Cornell and India Sign New Agreement for Agricultural Development

By Susan S. Lang

Source: Cornell Chronicle Online, December 13, 2005

(www.news.cornell.edu)

Exchanging scientific information freely, forging cooperative research, hosting Indian executives, students and faculty, and sharing agricultural biotechnology to promote the development and use of drought- and pest-resistant crops. These were just a few of the collaborations that were strengthened when Susan A. Henry, the Ronald P. Lynch Dean of the College of Agriculture and Life Sciences (CALS) at Cornell signed a renewed memorandum of understanding with officials representing the Indian Council of Agricultural Research on Dec. 12.

The agreement was signed during a visit to Cornell by Indian senior executives and government officials on the board of the newly formed Knowledge Initiative in Agricultural Education, Teaching, Research, and Service and Commercial Linkages (KIA).

“`We are very active in agricultural research in India, and renewing a memo of understanding with them builds on our more than 50 years of Cornell-India collaborations concerning agricultural education and research,” said K.V. Raman, associate director of international programs in CALS. Many of the Cornell-India linked programs are in collaboration with Sathguru Management Consultants, an India-based firm that represents CALS in India.

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About ABSPII

The developing world can benefit from advances in biotechnology, but much needs to be done to make bio-engineered products available in forms that farmers can use. The Agricultural Biotechnology Support Project II (ABSPII) believes that farmers and consumers worldwide should have the opportunity to make informed choices about using bio-engineered products. ABSPII focuses on the safe and effective development and commercialization of bio-engineered crops as a complement to traditional and organic approaches in developing countries. The project helps boost food security, economic growth, nutrition and environmental quality in East and West Africa, Indonesia, India, Bangladesh and Philippines. Funded by the United States Agency for International Development (USAID) and led by Cornell University, ABSPII is a consortium of public and private sector institutions.

The consortium develops innovative, pragmatic solutions, building on the successes of the Agricultural Biotechnology Support Project (ABSPI) that was led for over a decade by Michigan State University.

In South Asia (India and Bangladesh), ABSPII supports development of expertise in the areas of research, policy development, licensing and outreach to help reduce poverty and hunger through agricultural biotechnology. Current initiatives relate to development of Tobacco Streak Virus Resistant (TSVR) Groundnut, Late Blight Resistant (LBR) Potato, Fruit and Shoot Borer Resistant (FSBR) Eggplant, Drought Tolerant Rice and Salinity Tolerant Rice.

Message from Dr. S. A. Patil,
Vice-Chancellor, University of Agricultural Sciences, Dharwad

Science and technology are key components of economic and social development, vital to the development prospects of poor countries. They also provide measures that help improve specific problems that affect developing countries. Economically successful countries are those that are able to turn technical innovation in both the private sector and public sectors into economic productivity. This is achieved by developing strong public-private partnerships.

The technological boom in India is attaining new heights. India has already carved a niche for itself in areas of software services, pharmaceuticals and biotechnology, but the benefits of this boom are limited only to the educated elite.

Being an agriculture-centric nation, there are millions of people still languishing below the poverty line. This is because the fruits of technology have not reached the farmers. The Agricultural Biotechnology Support Project II (ABSPII) supported by the United States Agency for International Development (USAID) and led by the world renowned Cornell University has shouldered the responsibility of developing genetically modified food crops, a technological revolution in the field of agriculture mainly to meet the demands of the resource-constrained farmers in India.

The University of Agricultural Sciences, Dharwad is pleased to be associated with ABSPII and its consortium of partners across the world to realize the goal of developing bioengineered crops that will economically benefit the farmers. UAS-Dharwad is linked with ABSPII and other partners in pioneering these efforts to raising the standard of living of the rural population by adopting technology available in developed countries and private institutions which otherwise would have not have been made available to the resource-poor.
In this endeavor, ABSPII has played a key role in transferring world-class biotechnology in mitigating losses in eggplant due to fruit and shoot borer from the private sector to the public institutions free of royalty. This has helped the universities strengthen their research capabilities and develop their own bioengineered public varieties, which will be the first of its kind in India.

The public-private partnership forged by the ABSPII has become a strong model for helping technology reach the wider world. Such partnerships benefit both the technology owners and the end users, especially the resource-constrained farmers.

