High Level Policy Dialogue on Biotechnology for Food Security and Poverty Alleviation: Opportunities and Challenges

7-9 November 2005
Rama Gardens Hotel, Bangkok, Thailand

PROCEEDINGS

FAO REGIONAL OFFICE FOR ASIA AND THE PACIFIC (FAO RAP)
ASIA-PACIFIC ASSOCIATION OF AGRICULTURAL RESEARCH INSTITUTIONS (APAARI)
and
GLOBAL FORUM ON AGRICULTURAL RESEARCH (GFAR)

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FOREWORD

The Asia-Pacific countries have accorded high priority to biotechnology as reported during this high level policy dialogue. The level of utilization of biotechnology, however varies from country to country. Biotechnology ranges from micro-propagation of vegetatively propagated crops, advanced diagnostics, genomics, and genetic engineering to the development and commercialization of GM crops. China, India, Indonesia, Iran, Japan, the Philippines, and Thailand have made very good progress in the application of modern biotechnology for improving agriculture. The other countries are also moving towards the adoption of these new technologies for a common goal of achieving food security and poverty alleviation. While the area under GM crops as projected is likely to grow at a faster rate in the years to come, the capacity of the region in utilizing full potential of biotechnology greatly varies from country to country.

As of now, the use of modern biotechnology is limited to a few crops, a few desirable traits and a few countries and therefore with limited impact in addressing poverty and hunger in the region. Therefore, one very important issue before us is how to ensure that application of modern biotechnology promotes food security and reduces poverty in the region, which has almost two-thirds of the world's undernourished population. Success in eradicating hunger is central to the achievement of the Millenium Development Goals (MDGs).

Both FAO RAP and APAARI, over more than a decade, have held a number of conferences and expert consultations in the Asia-Pacific region, to address concerns of developing countries in the context of new technological options for increased agricultural production, especially by the small and marginal farmers. The joint FAO-APAARI-GFAR high level policy dialogue conducted on 7-9 November 2005 in Bangkok, Thailand was a step forward to assess the recent developments in biotechnology and address all relevant concerns that would accelerate their useful and safe application. This broad-based dialogue covered both conventional and modern biotechnological options. It addressed issues related to food security, policy and legal framework concerning biotechnology, biosafety and regulatory procedures, intellectual property rights (IPRs) and private sector research, as well as global and regional partnership.

We thank the 81 participants who contributed in this dialogue, including the Ministers/Secretaries of Agriculture, Heads of NARS and CGIAR Centers, distinguished scientists and leaders of several regional and international organizations, representatives of private sector, NGO and farmer organizations for sharing information, knowledge and experience. The dialogue succeeded in bringing together different stakeholders from governments, academe, the private sector, and civil society to promote greater understanding and foster mutual learning on some of the most debated issues related to biotechnology. The sharing of knowledge on new developments and findings on modern biotechnology tools raised awareness of the potential benefits and risks associated with biotech products and the implications in terms of needed regulatory framework, institutional capacity building and human resources development, and modes of partnership.

Developing countries in Asia-Pacific can take on appropriate knowledge-and science-based policy decisions with respect to application of both conventional and modern biotechnologies in their food and agriculture sector to address poverty and hunger, in accord with the World Food Summit and Millennium Development Goals. As recommended from this dialogue, FAO, APAARI-APCoAB and GFAR shall continue to assist developing countries in the region by taking proactive role in policy

dialogues, increasing public understanding, promoting the necessary legal and regulatory framework, capacity building, and mobilizing resources for enhancing regional cooperation to address the needs of the poor people in the region.

He Changchui
Assistant Director General and Regional Representative for Asia and the Pacific
(FAO RAP)

Raj Paroda
Executive Secretary
APAARI

ACRONYMS AND ABBREVIATIONS

AREO	Agricultural Research and Education Organization (Iran)
AARINENA	Association of Agricultural Research Institutions in the Near East and North Africa
ADG	Assistant Director General
AIT	Asian Institute of Technology
APAARI	Asia-Pacific Association of Agricultural Research Institutions
APCoAB	Asia-Pacific Consortium on Agricultural Biotechnology
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of South-East Asian Nations
AVRDC	Asian Vegetable Research and Development Center (World Vegetable Center)
BAFPS	Bureau of Agriculture and Fisheries Product Standards (Philippines)
BecA	Biosciences eastern and central Africa
BPI	Bureau of Plant Industry (Philippines)
Bt	*Bacillus thuringiensis*
CACAARI	Central Asia and the Caucasus Association of Agricultural Research Institutions
CARP	Sri Lankan Council for Agricultural Research Policy
CBD	Convention on Biological Diversity
CGIAR	Consultative Group of International Agricultural Research
CIMMYT	International Maize and Wheat Improvement Center
CIRAD	Centre de Cooperation Internationale en Recherche Agronomique pour le development
COEs	centers of excellence
CSOs	civil society organizations
DA	Department of Agriculture (Philippines)
DMC	direct sowing, mulch-based systems and conservation agriculture
DOA	Department of Agriculture (Thailand)
ECOSOC	Economic and Social Council
EO	Executive Order
FAO	Food and Agriculture Organization
FAO RAP	Food and Agriculture Organization Regional Office for Asia and the Pacific
FARA	Forum on Agricultural Research in Africa
FDI	foreign direct investment
FH	Future Harvest
FPA	Fertilizer and Pesticide Authority (Philippines)
FTAs	Free Trade Agreements
GDP	gross domestic product
GEAC	Genetic Engineering Approval Committee (India)
GFAR	Global Forum on Agricultural Research
GM	genetically modified
GMOs	genetically modified organisms
GPhI	global post-harvest initiative

GPP	global partnership program
IAC	Institut Agronomique Neo – Caledonien
IARI	Indian Agricultural Research Institute
IBSC	Institutional Biosafety Committee
ICAR	Indian Council of Agricultural Research
ICRISAT	International Crops Research Institute for Semi-Arid Tropics
IFPRI	International Food Policy Research Institute
ILRI	International Livestock Research Institute
INCANA	Inter-regional Network on Cotton in Asia and North Africa
IPGRI	International Plant Genetic Resources Institute
IPHT	Institute of Post-harvest Technology (Sri Lanka)
IPRs	intellectual property rights
IRRI	International Rice Research Institute
ISAAA	International Service for the Acquisition and Application of Agricultural Biotechnologies
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
IWMI	International Water Management Institute
JIRCAS	Japan International Research Center for Agricultural Sciences
MAS	marker-assisted selection
MDGs	millenium development goals
MLS	multilateral system
NACA	Network of Aquaculture Centers in Asia-Pacific
NARS	national agricultural research system
NEPAD	New Partnership for Africa's Development
NGOs	non-governmental organizations
OECD	Organization for Economic Cooperation and Development
PAFBA	Philippine Agriculture and Forestry Biotechnology Agenda
PGRs	plant genetic resources
PPP	public-private partnership
PROLINNOVA	promoting local innovation in ecologically-oriented agriculture and natural resource management
PVP	plant variety protection
QTL	quantitative trait loci
R&D	research and development
RAIS	regional agricultural information system
RARM	risk assessment and risk management
RCGM	Review Committee on Genetic Manipulation (India)
RDAC	Recombinant DNA Advisory Committee (India)
RDE	research, development and extension
SAARC	South Asian Association for Regional Cooperation
SBCC & DBCC	State and District level Biotechnology Coordination Committees (India)
SMTA	standard material transfer agreement
SPC	Secretariat of the Pacific Community
TRIPS	Trade-Related Aspects of Intellectual Property Rights

UNCTAD	United Nations Conference on Trade and Development
UNEP	United Nations Environment Programme
UNESCAP-CAPSA	Center for Alleviation of Poverty through Secondary Crops Development in Asia and the Pacific (Indonesia)
UPOV	Union for the Protection of Plant Varieties
WFP	World Food Programme
WHO	World Health Organization
WIPO	World Intellectual Property Organization
WTO	World Trade Organization

BACKGROUND

The global population is increasing by roughly 80 million annually and almost all this growth is taking place in the developing countries. Asia is home for 60 per cent of the world's population. It is projected that by 2025, Asian population will increase by over 35 per cent reaching 4.7 billion, as against expected world population of 8.0 billion. Most of this population lives in rural areas, where small farmers practice subsistence agriculture, often under harsh conditions. Most of these areas are also rampant with poverty, food insecurity and malnutrition. Today, Asia is home for the maximum poor people in the world.

