**Bt BRINJAL — India**

**What is Bt brinjal?**

Bt brinjal is eggplant that has been genetically modified (GM) to provide effective protection against the devastating eggplant fruit and shoot borer (EFSB) without the application of pesticide. It was first developed by the India-based Maharashtra Hybrid Seed Co. (Mahyco). Extensive field tests of Bt eggplant were conducted in India between 2004-2008, using more than 50 trial locations and documenting a 77 percent reduction in pesticide use. India’s Genetic Engineering Appraisal Committee (GEAC) conducted safety evaluations and approved commercialization of Bt brinjal in 2009. However, the seeds were never released to Indian farmers. Currently, Bt brinjal is currently cultivated only in Bangladesh. The University of the Philippines Los Banos is now preparing to submit a regulatory dossier for the Philippines, the first step toward commercialization in that country. The dossier will meet international standards and support the introduction of Bt brinjal elsewhere.

**What is the status of Bt brinjal in India?**

Brinjal is a popular vegetable in South Asia. However, its cultivation has been severely limited by the EFSB, prompting Mahyco to initiate development of an EFSB-resistant variety as an alternative to insecticide use. Mahyco successfully inserted a *Cry1Ac* gene into brinjal and conducted greenhouse trials that demonstrated its effectiveness against EFSB. In late 2003, USAID entered into the Agricultural Biotechnology Support Project II (ABSPII) partnership with Mahyco, Cornell University, Sathguru Management Consultants, the Bangladesh Agricultural Research Institute (BARI) and the University of the Philippines Los Banos to advance the development and introduction of Bt brinjal in India, the Philippines and Bangladesh. Much of the early research was done in India, and BARI scientists worked with Mahyco to introduce *Cry1Ac* into brinjal cultivars that are popular in Bangladesh.

Mahyco’s Bt brinjal was fully approved by the relevant biosafety review committee in India. However, responding to challenges from activist groups, the Indian Minister of Environment and Forests imposed a moratorium on release in 2010 that remains in effect today. Farmers have begun engaging in civil disobedience actions in a bid to secure access to Br brinjal seeds, but it remains to be seen whether the farmer protests will lead to a change in the political climate for GM crops generally. The moratorium could be reversed through a change in government or political pressure exerted by farmers and other stakeholders in the agricultural sector. Bt cotton is the only GM crop currently allowed in India and has been widely adopted by farmers.

**Is Bt brinjal safe?**

Extensive international research has documented that Bt crops are safe for human food and livestock feed. Both the Indian and Bangladeshi governments have determined that Bt brinjal is safe to eat. Rigorous food and feed safety studies, including toxicity and allergenicity evaluation and nutritional studies, confirmed that Bt brinjal is as safe as its non-Bt counterparts. Other studies have found Bt brinjal has no adverse environmental effects. Pollen flow, effects on soil microflora, agronomy, germination, and weediness studies indicate the safety of Bt brinjal with no unintended effects and no negative impact on beneficial insects, which instead benefit from the reduced use of pesticides.

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**What are the benefits of Bt brinjal?**

Research conducted by BARI and Cornell scientists has documented that the Bangladeshi farmers who grow Bt brinjal realized better yields and a 60 percent reduction in pesticide use, resulting in a six-fold increase in net returns. Net returns were $2,151/ha for Bt brinjal as compared to $357/ha for non-Bt varieties. Given that FSB pressure is intense in India, it is anticipated that the adoption of Bt brinjal would result in similar economic and health benefits in India, where smallholder farmers currently cultivate 1.3 million acres of eggplant. Studies conducted on India’s Bt brinjal trials show yields double those of non-Bt hybrids. The studies also point to an 80% reduction in insecticides used to control EFSB and a 60% drop in pesticide use overall. As a result of reduced pesticide use, health cost savings would be around $50/acre in the Center-South region and $470/act in the East region, which has a higher initial number of insecticide applications and pesticide poisonings. For farmers, gross margins are expected to increase by $361/acre in the Center-South region and $437/acre in the East region.

**What is the future of Bt brinjal in India?**

Though Mahyco’s Bt brinjal was fully approved by India’s relevant scientific committee, the 2010 moratorium on its release remains in effect today. The frustration of Indian farmers who can look across the border and see their Bangladeshi neighbors increase their eggplant harvests, while dramatically reducing their insecticide use, has led to civil unrest and pressure on the government to overturn the moratorium. Some Indian farmers have begun growing Bt brinjal that was apparently developed by the Indian Science Institute but is not approved for cultivation. The discovery and destruction of these illicit crops led to national protests, with farmers demanding greater access to GM seeds.

A similar situation occurred in India in 2001 when farmers began illegally planting Bt cotton, which effectively controlled bollworms. The government ordered the Bt cotton fields to be burned but the orders were not carried out. Farmers from cotton growing areas threatened to cultivate Bt cotton regardless of whether it was approved. In the face of fierce opposition by farmers, the government quickly approved three Bt cotton varieties that farmers rapidly adopted. India is now the world leader in Bt cotton production. It remains to be seen whether the current farmer protest will lead to a change in the political climate for GM crops generally and eventual approval of Bt brinjal.

In 2017, India harvested nearly one-quarter of the world’s production of eggplant. It is reasonable to predict that Bt eggplant, if approved, would have a similar adoption trend as did Bt cotton in India.