

Through with Thrips: A USAID-Funded Program Promises to Reduce a Vegetable Scourge, Raise Incomes in Rural India

Many an Indian farmer has knitted her brows in dismay to see the leaves on her tomato and pepper plants turning brown and curling up.

The damage is the result of newly emerging viruses spread by thrips—tiny insects that are almost invisible to the naked eye. Much as mosquitoes can carry malaria, thrips can carry viruses that ravage vegetables, a key component of diet in India.

Under a program funded by the United States Agency for International Development and led by Virginia Tech, scientists are studying ways to minimize damage caused by these thrips-borne viruses, called tospoviruses. It has been estimated that worldwide, tospoviruses cause yield losses of up to \$1 billion in a wide range of crops. The Virginia Tech-USAID program could potentially lead to huge benefits, given the significance of vegetables in the Indian diet and economy.

Vegetables Mean Life

Vegetables mean life in India, the second-largest producer after China. The production of healthy vegetables means higher income for the farmer, better health for the consumer, less susceptibility to disease—even HIV-AIDS, and a stronger economy. In the United States, vegetables represent only a small part of the American diet—five percent by some estimates, whereas in India, they represent fully 30 percent of the average Indian's daily caloric intake. And, small farmers have taken on additional vegetable cultivation because of an increased demand in cities and surrounding areas. For this reason, anything that attacks vegetables is a serious threat to livelihoods and health.

Farmers have typically dealt with thrips by spraying their vegetables with pesticides, although this does not get rid of the pest and in fact causes health problems of its own. In India, extremely toxic pesticides such as DDT are still used by poorer, less-educated farmers. Even with the application of these pesticides, thrips are difficult to eradicate, because they conceal themselves in the flowers and tender parts of young plants. It is there that they sink their stylets, like a syringe, into the plant, sucking out its contents. In the process, they inject the virus into the plant.

Naidu Rayapati, program leader on this project, and a researcher in the department of plant pathology at Washington State University, has been working on this problem with collaborators at the University of Georgia and in India and other developing countries since 2005. “We are generating strategic knowledge about the tospoviruses and thrips vectors that are prevalent in different vegetable crops, sensitizing farmers and other stakeholders to the problems they cause, and strengthening the capacity of the research community to tackle these challenges,” he says. “We anticipate that this knowledge will speed up the development of non-pesticidal measures and lead to the production of nutritious vegetables with benefits for human health and the environment.”

In other words, it will allow farmers to grow better produce using less pesticide—better for the environment, people’s health, and their pocketbooks as well.

No Silver Bullet

There is no silver bullet approach for virus diseases spread by thrips, Rayapati cautions, no magic wand one can wave at the scourge. What Rayapati and his colleagues have found is that farmers can be trained to identify the disease early in the crop growth stage and remove infected plants. This strategy, while tedious, is effective. The key for success is better awareness of the problem among different stakeholders and working with farmers to deploy a combination of tactics for mitigating the negative impact of these diseases. And when farmers see results, they are sold.

Rayapati and his colleagues hope to develop ways to translate science-based knowledge into strategies that will advance rural prosperity. “We work with farmers to improve their knowledge and enhance their ability to stay on top of the problem,” he says.

Vegetable Production Develops Management Skills

The impact of this program, Rayapati notes, extends far beyond a simple increase in farmer income. “If you are making more money, you’re eating better, if you’re eating better, you’re getting better nutrition,” he points out. And if you’re getting better nutrition, you’re better able to think and to make good decisions. “Interestingly enough,” says Rayapati, “studies even show that vegetable production develops management and leadership skills.”

But the outputs have implications here at home as well: Thrips and tospoviruses have great commercial and economic significance to U.S. agriculture. As a result of this project, scientists will have improved knowledge that can be used to address indigenous tospovirus disease problems in the United States. More specifically, project outputs will help the scientific and regulatory community to be better prepared when an exotic tospovirus or thrips species is accidentally introduced into the country.

Project Helps With Crop Biosecurity

Also, the knowledge and technologies generated in this project will bring more awareness to the ornamental and vegetable industry and the public in the United States, which will facilitate safe movement of plant materials. It will provide information to the regulatory community for better intervention, quarantine, and enforcement of federal statutes to deal effectively with “crop biosecurity” issues if and when there is an accidental or deliberate introduction of detrimental exotic tospoviruses.

From an altruistic standpoint, one immediate result is that the project increases the level of engagement of U.S. scientists in addressing global dimensions of agriculture and in sharing their scientific knowledge with those in less developed countries who can benefit from it.

Experiences in developing countries also help U.S. scientists reach out to the American public to increase understanding of international development and cooperation and the domestic benefits that accrue as a result of international involvement.