

## You Say 'Potato,' India Says 'More Income And Less Crop Destruction'

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Farmers in India and Bangladesh have become increasingly reliant on the potato over the past 50 years. Since the 1960s, Indian farmers have turned to this cash crop in lieu of more traditional crops such as buckwheat, hog millet and foxtail millet because of its high density of food per acre. Likewise, in Bangladesh, potato production has tripled since 1980. The highly nutritious potato provides essential vitamins, minerals and amino acids to the region's ricedominated diets.

In 2007, 70 percent of India's 1.28 million hectares of potato crops were lost to late blight, a plant disease caused by a fungal pathogen. An estimated \$236 million has been lost in India due to late blight infections. In Bangladesh, the disease has attacked 50 percent of potato crops, and an estimated \$43 million has been lost. It is not uncommon, in either country, for a farmer's entire crop to be ruined.

Late blight is the best known as the disease behind the Irish Potato Famine of the mid-1800s. It causes potatoes and tomatoes to rot in fields or in storage. An entire crop can be destroyed within one to two weeks under certain conditions. The pathogen can survive from season to season in infected potato tubers, and infected plants produce millions of spores in wet weather conditions. Late blight is a tough disease to control, to say the least.

Farmers in India and Bangladesh attempt to control the disease with pesticides, herbicides and fungicides. These primarily subsistence farmers can barely afford the high price of these chemicals, and, often times, the plants are resistant to them. Bangladeshi farmers apply more than 20 treatments a year. This not only cuts into their profits, but also poses health and environmental risks to the region.

*Solanum bulbocastanum* is a wild relative of the potato. It comes equipped with a gene that makes it resistant to late blight infection. Researchers first attempted to fight late blight by cross breeding the resistant variety with common cash crop potatoes, but they were unsuccessful.

However, researchers at the University of Wisconsin-Madison were able to isolate the resistant gene, Rb, and use genetic engineering to insert it into popular U.S. potato varieties.

Sathguru Management Consultants in India coordinated with the university to use this gene technology pro bono and develop resistant cultivators in India and Bangladesh. A global consortium under the United States Agency for International Development's Agricultural Biotechnology Support Project II (ABSPII) was formed for this project, including the University of Wisconsin-Madison, Sathguru, Cornell University, Central Potato Research Institute in India and Bangladesh Agriculture Research Institute.

>With funding from ABSPII, governments in India and Bangladesh, Cornell, Sathguru and the University of Wisconsin-Madison, researchers have introduced the Rb gene to popular local potato varieties. In India, Kufri Jyothi and Kufri Bahar varieties have been modified and tested, and in Bangladesh, Diamant and Cardinal varieties are being assessed. These field trials judge the Rb-infused varieties' effectiveness against local strains of late blight.

“ *Successful trials have led researchers to believe that soon new products will be available to farmers and become an integral part of pest management systems for late blight.*

The new products will be licensed to both public and private enterprises. Commercial farmers will have access to seeds through private companies' seed catalogues, while poorer farmers will receive seeds through local distribution channels. These channels will distribute literature and show audio-visual programs in key Indian languages to educate farmers about the new product, address safety issues and show the benefits of adopting the new technology.

The new product could save farmers between \$160 and \$200 million in chemicals alone. George Norton of Virginia Tech University, in partnership with national economists in India and Bangladesh, conducted a detailed socio-economic impact assessment that shows farmers using late blight resistant potatoes will double their income. The study also found that labor would decrease by 11 percent and potato yields would increase 25 percent. Chemical applications would also decrease and benefit local health and environment conditions.

This international effort in technology transfer and development will benefit both the farmers of these countries and consumers, who get a safe, high-quality product that is free of chemicals.

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