Knowledge sharing and the role of farmers

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In 1991, Mount Pinatubo in Central Luzon, Philippines, erupted and was recorded as the second most devastating volcanic eruption of the 20th century. The volcano spewed many tonnes of lava and molten rocks, killing thousands of people and animals. Lava flows wiped entire houses and communities off the map and reduced rich agricultural lands to barren, unproductive areas, including the fertile plains of the province of Pampanga.

For years, not a single crop grew on the lahar-covered areas, but when the land surface stabilized more than a decade later, farmers tried again to coax the land into producing crops. Among the very first seeds planted was *Bt* maize. Today, the province of Pampanga is one of the major maize-producing areas in the country. It is home to Carlos Guevarra, an

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early adopter of genetically modified (GM) maize who became a National Farmer of the Year awardee, feted by the Department of Agriculture. A risk taker and innovator, Guevarra is an inspiration to other farmers in his community who have tried the technology and reaped the benefits that have changed lives and communities. Filipino farmers planting *Bt* maize have registered unit yield increases of as much as 37 per cent, with a reduction in insecticide expenditure of 60 per cent.[1]

Li Wenjing, a Chinese farmer from Hebei Province, was persuaded by his village council to grow *Bt* cotton. He tried planting the crop and, compared to the traditional variety, he noticed a significant reduction in the cotton bollworm population and in the use of pesticides. As a result, his higher income enabled him to renovate his house and buy a new tractor and television set. Seeing the benefits and the potential of the technology, Wenjing did not hesitate to recommend it to relatives and farmer-friends in other villages. Similarly, Mohammad Habibbudin, an Indian farmer from Andhra Pradesh, changed to *Bt* cotton after suffering a huge loss in yield due to bollworm infestation. The decision proved to be a wise choice as his yields increased from 160–200 kilos per hectare using traditional varieties to 400–490 kilos per hectare using *Bt* cotton. Quite significantly, farmers in his village reduced the number of pesticide applications from 10–12 times on non-*Bt* cotton, only needing to spray the *Bt* cotton two or three times for the control other pests.

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Carlos Guevarra, Li Wenjing and Mohammad Habibbudin are just three of an estimated 18 million farmers planting GM crops worldwide.

Contrary to the notion that only farmers from developed countries are reaping the benefits of biotechnology, about 85 per cent of these farmers are small landholders from the developing countries of China, India, and the Philippines.[2] This is the major highlight of a research project on the adoption and uptake pathways of GM crops by farmers in the three countries.[3,4,5,6] Higher economic and yield benefits, freedom from high infestation rates of cotton bollworm or corn borer, and dramatic reduction in pesticide use and frequency of spray applications are the principal motivators for adoption.

A further, intangible, benefit is peace of mind in knowing that a dreaded pest would not wreak havoc. More interestingly, it is not the government agricultural extension service that is crucial in farmer adoption of new technology. Rather, farmer-leaders or village cadres have become local champions of GM crops as they take frontline action in testing the technology after seeing a demonstration field trial, sharing their knowledge, and demonstrating commitment to spread the benefits with fellow farmers within and beyond their community.

Who are the farmers using GM crops?

Traditionally, farming has been stereotyped as backbreaking, not commensurate to the efforts exerted, unprofitable, and particularly unappealing to youth. But farmers planting biotech crops paint a different picture. While *Bt* cotton production is still male-dominated, there is growing involvement of women in GM crop commercialization in China. Based on focus group discussions, more and more women are attracted to it as there is less labour involved due to the reduction in pesticide application.

In China, more and more women are attracted to the commercialisation of genetically modified crops as there is less labour involved.

Farmers believe that they owe it to themselves and their fellow farmers to share what would benefit everyone in the community.

In the Philippines men dominate the planting process, but wives control the purse and thus are major decision makers in the choice of crop to plant and the inputs to buy. In Indian households, planting of *Bt* cotton has become a family affair, with the household head taking the more strenuous activities, and mothers and children helping to pick and clean cotton bolls.

In India, it is a positive sign that the cultivation of *Bt* cotton is attracting the young, with more than 50 per cent in the 21–40 age bracket among those surveyed in the cotton-growing areas of Punjab, Andhra Pradesh and Maharasthra. And in the Philippines, even college graduates are venturing into GM maize production, thus finding it a viable income-generating opportunity. Farmers in China and the Philippines report two to three times higher income from planting GM crops, while Indian farmers obtain twice the income compared to traditional varieties.

