

Development of Soybean Germplasm with Designed Resistance to Soybean Rust and Other Diseases

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IMBA Project 2007-8

Project period: 1/1/07-12/31/08

Progress Report (covers period of 1/1/07-12/31/07)

With support from IMBA, we are approaching our goal of a platform technology for rapid design and implementation of defense peptides to protect plants from disease. The technologies required to achieve this goal include: 1) the invention of methods for rapid discovery of peptides that inhibit the development of a specific pathogen and its ability to cause disease, 2) invention of methods for rapid assessment of candidate defense peptides in plants, and 3) a means of delivering the best peptides in transgenic plants for sustained disease resistance.

As we move towards completion of these activities, we are approaching the point of generating valuable new plant varieties and proprietary technologies that could bolster new commercial biotechnology efforts.

In the past few years, we have refined our peptide discovery technology so that we can rapidly identify synthetic, inhibitory defense peptides. We have applied our approach to the discovery of peptides that inhibit several important fungal pathogens, including *Phakopsora pachyrhizi* (Asian soybean rust), *Phytophthora sojae* (soybean seedling and root disease), *Phytophthora capsici* (root and stem diseases of tomatoes and related high-value vegetable crops), and *Fusarium graminearum* (wheat scab).

We recently developed a protein scaffold for delivery of defense peptides in transgenic plants. The scaffold is based on a naturally occurring plant protein. Using this scaffold, we reported in *The Proceedings of the National Academy of Sciences*, the first evidence for deployment of synthetic defense peptides as a unique approach to plant defense.