



Agricultural Biotechnology Support Project II, South Asia

Supporting Agricultural Development Through Biotechnology

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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-engineering crops as a complement to traditional and organic agricultural 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 (ABSP) that was led for 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 K. Vijayaraghavan

Regional coordinator, ABSPII, South Asia.

Resource-constrained farmers in developing countries stand to benefit economically, through enhanced crop yield and quality, when research organizations cooperate on agricultural technology development. Sharing technology through technology transfer allows institutions to develop improved crop varieties while minimizing the cost of product development and testing. ABSPII has adopted a strategy whereby regions with similar problems in crop protection, yield and quality have come together to co-invest in product development and evaluation. Our consortium partners have contributed significantly to this collective effort. ABSPII projects have had required shorter product development and testing phases due to complimentary efforts undertaken by various partners in different regions. Capacity building efforts have contributed to sustainable long-term capacity creation among the partner institutions.

Public and private organizations also bring different and complimentary strengths to field trials, creating opportunities for efficiency and synergy. ABSPII's partners will further consolidate their efforts as they move their products into extensive field testing during the current and subsequent years.

We hope that the Fruit and Shoot Borer Resistant Eggplant will soon demonstrate the gains for resource constrained farmers as a result of partnership between the public and private sectors. There will be other products, such as Late Blight Potato, which will follow eggplant in further demonstrating the benefits of such partnerships.

We look forward to enhancing these gains through the consolidation of our partnerships and the creation of new alliances that would address the needs of the resource constrained farmers in the South Asia Region.

Successful Commercialization of Insect-Resistant Eggplant by a Public-Private Partnership: Reaching and Benefiting Resource-Poor Farmers

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ABSTRACT

This chapter looks at the results of a unique public-private partnership instituted to provide resource-constrained farmers in the developing world with access to proprietary agri-biotechnologies. Eggplant, a widely consumed vegetable crop in the tropics, is commonly infested by the eggplant fruit and shoot borer (EFSB), which devastates both plants in the field during development and eggplant fruits after harvesting. The chapter considers the application of insect-resistance technology (based on the Cry1Ac protein from *Bacillus thuringiensis*) in eggplant, focusing on its sublicensing from a private company to a partnership of public institutes and agricultural universities in Bangladesh, India, and the Philippines.

1. Introduction

Eggplant (*Solanum melano-genena*) is an important vegetable crop widely cultivated and consumed in the subtropical and tropical regions of Asia and Africa. It grows in a wide range of climatic conditions and is a staple of human consumption. About 510,000 hectares of arable land in India and 20,000 hectares in the Philippines are devoted to cultivating eggplant.

A long-duration crop, eggplant is grown using either hybrid varieties or open-pollinated varieties (OPVs, for which seeds can be saved and used later). Although much preventive care is taken, eggplant is commonly attacked by more than a dozen insect-pest species. Among these species, the eggplant fruit and shoot borer (*Leucinodes orbonalis*), or EFSB, is the most widespread and devastating in South and Southeast Asia, with infestation inflicting about a 70% crop loss¹. EFSB larvae feed inside the eggplant shoot and fruits, retarding the vegetative growth of the plant and decreasing the marketability and edibility of the fruit.

Many attempts to crossbreed eggplant varieties with EFSB-resistant wild varieties have been unsuccessful. So farmers have had to rely heavily on chemical pesticides to control EFSB. According to a study conducted on pest control for eggplant in South Asia, farmers spend about US\$400 per hectare on pesticides, two-thirds of which are used to control EFSB². In addition, EFSB populations have gradually become resistant to certain chemicals, so farmers have resorted to using other chemicals, some of which are more hazardous to human health and to the environment, as well as illegal, to control the insect.

2. The Technology

MAHYCO, a private Indian company, was the first in India to develop a hybrid eggplant containing a gene that provides resistance to EFSB. The gene it used (cry1Ac which produces the corresponding protein called Cry1Ac3) is obtained from *Bacillus thuringiensis* (Bt). Bt is a spore-forming bacterium that produces crystal proteins (called Cry proteins) that are toxic to many species of insects, including EFSB. Bt action is very specific. To become lethal,

the Bt protein has to be ingested; the Bt toxin is activated in the high pH environment of the insect gut. The activated protein perforates the lining of the gut, which causes the death of the insect within a couple of days.

