

## WHAT IS *Bt TALONG*?

It is an eggplant that looks exactly like your ordinary eggplant but actually contains a toxin gene from the soil-borne bacterium *Bacillus thuringiensis* (*Bt*), which does not naturally occur in plants.

The toxin, the *Cry* gene, has an **insecticidal trait** that is expected to kill specific types of insects. In the case of *Bt talong*, the specific toxin inserted into the genome of the eggplant is toxic to the fruit and shoot borer, a known pest of the eggplant.

## HOW WAS THE *Bt TALONG* DEVELOPED?

It's through a process called **genetic engineering**, a technique of altering an organism's genetic structure by rearranging, transferring or inserting genes from one organism to another.

In the case of *Bt* eggplant, the *Cry* gene of *Bacillus thuringiensis* was inserted into the eggplant's genetic structure. The *Bt talong* in the Philippines is a product of a cross between a genetically modified eggplant *Bt brinjal* (*brinjal* is eggplant in Hindi, the major language spoken in South Asia) and the Philippine eggplant varieties Dumaguete Long Purple and Mara.

In a nutshell:

Genes contain information that are the basis for an organism's traits. Genetic traits can be passed on from generation to generation hence the genes you get from your parents can determine your skin color, your hair type and other characteristics.

## What is the biological nature of eggplant?



*Bt Brinjal jack-o-lanterns.*

Lifted from <http://roflindian.wordpress.com/?s=bt+eggplant>

Eggplant belongs to the family Solanaceae and is known under the botanical name *Solanum melongena* L. The family contains 75 genera and over 2,000 species. There are three main botanical varieties under the species *melongena*<sup>1</sup>, namely *esculentum* (the round or eggshaped cultivar), *serpentinum* (the long, slender types), and *depressum* (the dwarf eggplant plants). The common eggplant, to which the large fruited forms belong, is known under the scientific name *S. melongena* var. *esculentum*.

<sup>1</sup> Choudhary, B (1976) Vegetables (4th Edition), National Book Trust, New Delhi, India.

The eggplant is said to have originated from South Asia and spread through mainland Southeast Asia, including the Philippines. Farmers have developed the richest diversity in species and varieties mostly as vegetables for human consumption. The plant is usually self-pollinated, but the extent of cross-pollination has been reported as high as 48%, thus it is often classified as cross-pollinated crop<sup>2</sup>. The high pollination rate in eggplant is due to heteromorphic or dissimilar flower structure called as heterostyly (or flowers with different forms or lengths). Outcrossing primarily takes place with the help of insects.

### ***Who developed Bt talong?***



*Mighty Proud: Lakay Iloy, a Full-Blooded Ilocano (FBI) shows off his pinakbet. It won't taste the same without the talong*

*Bt talong was originally developed by Maharashtra Hybrid Seed Company (Mahyco), the subsidiary of giant transnational seed and agro-chemical corporation Monsanto in India. The gene sequences and processes used by Mahyco in the development of Bt brinjal are all patented and owned by its mother company. Monsanto has used and continues to use these patented gene sequences in the development of other genetically modified crops such as corn/maize, cotton, potato, etc.*

Mahyco has sub-licensed the technology to public and private sector institutions forming the international research consortium called Agricultural Biotechnology Support Program (ABSP II), led by Cornell University in the US and wholly funded by the United States Assistance for International Development (USAID).

### ***Who are the proponents of Bt talong in the Philippines?***

The Institute of Plant Breeding (IPB) of the University of the Philippines at Los Banos (UPLB) is the main proponent of *Bt talong* in the Philippines. The project is led by Dr. Desiree M. Hautea, the coordinator of ABSPII in Southeast Asia who is also a researcher at the IPB-UPLB. Like all partners of ABSPII involved in the *Bt* eggplant research and development project, IPB-UPLB entered into a free licensing agreement with Mahyco. The details of the agreement, however, are not disclosed to the public.

ABSPII plans to commercially release open-pollinated varieties (OPVs) of *Bt talong* in the Philippines once regulators approve it. Dr. Hautea claims that releasing OPVs

<sup>2</sup> N. C. Chen and H. M. Li , CULTIVATION AND SEED PRODUCTION OF EGGPLANT , [http://libnts.avrdc.org.tw/fulltext\\_pdf/eam0124.pdf](http://libnts.avrdc.org.tw/fulltext_pdf/eam0124.pdf)

will ensure that poor eggplant farmers can save, exchange and re-use the seeds produced by *Bt talong*.<sup>3</sup> Hybrid varieties will only be released later when favorable commercial agreement with private seed growers is reached by ABSP II and Mahyco.

