Agricultural Biotechnology Support Project II

Supporting agricultural development through biotechnology

Project Overview

The Agricultural Biotechnology Support Project (ABSPII) and Product-Driven Capacity Building in Emerging Markets

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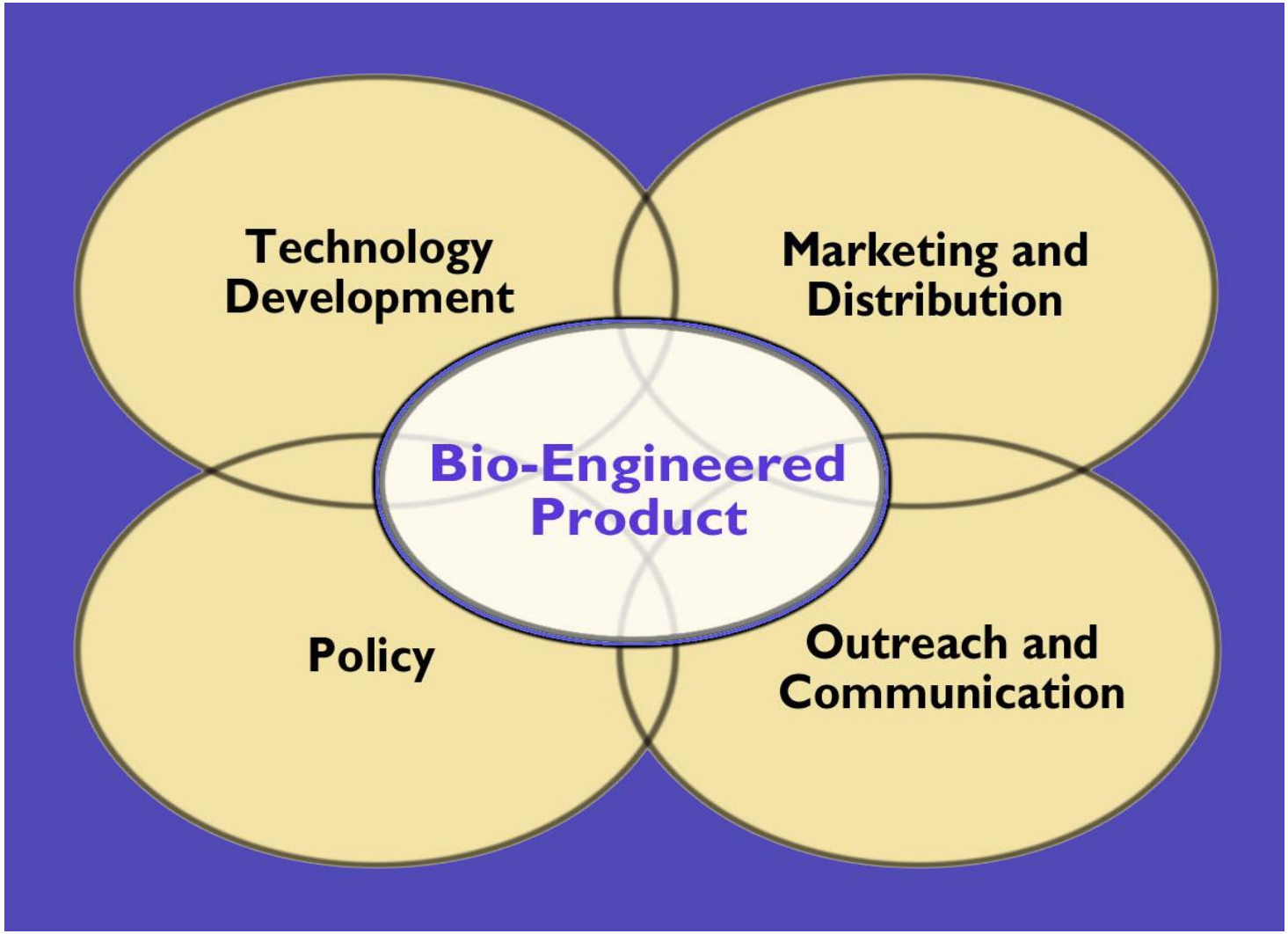
Primary Objective of ABSPII