It is well understood that the rising population growth will require substantial increase in food production, that too on sustainable basis. It is well recognized that to keep pace with increasing demand for food, existing technologies will have to be scaled up, using advanced biotechnological interventions. Biotechnology has emerged as a powerful tool for improving both food and nutritional security. It offers enormous opportunities to increase overall productivity, nutritional status, resistance to pests, drought, and salinity, among others. Furthermore, biotechnology is also expected to reduce health risks and environmental pollution due to reduced use of chemicals for pest management. Hence, there is a strong basis to supplement conventional breeding methods with biotechnological options for increasing production, improving nutritional status and reducing input costs for the resource poor farmers of Asia, resulting thereby in increased income as well as reduced poverty.

In 2004, global area under the GM crop was estimated to be 81.0 million ha, grown by 8.25 million farmers in 17 countries. Compared to 1.7 million ha in 1996, the present acreage represents a 47-fold increase in eight years. However, so far only 34 per cent of such areas is covered in the developing countries (mainly China, India, Argentina, Brazil, and South Africa). Soybean, cotton, canola, papaya, rice, tomato and potato are the major GM crops presently in the global market. However, so far only a few farmers in a few developing countries are reaping these benefits. Neither the private nor the public sector has invested significantly in these technologies for the crops that have great relevance for food and nutrition security such as wheat, rice and food legumes. Also there are technological and policy related barriers that prevent the poor from accessing modern biotechnology. These are: inadequate regulatory procedures, complex intellectual property issues, poorly functioning markets and seed delivery systems, and weak domestic plant breeding capacity.

One fundamental question often raised is whether GMOs are really needed to achieve the World Food Summit objective of halving the number of undernourished by 2015. This is because improved seeds and planting materials generated by the International Agricultural Research Centers as international public goods, including hybrids and varieties, have also not reached all smallholders of the Third World. In the meantime, attention has also been drawn to feed the world population that will increase from a current six billion to nine billion people in 2050, requiring a 60 per cent increase in food production. On the contrary, expanding the arable area is becoming unfeasible because of urbanization and industrialization. Also the second generation problems of green revolution are resulting in increased biotic and abiotic stresses, poor soil health, water quality and even salinization. Such a situation will require intensified cultivation, higher yields and greater productivity. It is in this context that genetic engineering and biotechnology offer tremendous opportunities for increasing productivity as well as profitability by reducing the costs of inputs. Transgenic crops offer new options to improve productivity through improved resistance/tolerance within the plants to both biotic and abiotic stresses.

It is also a well recognized fact that the capacity of different developing countries to apply advanced biotechnology greatly differs across the Asia-Pacific region. Some countries are clear about their priorities, have good scientific, policy and legislative capacity to participate in international negotiations and prepare necessary regulatory framework domestically to implement international undertakings, and are well geared towards national risk assessments and safeguards for using biotechnologies. Others are rather much behind and not yet clear about their policies and the pros and cons of using modern biotechnology. Thus, sharing of knowledge and experiences among developing countries in this fast developing field is critical at this stage.

Both FAO RAP and APAARI, over more than a decade have held a number of conferences/expert consultations in the Asia-Pacific region, wherein concerns of the developing countries were discussed in the context of new technological options for increased agricultural production, especially by the small and marginal farmers. The high level policy dialogue conducted on 7-9 November 2005 in Bangkok, Thailand was a step forward to assess the recent developments in biotechnology and address all relevant concerns that would make their application useful as well as environmentally safe. This broad-based policy dialogue covered both conventional and modern biotechnological options and addressed issues related to food security, policy framework concerning biotechnology, testing and regulatory measures, biosafety, and the issues related to IPRs and benefit sharing by both producers and consumers.

Objectives of the policy dialogue

In the context of increasing application of GMOs, the member countries' commitments to the MDGs and the World Food Summit Declaration and the strategic priorities of both FAO, APAARI and GFAR, there is need to support the developing countries in the Asia-Pacific region for moving forward to reap the expected benefits of biotechnology, through informed judgement to adopt appropriate policies, device regulatory procedures that are well tested and understood and to build needed institutional capacity and competent human resource. It is necessary to address the existing concern of "technology divide" in the Asia-Pacific region so that benefits are available to resource poor farmers and nations are able to address the concerns of food security, food safety and quality, and sustainability. Within this overall framework, the policy dialogue was conducted to address the following:

1. Review country experiences regarding application of biotechnology in the context of increasing food supply and environmental safety as well as biosecurity. Highlight socio-economic impacts and empirical evidence (or lack of it) on issues related to, *inter alia*, relevance and access of the technology to resource poor farmers, cost and benefit sharing, IPR and trade related issues;
2. Understanding the current status and limitations of public sector research in biotechnology and how to orient the same to reap the benefits as international public goods so that the resource poor farmers are able to contribute to poverty alleviation and food security;
3. Identify the biotechnology policy and regulatory issues faced in addressing food security, sustainability and biosafety and ways to tackle them. In particular, identify practical means to implement international instruments and develop standards of governance which would ensure faster adoption of new technological options that are pro-resource poor farmers;
4. Developing information, communication and public awareness to interlink all concerned for sharing the information on available technologies;

5. Identify the gaps and the needs for capacity building in the developing countries of Asia-Pacific region; and
6. Developing modalities for regional cooperation in the field of agricultural biotechnology involving all stakeholders.

Specific Aim: Selected countries who have adopted GM crops and who have either developed or in the process of developing national policy, institutions and infrastructure were requested to share their experiences with those who are yet to move forward in this direction. A total of 20 papers were presented in five sessions addressing the above objectives (Annex I).

Participants: A total of 81 participants (Annex II) attended this meeting. These included Agriculture Ministers/Secretaries, policy makers, research managers, heads of NARS, international organizations/CGIAR Centers, representatives of the private sector, and CSOs (NGOs and farmers).

OPENING SESSION

Dr. Raj Paroda, Executive Secretary of APAARI, welcomed the participants on behalf of APAARI, FAO and the GFAR – the co-sponsors of this important meeting. He acknowledged the presence of the Honorable Ministers of Agriculture from different developing countries that have laid considerable emphasis on agricultural biotechnology. He thanked the Heads of NARS and CG Centers as well as a number of distinguished scientists and leaders of several regional and international organizations, including representatives of Private Sector, NGO and farmer organizations. He recognized that this diverse assemblage of resource persons, policy makers, managerial scientists and other stakeholders constitute a think-tank, which will add to the success of this meeting. He mentioned that the need for organizing such a dialogue was conceived during the earlier joint meetings of APAARI and FAO. He thanked He Changchui, Assistant Director General, FAO RAP, P.K. Mudbhary, Sr. Policy Officer, Roozitalab, Chairperson, GFAR and Ola Smith, Executive Secretary, for co-sponsoring this event.