A main advantage of this technology is that it reduces the use of chemical pest control, thereby making the technology environmentally harmless. Through its safety tests, the U.S. Environmental Protection Agency has found no human health hazards related to Bt use. The agency has exempted Bt from its standards for food-residue tolerances and groundwater concentration, from endangered species labeling, and from special review requirements, indicating that cultivation of crops using Bt is safe for resource-constrained farmers in the developing world.

3. The Licensing Arrangement

MAHYCO is the first Indian company to have received the rights under license for the use of the Bt cry1Ac gene technology for insect-pest management from Monsanto Company. This licensed cry-gene technology was used by MAHYCO to develop and generate hybrid eggplant events. Under the aegis of the Agricultural Biotechnology Support Project II (ABSP II), funded by the U.S. Agency for International Development, Sathguru Management Consultants Pvt. Ltd. partnered with MAHYCO. The cry-gene technology was licensed then to several public institutes in South and Southeast Asia that were participating in a public-private consortium created to develop EFSB-resistant OPV eggplant that would improve the conditions of resource-constrained farmers in developing countries. The ABSP II played a pivotal role in this venture by funding all the consortium partners for their R&D roles in developing the EFSB-resistant eggplant.

The technology was sublicensed by MAHYCO on a royalty-free basis to public research institutes in India (the Indian Institute of Vegetable Research, Tamil Nadu Agricultural University, and the University of Agricultural Sciences, Dharwad), in Bangladesh (the Bangladesh Agricultural Research Institute), and in the Philippines (the University of Philippines, Los Banos). MAHYCO also sublicensed this technology to East West Seeds, a private corporation in Bangladesh, on commercial royalty-bearing terms. To safeguard the licensor's interests, specific strategies for the stewardship and monitoring of the technology by the licensees were addressed and formulated early in the sublicensing process.

4. Transgenic Eggplant

Most eggplant farmers in India grow OPVs. The area planted with hybrid varieties is less than 30% of the total area. Growers that plant these hybrid varieties also tend to use more purchased inputs and have higher yields compared to growers who plant OPVs⁴. The main reason that the cultivation of OPVs is more widespread is that OPV seeds can be saved and replanted in future growing seasons. As a result, OPV seeds are much more available and affordable. The market price of hybrid seeds is five to ten times the market price of OPV seeds.

The first transgenic Bt hybrids developed by MAHYCO are slated to be commercially released in India by the end of the 2006/2007 season⁵, after the fulfillment of all regulatory requirements. The transgenic Bt OPVs under development by the public-private partnership are expected to be commercialized about six months later.

Because of the existing price differential between conventional OPVs and hybrids, and because of the zero premium being charged for the Bt trait in the OPVs, it is still expected that most of the existing growers of hybrid eggplant will adopt the Bt hybrids rather than the Bt OPV, even though the Bt OPVs would be priced much lower than the Bt hybrids. This is primarily due to production and yield differences between the two systems. Farmers growing OPV eggplant are most likely to adopt the Bt OPV because of the cost factor. Growers of both types of eggplant can be expected to shift to the corresponding Bt versions because of the expected savings in pesticide expenses⁶.

The public-private partnership also addresses distribution issues: the participating public institutions will be able to deliver high-quality Bt eggplant seeds that are resistant to EFSB through their own public distribution systems on a cost basis (in other words, without adding profit margins).

Most resource-constrained farmers in the developing world cultivate OPVs because of the lower costs involved. By recognizing these agricultural practices, and by providing the public sector with access to Bt technology for use in OPVs, via a unique public-private partnership, MAHYCO both commercializes its Bt hybrid eggplant (sold on a for-profit basis) and through its donation addresses the need to improve crops of vital importance to poor farmers.

End Notes:

1 Dhandapani N, UR Shelkar and M Murugan. 2003. *Bio-Intensive Pest Management in Major Vegetable Crops: An Indian perspective. Journal of Food, Agriculture & Environment* 1 (2): 33039.

