modified seeds are favored over those that have not been genetically altered, then how can these suicides be linked to the use of GM crops? To solve this problem, we must dive into the lives of Indian farmers, banking practices in India, and the snowballing use of GM seeds.

Beginning in the early 1990s, suicide rates among Indian farmers dramatically increased. These horrific incidents might be recognized by the public as the 'GM Genocide', as Britain's *Daily Mail* named it (Malone, 2008). This major issue began to catch the public's eye in 1995 after Maharashtra, a southern state in India, began to report a substantial increase in suicides among rural farmers (Abid, 2013). According to the National Crime Records Bureau, over a quarter of a million Indian farmers have taken their lives, and the numbers continue to grow as this case continues (Shri Shafi, 2013). When it comes to the reasoning behind suicides, whether a group or individual, one must look at the larger picture. Farmers in India face many problems on a daily basis, such as the urbanization of production fields, the monumental losses they face if monsoonal rains do not come, price drops on the crops they produce, and the debt that many have come to obtain (Ghosh, 2013). India is known as one of the leading countries in agricultural production; therefore, the loss of production fields has become an issue. The irony is that even though this country is a top producer, most farmers live in poverty.

Many believe that the reasons for these suicides can be linked back to Monsanto. Several organizations attack Monsanto and the genetically modified seeds they produce every day, but there is a major hole in their story. Genetically modified cotton incorporating the use of *Bacillus thuringiensis* or Bt cotton is widely used in India, so much in fact that over 90% of Indian cotton farmers have come to use these modified seeds (Kloor, 2015). *Bacillus thuringiensis* is a bacteria found in soil that acts as a natural insecticide, enabling farmers to lessen their use of chemical insecticide. (Kloor, 2015). The anti-GMO activists state that the modified crops are failing throughout India; however, use of Bt cotton has exploded since its authorization in 2002 (Kloor, 2015). It seems rather unlikely that these farmers would continue to use a product that did not profit them. In fact, the Food Policy Research Institute's research contradicted the media's "evidence." As stated in their studies and mentioned in Keith Kloor's article, *Issues in Science and Technology*, Monsanto's Bt cotton has shown to be quite successful in producing higher yields and reducing the need for pesticides (Kloor, 2015). Furthermore, evidence does show that most of the victims were poverty stricken, which can lead to depression and suicidal thoughts. Some say that the

debt the farmers acquired was due to the failure of Monsanto's seeds. Monsanto gives several studies, including a 2008 study by the International Food Policy Research Institute, that show there are several issues that could have been involved with these suicides. Lack of irrigation systems and credit availability are issues that these farming families face (Monsanto, 2015). This shortage of irrigation systems leaves Indian farmers to depend on monsoonal rains for their crops. On Monsanto's website they state that the corporation is helping farmers in India by financially supporting agricultural projects and improving food security (Monsanto, 2015).

Anoop Sadanandan, a political economist, explains that India's banking policies, rather than the unproven GM crop failure, is the major contribution to the suicides. He argues that the enormous increase in suicides among farmers is a surprising consequence of the bank restructurings India undertook in the early 1990s. In particular, the introduction of foreign and private banks has made banking in India competitive and has led to fewer loans for farmers. With the amplified competition, banks viewed lending to farmers as unprofitable (Sadanandan, 2014). The World Bank also mentioned that India's rural banking system had "inefficiencies in the formal finance institutions, the weak regulatory framework, high transaction costs, and risks associated with lending to agriculture" (World Bank Group). Basically, a rural farmer looking to borrow money for his/her farm is left with no choice but to go to private banks that often charge extremely high interest rates (Kloor, 2015). Sadanandan goes on to explain that some states have increased suicides while others do not. The states Andhra, Pradesh, Chhattisgarh, Karnataka, Kerala, and Maharashtra have experienced an increase while the states Bihar, Jharkhand, and Punjab have not. Sadanandan believes that this issue has not been studied well enough to come to a conclusion (Sadanandan, 2014). In his report Sadanandan gave three hypotheses. The first was, "direct bank lending to farmers was lower in the states where foreign and private banks had greater presence." His second stated, "lending to agriculture, as part of priority sector lending, was lower in states with greater presence of private and foreign banks than in states where such banks had negligible presence." Finally, Sadanandan hypothesized that "in states with more foreign and private banks, credit to small scale industries and housing under priority sector lending was higher." In the end, he believed that there were fewer loans to farmers in states with a larger presence of national public banks (Sadanandan, 2014).

Other sources, such as Monsanto and the Indian Journal of Psychiatry, state that many of the Indian farmers who committed suicide had pre-existing mental disorders (Monsanto, 2015) (Vijaykumar). In fact, 88% of Indian suicide victims had a mental disorder, 25% of the victims had shown characteristics of mood disorders, and alcoholic behavior and abuse accounted for 35%. Social changes and even religion also play a role. Urbanization of the developing country has made a larger impact on India than previously thought. With new stressors in their environment and new expectations in the work force in a modernizing world, many fall short leading to a high rate of suicides among young adults. Religion could play a role in saving lives. Many of those who had taken their lives had less belief in God or had no religious association. It was found that 11% of the victims had lost their faith before committing suicide (Vijaykumar).

