



Farmers First

Feedback from the Farm





A record 17 million farmers grew biotech crops in 2017. Of these, over 95% or over 16 million were small resource-poor farmers in developing countries. Of this number, 94% were from China, India, and the Philippines.

Ma Congbiao from Hebei, China. Sudhakar Vasudevrao Bhamkar from Maharashtra, India. Rosalie Ellasus from Pangasinan, Philippines. They are some of the farmers who have been planting biotech crops for over a decade. They put a face on the millions of farmers with stories to tell – how they were introduced to the crop, the benefits they gained, and why they continue to plant and influence their peers to adopt the technology. Farmers like Ma, Sudhakar, and Rosalie prove that a technology can be adopted if it translates promises of benefits to an improvement in their lives and people in the community. Similarly, other factors can also hinder its acceptance and adoption.

Research studies on the Adoption and Uptake Pathways of Biotechnology Crops were spearheaded by the International Service for the Acquisition of Agri-biotech Applications (ISAAA) in collaboration with three institutes: The Center for Chinese Agricultural Policy, Chinese Academy of Sciences; Indian Society of Cotton Improvement; and the College of Development Communication at the University of the Philippines Los Baños. The studies provided empirical-based information that contribute to a better understanding of who biotech farmers are, and the process of technology awareness and acceptance.

This publication highlights interviews with sample farmers who shared their insights to the following questions: Who are the biotech farmers? What are the factors that farmers consider in adopting biotech crops? How have they benefited from adopting the technology? Who influenced them in adopting biotech crops?

Feedback from farmers, the primary beneficiaries of crop biotechnology, speaks for the technology. It is farmers first, after all, who will make the crucial decision on whether to plant a particular crop or not, to sustain its adoption, and to influence peers to follow their lead.

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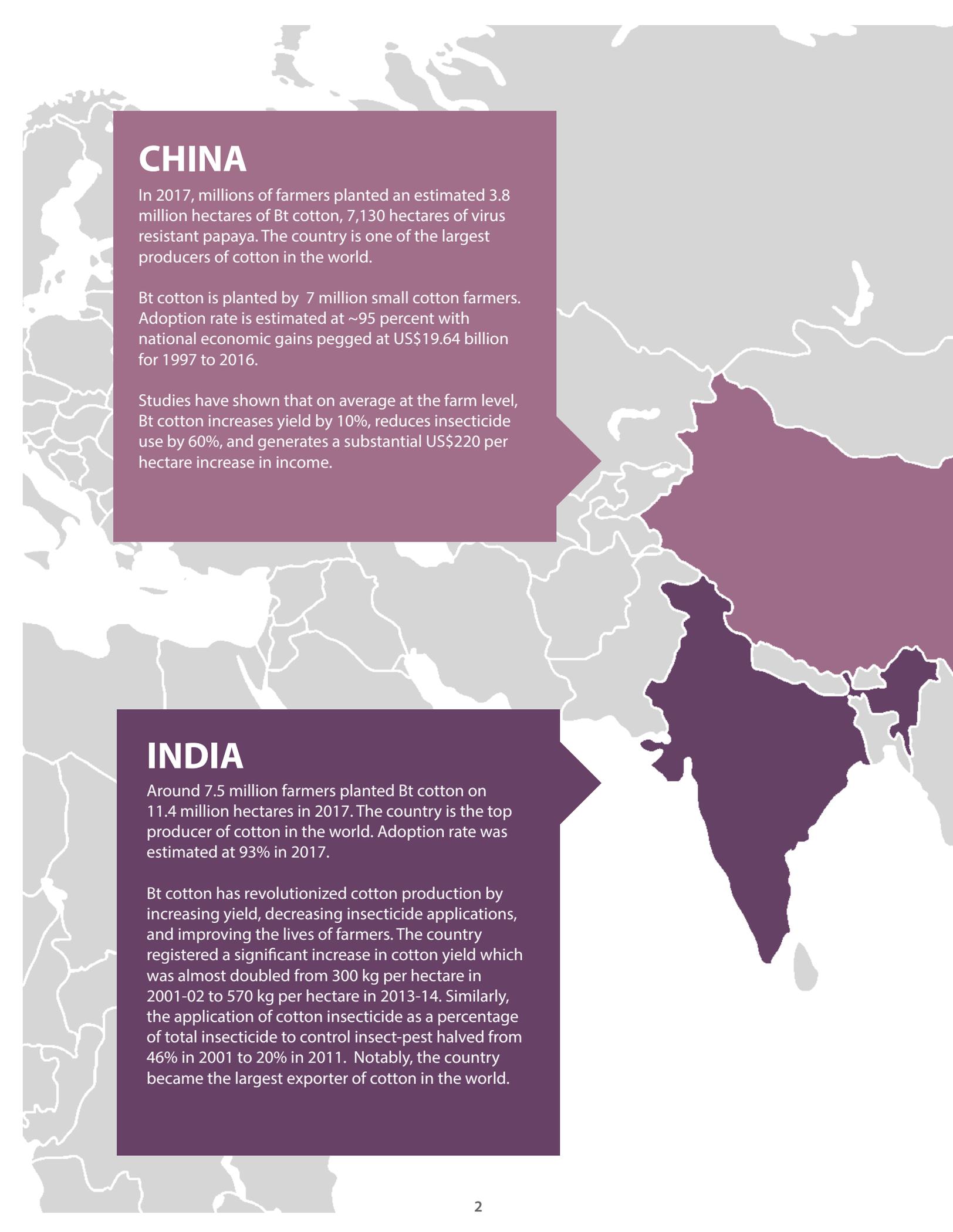
Twenty two years ago, in 1996, biotech crops (also known as genetically modified or transgenic crops) were commercialized for the first time. A total of 1.7 million hectares or 4.3 million acres of farm land were planted to biotech corn, soybean, and cotton. Farmers in the United States of America, Argentina, Canada, and China were the first adopters of the technology which promised agronomic, environmental, economic, health, and social benefits.

