Eggplant Grafting Transforms Life in Jessore, Bangladesh

In a small village in western Bangladesh under the shade of a bamboo-framed thatch roof, two women sit and work with a razor blade and eggplant seedlings. With a deft movement of hand on plant, Shovarani Kar and Trishna Rani Biswas are able to graft a high-yielding variety of eggplant onto the rootstock of another variety that is resistant to a devastating soil-borne scourge: bacterial wilt.

Under a Virginia Tech-managed program, these women have been trained to perform this task and are paid to do so, thus raising their income while improving the yield for eggplant farmers. Word has traveled that people in this village are now earning more because of improved agricultural practices, and villagers from surrounding towns and even distant villages travel regularly to this community to learn how to achieve the same results.

Because people in Gaidghat in the district of Jessore are earning more, their social status has risen. They formerly were addressed using the more familiar "tui," which is used to speak to children or someone of lower rank, but are now addressed with the term "apni," reserved for someone of higher status.

The women, who can complete about 300 grafts a day each, use the money they earn to purchase milk to improve their children's diet and to buy them clothing and school-related necessities such as books, notebooks, and pens.

The eggplant grafting program is part of a larger program under the Integrated Pest Management Collaborative Research Support Program (IPM CRSP), supported by funds from the U.S. Agency for International Development. The IPM CRSP, managed by Virginia Tech's Office of International Research, Education, and Development, has been addressing problems in developing countries around the world since 1993. In Bangladesh, Virginia Tech has partnered with scientists at Pennsylvania State University and Ohio State University since 1998. The eggplant grafting program was introduced in Jessore, known as the "vegetable basket" of the country, in 2003.

The technological impact of an improvement in agriculture is hard for Americans to grasp, since so few of us are directly involved in agriculture—two percent, by some estimates. In Bangladesh, two-thirds of the population is employed in the agricultural sector. The main crops are rice, wheat, sugar cane, jute, spices, and vegetables, of which there are more than 90 kinds. The fertile soils and warm climate are conducive to cultivating vegetables, which grow there year-round. For eggplant, Bangladesh is ideal, as the plant requires lots of water, hot weather, and rich, sandy soil.

Eggplant grafting was first developed by The World Vegetable Center in Taiwan in the early 1990s. By 1997, scientists there had begun grafting eggplant scions (the cut-off shoots) onto bacterial wilt resistant rootstock. They learned that one variety, EG 203, not only resists bacterial wilt, it also shows resistance to other kinds of wilt, certain worms,

and flooding. The last quality has proven extremely valuable in Bangladesh, where onethird of the country floods annually.

Eggplant is a staple crop in Bangladesh, not just the big, glossy, purple vegetable we see in our grocery stores. There are 100 traditional varieties of eggplant in Bangladesh, and 35 to 40 of them are commonly grown: long, short, purple, gray, white, yellowish, striped. The vegetable, technically a fruit—a berry, no less—is native to South Asia. In fact, its scientific species name, *Melongena*, comes from the Sanskrit *vatin gana* — "the plant that cures the wind" — in other words, the anti-flatulence vegetable!

Bangladeshis consume 114 pounds of eggplant per person annually because it is a standard ingredient in their daily dish of rice and curry. So when a disease or insect pest strikes this crop, it is a threat similar to that of the boll weevil on cotton in the American South of the 1890s, harming the livelihoods of millions of people and changing an entire economy.

In Bangladesh, it made sense to try the grafting technique to help stabilize the crop, and IPM scientists were not disappointed. Rezaul Karim, retired director of research for the Bangladesh Rice Research Institute and Virginia Tech's IPM site coordinator for Bangladesh since 1998, says researchers found that grafting of eggplant and tomato could reduce plant mortalities from bacterial wilt by 80 to 90 percent and produce two to three times higher yields. The variety of eggplant that resists the bacterial wilt, while not affected by the disease, produces a low yield. For this reason, it must be grafted with a high-yielding variety for optimum results.

The produce has brought high prices at the market, and since 2001, studies show that incomes have more than doubled in a single growing season in communities where eggplant grafting has been used.

Not only are far-away villagers coming to Gaidghat to learn what farmers there are doing, word has traveled through the non-governmental organization community as well. IPM CRSP now works with CARE-Bangladesh, Mennonite Central Committee, and other aid organizations to disseminate the grafting technique. Word has even traveled beyond the country's borders: The IPM CRSP site in the Philippines sent a team member to Bangladesh to learn the technique and train Filipinos in grafting.

In many areas of the country today, and in Jessore before the grafting technique was introduced, Bangladeshis dealt with pests and diseases by using chemicals supplied by pesticide makers. Beginning in the 1950s, these pesticides were given free to farmers. The government still subsidized the cost in the 1970s, but in 1979, farmers began having to pay full price. Now there are 104 chemical pesticide companies in Bangladesh, many of which misguide farmers into thinking they need their products. Karim explained that when pesticides were first introduced, farmers liked them because using them is easy, and they could *see* lots of dead insects. By contrast, "IPM practices are location-specific, plant-specific, and the effects are long-term. The visibility of results is low, and a little bit of drudgery is involved."

Although using pesticides was satisfying at first, the negative effects began to show up quickly. People developed frequent headaches and burning eyes. They lost sleep and their skin started to itch. To make matters worse, children did the spraying.

But IPM CRSP studies showed that spraying does not necessarily decrease pest infestation and, in fact, may increase it as the pests develop resistance. Besides, with soil-borne pathogens such as bacterial wilt, one cannot see the problem.

"What we saw," says Dr. Syed Nurul Alam, a researcher at Tech's partner organization, the Bangladesh Agricultural Research Institute (BARI), "is that an insecticide-based pest management system totally failed to control insect pests." While spraying might temporarily reduce the number of "bad" insects, it also kills the "good" ones — those that are natural enemies of harmful insects. In addition, some of the toxic chemicals remain as residue on the vegetables and get into the water supply.

But in Gaidghat, the integrated pest management program has been so successful that farmers have been able to reduce their purchase of chemical pesticides. Their cost of production has gone down and their yield has gone up — resulting in higher income. The farmers use the extra money to repair houses, buy cattle, and save to buy more land on which to grow vegetables. Vegetable production across Bangladesh has increased so much in recent years that produce now is being exported to the Middle East and to some European countries.

And the pesticide dealers? A farmer at the local agricultural technology implementation center (like a farmers' club) said, "One has already gone out of business this past summer!"

Because the eggplant grafting program has been so successful, BARI, with IPM CRSP support, conducts training sessions in eggplant grafting at its headquarters outside the capital city of Dhaka several times a year. At these sessions, extension workers learn the technique so that they can take it back to their communities. They hope that they, too, will have the same kind of success as the villagers in Gaidghat.

In Gaidghat, 100 percent of the children go to school. Health problems are down. And the farmers' cooperative has become something of a media attraction.

Eggplant grafting has not solved all of the farmers' problems. But Karim is optimistic. "Change happens slowly, but once it happens, it goes on and on."