### HOW did *Bt TALONG* REACH THE PHILIPPINES?

Date	Activity
2004	Project on Bt talong called the Fruit and Shoot Borer Resistant Eggplant Project in the Philippines started under the jurisdiction of the National Committee on Biosafety of the Philippines (NCBP)
January 30, 2006	License agreement signed between MAHYCO, represented by Dr. Brent Zehr, Joint Director for Research; Sathguru Management Consultancy Private Limited, represented by Director Kannan Ragnathan; and UPLB represented by Chancellor Rey Luis I. Velasco was signed.  The sub-licensing agreement aims to: (1) expedite the transfer of the seeds of the crosses produced between the MAHYCO's Bt parental line and selected Philippine varieties and (2) facilitate the commercialization in the country of the Bt eggplant varieties.
December 2006 and thereabouts	Contained trials of Bt talong at the IPB-BL2 of greenhouse
January 2007	USAID/Philippines financial assistance provided .  Mahyco's Bt Talong was crossed with Philippine varieties
March 30, 2009	Certificate of completion of contained experiment granted
September 2009	Proposal for field testing submitted to BPI
March 15, 2010	BPI issued Field testing permits in three sites: <ul style="list-style-type: none"> <li>• UPLB in Bay, Laguna,</li> <li>• Sta. Maria in Pangasinan</li> <li>• Central Bicol State University of Agriculture (CBSUA) in Camarines Sur</li> </ul>
June 28, 2010	BPI issued permits for field tests in four additional sites: <ul style="list-style-type: none"> <li>• Sta. Barbara, Iloilo;</li> <li>• Visayas State University, Baybay, Leyte;</li> <li>• University of the Philippines- Mindanao, Davao City;</li> <li>• University of Southern Mindanao, Kabacan, North Cotabato.</li> </ul>

<sup>3</sup> Melody M. Aguiba, "RP the First in Asia to Commercialize GM Eggplant", Manila Bulletin, 28 June 2010, <http://www3.mb.com.ph/articles/264196/rp-first-asia-commercialize-gm-eggplant>

## HOW IMPORTANT IS TALONG TO THE FILIPINOS?

Eggplants can be found in most home gardens and are widely sold in markets throughout the Philippines. A lot of farmers depend on eggplant cultivation as their main source of income. For an industry worth P 3.1 billion annually, many Filipino farmers cultivate and depend on eggplant for their livelihood.

From 2002 to 2006, eggplant farmers across the Philippines registered an average production of 183,821 metric tons. The Ilocos Region, produce more than a third (37.45%) of the country's eggplant with Pangasinan farmers producing 91% among the Ilocos provinces. The next top four eggplant producing regions in the country are CALABARZON (17.02%), Central Luzon (10.05%) and Cagayan Valley (9.05%).

Further, eggplant is part of the Filipino diet. It is a necessary ingredient in Filipino cuisine such as *pinakbet*, *kare-kare* and *sinigang*. Filipinos grill, boil or fry the eggplant, and make mouthwatering dishes such as *tortang talong*, *sinalad na talong*, *talong* chips, *pinagulong na talong*, and others. It is easy to grow in backyards and home gardens, and considered one of the most affordable vegetables for poor consumers. Eggplant is high in nutritional value because it is a good source of sugar, carbohydrates, dietary fiber, fat, protein, Vitamins B1, B2, B3, and B6. It also contains folate, vitamin C, calcium, iron, magnesium, phosphorous, potassium, zinc, and manganese<sup>4</sup>. Since eggplant is low in calories and fat, it is an excellent food to aid in weight loss.

## WHY SHOULD FILIPINOS BE CONCERNED ABOUT *Bt* TALONG?

Filipinos should be concerned because *Bt* talong has never been released commercially in other countries. If ever the BPI approves the application of UPLB-IPB, as part of the ABSPII consortium, the Philippines will be the **first** country in the world that will allow the commercial cultivation of *Bt* eggplant in the world. And this widespread cultivation of *Bt* talong can have adverse effects on eggplant cultivation by farmers.

The Indian government rejected the application of Mahyco for commercial propagation of *Bt* brinjal. On 9 February 2010, India's Minister of Environment and Forestry issued a moratorium on the release of *Bt* brinjal on the basis of precautionary principle until independent studies adequately establish its safety to human health, environment and genetic diversity of India.