By 2017, or after 22 years since biotech crops were first planted, there has been a phenomenal adoption of biotech crops particularly among farmers from developing countries. The adoption of biotech crops increased from 1.7 million hectares in 1996 to 189.8 million hectares in 2017 - a 112 fold increase in a 22 year period. The principal biotech crops include soybean, corn, cotton, canola, alfalfa, sugarbeet and others such as virus resistant squash, ringspot virus resistant papaya, and Bt poplar. Top ten countries or those planting 50,000 hectares or more include the USA, Brazil, Argentina, Canada, India, Paraguay, Pakistan, China, South Africa, and Bolivia.



About 17 million farmers adopted the crop technology. Over 95 percent or over 16 million were small resource-poor farmers in developing countries. It is estimated that 7 million farmers in China, 7.5 million in India, and 470,500 from the Philippines accounted for 94% of all developing country farmers.

The biotech crops were commercialized with a promise of multiple benefits in 1996. Today millions of farmers are reaping the benefits of biotech crops: more convenient and flexible crop management, lower cost of production, higher net returns per hectare, health and social benefits, and a cleaner environment through decreased use of conventional pesticides. All these collectively contribute to a more sustainable agriculture. Indirectly, consumers benefit as well, as they have safer and better quality alternatives to conventionally bred crops.



CHINA

In 2017, millions of farmers planted an estimated 3.8 million hectares of Bt cotton, 7,130 hectares of virus resistant papaya. The country is one of the largest producers of cotton in the world.

Bt cotton is planted by 7 million small cotton farmers. Adoption rate is estimated at ~95 percent with national economic gains pegged at US\$19.64 billion for 1997 to 2016.

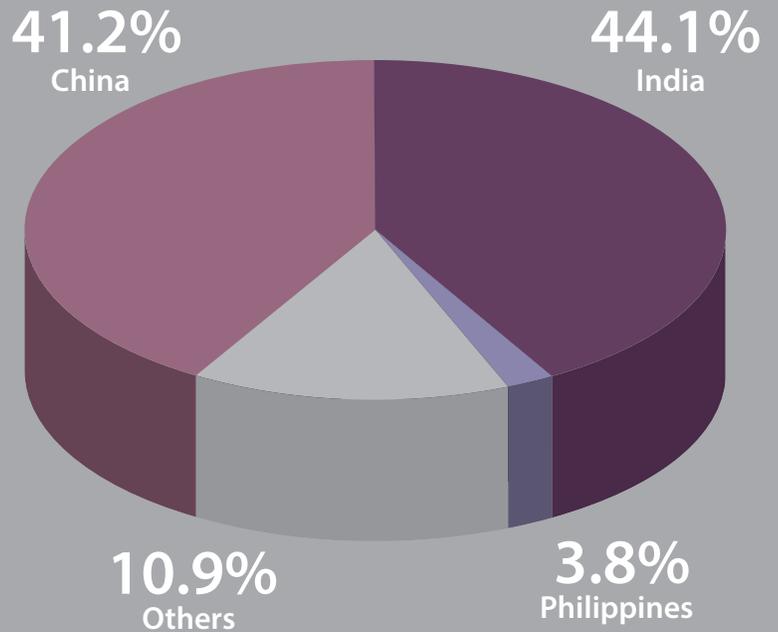
Studies have shown that on average at the farm level, Bt cotton increases yield by 10%, reduces insecticide use by 60%, and generates a substantial US\$220 per hectare increase in income.