2 ABSP11. 2007. *ABSP11 Bt Eggplant Insect Resistance Management Strategy for the Eggplant Fruit and Shoot Borer. ABSP11, Cornell University: Ithaca, NY. www.sathguru.com/absp2/irmstrategy.pdf.*

3 For a review, see Krattiger AF. 1997. *Insect Resistance in Crops: A Case Study of Bacillus thuringiensis (Bt) and Its Transfer to Developing Countries. ISAAA Briefs No. 2. ISAAA: Ithaca, NY. www.isaaa.org/kc/Publications/pdfs/isaaa/briefs/Briefs%202.pdf.*

4 Kolady DE and W Lesser (Cornell University). *Personal communication, October 2006.*

5 Krishna V and M Qaim. 2006. *Estimating the Adoption of Bt Eggplant in India: Who Benefits from Public-Private Partnership. University of Hohenheim: Stuttgart. www.envfor.nic.in/divisions/csurv/geac/so_brinjal_part-II.pdf.*

6 Kolady DE and W Lesser. 2006. *Who Adopts What Kind of Technologies? The Case of Bt Eggplant in India. AgBioForum* 9 (2): 94103.

Chapter 17 of Intellectual Property Management in Health and Agricultural Innovation: A Handbook of Best Practices (eds. A Krattiger, RT Mahoney, L Nelsen, et al.). MIHR: Oxford, U.K., and PIPRA: Davis, U.S.A. Available online at www.ipHandbook.org.

The Seed Supply System in India

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Seed is the single most critical input determining agricultural productivity. It is the carrier of genetic attributes of a variety for higher yielding ability, resistance to biotic and abiotic stresses as well as quality characteristics. Timely availability of high quality seeds of genetically improved and agro-ecologically suitable plant varieties, at affordable cost, is the pre-requisite to the success in agriculture. Quality of seed is determined by various parameters such as varietal (or genetic) purity, physical purity, germination, vigour and seed health, which can be achieved by following appropriate systems of seed production and

quality assurance. Use of quality seed alone is expected to bring upto 20% enhancement in crop production. While the crop improvement programmes are dedicated at developing varieties with increased productivity and/or having special quality traits, an efficient seed multiplication and supply system determines the benefits accrued from them.

Ideally, the farmer must purchase quality assured seeds (certified or truthfully labelled) at least every three years in case of self-pollinated species and every alternate years in case of cross-pollinated species, requiring a seed replacement rate (SRR) of > 30% and 50%, respectively. In case of hybrids, seed is to be replaced very year, i.e. 100% SRR. A regular seed replacement system not only ensures use of high vigour, pure and healthy seeds but also helps in popularization and spread of newly developed varieties with improved genetic potential for yield, quality and resistance to biotic and abiotic stresses.

The Indian seed supply system is a combination of formal and informal components, wherein the informal (or unorganized) system still plays a major role, particularly in low value, high volume self-pollinated field crops viz. rice, wheat, pulses and oil seeds. Farm-saved seed (including the seed purchased from non-recognized sources or exchanged) roughly accounts for about 80% of total seed used for cultivation across the country. The organized seed supply system comprises of research organizations in the ICAR-SAU system, the seed producing machinery in the public sector with NSC, SFCI and 13 SSCs, a vibrant private sector with more than 500 big, medium and small seed companies. This is supported by a seed quality control mechanism implemented by 19 State Seed Certification Agencies and about 100 notified Seed Testing Laboratories and a referral unit Central Seed Testing Laboratory in place. The ICAR-SAU system is the backbone of country's crop improvement and breeder seed production programme, particularly in field crops. This has helped in establishing a strong seed production and supply system in the country, which enhanced the breeder seed production from 26246 q in 1995-1996 to 60831 in 2004-05, raising the availability of quality seed from 73.27 lakh q to > 140 lakh q, respectively (DAC, 2006). There has been a significant advancement in the R&D activities in the private sector also in the last one decade or so though the focus of the private sector is primarily on vegetables and hybrids in field crops.

Even with such quantum increase in seed production, the gaps exist between the demand and supply of quality seed, leaving the Seed Replacement Rates (SRR) much below the desired levels in many crops, particularly pulses (where it ranges from 5.54% in gram to 18.76% in pigeon pea) and groundnut (9.82%). Even in a staple food crop like wheat, the SRR is estimated to be around 15%, whereas ideally, it should be in the range of 25 to 33%. In spite of a satisfactory SRR of 32.9% in paddy, there are shortfalls in seed supply for varieties which are more in demand. On the other hand, due to lack of a strong extension programme, many improved varieties released by the public sector research institutes do not get popularized.