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<sup>4</sup> USDA Nutrient database

## **WHY SHOULD FILIPINOS SAY NO TO *Bt TALONG*?**

### **1. Very little or no information at all was released to the general public about *Bt talong***

Farmers and consumers' are kept in the dark on the real score of the field release of *Bt* eggplant in the Philippines. Access to public information necessary for farmers and consumers to be able to effectively make informed decisions on whether to approve or deny field testing of *Bt* eggplant in their localities were not granted.

The Philippines' National Biosafety Framework (NBF) mandates that all stakeholders "shall have appropriate access to information. This must include information that will enable the public to examine the risk and to make informed decision about the acceptability of *Bt talong*."

To this date, only the Public Information Sheet (PIS) for Field Testing of the trials sites were provided to the public. The PIS is inadequate and insufficient for the public to judge and discern the health and environmental safety of *Bt talong*.

No information on risk assessment, risk management and product monitoring, and other relevant assessments was disclosed .

### **2. Public participation in decision-making for the field tests has not been fulfilled**

The NBF also enumerates the following minimum requirements of public participation:

- i. Notice to all concerned stakeholders, in a language understood by them and through media to which they have access;
- ii. Adequate and reasonable time frames for public participation procedures;
- iii. Public consultations, as a way to secure wide input into the decisions that are to be made;
- iv. Procedures for public participation shall include mechanisms that allow public participation in writing or through public hearings, as appropriate, and which allow the submission of any positions, comments, information, analyses or opinions. Concerned departments and agencies shall include in their appropriate rules and regulations the stages when and the process to be followed for submitting written comments; and, most importantly
- v. Consideration of public concerns in the decision-making phase following consultation and submission of written comments.



These requirements were not followed. Proponents consider the posting of public information sheet (PIS) regarding field trials enough for the public to participate in decision making processes in relation to field testing. PIS, however, does not contain substantial information for the public to raise their concerns. Often, PIS are posted in obscure places and published in newspaper sections that nobody reads.

In the local government code, proponents are also required to secure permits from the provincial, municipal and barangay levels. In Bay, Laguna, for example, UPLB only made the town mayor sign the application for field testing. In this case, UPLB violated the local government code.

### **3. Consumers would not be able to exercise their right to choose if *Bt talong* is commercialized**

The Philippines has no law or regulation on labeling of genetically modified organisms (GMOs) and products derived from GMOs. Once it is out in the market, consumers will not be able to distinguish what is conventional *talong* from *Bt talong*. Corporations that produce GMOs and the proponents of the technology in the public sector continue to lobby hard against labeling of GMOs, despite the clamor from consumer groups over the years. Several bills on GMO labeling have been filed in previous sessions of Congress, but none has advanced.

### **4. Environmental Impact**

- **Inadequate tests to determine safety to friendly insects**

One of the reasons why India rejected *Bt talong* is the study<sup>5</sup> conducted by Pr. Gilles-Eric Seralini. The Mahyco tests submitted to India's regulatory agencies pointed out that the experiments on the potential toxicity of GM *Bt* brinjal to non target organisms (such as butterflies and moths), to beneficial insects and to long-term soil health are woefully inadequate and give no assurances for the environmental safety of growing GM *Bt* brinjal. He added that, in many cases the experiments were considered irrelevant as these do not consider indirect effects, such as effects up the food chain.

<sup>5</sup> Gilles-Eric SERALINI, "EFFECTS ON HEALTH AND ENVIRONMENT OF TRANSGENIC (OR GM) BT BRINJAL" University of Caen, France, January 2009.

- **High possibility of contamination through cross pollination**

As mentioned, eggplant is also considered as a cross-pollinated plant. The Philippines has a total of 80 known varieties of eggplant being grown by farmers all over the country. There is possibility that the inherent risks of *Bt* eggplant maybe acquired by non *Bt*-eggplant through cross-pollination.

- **Increase in pest resistance**

The study of Tabashnik et. al on *Bt* cotton showed target pests have higher risk of developing pest resistance to combined *Bt* genes<sup>6</sup>. Similarly, the *Bt talong* used two *Bt* genes. It is possible that the eggplant's fruit and shoot borer can develop higher pest resistance to *Bt* genes rendering *Bt talong* ineffective to control the target pest.