In their opening messages, APAARI Chairperson Dr. Herath Gunasena and Executive Secretary Dr. Raj Paroda pointed out the emerging concerns in the Asia-Pacific region such as rapid population increase (over 35%, thus reaching 4.7 billion by 2025), poverty, food insecurity and malnutrition, expanding urbanization and industrialization, and conservation of natural resources. Pragmatic approaches for sustainable agriculture to improve productivity, meet food security, alleviate poverty and increase income of resource poor farmers would need a blend of both conventional and modern biotechnologies. In Asia-Pacific region, the NARS are heterogeneous in their R&D structure, and in their capacity to apply advanced technologies. The public needs science-based information concerning food safety, biosecurity and environmental risks associated with release of GM crops. A stronger public-private partnership is crucial to ensure quick access to the new technologies by the farming community. They acknowledged that this dialogue is part of the policy advocacy mandate of the Asia-Pacific Consortium on Agricultural Biotechnology (APCoAB), an initiative of APAARI and FAO.

GFAR Executive Secretary Dr. Ola Smith indicated that the theme of this policy dialogue could have not been more appropriately chosen given the times we live in. He emphasized the benefits and opportunities that these biotechnologies offer in terms of producing more and better quality food. He likewise pointed out the following challenges in the development and appropriate application of biotechnologies: provision of the required infrastructure and capacity building, understanding and effectively managing risks, and finding ways to promote partnerships among stakeholders for mutual benefits without crippling conditionality.

Vice-Minister Mr. Charal Trinvuthipong, Thailand Ministry of Agriculture and Cooperatives, indicated that the Royal Thai Government has taken many initiatives towards the use of biotechnology in agriculture for sustained growth of the sector and has undertaken measures to build national research and regulatory capacity. He congratulated the organizers such as FAO, APAARI and GFAR for taking the initiative to bring all the stakeholders together to develop greater understanding and mutual respect for each others' views.

In his inaugural address, FAO Assistant Director General and Regional Representative for Asia and the Pacific Dr. He Changchui highlighted the need to achieve the Millennium Development Goals of poverty and hunger eradication through technological progress. He emphasized that technology must be pro-poor and its delivery system must be effective. He indicated that there are many biotechnologies that have helped farmers to improve, protect and diversify their production, and assisted processors and marketers to add value and increase trade in food and agricultural products. The most widely discussed and controversial one is genetic engineering giving rise to genetically modified organisms (GMOs). While commercial planting of GM crops rose to 81 million hectares in 2004, with China cultivating 3.7 million hectares, and India and Philippines cultivating more than 100,000 hectares, current GM crop releases are still very narrow in terms of crops and traits and have not addressed the special needs of developing countries. Many important crops such as pulses, vegetables, and fodder and industrial crops, and certain traits such as drought- and aluminum-tolerance are still almost entirely neglected. He emphasized the need to establish national legal and regulatory framework in harmony with the international instrument and the necessary infrastructure including human resources to efficiently implement the established system. He encouraged the participants to pay attention to the expected three major outcomes of this meeting which are: (i) identification of the major priorities in biotechnology that FAO and its partners should focus on to enhance its contribution to food security and poverty reduction, (ii) recommended roles for different stakeholders in meeting these priorities, and (iii) mechanisms and modalities of enhanced cooperation and partnership among stakeholders.

A publication entitled "Commercialization of Bt Corn in the Philippines: A Status Report" was released by Philippine Agriculture Secretary Mr. Domingo Panganiban. This publication has been co-authored by Philippine scientists R.V. Ebora, M.B. Palacpac and C.G. Custodio, Jr. and published by APCoAB, a Consortium on Biotechnology under APAARI umbrella. Copies of publication were distributed to APAARI members and other participants during the dialogue.

Dr. Purushottam Mudbhary, Sr. Policy Officer and Acting Chief, Policy Assistance Branch, FAO RAP, referred to the background document earlier circulated to the participants. He briefed the participants about the objectives and expected outputs of the policy dialogue, as follows:

Objectives:

- Take stock of status and experiences: Global, Regional, National
- Discussion on policy and regulatory issues: Biosafety, Regulatory measures, Bioethics, and IPR
- Enhancing biotechnology as international public goods to expand access
- New partnership initiatives to promote biotechnology
- How to make modern biotechnology work for poverty alleviation and food security

Expected outputs:

- Identification of priorities
- Recommendations for building capacities for policy, research and development and biosafety regulation – large and small country cases
- Addressing the IPR, trade and issues to promote equitable and safe access to biotechnology
- Strengthening global and regional partnership and regional/sub-regional cooperation including role of international organizations and research systems (FAO, WTO, CGIAR system, and others)
- Promoting dialogue and understanding among stakeholders

SESSION I: STATUS OF AGRICULTURAL BIOTECHNOLOGY

Chairperson: Andrew Bennett, Syngenta Foundation
Co-chairperson: Thierry Mennesson, IAC

In this session, five papers were presented regarding the status of biotechnology at the global and regional levels, developments in China and India, and the CGIAR approach to biotechnology and biosafety.

A comprehensive paper on Global Development on Agricultural Biotechnology was presented by Clive James, President, ISAAA. He presented the latest information on the global status of genetically modified (GM) crops, now more often referred to as biotech crops and reviewed the data for 2004 regarding global adoption during the last nine years (1996-2004). Most recent status (2004) was presented by country, crop and trait wise. He stated that during 1990s many were skeptical that biotech crops would deliver improved products and make an impact in the near-term at the farm level. There was even more skepticism that developing countries in Asia, Latin America, and Africa would adopt biotech crops.

Dr. James highlighted that between 2003 and 2004, global area of biotech crops increased by 20% (13.3 million hectares). In 2004, the estimated total global area of approved biotech crops was 81.0 million hectares, grown by approximately 8.25 million farmers in 17 countries. He also emphasized that almost 90% of the beneficiary farmers were resource-poor farmers from developing countries, whose increased incomes from biotech crops contributed to the alleviation of poverty. In 2004, there were 14 biotech major countries (compared with ten in 2003), growing 50,000 hectares or more, (9 developing countries and 5 industrial countries). In order hectarage they were: USA, Argentina, Canada, Brazil, China, Paraguay, India, South Africa, Uruguay, Australia, Romania, Mexico, Spain, and the Philippines.

According to him, the developing countries had higher increase in biotech area than industrial countries in 2004. The number of developing countries (11) growing biotech crops in 2004, was almost double the number of industrial countries (6). Biotech area in developing countries grew 7.2 million hectares, or 35% in 2004, compared with 6.1 million hectares or 13% in industrial countries. The five lead biotech crop developing countries (China, India, Argentina, Brazil and South Africa) with a combined population of 2.6 billion (40% of global) grew 26 million hectares of biotech crops in 2004, which is almost one third of the total area. He also highlighted the potential economic benefits from deploying biotech crops by the five lead developing countries as follows:

(1) China – seven million small farmers benefitted from Bt cotton in 2004 and benefits equivalent to US$ 5 billion are projected for 2010 from rice and cotton;

(2) India – adopted Bt cotton in 2002; the area under Bt cotton increased five-fold to 500,000 hectares in 2004; more than 15 biotech crops at R&D stage;

(3) Argentina – ranks number two biotech country, growing 20% global area in 2004, with benefits amounting to about US$ 2 billion/yr from biotech soybean, maize and cotton;

(4) Brazil – approved herbicide resistant soybean in 2003 which covered five million hectares in 2004; estimated potential benefits of about US$ 1b/yr from soybean, maize and cotton;

(5) South Africa – lead biotech country in Africa; in 2004 biotech maize, white (food), yellow (feed), soybean and cotton were grown.