The Seed Replacement Rates can be enhanced by

- ◆ generating farmers' awareness about advantages of improved variety and quality seed through demonstrations and extension programmes.

increasing Breeder Seed availability
 following an effective conversion of Breeder to Certified Seed
 improving the availability of quality seeds at village/block level.

Partnerships between the Public-private sector organizations and between farmers/farmers' cooperatives and public/private sectors can provide a mechanism for a strong extension programme and developing an efficient seed supply system. Such partnerships are expected to be based on distributed and identified responsibilities.

India has a sound system of crop improvement and variety release. It is envisaged that the basic and strategic research would primarily remain the responsibility of ICAR-SAU system, while the adoptive phase, along with commercialization, would be with the SAUs, line departments and private sector (ICAR, 2007). Such a system can be successful only on the basis of mutual trust and profitability. Keeping the PPV&FR Act in view, the ICAR has formulated Guidelines for Intellectual Property Management and Technology Transfer/ Commercialization, which on one hand encourages public-private partnership and on the other offers a mechanism to gain through innovations and intellectual interventions. Several options have been outlined to strengthen mutually beneficial partnerships, through licensing, sub-licensing, contracts, agreements and MoUs which will be most relevant in variety development and seed supply chain, particularly in hybrids and in GM varieties.

With the introduction of hybrids in most of the major field crops and vegetables, which have significant yield advantages under a wide range of conditions, there is a high demand for quality seeds of hybrids even at a higher price. In case of hybrids, private sector plays the major role in seed production and supply, even of many public-bred hybrids. This has initiated some successful partnerships between the public research institutes and private seed sector viz., IARI-MAHYCO (for paddy hybrid PRH-10) and KKV-Syngenta (for paddy hybrid Sahyadri). A much larger potential exists in a number of other crops.

Farmers/farmers' societies or cooperatives are expected to play a greater role in the seed supply chain in the coming years. The initiatives taken by UAS, Dharwad, JNKVV, Jabalpur and many other SAUs and ICAR institutes have shown that an effective quality seed supply and delivery system can be established through active involvement of farmers. Seeds of the varieties, suitable for a agro-climatic region can be produced in the same area and timely availability of seeds to the farmers can be ensured.

By involving farmers, "Seed-hubs" or Seed Villages can be created, following a 'Compact Area' approach, in which seed of a particular hybrid/variety can be produced in a particular village or adjoining villages to avoid/minimize genetic contamination. Here again, the public sector institutions are expected to provide

- (a) basic seed materials
- (b) necessary training to the farmers and
- (c) guidance for developing seed processing, quality evaluation and storage facilities.

Farmers' participation in quality seed production also provides a means for rural employment generation. As there is a huge

demand for quality seeds of both field and vegetable crops, enterprising and progressive farmers can take up seed production not only for their own use but also to supply to the farmers of the same/neighboring villages or be contract growers for seed producing agencies. For the production of quality seeds foundation/certified seeds need to be obtained from an authentic source, and multiplied following the recommended procedures. Production of hybrid seeds, particularly those which are produced through manual emasculation and pollination, requires certain special skills, training and care. In view of these, seed production of both open pollinated (O.P.) and hybrid varieties provides great opportunities for fulfilling the seed demand and generating employment opportunities.

As per an estimate (Singh and Dutta, 2005), India is producing more than 115 thousand tones of hybrid seeds of field crops from nearly 132 thousand acres, of which cotton alone contributes for 82.5%, generating an employment of 24 million man-days per year. Similarly, about 944 tones of hybrid seeds of vegetables is produced from nearly 800 acres, generating employment of 2.71 million man-days per year, of which solanaceous crops contribute for more than 56%, followed by cucumber and okra.

Among field crops, net average income through hybrid seed production is maximum for cotton, followed by paddy, sunflower and millets. Among vegetables, hybrid seed production in sweet pepper is most remunerative, followed by hot pepper, tomato and watermelon.

