

Bio-engineered Crops for Agricultural Development in Southeast Asia

Agricultural Biotechnology Support Project II - Southeast Asia



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Enhancing Food Security and Productivity for Southeast Asia

In Southeast Asia, including the Philippines and Indonesia, concerns on food security, poverty alleviation, and environmental sustainability are putting more pressure on people and institutions to find alternative ways to achieve greater agricultural productivity. Because conventional plant breeding can not always enhance crop resistance or tolerance to most pests, modern biotechnology has become a feasible and viable option for developing countries to produce commercially important crops for small-scale and resource-poor farmers and consumers. Bio-engineered crops that are pest- and disease-resistant, requiring less production inputs, but with increased yields, can enhance greater farm productivity, ensure food security, and expand rural economies in developing countries.

ABSP II: Promoting Dynamic Partnerships. The Agricultural Biotechnology Support Project II (ABSP II), which is funded by the United States Agency for International Development (USAID) and led by Cornell University, aims to provide substantial benefits from agricultural biotechnology to countries in East and West Africa, India, Bangladesh, Indonesia, and the Philippines. The ABSP II Southeast Asia Center is spearheading efforts to develop and commercialize biotechnology products from public research so that these can reach the Southeast Asian market.

The Institute of Plant Breeding at the University of the Philippines Los Banos is the Southeast Asian Regional Coordination Center for ABSP II. It oversees project activities in the Philippines and Indonesia.

The regional center in Southeast Asia collaborates with three regional centers located in East Africa, West Africa, and South Asia, and with other institutions in the north. Through synergistic partnerships, the needs and strengths of the various programs, including manpower, resources, and facilities, are matched; productive research and development (R&D) are pursued; and access to biological materials is maximized. Collaborations also hasten the

development and effective delivery of both information and products from the research laboratory to farmers and other stakeholders.

Developing Bio-engineered Products from the Public Sector to the Market. The ABSP II Southeast Asia Regional Center targets the safe and effective development and commercialization of bio-engineered crops, which are important to subsistence and resource-poor farmers, but because of their limited markets or commercial value are often overlooked by the private sector. The initial crops have been prioritized based on consultations and participatory research with stakeholders in Southeast Asia.

Scientists in the Philippines are focusing on Papaya Ring Spot Virus (PRSV)- resistant papaya, Fruit and Shoot Borer (FSB)-resistant eggplant, and MVR tomato. Scientists in Indonesia, on the other hand, are working on Multiple Virus-resistant (MVR) tomato, Late Blight-resistant potato (LBR), and Drought- and Salt-tolerant (DST) rice.

Sustaining the Environment. Heavy and frequent use of chemical pesticides against insect infestation and diseases, as well as environmental constraints have proven hazardous to farmers and consumers, and destructive to the environment. Because conventional plant breeding cannot always enhance crop resistance or tolerance

to most pests or ensure a good harvest against poor soils, biotechnology offers a feasible and viable option for increasing yield without harming the environment.

Building capacity. The project enhances the capacity of developing countries in the development, regulation, and commercialization of biotech crops. This involves building capacity of local researchers and stakeholders on such issues as intellectual property rights, regulatory and biosafety requirements, socio-economic impacts, and communicating biotechnology.

Most importantly, the proactive dissemination of scientific and accurate information about biotechnology products has enhanced the understanding of the scientific community, policymakers, and farmers on the premises and issues behind the use of bio-engineered products. Thus, all stakeholders, especially the farmers, can make better- informed decisions about the use of biotech products.





Products Being Developed

of the total volume of vegetables, which amounted to a total of 179,000 metric tons in 2002. Its value of production is the highest among the leading vegetables, with the crop planted over more than 20,000 hectares. Average yields, however, are low due to chronically high infestations of fruit and shoot borer, the most serious pest of eggplant. In the Philippines, damage by this pest results in yield losses from 54% to 70%, and with no available commercial varieties resistant to the pests. ABSP II aims to develop and commercialize transgenic open-pollinated fruit and shoot borer-resistant eggplant for resource-limited farmers in India, Bangladesh, and the Philippines.