The media has portrayed GMOs as hazardous for our health, and the public seems to trust these beliefs. People tend to be afraid of things they do not understand. If education was given from a publically trusted source, perhaps more people would come to trust this new technology and the many ways it could benefit food production. To understand how GMOs are created, one needs an understanding of biology and genetics. There are several ways to introduce a new gene into another organism, but a commonly used procedure involves an agrobacterium found in soil *Agrobacterium tumefaciens*. This agrobacterium has the ability to establish genetic information into a plant's genome naturally, and is generally used as a transmission vector. Genes that are considered beneficial often allow the plant to be more resistant towards insects, weeds, diseases, and droughts. The first step is to isolate the desired gene. Second, the trans-gene is inserted into the transmission vector. The trans-gene is not positioned on the chromosome of the agrobacterium; it is introduced through the plasmid. The third step is called plant transformation. The newly modified *A. tumefaciens* cells containing the plasmid and the new gene are mixed with plant cells. The plasmid introduces the desired genes into one of the plant's chromosomes to form GM cells. Scientists continue by selecting the modified plant cells that have successfully incorporated the new gene.

These modified cells are then regenerated into plants and tested thoroughly. Once the plantlets are rooted, they are taken to be grown and tested in greenhouses. Verification is the seventh step; this involves testing the plants for whether or not the new gene is present and functional. Once the plants have been grown and tested, the GM plants are then tested in multi-location field trials to ensure the plants are safe for commercial use. This testing process may take six to fifteen years to complete. Safety assessment is the final step. Food and environmental safety assessments are carried out during testing of plant performance (Federal Ministry of Education and Research , 2012). It is important to remember that GMOs are widely tested throughout the world, more so in the United States, Japan, and Europe (Grant, 2001).

In India, the Bt cotton that is used is more resistant to insects, such as the bollworm. In 2009, it was confirmed by Monsanto that the pink bollworm was resistant to their first generation of Bollgard® I cotton. Since then, they have been working with Indian farmers to establish their second generation, Bollgard® II cotton, which allows the plants to be resistant towards the pink bollworm. Bollgard® II cotton contains two Bt proteins, rather than the one protein found in Bollgard® I cotton. This issue could possibly be the failures that the media and other organizations are speaking of, but the issue has been taken care of. Monsanto has replaced the first generation on the market with the second generation and is now working on a third (Monsanto, 2015).

Nevertheless, these suicides are continuing to happen. Although the blame is viciously sought after, hardly anything is being done to help the families caught in this tragedy. In the United States, we have suicide hotlines, anti-depressants, and therapists. Unlike the United States and the quick medical care we take for granted, India's poverty stricken, rural areas don't have access to the help they need. Education on how to care for these victims and how to prevent further suicides is one way to put a quick end to this ghastly event. Surprisingly, in India it is an offence to commit suicide and is punishable by imprisonment, fines, or both. Hospitals may turn away suicidal patients to avoid legal issues that may arise (Vijaykumar). India's government and other national organizations, such as the World Health Organization, are trying to create a national plan to prevent further suicides all across India. There are many ideas on how to prevent these suicides, but overall, decriminalization of attempted suicide is thought best. Other ideas include providing more primary care workers and availability of mental health services, reducing accessibility to pesticides and alcohol, and training other officials to provide emotional support to individuals plagued with suicidal thoughts (Vijaykumar).

The media has rendered these suicides as acts against Monsanto and its "monopolistic" characteristics, but the truth seems to be that rural farmers are having a hard time coping with a modernizing world with no emotional support. There are several reasons for these suicides. No one factor, like the use of genetically modified seeds, can be blamed as the overall cause for the suicides. There are several ways that the Indian government and non-government organizations can help; and there is no better time than now. One way that officials can help these distressed families is to set up a task force or help centers in rural areas to work through the problems that Indian farmers face and to provide emotional support. Most of the victims sought out professional help months before they took their lives. It cannot be assumed, however, that these troubled farmers will actively find help, some are not capable. By providing irrigation systems and water for those systems, farmers will become less dependent on the unpredictable monsoonal rains. Less dependence on weather patterns could lead to fewer crop failures. In return, banks would start viewing lending to farmers as profitable again. Reestablishing religion in some households and to individuals could save lives as well. Addressing the issue of loss of land, there is not much to be done. Placing protective policies could help in that case, but it would be a hard task to undertake. Educating officials on how to care for a suicidal individual could help immensely. Perhaps the greatest way to prevent further incidents is to decriminalize attempted suicides. The media can aid the situation by providing accurate information and promoting professional care. In the end, several factors must be taken into account to prevent these suicides, any way that farmers' stress could be alleviated is another step in the right direction.

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