An effective of seed quality assurance is an important component of seed supply system. With the recent technological advancements, it is possible to have more reliable assessment of seed quality in terms of vigour, health, genetic purity and genetic modifications. The spread of Bt-cotton hybrid in 3.8 mill.ha within 4 years of first Bt-hybrid release in India is a clear indication of the fact that the farmers are willing to adapt an effective technology, even at a higher seed cost. However, it will be imperative that the seed purchased at a premium will assure better quality both by way of its genetic improvement and maximum planting value (high vigour, high seed health standard etc.) Hence, there is a need to strengthen Seed Quality Testing Laboratories, whether in the public or private domain, with modern tools and techniques to achieve highest quality standards. Scientific capability and modern laboratory facilities available in the ICAR SAU institutions would provide technological support in upgrading quality assurance system, matching international standards. Seed standards (IMSCS) of some high value crops, particularly vegetables, are relatively low, which need revision and upgradation, as a step towards better quality assurance.

The Ministry of Agriculture through DARE and DAC, has taken several measures to enhance the availability of quality seed of improved varieties and hybrids.

ICAR started a project worth Rs. 198.89 crores on "Seed Production in Agricultural Crops and Fisheries" in 2005 to strengthen the capacity for improved seed production, rapid multiplication of planting materials in horticultural crops, farm-level seed production and proper storage, enhanced production of fish seed and for training of farmers, seed producers and trainers. This involves 46 ICAR institutes and 37 SAUs, of which seed and planting material production of field crops, vegetables and horticultural species are

being taken up at 55 and 45 centers and that of fisheries seed in 37 centres, respectively.

The project is expected to double the production of breeder seed and certified/TL seed of field crops and vegetables and planting materials/vegetative propagules of fruits, ornamentals and other crops.

- ◆ Enforcement of an effective mechanism of quality assurance is as important as the production of quality seed. Hence, steps have also been taken by the DAC to strengthen State Seed Testing Laboratories with modern tools and facilities. Several measures have been introduced in the New Seed Bill, 2004. To stream line the Seed Law enforcement, necessary provisions have also been made for quality assurance and monitoring of transgenic varieties and registration has been made compulsory for seed sale. A National Seed Research and Training Centre (NSRTC) has been established in Varanasi, where the Central Seed Testing Laboratory has been shifted after functioning for 40 years at IARI, New Delhi. Being the referral lab, it is mandated to monitor proper functioning of the State Seed Testing Laboratories across the country and provide necessary training to the Seed Analysts.

- ◆ In order to popularize the public-bred hybrids and to regulate the pricing of hybrid seeds, ICAR has made concerted efforts in developing improved hybrids / varieties and making available their breeder seed non exclusively to seed producing agencies through public-private/public-public partnerships. It also plays an important role in judicious application of biotechnological interventions in crop variety development. The ICAR SAU institutes have undertaken several research programmes on molecular breeding and transgenic development in priority crops. This aims at offering genetically improved varieties at affordable prices through a multi layered supply system and to restrict any such technology which is potentially harmful to the farmers or the environment. At the same time studies authenticated by this system helps in dispelling any misconception for or against new technologies such as transgenics , and helps in their adoption.

- ◆ As seed production requires some specialized skills, ICAR-SAU organizations regularly conduct training programmes for farmers, seed producers and entrepreneurs. Imparting training to rural youth and farmers with small holdings, especially in hybrid seed production, also opens an alternative for rural employment generation.

From Manufacturer's supply push to consumers demand pull: Preparations for the current and emerging era

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In the early 20th century, most types of farm products were sold as commodities on the open market. Sellers brought their grain and sold them to middlemen on the spot, keeping costs low. The rule of the day was “pushing” large volumes of standardized commodities through the supply chain. This system worked well as long as consumers sought basic staples for cooking meals in their own kitchens. Today, many consumers look for a wide assortment of prepared foods, including packed meals delivered at their doorsteps. This has happened mainly due to demographic changes like more mature consumers, greater

diversity, and larger disposable incomes among consumers. Today's time-pressed consumer is using his or her higher level of income to purchase more convenient products, while looking for quality, variety, and value.

Threats like continually changing consumer preferences, rapid technological advancement and other socio-economic changes, offer agribusiness companies new opportunities. Understanding and meeting the diverse preferences of consumers is a top priority for companies and thus allows consumers to “pull” products through the supply chain. Communicating consumer preferences back through the supply chain to prompt the needed adjustments in a cost-effective manner becomes the challenge. The challenge is much more in developing countries where agriculture is lagging behind relative to other countries, and farm households are generally small. In this environment, agribusiness companies have to involve the farming community to improve their systems, innovate on the whole value chain of farming, and be able to meet the changing consumer needs.