Uptake pathways of genetically modified crops

Early-adopting farmers in India and the Philippines take the risk of a new technology by evaluating a biotech crop which they initially heard about from a demonstration field trial set up by seed companies or from progressive village leaders. Other farmers in the community have a "wait and see" attitude: they take time to see how things progress, but become easily motivated once they see convincing results of the early adopters' higher yields and bountiful harvests.

Instead of keeping the new information from which they have reaped rewards to themselves, early adopters are committed to sharing the benefits with their

relatives and peers. Among the farmers and other actors in the farming system, knowledge-sharing about biotech crops is highly interpersonal and face-to-face. This is due to the strong prevailing peer system among farmers and the belief that they owe it to themselves and their fellows to share what can benefit everyone in the community.

In China, the role of village cadres is quite important in that they coordinate with technicians to arrange training and convince farmers to participate in farm-related activities. Hence, the factors that facilitate early adoption are three-fold:

- getting support for GM crop production from trusted village leaders;
- close ties and good communication between farmers;
- avoidance of heavy losses incurred by farmers cultivating non-GM crops.

Conclusion

The champions of GM crops are the farmers. It is not scientists, institutional advocates, extension officers or other government agents who play key roles in making farmers adopt a new technology in the first place. At the end of the day, it is the individual farmers who makes the crucial decision of whether to plant a crop or not, decide on the variety to plant, and adopt new techniques and cultural practices. They have tilled the land for so long and have a wealth of experience, allowing them to decide what is best for them and their community. Farmers are naturally risk-averse and may need progressive village leaders to convince them to try new technologies, but once they see the benefits there is no turning back.

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Yet, as with any technology, there are also factors that limit or slow down the adoption

The farmer is indeed the master of his own fate.

and uptake of GM crops, including lack of capital and the high cost of farm inputs, especially in India and the Philippines. In China in the initial years of commercialization, local seed companies could not meet the demand for GM seeds, and a lack of knowledge and wrong information about GM crops also contributed to delayed adoption.

Nevertheless, farmer adoption of *Bt* cotton is now more than 95 per cent of total cotton production in China and India, while 80 per cent of Filipino yellow corn farmers are planting GM maize.

The farmer is indeed, to borrow William Ernest Henley's words, the master of his fate.

References

1 Yorobe, J. (2006) Economic impact of *Bt* corn in the Philippines. *The Philippine Agricultural Scientist* 89:258–267.

2 James, C. (2014) Global status of commercialised biotech/GM crops: 2013, *ISAAA Brief* No. 46. International Service for the Acquisition of Agri-Biotech Applications, Ithaca, NY. ISBN 978-1-892456-55-9. www.isaaa.org/resources/publications/briefs/46/.

3 International Service for the Acquisition of Agri-biotech Applications (2013) *Cadres of Change: Transforming Biotech Crops in China, India, and the Philippines*. ISAAA, Center for Chinese Agricultural Policy, Chinese Academy of Sciences; Indian Society for Cotton Improvement; and College of Development Communication, University of the Philippines Los Banos. Ithaca, NY.

4 Mayee, C.D., Choudhary, B. (2013) *Adoption and Uptake Pathways of* Bt *Cotton in India*. Indian Society for Cotton Improvement, Mumbai, India.
5 Torres, C., Daya, R., Osalla, M.T., Gopella, J. (2013) *Adoption and Uptake Pathways of GM/Biotech Crops by Small-Scale, Resource-Poor Filipino Farmer*s. College of Development Communication, International Service for the Acquisition of Agri-biotech Applications SEAsiaCenter, and SEAMEO Southeast Asian Regional Center for Graduate Study and Research in Agriculture, Los Banos, Laguna, Philippines.
6 Wang, X., Huang, J., Liu, H., Xiang, C., Zhang, W. (2013) *Adoption and Uptake Pathway of GM Technology by Chinese Smallholders: Evidence from* Bt *Cotton Production*. Center for Chinese Agricultural Policy, Chinese Academy of Sciences, Beijing, China.

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