Dr. James also mentioned that continuing rapid adoption of biotech crops reflects the substantial improvements in productivity, the environment, economics, health and social benefits realized by both large and small farmers, consumers and society in both industrial and developing countries. The major benefits are summarized as follows:

(1) Improved productivity and income-increased yields of 5 to 40%, farm income gains of US$ 6.5 billion in 2004 and US$ 27 billion in 1996-2004, biotech crop production value of US$ 44 billion in 2003;

(2) Protect biodiversity – double crop production on same area of land, save the forests/biodiversity considering that 13 million hectares loss/year in developing countries;

(3) Environmental impact – reduce need for external inputs thus saving of 172,000 MT a.i. from 1996–2004. Conservation of soil and water impacts on sustainability of the environment;

(4) Yield stability – control of abiotic/biotic stresses, promising progress with drought tolerance which is a major cause of famine; and

(5) Social benefits – alleviation of poverty, improved environment and health, a time saving technology which contributes to more affordable food, feed and fiber.

He concluded his presentation while highlighting the cautious optimism that global area and the number of farmers and countries planting biotech crops will continue to increase in 2005, which is the 10th anniversary of the commercialization of biotech crops. Furthermore, using 2004 baseline data, it is projected that by 2010, the number of biotech countries will increase from 17 to 30, the number of farmers planting biotech crops will increase from 8 million to 15 million, and the total global area of biotech crops will increase from 81 to 150 million hectares. The challenges for the future though include the following:

(1) improved communication with society to be able to make knowledge-based decisions regarding biotech crops;

(2) increase in number of biotech countries, farmers and area; and ensure that developing countries have option to use biotech crops in conjunction with conventional technologies to contribute to a more sustainable agriculture, global food, feed and fiber security, alleviation of poverty and a safer environment for all.

Another Status paper on R esear ch and De velopment of A gricultur al Bio technology : Regional Scenar io was pr esent ed by Anupam V arma in whic h he g ave a br ief s tatus of bio technology r esear ch and development in some of t he countr ies of t he region. These countr ies ha ve accor ded high pr ior ity t o bio technology . Ho wever, the le vel of utilization of bio technology v aries g reatl y among t hem, fr om the le vel of adop tion sof t bio technology suc h as tissue cultur e-based micr o-pr opag ation and biocontr ol on t he one end t o that of commer cial intr oduction of GM cr ops on t he o ther end. He r epor ted t hat the application of bio technology and t he use of GM cr ops in China, India and t he Philippines ha ve sho wn g reat pr omise. The o ther countr ies ar e also mo ving t owards t he adop tion of t hese ne w technologies f or a common goal of ac hie ving f ood secur ity and po verty alle viation.

He fur ther mentioned t hat some countr ies ha ve also de veloped GM animals and f ish f or im proved quality and im proved pr oduction. It r eflects a g reat v ariation in t he capacity of t he region in utilizing full po tential of bio technology . In 200 4, t he ar ea under GM cr ops w as less t han f ive million hect ares in Asia. It is lik ely to grow at a f aster rate in t he years to come, consider ing t he initiativ es t aken by some of t he countr ies t o de velop tr ansg enic cr ops of t heir int erest. The success of bio technology application, ho wever, depends on t he es tablishment of a t echnicall y sound national fr amework for biosaf ety. This is an im portant pr ior ity, as t he Car tagena Pr otocol on Biosaf ety is an int ernationall y accep ted leg al ins trument dealing wit h issues lik e tr ansboudar y mo vement of GMOs and allo wing countr ies t o take inf ormed decisions t o im port GMOs. As of 25 Oct ober 2005, 3 1 countr ies of Asia and t he Pacif ic ha ve deposit ed ins truments of r atif ication or accession wit h the UN Secr etary-Gener al so as t o be a par ty to Car tagena Pr otocol.

Varma also s tated t hat t he countr ies of t he region, ho wever, dif fer consider ably in t heir s tatus of formulating and im plementing r egulat ory mechanisms t o ensur e biosaf ety of GMOs. These countr ies mos tly lac k unif ied sys tem to ensur e biosaf ety, whic h is co vered by dif ferent minis tries and depar tments. An ideal sing le windo w sys tem, for t he ef ficient t esting and r elease of GMOs has no t been de veloped in mos t countr ies. Ther e is an ur gent need t o put in place biosaf ety regulat ory mechanisms and de velop an ef ficient sys tem for r isk assessment and r isk manag ement (RARM). Ir respectiv e of div ersity of countr ies of t he region, t he regulat ory measur es r elat ed t o biosaf ety would ha ve consider able common featur es. Hence, har monization of biosaf ety pr ocedur es will be useful f or ensur ing saf ety and ef ficient implement ation of r egulat ory mechanisms.

Some countr ies in t he region ar e bet ter placed t han t he o thers in ha ving a s trong g roup of scientis ts trained and pr acticing har dcor e molecular biology and bio technology . Ho wever, mos t of t he countr ies in t he region lac k t he requir ed expertise essential f or de veloping and utilizing biosaf ety requir ements. Training of scientis ts and o ther experts in v arious biosaf ety r elat ed ar eas lik e r isk assessment and risk manag ement (RARM), monit oring, de tection of GMOs, biosaf ety guidelines and r egulations, ar e therefor e, very important.

While concluding he mentioned t hat t he regional collabor ation will be needed in t he ar eas of capacity building, tr aining of scientis ts, leg al experts and adminis trators, w orkshops, shar ing of inf ormation (on all aspects of biosaf ety and document ation of pr oblems, and on RARM), de velopment of dat abase, har monization of biosaf ety pr ocedur es, RARM (capacity and me thodologies), s trengthening of quar antine sys tem, collabor ativ e r esear ch (on f ood, f eed, and en vironment al saf ety of GMOs, developing s tandar dized me thods f or GMO de tection), and s trengthening of r egional pr ograms suc h as Asian BioN et and APCoAB.

A paper entitled A gricultur al Bio technology in China: S tatus and P erspectiv e was pr esent ed by Zhangliang Chen in whic h he indicat ed t hat t he Chinese go vernment belie ves t hat ag robio technology

offers an important new tool for agricultural production and country food security. Thus the Government strongly supports more than 200 agrobiotech R&D laboratories in China. However, the safety debates and trade policy on GMO today in the world are greatly affecting application of the technology in China. The Chinese government has, therefore, been cautious in approving commercialization of transgenic crops.

China was the first country in Asia to introduce GM crops in 1996. Since then, a large number of transgenic crops have been approved for pre-production field trials, and some (cotton, green pepper, petunia and tomato) are grown commercially. The area under GM crops in China is growing at a much faster rate. About 5 million farmers are growing Bt cotton. In 2004, nearly 3.7 million hectares was under GM crops.

Chen stated that in China, many research institutions are developing transgenic plants with traits like improved yield, herbicide-tolerance, stress- and disease-resistance, and quality (nutrient improvement). The National Biosafety Committee also approved the production of GM X-21 rice in November 2004, after extension field testing for 7 years. However, the government has yet to give its final approval. The National Regulation on Safety Management on Agricultural GMO consists of:

(1) Final approval by the Committee consisting of several ministries;

(2) Production trials for GMO before commercialization;

(3) Labeling requirement; and

(4) Import regulation.