Problems small farm households face in the supply chain and/or markets

With economic and social development, there are great changes in people's consuming habits. The traditional consumption system is being replaced by the “agro-industrialized food” system. With the flourishing development of supermarkets and the appearance of the logistics industry and middleman, farmers are losing direct contact with consumers. Accordingly, farmers get a smaller proportion of food value because most of the value is distributed among other participants in the supply chain. In addition, trade liberalization further enlarges the income gap among domestic and overseas agricultural producers.

It is very difficult for small-farm households in many developing countries to enter the market. There were three main barriers for small farm households to enter markets. First, the high transaction costs when small households enter markets alone. Second, a lack of sufficient and accurate information due to lower education, long-term closed operation of farms, and low ability to interpret information, all of which lead to vulnerable negotiation positions for farmers. Third, the disadvantages of small-farm households such as small production scale, shortage of capital, low ability to compete, and so on, further influence their operation efficiency.

Family, as the basic structure of produce circulation, bore two important tasks at the same time: production and circulation. In this condition, farmers can fully be devoted to neither production to ensure the improvement of the produce output and quality nor the circulation to increase the value of the agro-food.

The following suggestions need to be kept in mind to successfully transform from supply push to demand pull:

1. Produce diversification

With the development of the consumer-oriented market, food characteristics are no longer determined by producers or their area of origin, but by consumer demands understood by traders, supermarkets or other middlemen. Agro-food industries and supermarkets usually set their own standards, based on their understanding of consumer demand and existing regulations. And diversified consumers' demand leads to diversified food standards.

2. Invest in human capacities to improve technique and market

consciousness of farmers

According to explanations of new institutional economics, advancement in social science and related special knowledge will reduce the costs of institution innovation. The more scientific knowledge people have, the more effective the institution innovation will be. And low education degree of farmers is a barrier to the institution innovation to a certain extent. Thus, investments in culture and human capacities of farmers are significant. Farmers have to improve their market consciousness, and be helped and instructed on techniques. If farmers change their notions and are able to compare between benefit and cost reasonably, they will establish or participate in innovation or techniques spontaneously.

3. Provide market linkages to farm produce, avoiding non-value added middlemen in the value chain

The concept of improvised value chain is to respect everyone who adds value in the entire supply chain and disrespect all those who do not add value in the supply chain. In order to avoid non-value added middlemen in the entire supply chain, it is important that market linkage is established for farm produce right at the farm gate.

4. Respect for Consumer's desired product knowledge like traceability etc.,

A growing consumer segment cares not only about what's produced, but how it's produced. Traceability of products will be increasingly important for consumers, who will in all likelihood wish to know more about the origins of their product. Consumers may wish to have more information concerning the freshness of the stock, the biotechnology employed in raising the product, the risks of chemical or heavy metal contamination, or the manner of post harvest handling. Greater traceability would also be useful for management purposes because it could help exclude products from markets when their production fails to conform with established guidelines. Certification schemes provide a means for companies to recoup the extra costs of employing technology to conform to guidelines, as long as consumers are willing to pay a premium for certified products.

5. Build supply chain efficiency to reduce cost in the whole value chain

Many important changes in the food system are not directly visible to consumers. Instead, these changes are reflected in the variety, quality, and quantities of food products available. Companies not only have to develop and produce a larger number of goods but must also get the right products to grocers and foodservice establishments on time, in the right quantities, and at economical prices. Wal-Mart was one of the first firms to implement supply chain management techniques to efficiently handle large product volumes targeted to consumer preferences. These cost-cutting and information managing techniques helped the chain lower its prices and grow into America's largest general merchandise retailer. In 1988, it entered food retailing with the opening of its first supercenter, combining a large discount general merchandise store with a self-contained supermarket. By bringing its business strategy to the food sector, the company quickly became a leader in food retailing. Based on their buying clout, companies such as Wal-Mart and McDonald's wield a heavy influence on the business practices and products of their suppliers and rivals.