INDIA

Around 7.5 million farmers planted Bt cotton on 11.4 million hectares in 2017. The country is the top producer of cotton in the world. Adoption rate was estimated at 93% in 2017.

Bt cotton has revolutionized cotton production by increasing yield, decreasing insecticide applications, and improving the lives of farmers. The country registered a significant increase in cotton yield which was almost doubled from 300 kg per hectare in 2001-02 to 570 kg per hectare in 2013-14. Similarly, the application of cotton insecticide as a percentage of total insecticide to control insect-pest halved from 46% in 2001 to 20% in 2011. Notably, the country became the largest exporter of cotton in the world.

Out of the 17 million farmers that grew biotech crops in 2017, about 15 million were small resource-poor farmers from China, India, and the Philippines.



PHILIPPINES

An estimated 470,500 farmers planted biotech corn on 642,000 hectares in 2017. Farmers planted single gene insect resistant Bt corn in 2003. Over the years, farmers have shown a preference for stacked trait corn which occupied 94.5% of total biotech corn hectares in 2017. Stacked trait corn combines two traits such as insect resistance with herbicide tolerance.

Studies have shown that farm level economic benefit of planting biotech corn is estimated to have reached US\$724 million in 2016. Farmers reaped the net additional benefit of US\$180 per hectare with savings of US\$3 per hectare in insecticide costs.



Wang Yuping
Zhangzhai, Nancheng, Xiajin
Shandong, China

I used to plant ordinary cotton but bollworm infestation was a problem. I even wanted to give up until I was introduced to Bt cotton through a seed technician. He said Bt cotton is a transgenic crop and it is resistant to pests. I then bought seeds from the Bureau of Agriculture and began to grow Bt cotton. I also get subsidy as I grow the said variety. Everyone in our village is already planting Bt cotton. The production of cotton is higher than the traditional variety by more than 50 percent. Bt cotton is really good. It is productive, it is profitable, and it saves labor and pesticide.



Delson Sonza
Sara, Iloilo, Philippines

Farmers from our province are one of the early adopters of biotech corn. Iloilo is a mountainous province and some of its hilly grasslands are idle, thus there was a need to convert these grasslands to corn farms. Before biotech corn was commercialized in the country, farmers only earn during rice farming season (May-July), sugarcane planting season (October-January), and harvesting of rice and sugarcane (October -December).

In 2005, when glyphosate tolerant corn was introduced in the Philippines, dialogues with farmers in Iloilo were conducted to convert our grasslands into corn farms. With farmers convinced to adopt the biotech crop, technology transfer initiatives took place. The adoption of biotech corn was able to uplift our lives as farmers. This gave us an income of roughly Php30,000 (US\$750) per hectare which is far higher than income derived from conventional corn. Also, we no longer need to plow and weed, hence, we have more time to find other means of livelihood. Because of higher income, we can now afford to buy appliances, renovate our houses from nipa hut to concrete shelters, and acquire service vehicles such as motorcycles or even a truck. We can also send our children to school and we can even invest in post harvest equipment.



Prabhu
Andhra Pradesh, India

When we used non-Bt cotton seeds we did not get much yield. By using Bt cotton on my five acre land, I can get yields of 8 quintals (800 kg) per acre. We used so much insecticides before but now life is fine.



Kaibo Wang
Jiguan, Wangjiang
Anhui, China

I am a 57-year old farmer who is presently planting 15 *mu* (1 ha) of Bt cotton. I have been planting cotton for 40 years but I started to plant Bt cotton in 1999. By 2002, all cotton planted in my farm is already Bt. The crop was introduced to me by a relative. After trying Bt cotton, I learned that it did not need much pesticide and that it had higher yield than its conventional counterpart. Adopting Bt cotton also resulted to less labor and thus it became easier for me to manage my farm. I also commend the good quality of Bt cotton which has better cotton fiber.