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ABSPII-Led Consortium Makes Progress in the Application of Biotechnology to Address the Late Blight Problem in India, Bangladesh and Indonesia

Control of late blight by introducing the resistance gene has been a goal of potato breeders for decades. Public Institutions in India, Bangladesh, Indonesia, Peru, Mexico, and the US are working to develop the RB gene technology. Resistance gene “RB” from S. bulbocastanum has been identified and cloned. Transgenic “Katahdin” has been field tested in Minnesota, Wisconsin, Prosser (WA) and in Tohoku-Mexico.

ABSPII II in collaboration with researchers at the University of Wisconsin and Wisconsin Alumni Research Foundation (WARF) and potato research institutions in Asia finalized the appropriate agreements for the transfer of transgenic “Katahdin” and constructs for developing appropriate locally adapted potato cultivars with resistance to late blight.

Last year a team of scientists from India, Indonesia and Bangladesh participated in a fact finding mission under the aegis of the Agricultural Biotechnology Support Project II (ABSPII). The group visited the laboratory of Prof. Helgren to ascertain the efficacy of the RB gene technology in addressing the late blight problems in their respective countries. Convinced by the utility of this technology, the scientists worked together and formulated a collaborative project for utilization of the RB gene in development.

The agreement was signed between Mahyco, the technology donor, represented by its Director for Research Dr. Brent Zehr, Satguru Management Consultants Private Limited, as technology facilitator, represented by its Director Kannan Ranganathan, and UPLB, represented by its Chancellor Rey Luis I. Velasco. Dr. Ronnie Coffman, co-director of ABSPII and director of the International Programs of the College of Agriculture and Life Sciences, Cornell University, and Dr. Desiree Hauuta, director of the Institute of Plant Breeding, UPLB and ABSPII-Southeast Asia Regional Coordinator were present on the occasion.

Among several important personalities present during the ceremony were Dr. Cecilio Arboleda, Executive Director of UPLB – Foundation Incorporated, Dr. Enrico Supangco, Vice-Chancellor for Research and Extension, Dr. Rita Lande, Vice-chancellor for Instruction, Dr. Florentina Merca, Director of the Office for Institutional Linkages, and Professor Stella Tirol, Director of Public Relations.

ABSPII Sponsors Stakeholders Meeting In Bangladesh

An ABSPII-convened meeting of stakeholders was held in Bangladesh on January 23, 2006 to discuss and review progress of ABSPII supported projects. Participants from USAID, Bangladesh Ministry of Agriculture, Government of Bangladesh, Bangladesh Agricultural Research Council, Bangladesh Agricultural Research Institute, Bangladesh Rice Research Institute, private seed enterprises, international donor agencies, and university scientists participated.

In an address to participants, Dr. Ronnie Coffman, co-director ABSPII, said he appreciates the support provided by all the stakeholders in accelerating progress towards enhancing food production in Bangladesh through the use of agricultural biotechnology. He hailed the quality of scientists in Bangladesh and the enthusiasm of the policy planners in supporting frontier research.

ABSPII Approach for Technology Dissemination Presented at Global Technology Managers Meeting

The Annual meeting of The Association of University Technology Managers (AUTM) was held in Orlando, Florida from March 2 to March 4, 2006. Over 1800 technology managers from 15 countries converged at the meeting to discuss multi-faceted issues relating to technology licensing, sponsored research projects, “public good” licensing and post-license monitoring. The social, legal, managerial and scientific aspects of technology management were discussed through presentations made by over 200 experts representing different countries across the world.

ABSPII South Asia regional coordinator and Hon. President of Society for Technology Management (STEM) K. Vijayaraghavan in his presentation highlighted the unique approach taken by ABSPII to disseminate technologies in the agricultural biotechnology realm with a view to benefiting resource-constrained farmers. On the occasion, a meeting was convened under the auspices of STEM to bring together international technology managers to sensitize them to the environment for technology transfer and collaborative research in South Asia and, more particularly, in India.

Following this, large scale field tests to comply with regulatory protocols will be developed by participating researchers in each collaborating country. For additional details on progress in this project see: www.absp2.cornell.edu

It is anticipated that the RB gene technology will become an integral component in an integrated pest management system for late blight.
Genetically Engineered Potato to Combat Potato Late Blight in Asia

The deadly plant pathogen *Phytophthora infestans* (Mont.) that escaped from the rugged mountains of central Mexico in the 1840s caused the Irish Potato famine that lead to the death of millions of people and mass migration. To date, late blight caused by this pathogen remains the world’s most devastating crop disease. A drought in 1976 caused a potato shortage in Europe and led to the introduction of deadly new late blight disease strains. The drought caused Europe to import 25,000 tons of potatoes from northern Mexico, where the A2 mating type of the late blight pathogen did not exist. Local farmers at that time could not provide the volume requested, and thus bought and shipped potatoes from Toluca (in central Mexico), which is considered to be the late blight pathogen’s ancestral home. The introduced A2 mating type was first detected in Europe in 1981 and has subsequently been detected in most potato growing areas worldwide. Retrospective analysis of late blight isolates using phenotypic, biochemical and DNA fingerprint markers, showed that increased levels of disease in Europe coincided with appearance of exotic pathogen strains. Disease control now relies on more frequent applications of fungicides. Reports indicate that new genotypes have now appeared in countries in Asia, Latin America, and Africa.