Multiple Virus-resistant TOMATO. Tomato is one of the most important vegetables in the Philippines and Indonesia, both economically and nutritionally. It is widely grown by resource-limited farmers in parts of both countries. Production, however, is severely hampered by Tomato Leaf Curl Virus (ToLCV) and Cucumber Mosaic Virus (CMV). Viral diseases caused by ToLCV and CMV have become increasingly important in recent years. This project aims to combine near-market transgenic technologies for CMV with conventional resistance against ToLCV to produce commercial tomato varieties with multiple virus

resistances (MVR) within 5-7 years.

Late blight-resistant POTATO. The potato is an important vegetable crop in India, Bangladesh, and Indonesia, where it is grown predominantly by resource-limited farmers. In addition to the lack and high price of good quality seeds, one of the major constraints on potato production is biotic stress caused by insect pest and plant diseases. Late blight disease, caused by *Phytophthora infestans*, causes potato yield losses averaging from 12-31% in the field. ABSP II aims to develop transgenic local potato varieties resistant to late blight disease.

Drought and Salt-Tolerant RICE. Rice is the staple food in the Indonesian diet, and is also the source of livelihood for about 40 million households, or about 200 million people. Rice production in Indonesia continuously faces the challenge of keeping pace with an annual population increase, while the area of fertile wetland (lowland) available for rice farming is steadily decreasing due to urbanization and industrialization. Indonesia will have to expand rice cultivation to marginal dry-land (upland) areas, where rice production is severely hampered by dehydration stress due to drought. ABSP II aims to develop and commercialize transgenic rice with drought and salinity tolerance.

Papaya Ringspot Virus-Resistant

PAPAYA. Papaya, largely grown as a home garden crop, is an important commercial crop for growers in the Philippines, as well as a source of home-produced vitamins and minerals for many households. Papain, a substance found in papaya, is widely used as the main component in the manufacture of cosmetics, including soaps and shampoos. The crop, however, is susceptible to the Papaya Ringspot Virus (PRSV), which deforms fruits, rendering them inedible. ABSP II aims to develop and commercialize transgenic papaya resistant to PRSV.

Fruit-and-shoot-borer-resistant

EGGPLANT. The eggplant is one of the most important vegetables consumed in South Asia and the Philippines. In the latter region, eggplant production accounts for 28%

Some of Our Partners

US Public Institutions

- Cornell University
- Michigan State University
- University of California Davis
- University of Wisconsin

National and Regional Partners

- Bangladesh Agricultural Research Institute (BARI)
- Bangladesh Rice Research Institute (BRRI)
- Central Potato Research Institute (CPRI), India
- Central Soil Sciences Research Institute (CSSRI), India
- Department of Agriculture-Biotechnology Project Implementation Unit (DA-PIU), Philippines
- Department of Biotechnology, India
- Department of Science and Technology,

- Philippine Council for Agriculture, Forestry, and Natural Resources Research and Development (DOST-PCARRD), Philippines
- Directorate of Rice Research (DRR), India
- Indian Council of Agricultural Research (ICAR)
- Indonesian Institute for Rice Research (IIRR)
- Institut d' Economie Rurale (IER), Mali
- Research Institute for Agricultural Biotechnology and Genetic Resources (ICABIOGRAD), Indonesia
- Tamil Nadu Agricultural University (TNAU), India
- Tuber Crops Center (TCS), Bangladesh
- University of the Philippines Los Banos (UPLB)

Private Sector Entities

- East-West Seed Co., Philippines

- Maharashtra Hybrid Seed Company (MAHYCO), India
- MONSANTO, USA

CGIAR Center and Other International Institutions

- Indonesian Vegetable Research Institute (IVEGRI)
- International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)
- International Institute for Tropical Agriculture (IITA)
- International Cooperative Program for Late Blight Potato Research (PICTIPAPA), Mexico
- International Service for the Acquisition of Agri-Biotech Applications (ISAAA)
- World Vegetable Research and Development Center (AVRDC), Taiwan and Mali

ABSP

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