Vijay Atmaram Ingle
Chitalwadi, Ta, Telhara, Akola
Maharashtra, India

I am a third generation cotton farmer who was not able to finish studies because my family did not have enough resources to send me to college. In 1976, I inherited a cotton farm of 14 acres (5.67 ha) where I was just harvesting 2.5 quintals (0.25 ton) of cotton per acre. In 1997-1999, I was one of the first farmers to conduct Mahyco's Bt cotton field trials. Today, my annual income from planting Bt cotton alone is about Rs. 12,60,000 (US\$23,386.61). I was able to send my children to college. My son is currently studying agricultural biotechnology while my daughter has a degree in education. Being one of the first adopters of Bt cotton, my farm received wide publicity from media, including local newspapers and farm magazines. Among the benefits I gained from Bt cotton cultivation are the increase in my income which has tripled in the last ten years; improvement of my social status; ability to afford higher education for my children; acquisition of additional 8 acres of land in 2010; establishment of a dairy farm with 100 animals and other businesses; and building a Pucca (cement) house.



Venkatayya

Hussainpur, Sankarapalli Mandal
Andhra Pradesh, India

We used to plant conventional cotton varieties but yield was poor. We used insecticides every other day or once every two days. Yet we got only 3-4 quintals (300-400 kg) yield per acre. But after using Bt cotton seeds we now yield 1 ton. We are using less insecticide and the crop quality is good. Before we had debts because we spent a lot on insecticides. We are clearing those debts now with the profits from Bt cotton.



Li Yizheng

Qinahuozhuang, Xinshengdian, Xiajin
Shandong, China

I was introduced to Bt cotton when our county's cotton improvement office recommended the seed to us. When we planted Bt cotton, we saved on labor and had a more productive yield. Bt cotton reduces need for pesticide so we work less in the field, but earn more. To improve our Bt cotton farming, I and my fellow farmers share each other's methods on proper cultivation. I hope the government will continue to promote good varieties of cotton.



Sudhakar Vasudevrao Bhamkar

Kamthi Khanapur, Vardha
Maharashtra, India

For the last 25-30 years, I have been planting cotton referred to as white gold. Farmers need to adopt new scientific technology to improve production as well as earn more money. Growing Bt cotton helps farmers to save more by reducing labor cost otherwise spent for pesticide spraying. There is no need to spray pesticide on Bt cotton. I hope that agricultural research institutes can also focus their research to control other insect pests and diseases which infect Bt cotton.

Mohamad Habibudin
Hussainpur, Mandal Shankarpali
Andhra Pradesh, India

I have been growing Bt cotton in the last five to six years. Previously I was growing conventional cotton but I suffered a huge loss in yield due to bollworm infestation. Since Bt cotton was introduced, my yield has increased to 10-12 quintals (1,000 to 1,200 kg) per acre. Planting non Bt cotton used to yield only 400 to 500 kg/acre. Previously we were spraying pesticides 10- 12 times on non Bt cotton. Now we are spraying only 2-3 times.



Ramu Dasrat Khoth
Nandora, Maharastra
India

My father used to grow traditional cotton varieties. Due to help from the government, we are now growing Bt cotton. Bt cotton technology helped increase yield. Previously, yield of non-Bt cotton was 6-7 quintals (600 to 700 kg) per acre but now we get up to 8-9 quintals (800 to 900 kg) per acre with very less expenses.



Rosalie Ellasus
San Jacinto, Pangasinan
Philippines

I tried Bt corn after attending the Farmers' Field School. Our speaker had been telling us that we should always choose good seeds. A seed company eventually conducted a Bt corn trial in a nearby town. During that time, infestation of ordinary corn in our place was so high. But with the Bt corn planted for the trial, I really saw that crops were so healthy. There was not even a trace of pests considering that they did not apply insecticide. Furthermore, you no longer need to visit your corn field everyday and this gives you peace of mind. The production cost will be lessened as well compared to conventional corn farming and the yield will be more. This is why I adopted Bt corn.