Conclusion

Good information and monitoring systems are essential for achieving effective supply chain management, so that one can service the new paradigm shift in consumer preferences in a dynamic manner. Since servicing consumers in the emerging system of "demand pull" requires online and real time knowledge, it is important that a simple but effective supply chain system is developed and customized to needs of every project situation.

Graduate Program on Intellectual Property Management and Technology Transfer

The impact of technology on modern life has never been more relevant than in these days of globalization. The open market economy and the ensuing competition have awakened many majors to the necessity of perpetual technological innovations. This in turn has created a vital role for academic and public research institutions with their intellectual property resources. Emerging economies like India stand to gain a lot from such exchange of intellectual resources.

Post 2005, India's compliance to TRIPS and product patents has strengthened foreign investment by global giants in technology development thereby forcing Indian companies to understand the importance of technological innovation. Furthermore, amendments in the government policies have allowed companies to look into national institutes for sourcing their research needs.

It is in this backdrop, that STEM conducted the graduate course in Intellectual Property Management and Technology Transfer at Goa to cognize the importance of technology transfer and build expertise for the emerging technology transfer industry. Focusing the needs of Indian industry, this was a forum for many professionals from India and abroad to discuss and address issues, exchange success stories and the ideal models for technology transfer.

STEM Hon. President, K. Vijayaraghavan commenced the 4-day intensive program with his opening remarks stressing on the importance of technology transfer in the country, especially between public institutions, academia and the industry.

Speaking on Global Intellectual Property and Technology Transfer Opportunities, AUTM Past President John Fraser, elicited on the "Lessons for Developed Economies", emphasizing on the need for clear government policies, which could foster technology transfer thereby forging the developing economies on the growth tangent.

During the course of the presentation, he also emphasized on the American Bayh Dole Act of 1980, which played a significant role in the development of a patent policy among the many federal agencies that fund research, enabling small business and non-profit organisations, including universities, to retain the title to inventions made under federally-funded research programs.

This concept was further augmented by K. Vijayaraghavan during his discussion on the "Lessons for Economies in Transition", bringing into focus the need for the developing economies to be self reliant in defense, health and agriculture.

Lars von Borcke, Business Development Manager from Plant Bioscience Limited analysed the licensing landscape in agricultural technologies. He stressed on the changing market scenario in last couple of decades with the introduction of GM

technologies and growth in the Ag-biotech sector. He said that with changing policies and lands with 90m ha under GM crops, and 8m growers in 21 countries, immense opportunities exist in geographic locations (e.g. India); novel traits (output / abiotic stress) improved input traits and better enabling technologies.

Richard Cahoon, Associate Director of the Technology Transfer office of Cornell University argued for an effective institutional IP policy to provide clarity in IP ownership between the institution and researcher, which is very critical for stability of long-term, sustainable tech transfer and inter-institutional collaboration. Dr Cahoon called for a “business model” for technology transfer so as to have a uniform structure in technology transfer.

Dr. Shashank Mauria, Asst. Director General for IPR and policy from Indian Council of Agricultural Research spoke on the essential components of IP policy in public system, wherein he discussed the ICAR guidelines, in view of the rapid developments in Intellectual property rights and recognized the need for efficient management for ICAR's intellectual property.

Dr. K. Satyanarayana, Head of IPR from Indian Council of Medical Research gave an overview of Intellectual Property Management at the Indian Council of Medical Research and RK Gupta, Head of IPR from Council of Scientific & Industrial Research spoke about CSIR's IPPolicy and its implementation.

They laid emphasis on the willingness of the public institutions to work with the industry and encouraged the industry to tap the research potential of the government institutions for technology transfer.

On the same note, Dr. Anthony Bunn, from the Medical Research Council Innovation Centre, South Africa, presented a case study on IP Policy Development at the South African Medical Research Council (MRC). The focal point of the address was Bunn's statement “ideal process is one of co-creation and involvement at all relevant levels in an organization ensuring optimal buy-in.”

On Corporate IP policy, Vijayaraghavan stressed on the need for corporate IP policies conducive to cataloguing existing IP assets and in licensing to fill in the technology gaps and maintain competitive leadership. He insisted that the major sources of early stage viable technologies for the industry would be the public research institutes and the academia.

On patent importance and prosecution, K. Satyanarayana, highlighted on the need for patenting and exploitation of commercial aspects in the Indian context. He encouraged the scientific community to work towards generation of more IP in order to leverage India's contribution to the global mark.