Chen concluded that adoption and commercialization of transgenic crops is faced with the challenges related to environmental safety, food safety, and public acceptance and trade issues. Harmonization of international regulations of GM crop production is the key issue today, which we should jointly address.

Another case study on Agricultural Biotechnology in India: Status, Opportunities and Challenges was presented by G. Kalloo in which he presented an account of biotechnology activities conducted by the different institutions led by ICAR and by the private sector. These activities are on tissue culture (potato, banana, sugarcane, medicinal and aromatic plants), molecular breeding (improved molecular markers, mapping populations, QTL mapping and marker assisted breeding in various crops such as rice, maize, wheat, sorghum, pigeon pea, soybean, potato, tomato, sugarcane, banana, grape), transgenics (novel genes and promoters, improved regeneration and transformation protocols, biosafety, public awareness), and genomics (structural and functional genomics for important traits in rice, wheat, maize, chickpea, brassica, tomato, and banana). Biosafety regulation of biotech crops requires review and approval at various levels such as the Institute Biosafety Committee, the Review Committee on Genetic Manipulation (RCGM) under Department of Biotechnology and the Inter-Ministerial Genetic Engineering Approval Committee (GEAC) under MOEF. In March 2002, GEAC approved commercial cultivation of three Bt cotton varieties of MAHYCO's (MECH12, MECH162 and MECH184) for a period of three years. There are now nearly 20 hybrids available. The first commercial planting in 2002 was done in total area of 44,500 hectares covering six states. In 2005, more than 700,000 hectares is planted to Bt cotton. While concluding Dr. Kalloo stated that biotechnology research in India is addressing the challenges of improving productivity, countering the biotic and abiotic stresses, enhancing the nutritional quality, value addition and export orientation, and global competitiveness and system sustainability.

An Assessment of the Perspectives within Future Harvest Centers of the Consultative Group on International Agricultural Research Approach to Biotechnology and Biosafety was presented by R.S. Ziegler. He shared the current status of discussions within Future Harvest (FH) Centers of the CGIAR regarding important biotechnology issues, such as biosafety and regulatory issues, and Intellectual Property issues and the private sector research.

He indicated that the CGIAR Centers firmly believe that biotechnology research has a significant role to play in achieving food security and alleviating poverty in developing countries. It has potential to help improve livelihoods, preserve the environment and reduce environmental impact of agriculture in developing countries. However, biotechnology is not a silver bullet and it rather complements many approaches. The FH Centers approach to biotechnology is as follows:

(1) Biotechnology *per se* is neither safe nor unsafe;

(2) Only 'products' of biotechnological research can be so attributed; and

(3) Products need to be examined and tested case-by-case.

The different tools and uses of biotechnology in FH Centers are: genomics, molecular markers, genetic engineering, tissue culture and micro-propagation, *in vitro* selection, diagnostics and epidemiology, vaccine development, and animal nutrition. The centers see the potential for transgenics to offer important options for meeting food demand and environmental challenges. In several countries where FH crop research centers are located (India, the Philippines, Colombia, Mexico, and Indonesia), commercial production has already been approved. To date the adoption of biotech crops continuously rises across developed and developing countries. As controversies arise, the FH Centers engage in public dialogue on a range of issues (biosafety, food safety, trade issues, intellectual property rights, and ethical and cultural issues). While CGIAR member countries will unlikely reach consensus on every issue, it is crucial that all countries adopt science-based policies.

Zeigler further emphasized that on biosafety and regulatory issues, FH Centers: (1) will comply with all relevant national and international legislation, treaties and guidelines, or regional biosafety, food, environmental, and policy regulations; (2) will not conduct research on genetically engineered organisms in any country lacking such regulations; (3) may voluntarily adhere to more stringent standards than the national minimums; (4) will not make GMOs available in a country without that country's prior informed knowledge, consent and support; and (5) will work with national partners to help develop capacity, strategies and methodologies.

In concluding remarks, Zeigler stated that on IPR issues and the private sector, FH Centers will work to ensure that new opportunities and solutions are available as international public goods, i.e. with as few restrictions as possible. Moreover, the centers will complement private sector research that may otherwise fail to reach the poor.

SESSION II: ISSUES (BIOSAFETY, IPR AND REGULATORY MEASURES)

Chairperson: Robert Zeigler, IRRI
Co-chairperson: Thomas Lumpkin, AVRDC

There were four papers presented in this session, on issues such as biotechnology and biosafety capacity building, regulatory measures, IPR, and access to biotechnological innovations from the private sector perspective. Following are the highlights of the presentation:

Andrea Sonnino addr essed in his pr esent ation im portant issues r elating t o Bio technology and Biosaf ety Capacity Building. He pr esent ed t he follo wing anal ysis of cur rent bio technology applications and t he role and activities of F AO in t his ar ea:

There is a hug e po tential of bio technology in f ood secur ity if it is (1) pr operly int egrated wit h other technologies, (2) accom panied b y a sys tematic r isk assessment and manag ement (biosaf ety sys tem), and (3) used t o addr ess f ood secur ity and o ther k ey agricultur e challeng es of poor countr ies. Ho wever, there are problems associat ed wit h GMO cultiv ation, mainl y: (a) t he need f or hea vy regulat ory sys tems, (b) t echnical com plexity suc h as coe xis tence, pr eser ved identity , refugia among o thers), (c) t oo competitiv e-monocultur es, illeg al cultiv ation, (d) def iciencies of e xtension ser vices, and (e) im proper utilization – wr ong e vent, wr ong r ecipient v ariety.

Sonnino highlight ed that in t erms of in vestment, t en top multinationals fr om indus trialized countr ies have invested a t otal of US$ 3 billion or 96% of t otal in vestments in bio technology . All commer ciall y released GMOs w ere de veloped b y US pr ivate com panies f or US mar kets (e xcept in China). The tr aits and cr ops ar e for t emperate climat e and mec hanized ag ricultur e. Few countr ies, ho wever, benef it from spillo vers. Bio technology activities in de veloping countr ies ar e mos tly at t he resear ch le vel, wit h se veral f ield tr ials, and limit ed commer cial application.

To ensur e access t o inf ormation, F AO has de veloped a dat abase (BIODEC) on t he s tatus of de velopment, adop tion, and application of bio technologies in de veloping countr ies (http://www .fao.or g/bio tech/ inv ent ory_admin/dep/def ault.asp). F AO pr ovides t echnical assis tance t o de veloping countr ies in t he areas of: (a) identif ication of needs (t hrough r egional or sub-r egional sur veys, w orkshops or t echnical consult ations), (b) national policies, (c) r egulat ory f rameworks, and (d) tr aining and f acilities. In capacity building f or biosaf ety, FAO has pr ovided leg al assis tance t o dr aft national legislation, tr ain r egulat ory bodies in r isk anal ysis, tr ain scientis ts and t echnicians in GMO de tection, and communication and public a wareness f or jour nalis ts/media, sc hool t eachers, e xtension of ficer s, policy mak ers, and community leader s. R egional or sub-r egional pr ojects and ne tworks suc h as REDBIO, Asian BioN et and APCoAB ar e initiat ed and suppor ted. Mor eover, FAO builds par tnership wit h other int ernational organizations suc h as UNEP , WHO, WFP.