Pablito Lobendino

**Villapaz, Naguillan
Isabela, Philippines**

Seed company technicians introduced biotech corn varieties to us. They said these varieties are good to plant because it minimizes the cost of farming especially in removing weeds. When we tried biotech corn, it indeed reduced our production cost. The yield is also higher. We still plant ordinary corn from time to time when the Department of Agriculture (DA) provides seeds but farming inputs are expensive. When we were not yet planting biotech seeds, there was barely money left because you spend a lot particularly to remove weeds. When we started to plant biotech seeds, we earned a decent profit.

Indalencio Supan **Balitucan, Magalang Pampanga, Philippines**

I have been farming since I was 20 years old and now I am already 73 years old. Before Bt corn was commercialized, I was planting sweet corn but the crop is prone to borer infestation. I learned about Bt corn through seed technicians from the government and private seed companies. They encouraged us to plant this variety to increase our earnings. We were convinced because Bt corn really yields more than the conventional variety as the latter is usually eaten by the corn borer. We started to plant Bt corn in 2003 and we are still planting it up to now. Because of planting Bt corn, we were able to buy a house and lot, farm machineries and even farm land. But we still want to learn more from seed technicians during seminars. We also look forward to government support especially in terms of financial assistance so that we can minimize borrowing from traders.



Chen Jianbin

Da Lisi, Wangkou, Xinji City
Hebei Province, China

We were introduced to Bt cotton when a seed company worker visited our village and distributed the seed variety. I tried it and found it good. My crop was not infested by pests so I continued to plant the variety. There is not much problem. Actually, there are lots of benefits. We save labor and time; the production is also high so our income increases too. Because of planting Bt cotton, we have built a big house, earned more money, and now we live a better life. Most of the cotton planted in our village is already Bt cotton. The ordinary cotton which is not pest-resistant has almost disappeared. We farmers always share our experiences in growing Bt cotton with each other and we apply the good practices we learned from our fellow farmers.



Aquino Gozun

Lacmit, Arayat
Pampanga, Philippines

We started to plant Bt corn in 2004. The Office of the Provincial Agriculturist organized a Farmers' Field School in our place where they also conducted farm demonstrations. I was one of the cooperators in their farm demo. That was the very first time I planted Bt corn. I initially saw the big difference between Bt corn and conventional corn. The pests always eat the conventional corn that's why we sometimes end up with no earning at all. When Bt corn was introduced to us, it brought good results to farmers as we no longer need to apply insecticide and we even have more yield. This gives us an income twice more than what we get from the conventional corn. That's why almost every farmer in my place is planting Bt corn.





Xu Derong
Zhangzhai, Xiajin,
Shandong, China

I started to plant Bt cotton in 1998. They initially introduced Bt cotton to young people since they are open-minded. People in our village did not want to grow Bt cotton, they did not believe it is resistant to pests. I could not believe it as well. At first, there were only 30 families who were growing Bt cotton. Then my uncle introduced Bt cotton in our village. On the first year, I planted a little. Since then, I began to expand my Bt cotton farm. Aside from my existing 0.13 ha cotton farm, I leased another *mu* (0.13 ha) for Bt cotton, and later on I expanded my Bt cotton farm to another 7-8 *mu* (0.47-0.54 ha). I think Bt cotton is better. With ordinary cotton we only got production of over 150 kg per 0.067 ha. Now we get 250-300 kg harvest per 0.067 ha. Before, we all thought that the input cost is too high. Seeds are expensive too. But those who didn't grow Bt cotton gained nothing after the harvest period. Now, people realize that planting Bt cotton can make more money.



Aurea Raso
Macayug, San Jacinto
Pangasinan, Philippines

We have attended a lot of seminars on biotech corn farming from different seed companies. We were oriented on proper way of cultivating the crop, its traits, and its benefits. There were also farm demonstrations from seed companies and encouragement from progressive farmers in our village like Rosalie [Ellasus]. This is why we decided to try Bt corn. Bt corn is really good because we no longer have to spray insecticide to control the pests. With ordinary corn, you really need to apply insecticide because they are vulnerable to pests. There are also varieties which can tolerate herbicide. Adopting biotech corn indeed helped my family. When harvesting period comes, we are confident that we will have a sure earning.