Dr. Harry Thangaraj, Director for research, Centre for the Management of IP in Health R&D (MIHR), Oxford, spoke about patent prosecution through PCT route and then R. K. Gupta from CSIR provided insights on patent searches and FTO analysis as an essential means to avoid infringement liabilities. There was also an informal discussion on IP search and FTO analysis held in small groups led by Richard Cahoon, Kevin Croft, Harry Thangaraj, Satyanarayana, John Fraser and R. K. Gupta.

The third day of the program was on IP licensing wherein John Fraser and Kevin Croft, Managing Director from Croft IP, Australia,

discussed methods and result oriented practices for maximizing economic gains from IP licensing. They stressed on the need for management of IP and relationships, encouraged deal making through skilled negotiation practices and also discussed the perspectives on economic gains for the licensor, the licensee and the technology transfer community at large.

Sourcing of biomaterial from India and related IPR issues were discussed by Gupta towards the end. He spoke at length on the Biodiversity Act of 2002 and discussed about procedures and regulations on biomaterial licensing from India. He dwelt at length about the provisions of Material Transfer Agreement as outlined in the Biodiversity Act of 2002.

One of the most appreciated sessions during the program was by Richard Cahoon, who discussed the importance of good license agreements and described the “art” of writing good licensing agreements. He shared his insights and nuances on the anatomy of license agreements, which was followed by informal discussions by the participants with the expert faculty members.

Dr. Michelle Mulder, from the Medical Research Council Innovation Centre (MRC), South Africa, presented a case study on IP management for public good. On the case study on South African AIDS vaccine initiative SAAVI, Dr. Mulder explained the importance of public private partnership, governance and management of Intellectual Property in a consortium.

Deepanwita Chattopadhyay, Chief Executive Officer, ICICI Knowledge Park, illustrated the role of Incubators as a way to enhance technology access and enterprise value. She spoke on the utility of incubators in commercializing technologies and encouraging entrepreneurship.

K. Ragunathan, Director, Sathguru Management Consultants, a major supporting firm of the event, discussed the nine principles of technology valuation in his presentation on technology valuation, Croft and Gupta, meanwhile, enacted the negotiations between licensor and licensee to give few of the novice participants a feel of the important and much apprehensive subject.

Dr. Sadhana Srivastava and Satyanarayana from the Indian Council of Medical Research presented a case study on global partnerships for addressing health needs wherein they stressed on the emerging health threats, dearth in the availability of new health products and the role of ICMR in forming consortiums of public and private stakeholders to mitigate these issues of global concern.

On the crucial aspect of Public-Private Partnerships, Vijayaraghavan highlighted on the Agricultural Biotechnology Support Project II, a global consortium for agricultural development. He discussed on the need for bioengineered crops, identification of the consortium partners, the product development cycle, the different aspects involving technology transfer and the project output. The program concluded with a graduation ceremony and felicitation of speakers.

STEM was praised for its unstinted support and contribution to the field of technology transfer.

To know more on the program log on to www.stemglobal.org

MAHYCO hands over transgenic seeds to IIVR.

In an event that marked another milestone for ABSP-II, Maharashtra Hybrid Corporation (MAHYCO) Managing Director Raju Barwale handed over back-crossed BC1 eggplant (transgenic) seeds to Dr. Mathura Rai, Director, Indian Institute of Vegetable Research (IIVR) on 18th June 2007.



MAHYCO IIVR seed hand over ceremony

In May 2006, selected IIVR developed varieties of egg plant seeds were given to MAHYCO for crossing with Mahyco Elite Event 1 (transgenic event which contains Cry 1Ac gene) for introgression. The transgenic seeds were handed over to IIVR.

At IIVR these transgenic seeds would undergo further breeding in confined condition and subsequent field evaluation.

K.Vijayaraghavan, (Regional Coordinator for ABSP-II south Asia), Dr. K.V. Raman, Dr. V.P Gupta (Advisor, Directorate of Bio Technology, Government of India), Dr. P. Balasubramanian (PI, TNAU, Coimbatore).Dr. M.S Kuruvinashetti (PI,UAS D), Dr. P. Karnan (ABSPII) attended the event. IIVR efforts are supported by ABSPII in South Asia.

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