Sonnino fur ther em phasised t hat t he follo wing ne w challeng es ar e recognized: full enf orcement of Cartagena Pr otocol, locall y de veloped GMOs, pos t-r elease monit oring, socio-economic consider ations, and r egional v ersus national pr ior ities/concer ns. In or der t hat de veloping countr ies shall benef it full y from ne w technologies, F AO shall assis t member countr ies in policy f ormulation, legislation de velopment for biosaf ety, PGRs and IPRs, and capacity building.

Manju Shar ma in her pr esent ation highlight ed im portant issues concer ning R egulat ory Measur es. She gave a br ief r eview of bio technology issues suc h as biosaf ety, food saf ety, consumer issue on labelling, and IPR. She cit ed t he biosaf ety r egulation in India and shar ed her insights on t he matt er. The biosaf ety r egulation in India w as issued in 1 989 b y t he Minis try of En vironment and F or ests under the Environment (Pr otection) A ct 1986. The no tif ication has se t the rules f or manuf actur e, use, im port, expor t and s torage of hazar dous micr oor ganisms/g ene tically engineer ed or ganism or cells. The notif ication has also se t up v arious le vels of committ ees consider ing t he le vel of r isk in volved. These committ ees ar e: R ecombinant DN A Advisor y Committ ee (RD AC), R eview Committ ee on Gene tic Manipulation (R CGM), Ins titutional Biosaf ety Committ ee (IBSC), Gene tic Engineer ing Appr oval Committ ee (GEA C) and S tate and Dis trict le vel Bio technology Coor dination Committ ees (SBCC & DBCC).

Sharma further informed that a Task Force on Applications of Agricultural Biotechnology under the Chairmanship of M.S. Swaminathan submitted a report to the Ministry of Agriculture for streamlining the regulatory procedure and speeding up the clearances. The guiding principle of this report is "National Agricultural Biotechnology Policy should be the economic well being of farm families, food security of the nation, health security of the consumer, protection of the environment and the security of our national and international trade in farm communities." The Task Force recommended a National Agricultural Biotechnology Regulatory Authority. Another Task Force on Recombinant Products for Pharma Sector chaired by R.A. Mashelkar has also suggested reorganization of the existing structures in order to have a 'single window' clearance mechanism.

She further emphasized that the present regulatory procedures take time, especially when biosafety and agronomic evaluation are not conducted concurrently. Reducing the time-gap is the key in the innovation chain starting with research in the laboratory to the greenhouse, to the limited field trials and finally, large-scale field trials in the farmers' field. If the time can be reduced without compromising the safety protocols, it will reduce the frustration of not only the scientific community, but also the farmers and industry. Proactive research on GM crops, generation of agronomic data, correct interpretation and analysis of the agronomic trends are some of the areas in which research protocols need to be generated by various countries. Although, it is essential to have a 'single window' system for clearances, yet decentralization at various levels will also be important. It is time that each country develops a regulatory mechanism which will be able to stand the test of all the scientific queries and investigations, which would be less time consuming, which will also give opportunity to the farmers to learn the new agronomic practices for transgenics and which would, at the end, lead to the commercialization of the GM crops taking note of the plant variety protection issues and the intellectual property rights. The ultimate objective is to give farmers full satisfaction about the importance, efficiency and higher productivity, nutritional and economic value of a particular crop. Rigorous training programs for the farmers need to be conducted to introduce precision farming, molecular breeding programs and large-scale cultivation of transgenic crops with desired novel traits introduced through genetic engineering. Broad guidelines can be taken up from the countries which have had success. However, the regulatory measures must be in conformity with the national regulatory procedures. The labeling of GM crops especially used for edible purposes also requires an appropriate regulatory system. It has to be a joint responsibility of governments, scientists, industry and the farmers to put in place a proper regulatory system based on sound scientific principles, easy to implement and replicable and last but not the least, should be acceptable to the farming community.

Sharma concluded that each national government, as per its rules and regulations and the laws of the land, needs to have a regulatory policy for biotechnological interventions in agriculture and for food and nutritional security. The key to an efficient regulatory mechanism must be the basic principle of science, efficiency and speed with which papers move. Single window approach can be useful provided the consumer, the industry and the scientists understand the guidelines and procedures. Number of steps need to be taken starting from transgenic research in laboratories, greenhouse experiments, contained field trials, large-scale field trials and seed production and finally commercialization. The time between various steps must be reduced. An appropriate legal framework is also essential as part of the regulatory procedure for plant varietal protection, rights of the farmers and IPR. Biotechnology offers enormous potential with the rapid advances taking place in genomics, cell biology, crop and plant breeding and in developing new molecular approaches and precision farming methods. Human and animal safety and environmental protection are the three major factors to be taken note of for safety and thus, regulatory procedures need to be conducive to the farming community and the living beings.

Victoria Henson- Apollonio made a presentation on Recent Developments in IP Laws and Practice. She gave an account of recent developments in international agreements, regional/bilateral agreements, national laws and contract laws. She provided some examples of activities and offered recommendations for future action.

The following international agreements were highlighted: International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), Convention on Biological Diversity (CBD), Trade Related Aspects of Intellectual Property of the WTO Agreement (TRIPS), UPOV, and WIPO Development Agenda.

- The ITPGRFA which came into force on 29 June 2004 builds on the International Undertaking. It provides for a multilateral system (MLS) for exchange of plant germplasm as listed in Annex 1 of the Treaty. Exchange will be under a Standard Material Transfer Agreement (SMTA) which will be adopted by the Governing Body (members states) in June 2006.
- The CBD *ad hoc* Working Group on Access and Benefit Sharing held its 3rd Meeting in February 2005. The first meeting of the *Ad Hoc* Open-ended Working Group on Review of the Implementation was held in Montreal from 5 to 9 September 2005. The Cartagena Protocol on Biosafety negotiated under the CBD, which came into force in September 2003, had met in July 2005.
- The TRIPS concerns the disclosure of country or origin of source of biological material or traditional knowledge, Prior Informed Consent (PIC), and Equitable Benefit Sharing, in patent application.
- UPOV concerns on the release of information associated with protected varieties. UPOV currently in talks with several APAARI countries regarding membership in UPOV.
- At the June 2005 Meeting of the WIPO Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore (IGC), it was decided to recommend that the WIPO General Assembly renew its mandate as it stands for a further two years.

Regional and bilateral Free Trade Agreements (FTAs) have proliferated in the region following the setback of the WTO Ministerial Conference in Cancun in September 2003. Thailand is reported to have initiated agreements with ten countries and hoping to conclude most of these in 2005.

Henson- Apollonio further stated that special interest to this dialogue is the information that several countries in the Asia-Pacific region have either drafted or passed their national IP laws and other legal instruments, namely: Australia (houses its PVP administration in IP Australia), Bangladesh (draft PVP law), Chinese Taipei (2004 PVP law scheduled for enactment June 2005), Japan (created a special patent court in 2003), Malaysia (administration of IP has been put in the Intellectual Property Corporation of Malaysia; and UPOV in discussions regarding PVP bill compliance), Nepal (acceded to the Berne convention in October 2005), Pakistan (*sui generis* PVP bill being promulgated), Sri Lanka (draft PVP bill based on UPOV 1991), Thailand (formulated Biotechnology Framework 2004-2011), and Vietnam (Ordinance on Plant Varieties in force, April 2004).

Henson- Apollonio concluded by stating that APAARI member countries should: (1) utilize broad range of experiences available among them; (2) join the ITPGRFA; (3) look for experience that they have within each country; and (4) inventory intellectual property assets and publicly disclosed least

contr oversial ones. She quo ted the World In vestment R epor t, 2005, UN CTAD, that " Trade secr ets may in f act be e ven mor e im portant t han pat ents f or a countr y to be able t o attr act FDI in R&D".

