Commercialization of Potato Tuber Moth Resistant Potatoes in South Africa

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Introduction

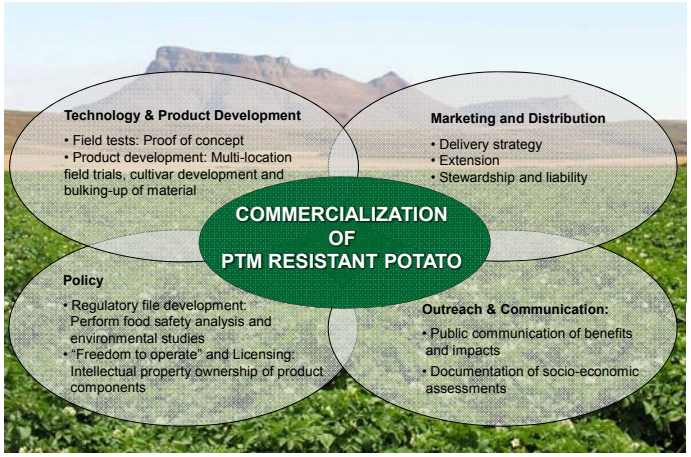
The cultivated potato, *Solanum tuberosum* subsp. *tubersoum* L. is the world's number one non-grain food crop. Potatoes are becoming more and more important to developing nations because potatoes are a nutritious food that can grow on less land and endure harsher climates than any other major crop. The potato tuber moth (*Phthorimaea operculella* Zeller) is the primary insect problem facing potato farmers in developing countries. Currently, the only available means to control the potato tuber moth and avoid crop losses is the use of chemical pesticides. A desirable alternative would be the development of potato tuber moth (PTM) resistant varieties by conventional breeding. However, this would require a 10-12 year period from the initial crosses to varietal release. Unfortunately, this goal cannot be achieved because PTM resistant germplasm has not been identified.

Potato Tuber Moth
(*Phthorimaea operculella* Zeller)

- World wide distribution
  - Tropical and subtropical regions
    - Africa, SE Asia, Southern US, Central and South America
- Leaf mining and defoliation in field may reduce yield by up to 30%
- Eggs and larvae in harvested tubers enter storage
- Storage losses may be 100% especially in small farmer storage conditions

Product Development

Michigan State University, Funded by the U.S. Agency for International Development (USAID) through it's Agricultural Biotechnology Support Project (ABSP), initiated biotechnology research on the development of PTM resistant varieties. A *Bacillus thuringiensis* (Bt) - *cry1Ia1* gene was successfully introduced into the potato variety Spunta. The transgenic lines were shown to have a high level of foliar expression of the Bt protein. Collaborative research between MSU and research institutions in developing countries such as Egypt and South Africa has progressed far enough to identify a Spunta line which has the potential for commercial application. MSU and its major South African partner, the Agricultural Research Council's Vegetable and Ornamental Plant Institute (VOPI) have collected the data necessary for submission of a regulatory dossier requesting commercial approval of the transgenic variety, Spunta G2, in South Africa.



Benefits to the farmers and end-users will be:

· Reduced input costs (less insecticides used)
· Increased marketable yield and improved quality
· Reduced post-harvest losses
· Reduced human exposure to pesticides
· Less pesticide residues on potato tubers

Impacts:

The potato tuber moth resistant potato is one of the first public sector-developed transgenic crops and will serve as a model for the public-sector deployment of insect resistant crops.

Commercial development of this transgenic crop will significantly benefit resource-poor farmers and commercial potato farmers.

This project will demonstrate the feasibility of efforts led by the public-sector, and developing country institutions, to make biotechnology available to end-users.

Regulatory Dossier Development.

Before the Bt Potato product can be commercially released in South Africa, regulatory approval must be granted by the South African authorities. A regulatory dossier was compiled to document the food and environmental safety of this product. Data was collected in a collaborative effort between institutions in South Africa and Michigan State University and included molecular characterization of the Bt Potato line, allergenicity and toxicity assessments, evaluation of out crossing and weediness potential, and the effect on non-target insects.

Obtaining Freedom to Operate (FTO) and establishing licensing relationships.

The MSU Bt potato team worked with the MSU-Office of Intellectual Property (OIP) and other appropriate parties in partnering countries to ensure that the rights of all owners of intellectual property involved in this project are respected.

Marketing & Technology Delivery.

Upon approval, the PTM resistant potato will be a non-profit distribution to farmers in South Africa through commercial seed potato growers who have established markets serving commercial and resource-poor farmers. The ARC will license the PTM resistant potato to seed potato growers through the commodity organization, Potatoes South Africa (PSA).

Documentation of Socio-Economic Benefits.

The potential impacts of the adoption of a PTM resistant transgenic potato in South Africa and Egypt have been studied in 2002. The study determined that the economic benefits would be significant and many times the initial cost required to bring a transgenic crop with this trait to market. Follow-up studies will be done to determine the benefits to poor farmers as well as other sociological impacts. Further economic benefits would also be seen in the future as this model of public sector deployment of genetically engineered crops develops.

Public Communication.

Public communication is essential during the project to minimize opposition to the potatoes caused by poor information and poor transparency. The aim of the communication strategy is to provide regular, accurate information on Bt potatoes to target groups, in order to achieve product acceptance.

Current Status.

In July 2008 an application for general release of the SpuntaG2 product, including the regulatory dossier, was submitted to the GM Authorities in South Africa and is currently under review.