There are also unintended direct adverse effects of *Bt* toxins on biological diversity, both lethal and sub-lethal including but not limited to insects, aquatic life, soil microbe and their food web dynamics.<sup>7</sup>

- **Emergence of new pests.**

Continued use of *Bt* crops have led to emergence of new pests. *Bt* corn, which has been massively cultivated in the US since the 1990s, was recently found to cause the spread of a new pest in the US Corn Belt. The western bean cutworm infests the tips of the corncobs. Massive damage is being reported from those regions where the Monsanto's *Bt* corn (YieldGard)<sup>TM</sup> is grown. *Bt* corn is clearly suppressing the natural enemy of the western bean cutworm and damage due to this pest is increasing yearly. Other pests might also emerge as a consequence of the *Bt* toxin killing the natural enemies of this new pest. This might prove similar to *Bt* eggplant, having the same bacterium toxin, once it becomes released commercially.

- **Continued and possible increased use of pesticides.**

*Bt talong* is only resistant to fruit and shoot borer. There are other pests that attack eggplants. Farmers also spray fungicides as often as they spray insecticides to prevent fruit rot (*Phomopsis vexans*) and other fungal diseases of eggplant. Hence, there is no assurance that planting *Bt talong* will cut overall pesticide use. As EFSB resistance evolves over time, farmers will have to go back to using chemical pesticides to control the more virulent forms of the pest.

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<sup>6</sup> Tabashnik B.E., JBJ Van Rensburg, C. Yves. 2009. Field-evolved insect resistance to Bt crops: definition, theory & data. Journal of Economic Entomology 2009

<sup>7</sup> <http://www.vkm.no/dav/23deqb2ff.pdf>

### 5. *Bt talong* poses Health Risks

The lack of comprehensive risk assessment studies on the potential impacts of GM crops on human health and the environment should be enough to pause and reconsider. Analysis done by Dr. Seralini of the *Bt* brinjal, which was crossed with *Bt* eggplant in the Philippines, shows that tests were invalid, and that *Bt* brinjal may cause liver, blood, and stomach problems. The tests also do not validly measure the long-term effects of *Bt* eggplant. Also, as Seralini pointed out, the recommendation of Mahyco that consumption of *Bt* brinjal be limited to 50-100 g for a person per day for five days “for a safe dose level” puts to doubt the safety of *Bt* eggplant as food.

**Table 1: Nutritional Content of *Bt* Talong**

Characteristic	Our Ordinary Eggplant Today	<i>Bt</i> Talong
<b>Nutrition</b>	Contains Vitamin A, B, C as well as calcium, iron, phosphorus, and potassium	Has 15% less Kcal/ 100g than the usual eggplant
<b>Medicinal properties</b>	<p>Known cure for asthma, hemorrhoids, syphilis, throat and stomach troubles, abscesses and cracked nipples, rheumatism, foot pain, cardiovascular illnesses, and toothache, .</p> <p>used as an antidote to poisonous mushrooms, and toothache.</p> <p>Helps to lower blood cholesterol levels and is suitable as part of a diet to help regulate high blood pressure.</p> <p>a diuretic and relieves colic, reduces stomach ulcers and is considered a sedative, as well as a calmative stimulant for the liver and intestines.</p>	Bt Talong has a different alkaloid content that may affect its medicinal properties.
<b>Antibiotic resistance</b>		Makes people resistant to antibiotics, specifically kanamycin, a well known widely used antibiotic.
<b>Insecticide content</b>		16-17mg/kg <i>Bt</i> insecticide toxin is found in <i>Bt</i> Talong and this is poorly characterized for side effects

Seralini also scoured over the toxicity tests submitted by Mahyco and found damning evidence that *Bt* eggplant is unsafe even among the lab rats, rabbits, goats and cows, fish and chickens. Toxicity tests applied to other lab animals are not conclusive because of the short duration of the studies. The study also found substantive differences in the nutritional content of conventional eggplant and *Bt talong*. Table 1 compares the traits of the present eggplant varieties and the *Bt* eggplant.

## 6. *Bt talong's* Economic Risks

As consumers become aware of the health and environmental risks of *Bt talong*, there is a possibility that consumers will avoid buying eggplant altogether because there is no way of telling which one is the *Bt talong* and which one is not. This may potentially affect the Php3.1 billion peso eggplant industry<sup>8</sup>. If this happens, eggplant farmers will certainly suffer huge losses of income. This is very alarming because a lot of Filipino farmers depend on eggplant for their income.

**Farmers planting organic eggplants will seriously suffer** because they will no longer be able to guarantee the integrity of their products. Organic farming standards do not allow the use of GMOs like *Bt talong*.