A Cor porate Foundation P erspectiv e for Access t o Bio technological Inno vations w as pr esent ed by Andr ew Benne tt. He e xplained t he mission of Syng enta Foundation f or Sus tainable A gricultur e, i.e. to incr ease oppor tunities and c hoice f or poor r ural communities, in semi ar id-ar eas t hrough sus tainable inno vation in ag ricultur e. The cont ext and s tructur e of ag ricultur e are changing and so ar e prior ities. Application of bio technologies and access t o them should consider t hese cur rent r ealities.

Bio technology co vers a wide r ange of t echnologies and pr ocesses in whic h some ar e consider ed old such as f erment ation and nitr ogen fixation; some ne w (vaccines, monoclonal anti bodies); some accep ted (tissue cultur e, mar ker assis ted br eeding); some contr oversial (s tem cells, tr ansg enic, embr yo tr ansf er); some public goods (f erment ation); some pr oprietary (tr ansg enic tr aits and pr ocesses); and some ar e expensiv e, while o thers ar e cheap. Mor eover, some ar e consider ed saf e because t hey have been in use for man y gener ations; t heir r isk s and benef its w ell under stood while o thers ar e new and because of this t he risk s and benef its associat ed wit h them ar e not yet full y document ed and under stood.

Accor ding t o Benne tt, t here are many fact ors whic h now inf luence access t o new technologies and the de velopment and deliv ery of pr oducts of benef it t o f armers. These ar e: sys tems f or access, availability and deliv ery of t echnologies t o f armers, in vestment in r esear ch and o wner ship of technologies, licensing ag reements, r egulat ory requir ements, managing r isk s and uncer tainties, responsibility f or s tewardship, and f ormation of par tner ships.

There is an e volving leg al, social and political cont ext wit hin whic h bio technologies oper ate. It is dif ficult t o insur e and a void r isk s associat ed wit h the follo wing: (1) f ailur e to de velop and deliv er varieties t hat ar e reliable, accep table and af fordable, (2) unr ealis tic e xpect ation of t he pr oducts ('o ver-hyping' t he technology), (3) f ailur e to obt ain t he necessar y freedoms t o oper ate (IP), (4) dela ys, for a v ariety of r easons, incr easing cos ts, (5) human er rors suc h as spr aying of e xper iments wit h pes ticides and f ailur es of s tewardship suc h as accident al r elease of mat erials, (6) insuf ficient ins titutional capacity and infr astructur e to handle t he tasks and t o deliv er pr oducts t o f armers, (7) absence of clear , robus t policy and leg al (biosaf ety) fr amework for t he manag ement and r elease of tr ansg enics – uncer tainty o ver r egulat ory requir ements, (8) loss of conf idence and par tner ship t hrough mis takes, non-per formance and dela ys, (9) insuf ficient f inancial r esour ces t o com plete the project, (1 0) sus tained opposition and activ e cam paigning ag ains t the use of tr ansg enic t echnologies despit e any evidence of harm to healt h or t o the en vironment, leading t o over-cos tly regulation, insuf ficient f inancial r esour ces, loss of consumer conf idence, mar ket resis tance or non-accep tance of t he technology , and (1 1) f ailur e to put in place, im plement and sus tain, ef fectiv e pos t-r elease r esis tance manag ement and monit oring sys tems, leading t o a loss of ef fectiv eness of t he technology .

Benne tt fur ther em phasized t hat a be tter under standing of r isk and ear ly de tection is quit e essential. This can be done b y (1) identifying t he po tential r isk s, t he lik elihood of t heir occur ring, t he scale of their im pact, possible count er-measur es, t he means f or seeing t hem coming, and t he ability t o respond quic kly; (2) es tablish s trong t echnical advisor y and e xecutiv e committ ees t hat mee t regular ly; (3) assign clear r oles and r esponsibilities f or all t he par tner s; (4) pr ovide s taff training; (5) de velop ef fectiv e repor ting and inf ormation sys tems – vigilance and r esponse; (6) encour age transpar ency and eng agement wit h all s takeholder s and de velop a dialogue wit h them on t he issues; (7) build tr ust amongs t the partners; and (8) mak e decisions – e ven if t hey are unpopular – and im plement t hem. R egulation is also necessar y but should be r ealis tic. While t he aim is t o pr otect socie ty and t he en vironment and build conf idence, s tandar ds mus t be clear and enf orceable, and r esponsibilities of k ey people and

institutions are clear. Regulation should balance precaution with proportion and may be modified with experience.

He further pointed out that the partnerships are able to help manage risk – but they cannot remove it. Partnerships must be voluntary and purposeful. The key to successful partnerships are: (1) leadership and preparedness to take risks; (2) clear responsibilities and shared objectives; (3) incentives and rewards; (4) acceptance of different motivations and comparative advantage, but a balance between the partners; (5) access to resources; (6) trust and transparency; (7) time; and (8) progress and luck. When introducing transgenic crops public and private partnerships could be a fruitful ground for purposeful partnerships aimed at better and quicker delivery of products of biotechnological research for the benefit of farmers. Many of the skills and experience are in the private/business sector and hence can be harnessed effectively.

SESSION III: MINISTERIAL ROUNDTABLE ON NATIONAL DEVELOPMENTS

Chairperson: Secretary Mr. Domingo Panganiban, Philippines
Co-chairperson: Deputy Minister Dr. Jafar Khalghani, Iran

There were four presentations during this session: Iran, the Philippines, Sri Lanka and Thailand. The aspects highlighted were: the priority accorded to biotechnology by each government, the enabling environment under which biotechnology operates the scope of R&D, and the success to date with respect to commercializing products of bio technology, both conventional and modern.

Agricultural Biotechnology in Iran: History, Policy and Achievements

Dr. Jafar Khalghani, Deputy Minister of Agriculture, Iran

Dr. Khalghani in his presentation highlighted that bio technology in Iran started 80 years ago and is currently one of the three top priorities in science and technology. A Higher Council for Biotechnology composed of the President, seven Ministers, three Deputy Presidents and four experts was established as the high level policy making body. Biotechnology policies include approval of the medium term strategic plan, approval of the GM technology for both research and production, strong national financial support, ratification of Cartagena Protocol on Biosafety and establishment of National Biosafety Committee and Bio technology Clearing House (CH). There are many government institutions involved in biotechnology, conducting basic and applied researches in agriculture, medicine, environment, food biotechnology and bioprocessing, among others. The private sector is quite active. Rana Agro-Industry Corp, a pioneering private company established in 1992 in a joint venture with a British company, is successfully producing tissue cultured date palm and banana plantlets, about 200,000 plantlets per year. The first transgenic crop plant released in Iran is rice, the first transgenic rice released in the world.

According to Dr. Khalghani, some of the challenges of bio technology are: (1) effective biotechnology policy framework compatible with international agreements, which will provide for an effective IPR regime, incentives for local investment and innovation, and enforceable science-based regulations; (2) capacity building; (3) harmonization and simplification of biosafety regulations in the region; and (4) partnership involving South-North -, as well as private-public sector collaboration.

He further informed that Iran offers to share information with NARS/IRCs, provide on-the job trainings, conduct training courses and workshops in collaboration with NARS/IRCs, exchange of "germplasm"

for "technology", and conduct joint research and development with NARS/IRCs. It expects APCoAB to: (a) strengthen capacity of developing countries in the region, in particular IPR related issues and assistance in acquisition and application of "technology"; (b) facilitate and provide a ground for constructive dialogue between the private and public sectors to promote R&D and investon biotechnology products; (c) facilitate networking for the local development of the GM technology in the region; and (d) assist in harmonization and simplification of the biosafety regulations in the region.