- USAID/Cornell University project designed to complement national and regional efforts to develop and commercialize safe and effective genetically engineered crops in:
  - **South Asia**: India, Bangladesh
  - **Southeast Asia**: Philippines, Indonesia
  - **Africa**: Uganda, Mali

Product Demand Driven Strategy

- **Focus:** To deliver the right bioengineered products to resource-poor farmers (priority setting)
- Ex-ante socio-economic impact assessments
- Communication and outreach
- Concrete examples to develop capacity in:
  - Licensing (FTO issues)
  - Policy issues (intellectual property rights, Biosafety)
  - Product development
  - Regulatory approval process
  - Communication and outreach

Integrated, Holistic Approach to Bioengineered Product Development and Commercialization



ABSPII-Supported Products

- Fruit and Shoot Borer Resistant Eggplant (India, Bangladesh, Philippines)
- Late Blight Resistant Potato (India, Bangladesh, Indonesia)
- Disease and Nematode Resistant East African Highland Banana (Uganda)
- Papaya Ringspot Virus Resistant Papaya (Philippines)
- Drought and Salt Tolerant Rice (Bangladesh)
- MVR Tomato (Mali)

Eggplant in India, Bangladesh and the Philippines

- Cultivated on 510,000 ha in India alone
- Number one vegetable crop in the Philippines
- Primarily grown on small family farms
- Source of cash income for resource-poor farmers

Eggplant in India, Bangladesh and the Philippines

- Eggplant Fruit and Shoot Borer is the most destructive pest for Brinjal
- Losses range from 50-70%
- Farmers spray 25 to 80 times per season
- Usual control measures often not sufficient
- Health concerns due to pesticide exposure

Fruit & Shoot Borer-Resistant Eggplant

- Project objective
  - Deploy Bt gene to control the Eggplant Fruit and Shoot Borer
  - Increase marketable yield and reduce the use of pesticide

Bt Eggplant Multi-Location Field Trials in India and the Philippines

Scientists working at Bt eggplant field trials in the Philippines.

Scientist collecting data on plants at UAS-Dharwad MLT in India.

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Late Blight Resistant Potato
India, Bangladesh and Indonesia

Objectives:

- Develop late blight resistant potato for over 2 million poor farmers in India, Bangladesh and Indonesia.
- Reduce spraying of harmful fungicides on potato crop.
- Empower the public research system to carry out genetic transformation and precision breeding technology & establish a tractable seed delivery system for farmers.

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Late Blight Resistance Technology

The resistance gene is from a wild-type potato species (*Solanum bulbocastanum)*

- Race non-specific major gene
- Durable: shows high level of resistance to most races since 1953
- RB gene was cloned by researchers at U of Wisconsin
- Technology licensed form WARF

S. Bulbocastanum

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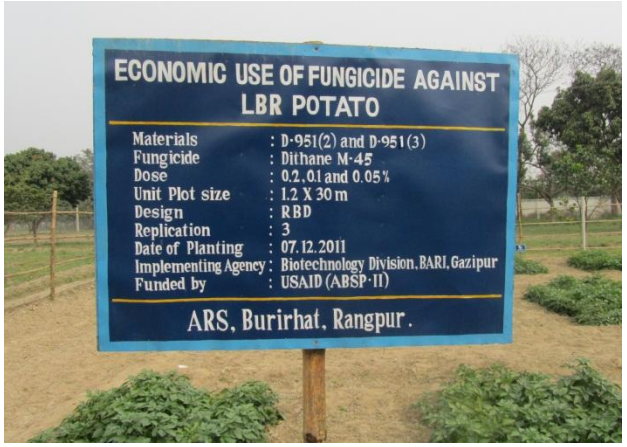
Multi-Location Late Blight Resistant Potato Trials in India, Bangladesh and Indonesia