Eggplant farmers who would like to take advantage of the growing market for *Halal* food may find it difficult to market their product as such. The Muslim Mindanao Halal Certification Board, one of the respected certifying bodies in the Philippines, considers GMOs as best to be avoided (*masbooh*).

## 7. India said no to *Bt* eggplant. Why should we?

On February 9, 2010, India's Minister of Environment and Forest, Jairam Ramesh imposed a moratorium on the commercial release of Mahyco's *Bt* eggplant due to food safety, food security and loss of biodiversity considerations.

Ramesh conceded that India's regulatory system lacks the expertise and autonomy required to put decisions beyond reproach and came out with a decision based on precautionary principle-based approach.

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<sup>8</sup> Selected Statistics on Agriculture 2010. [http://www.countrystat.bas.gov.ph/documents/ssa\\_2010.pdf](http://www.countrystat.bas.gov.ph/documents/ssa_2010.pdf)

## WHAT YOU CAN DO:

### For Farmers:

#### 1. Use resistant varieties

With many varieties of eggplant in cultivation, there are varieties that are able to resist fruit and shoot borers. It is the role of agricultural research institutions to test different varieties under local farm conditions to identify which varieties are resistant to EFSB, and make these available to farmers. Further, farmers can undertake breeding of varieties to develop resistant lines from which new varieties are produced.

#### 2. Adopt Integrated or Ecological Pest Management practices to manage Fruit and Shoot Borer

Farmers have adopted practical measures and strategies to effectively manage fruit and shoot borer. Knowing that EFSB moths lay eggs on eggplant, it should then be prevented from getting into the eggplant. Some strategies employed include:

- a. Weekly removal of infected shoot and fruits during growing stage of eggplant;
- b. destruction of eggplant stubbles after harvesting through shredding, burying or burning to remove eggplant larvae;
- c. using of eggplant shoot and fruit borer pheromones that are now being sold in the market and use of sticky traps;
- d. planting of marigold attractants in the periphery of eggplant gardens to attract friendly insects such as lady beetle, praying mantis, spiders and wasps that feed on EFSB larvae and traps EFSB moths.
- e. non-application of insecticides and pesticides that kills friendly insects and natural enemies of EFSB.

Some local government units also conduct Farmer Field Schools on Integrated Pest Management on Eggplant which includes regular observations of EFSB's life cycle and agro-ecosystem analysis to manage and control EFSB.

#### 3. Diversify your farms

Diversifying one's farm by planting combinations of different species help farmers both economically and ecologically. Diversification spreads out risks. Farmers are able to sell different products and are able to make up for failures in one or two crops with good harvests from others. Farmers do not become dependent on only one or two crops. Diversified farms improve overall management of pests as different species can serve as pest control or as hosts of friendly insects that prey on certain pests.

#### 4. Go Organic!

There is a growing awareness of the benefits of organic food and the market for organic products is growing bigger over time. Organic farming employs crop and species diversification and makes use of naturally resistant crop varieties and biological and non-chemical control methods, An organic farming system can better offset and minimize pest damage while providing farmers increased incomes due to higher market price for organic produce.

#### For Consumers:

##### **Assert your right to know and to choose safe and healthy foods**

- Inform your local governments if there are planned Bt talong field experiments in your localities. Demand for a public consultation process and an open and informed debate on the issue. Ask questions.
- Write to national government agencies particularly Department of Agriculture Secretary Proceso Alcala, Department of Environment and Natural Resources Sec Romeo Paje, Bureau of Plant Industry Director Larry Lacson not to commercialize *Bt talong* and demand that your letter be answered within 15 working days.
- Contact local or national print and broadcast media and let them know that:
  - as consumer and as citizen you have the right to information about what is happening with the field testing and plans for commercialization of *Bt talong*.
  - you reject GMO foods, particularly *Bt talong*
  - you do not want genetically modified food in the marketplace and on your dining tables.
- Demand your Congressional representative and ask the Senate of the Philippines to sponsor and enact legislation on mandatory labeling of GMOs and food products with GMO content.

**Further Readings and References :**

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Norway's report submitted by the government to the AdHoc Technical Expert Group (AHTEG) on Risk Assessment and Risk Management to the Cartagena Protocol on Biosafety

[www.indiagminfo.org](http://www.indiagminfo.org), 10 REASONS FOR YOU TO SAY "NO" TO BT BRINJAL!

Genetic Engineering Approval Committee (GEAC) in the Ministry of Environment and Forests based on the recommendations of an "Expert Committee" on Bt Brinjal.

<http://moef.nic.in/modules/contact-ministry/contact-ministry/>

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