As a consequence, the disease in these regions has become more severe. The potential threat of this apparently renewed disease may lie in:

- the spread of new strains with increased fitness/aggressiveness;
- an expanded capacity to produce oospores (sexual spores which enable long term survival in the absence of the host, and which may have enabled earlier epidemics);
- the shortage of chemicals and effective integrated control measures; and
- the lack of widely accepted, resistant commercial potato varieties.

Given this dire scenario, a rapid commitment to support research on the late blight disease is of utmost importance for preventing a potential catastrophe.

Economic impact of late blight in developing countries

Late blight is poised to strike hardest at the millions of poor people who rely on potatoes but can least afford to buy expensive chemicals to keep the fungus-like pathogen in check. Hardest hit are potato producers in Asia, Africa, the Russian Federation and Eastern Europe. Almost all losses attributable to the disease in these regions are due to lost production. In Latin America and Asia the costs of fungicides are substantially more important, contributing to the total economic cost of the disease, not including the cost of environmental damage. Economists at the International Potato Center (CIP), in Lima, Peru estimate the overall annual cost of late blight in developing countries at USD$3.25 billion.

In India, Bangladesh and Indonesia over 20 fungicide sprays per crop season are used to control late blight, which is considered the worst agricultural disease of potatoes. Average loss due to late blight is estimated at 30%. Economic values for genetically engineered potatoes with resistance to late blight estimated by ABSPII for resource constrained farmers at 70% adoption rate in India is valued at USD $200 million; for Bangladesh at $40 million and in Indonesia at $6 million annually. The environmental “cost” of the use of fungicides is also of concern. While documented environmental ravages caused by fungicides are rare, it is prudent to limit the use of such chemicals in agriculture. In some agro-ecosystems of Asia, applications of fungicide to suppress this disease approach 3–4 applications per work.

Looking to the future

New developments in the area of potato biotechnology now make it much easier to transform potatoes with genes of interest. Such new techniques should make it possible to insert disease resistance into popular potato varieties without jeopardizing their desirable qualities or their market share. As a result, genotypes will be able to respond more quickly to new stresses without having to go through the difficult process of rebuilding consumer acceptance.

There is also every reason to believe that developing country farmers will accept potato varieties with broad based late blight resistance. Farmers in these regions will readily adopt potatoes that are less dependent on chemical sprays for insect pests and diseases. The adoption process will be much higher and quicker if resistance to late blight can be combined in well-adapted susceptible potato varieties, which are currently grown by farmers.

The need for global research to control late blight

Because of the gravity of the late blight problem many late blight control programs have been initiated all over the world and most of these will contribute to a sustainable solution. ABSPII currently facilitates a project to develop and commercialize genetically modified potato with resistance to late blight in Asia.

Potato is an important vegetable crop in India, Bangladesh and Indonesia, primarily grown by resource-poor farmers. Potato is a highly nutritious food that provides many essential vitamins, minerals and amino acids, and is an important supplemental source of nutrients and calories for people living on rice-dominated diets. Late blight in many of the potato growing regions of Asia spreads extremely fast. An entire crop can be destroyed within 1 to 2 weeks under certain conditions. Controlling this disease is essential for resource-poor farmers who depend on potato for basic nutrition. Farmers who can afford fungicides apply them repeatedly. Excessive use of fungicides poses environmental and health risks and greatly reduces farmer profits.
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This promising approach has the potential to provide a cost effective cash crop and nutritional food source to small scale farmers in Asia.

- Dr. K. Y. Ramas

**ABSPII-Led Consortium Makes Progress in the Application of Biotechnology to Address the Late Blight Problem in India, Bangladesh and Indonesia**

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A product development strategy has been developed by ABSPII. Several potato researchers from India, Bangladesh and Indonesia have been trained and are now actively engaged in both transformation and use of breeding to incorporate the “RB” gene in two prominent potato cultivars grown widely in India, Bangladesh and Indonesia. Greenhouse and field trials are likely to begin shortly to demonstrate the efficacy of the “RB” gene.