- **Field trial in Indonesia**
- **Field trial in Bangladesh**

East African Highland Banana Project in Uganda

- Banana is the most important food staple for millions in Uganda and East Africa
- Grown mainly by resource poor farmers for subsistence
- Production in Uganda suffers several pest and disease constraints
- Most EAHB are sterile and conventional breeding not an option for improvement

East African Highland Banana

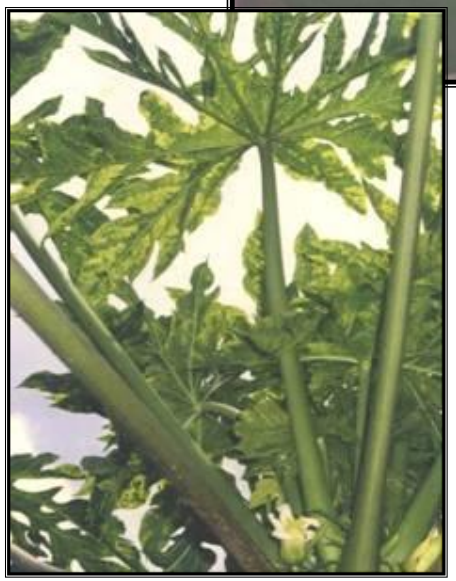
- Objectives:
  - Develop genetically engineered East African Highland bananas resistant to and black sigatoka and nematodes
  - Train Ugandan scientists.
    - Develop transformation system
    - Conduct product development and biosafety tests
    - Contribute to improved food and income security

Genetically Engineered Banana Field Trial

- **GM Banana plants in the field on March 19, 2008**

PRSV-Resistant Papaya in the Philippines

- Objective
  - Develop transgenic papaya varieties resistant to papaya ring spot virus (PRSV)
- Technology
  - Coat protein-mediated papaya resistant system



Prioritization of Technology/Constraint

- ABSPII technologies work:
  - Bt eggplant
  - Late blight resistance in potato
  - Virus resistance in papaya
- Socio-economic impacts are significant for all of our projects
- Project termination when necessary

Field Trials

- First time field trials in Uganda and Bangladesh.
- India – first biotech food crop field trials using domestic technology
- West Africa – not transgenic, but first large scale regional cooperative field trials
- ABSPII has been successful where many others have failed

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ABSPII Field Trials

Biosafety and Compliance

- ABSPII has actively participated in the development of biosafety guidelines in several countries
- We work within existing policy framework regardless of how cumbersome they may be
- Noted for our high quality training programs
- ABSPII field trials are noted for highest quality and being professionally managed
- Not a single incident of non-compliance

IP and Licensing

- IP assessments are thorough and complete
- Licensing via Sathguru and ISAAA (professional services)
  - Bt eggplant from Monsanto for India, Bangladesh and Philippines
  - Late blight resistant potato from WARF for India, Bangladesh and Indonesia
    - 100% public research driven product
  - PRSV papaya technology from Monsanto to PCARRD
- AUTM award for eggplant and potato projects

Product Development

- Understand our products and our end users
- Bt eggplant seed distribution and tracking system
- Establish linkages early on with local seed industry so they more readily "buy-in" to the ABSPII technologies
- Communication and outreach to growers and consumers exists, but must be strengthened

Capacity Building in Biotechnology

- Build Infrastructure
- Hire and train personnel
- Partner with all research teams

Host-Country Support

- In South Asia, ABSPII has approximately a 10:1 leverage ratio
- In Southeast Asia, ABSPII has greater than a 5:1 leverage ratio
- USAID Mission in Uganda responded to GOU willingness to expand their banana research program

Anticipated Benefits

- Improved capacity for research, licensing and communication through hands-on training
- Access to technology
- Delivery of high quality seed to resource-poor farmers
  - Improved yields
  - Lower production costs
- Reduced pesticide use: less residue in the environment and improved human health

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ABSPII team members are the ones who have made the project a success.

ABSPII/NARO Team in Uganda

Philippines Bt Eggplant and Papaya Team

Bt eggplant team in TNAU

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Bt eggplant at Dharwad University

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BARI Potato Team

India LBR Potato Team

Some of the ABSPII Management Team

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