Li Yihua

Qianhuozhuang, Xinshengdian, Xiajin
Shandong, China

I have been growing Bt cotton for eight years. Some people from the government's cotton improvement office brought the Bt cotton seeds to us. They wanted us to try the variety. That time, we could not believe that there is a kind of cotton that can resist pests. But we tried it and it turned out that Bt cotton can really resist pests. Bt cotton is also profitable. Gradually, people began shifting from ordinary cotton to Bt cotton. The production of Bt cotton proved to be high. Nearly all farmers in our village want to grow Bt cotton. At first there were only few people who wanted to grow Bt cotton. The next year, Bt cotton seeds were no longer enough in our village. In the third year, Bt cotton turned out to be the seed of choice.

Corazon Cabasag

Sta. Rosa, Iguig
Cagayan, Philippines

We started to plant Bt corn eight years ago when the government introduced the variety to us. They said that Bt corn cannot be infested by borers. Even if the seed's price is higher than ordinary corn, they said Bt's outcome will be far better. Then we attended their farm demo. Since then, we started to plant this variety. Bt corn indeed gives more yield than the ordinary corn since the latter is prone to borer infestation and you also have to apply insecticide. You will really see the big difference between ordinary corn and Bt corn. Because of Bt corn, we were able to acquire a big thresher.





Srinivasa Reddy
Andhra Pradesh, India

Four years ago I used conventional seeds which yielded only 4 quintals (400 kg) per acre. In the last four years when I shifted to Bt cotton, I have been getting a yield of 8-9 quintals (800-900 kg) per acre which translates to a profit of INR50,000-70,000 (US\$825-1,154). I have been able to study for a college degree while working on the farm as well.



Li Wenjing
Da Lisi, Wangkou, Xinji City
Hebei, China

Bt cotton was recommended to us by a Chinese agricultural company. The village council also persuaded us to grow Bt cotton as they said that the variety has lots of benefits compared to the conventional cotton. Ever since I planted Bt cotton, it saved me labor and money as I do not buy pesticide. We gain higher income unlike when we were growing ordinary cotton. Bt cotton is productive and the pests are minimal. The cotton bollworms were hugely reduced too. Since we planted Bt cotton, we had higher family income. We renovated our house, bought a new tractor, and a colored TV as well. I already saw its benefits and potentials so I recommended it to my relatives and friends in other villages.



Narasimhulu
Masanigude, Sankarapalli Mandal
Rangareddy, Andhra Pradesh
India

I did not make money when we were planting conventional cotton varieties. Most of our money went to pesticides. Today I am growing Bt cotton on five acres of land. We are using less insecticides. This means more profits for us.

Faustino Astrero Jr.
Banga, South Cotabato
Philippines

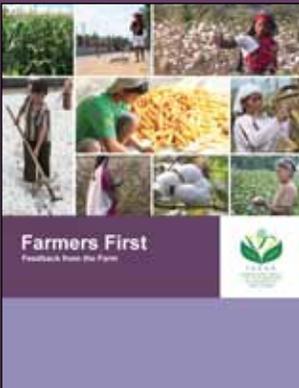
In our place, large seed companies organize a harvest festival for farmers. Aside from free food, they also give us samples of their products and they conduct seminars on Bt corn. When I started to plant Bt corn, I felt more relaxed because there is less labor in planting Bt corn unlike with conventional corn where you still need to till the land. One no longer needs to spray insecticide. It also reduces my time for corn farming and I can spend more time with my other crops. We also get higher yield from Bt corn.



Ma Congbiao
Mazhuang Village, Xinji City
Hebei, China

We have been planting Bt cotton on a five *mu* (0.34 ha) farm for more than a decade. Our village leaders influenced us to plant Bt cotton by organizing a meeting to introduce the benefits of planting Bt cotton to farmers. Planting Bt cotton saves labor and time. Pests were also minimized thus the use of pesticides was reduced. Most of all, we increased our cotton production. Because of this, Bt cotton became very popular to farmers. We have acquired new appliances and furniture for our house. Compared with the past, our life has really improved. To further improve our Bt cotton cultivation, we farmers talk about our harvest and who grows Bt cotton better. We also share our knowledge and experiences on planting the crop.





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Sources:

ISAAA Video Projects: Adoption and Uptake Pathways of GM/Biotech Crops by Small-scale, Resource-poor Asian Farmers (2013) and *Kernels of Change* (2012).

ISAAA. 2017. *Global Status of Commercialized GM/Biotech Crops: 2017*. ISAAA Brief No. 53. ISAAA: Ithaca, NY.

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