Team of scientists from USA, India, Indonesia and Bangladesh at the University of Wisconsin, Madison, USA. Prof. John Helgeson is standing at the right-back corner.

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The interaction team also visited greenhouse and field trial stations to witness the physical progress achieved by the partner institutions. The review team visited farmer fields, experiment stations at Dharwad, Coimbatore, Jalna and Modipuram and interacted with scientists at various centers. The week-long interaction provided the project partners an opportunity to interact with experts and discuss scientific, regulatory and product delivery strategies. The evaluation team also visited greenhouse and field trial stations to witness the physical progress achieved by the partner institutions.

FSBR Eggplant Technology Transfer Agreement Between Mahyco, UPLB and Sathguru to Facilitate Commercialization of Bt Eggplant in Philippines

The technology transfer agreement for Fruit and Shoot Borer Resistant (FSBR) eggplant was signed on January 30, 2006 at the Office of the Chancellor, University of the Philippines, Los Banos (UPLB) to facilitate the commercialization of Bt Eggplant varieties in Philippines.

The agreement between the Maharashtra Hybrid Seed Company (Mahyco), UPLB and Sathguru Management Consultants will help expedite the transfer of seeds of the crosses produced between the Mahyco Bt parental line and selected Philippine varieties. The agreement is now going at full steam at CPRI, Shimla.

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Dr. Ronnie Coffman, director of International Programs in Cornell’s College of Agriculture and Life Sciences (CALS), shakes hands with Dr. Mangala Rai, secretary and director general of the Indian Council of Agricultural Research at the Ramada Inn in Ithaca on December 12, 2005 following the signing of a renewed memorandum of understanding.

Contact Us

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Going ABSPII Projects In India

The following projects in India are currently underway under the umbrella of ABSPII:

1. University of Agricultural Sciences, Dharwad
   - Tobacco Streak Virus Resistant (TSVR) Groundnut
   - Late Blight Resistant (LBR) Potato
   - Fruit and Shoot Borer Resistant (FSBR) Eggplant
   - Drought Tolerant Rice
   - Salinity Tolerant Rice

2. University of Agricultural Sciences, Bangalore
   - Drought Tolerant Cassava
   - Resistance to Cassava Mosaic Virus

3. University of Agricultural Sciences, Pune
   - Drought Tolerant Rice
   - Resistance to Rice Blast

4. University of Agricultural Sciences, Hyderabad
   - Drought Tolerant Rice
   - Resistance to Blast

5. University of Agricultural Sciences, Guwahati
   - Drought Tolerant Rice
   - Resistance to Bacterial Leaf Blight

6. University of Agricultural Sciences, Belgaum
   - Drought Tolerant Rice
   - Resistance to Blast

7. University of Agricultural Sciences, Mysore
   - Drought Tolerant Rice
   - Resistance to Blast

8. University of Agricultural Sciences, Ranchi
   - Drought Tolerant Rice
   - Resistance to Blast

These projects are aimed at developing crop varieties that are resilient to various environmental stresses and diseases, thus enhancing crop productivity and food security in India.

The Indian Council of Agricultural Research, which facilitates scientific and technical collaboration with the Indian Council of Agricultural Research, and supports the development of agricultural biotechnology in India.

The Indian Council of Agricultural Research (ICAR) is the apex body for agricultural research in India. It is a national research system dedicated to the development of agricultural biotechnology and its application to overcome the problems of poverty, hunger, and malnutrition. ICAR plays a crucial role in facilitating scientific and technical collaboration with the Indian Council of Agricultural Research, and supports the development of agricultural biotechnology in India.

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About ABSPIII

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In South Asia (India and Bangladesh), ABSPIII supports development of expertise in the areas of research, policy development, licensing and outreach to help reduce poverty and hunger through agricultural biotechnology. Current initiatives relate to development of Tobacco Streak Virus Resistant (TSVR) Groundnut, Late Blight Resistant (LBR) Potato, Fruit and Shoot Borer Resistant (FSBR) Eggplant, Drought Tolerant Rice and Salinity Tolerant Rice.

The University of Agricultural Sciences, Dharwad is pleased to be associated with ABSPIII and its consortium of partners across the world to realize the goal of developing bioengineered crops that will economically benefit the farmers. UAS-Dharwad is linked with ABSPIII and other partners in pioneering these efforts to raise the standard of living of the rural population by adopting technology available in developed countries and private institutions which otherwise would have not have been made available to the resource-poor.

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