Breaking Grounds for the Seeds of Biotechnology

Agriculture Secretary Mr. Domingo Panganiban, Philippines

H.E. Panganiban mentioned that biotechnology research and development was initiated in the Philippines in 1979. The R&D institutes engaged in biotechnology have adequate core competencies and infrastructure. Work on transgenic for corn, papaya, mango, banana and coconut began in 1997 for disease resistance, long shelf life, quality oil and expanded to include other crops, fishes, and other traits, majority of which are in the research stage. Only Bt corn produced by Monsanto is commercialized since 2002. The country joined the mega-country group producing GM crops in 2004.

In 1990, the country established a National Biosafety Committee which developed guidelines for the planned release of GMOs and potentially harmful exotic species (EO430). DA AO 8 was also passed to regulate the import, field testing and propagation of GM plants and plant products. The Philippine regulatory system is harmonized with OECD, FAO/WHO, Codex, and Cartagena Biosafety Protocol. A National Ethics Committee on Biosafety of the Philippines was also established. The responsibilities of the different regulatory agencies implementing the DA AO 8 are: Bureau of Plant Industry (BPI) for environmental safety, Bureau of Agriculture and Fisheries Product Standards (BAFPS) for food safety, Bureau of Animal Industry (BAI) for feed safety, and the Fertilizer and Pesticide Authority (FPA) for safety for plants with pesticidal properties. There are three approved transformation events for propagation, 20 approved transformation events for direct use as food, feed, and for processing, seven approved combined trait products for direct use as food, feed, and for processing, and one approved combined trait product propagation.

On IPR, Executive Order 247 and Republic Act 9147 were the country's response against biopiracy, ensuring also that benefits accrue to the appropriate stakeholders. Likewise, the Plant Variety Protection Law in the Philippines was issued to protect the intellectual properties of technology generators.

He further informed that in 2001, the government articulated its policy on modern biotechnology, which is "to promote the safe and responsible use of modern biotechnology and its products as one of the several means to achieve food security, equal access to health services, a sustainable and safe environment, and industry development." The Philippine Agriculture and Forestry Biotechnology Agenda were formulated (PAFBA I: 1995-2005) and updated (PAFBA II: 2002-2010). In 2005, the Biotechnology Media and Advocacy Resource Center was created, the Biotechnology Week was proclaimed and the first GAWAD GALING for Biotechnology Journalism was awarded. Likewise, the Agricultural Biotech Center and Biotechnology Intellectual Property Center at the Philippine Rice Research Institute was established.

In conclusion, he emphasized that harmonization of regulations and collaborative programs for technology development and regulatory compliance still remains a challenge.

Biotechnology Status in Sri Lanka

Mr. Tissa Warnasuriya, Secretary, Ministry of Agriculture

According to Mr. Warnasuriya, the Ministry of Agriculture has given highest priority to develop and apply biotechnology to improve agriculture, livestock and fisheries sectors of the country. There are three institutions looking at various aspects of bio technology: Council for Agricultural Research Policy (CARP), Hector Kobbekaduwa Agrarian Research and Training Institute (HAR&TI), and Institute of Post-harvest Technology (IPHT). CARP has formed a National Steering Committee on "Plant Breeding" and "Bio technology" with the involvement of both the public and the private sector. This committee has formulated national priorities in Bio technology Research (2003-2008). It is developing an Investment Plan on Bio technology R&D to privatize the areas of research that has potential for local application. On the other hand, HAR&TI is engaged in bringing in agrarian reforms through education and training and rural institutional development. HAR&TI has recently reviewed bio technology applications, the constraints and models of partnership. IPHT is engaged in using R&D outputs in the industry and rural agro-based enterprises in poverty reduction and employment generation.

Mr. Warnasuriya further mentioned that with regard to bio technology commercialization Sri Lanka still is in an evolving process. Some modest applications include (a) nitrogen fixing inocula for soya bean root nodules; (b) tissue culture of banana, potato, pineapple, cinnamon and cardamom; (c) hybrid seed development for 25-40% yield increase in maize, capsicum, brinjal, tomatoes, chilli and rice; and (d) DNA finger printing of under utilized crops (Amla, Woodapple and Anona) and livestock (domestic cattle and fowl). The challenge is to use modern biotechnology tools in combination with conventional methods, which Sri Lankan scientists are currently addressing.

Biotechnology for Food Security and Poverty Alleviation: Thailand's Opportunities and Challenges

Dr. (Ms.) Supranee Impithuksa

Dr. Supranee Impithuksa of Department of Agriculture, presented the status of bio technology and biosafety of GM crops in Thailand, cited the specific case of viral-resistant transgenic papaya, the challenges and strategies in development and utilization of bio technology. Thailand is one of the countries that realize the importance of bio technology as an alternative tool to achieve food security in a sustainable manner. The National Bio technology Policy Framework (2004-2009) spells out the goals for bio technology development in Thailand, namely: emergence and development of new bio-business; promotion of Thailand as the Kitchen of the World; healthy community and health care center of Asia; environment conservation and clean energy; self sufficient economy; and human resource development.

She mentioned that the development of transgenic plants for quality improvement, tolerance to abiotic stresses and resistance to pests and diseases has been accorded high priority. Biotechnology applications including genome sequencing, gene cloning, marker assisted selection, and the implications of genetic engineering are used in R&D projects aimed for crop variety improvement and increasing productivity. Transgenic plants have been developed in several crop species for a variety of traits. Some of the transgenic lines are being tested at field scale. The viral resistance papaya is the first transgenic plant to be in an advanced stage of evaluation. It was developed through a direct collaboration between the government of Thailand and Cornell University. The transgenic papaya however, is covered by intellectual property rights which is now being managed to ensure that the technology will be available to the rural communities.

She highlighted that the biosafety Guidelines on Genetic Engineering and Biotechnology for laboratory work, field work and planned release of GMOs, were finalized in 1992 and updated in 2002. A National Biosafety Committee and a total of 25 Institutional Biosafety Committees were established. Although many research and development projects on genetically modified plants have been established, the Thai government still does not allow commercial release of genetically modified plants until proven that they are safe. The Ministry of Agriculture and Cooperatives issued a notification under the Plant Quarantine Act B.E. 2507 (1964) as amended in B.E. 2542 (1999), which specified 89 transgenic plant species from all sources as prohibited materials for importation unless permitted for research purposes. Several GM crops have undergone biosafety testing and assessment in accordance with the Biosafety Guidelines. A specific law on biosafety has recently been in consideration. Several laws that are applicable for the protection of biotechnological products are the Patent Act, Plant Variety Protection Act, Bill on the Law of Trade Secret, and Thai patents. Thai patent is still struggling with protection for DNA, genes and proteins. Thailand needs to continue strengthen its capacity for the development of human resources, research and technology, regulations, and programs on assessment and management of biosafety based on transparent and science-based approaches. While the use of gene technology applications is wider and much appreciated for use in the pharmaceutical area, negative perception against GM crops in Thailand remains. The need for increasing public awareness is critical. The implication of intellectual property rights as experienced from the viral resistant transgenic papaya is of utmost concern, and the capacity for managing IPR must be strengthened.

GENERAL CONCLUSIONS

Biotechnology is accorded high priority by most of the Governments. They are committed to enhance investments in R&D. The enabling environment under which biotechnology operates varies from country to country. Some have formulated biotechnology policy framework with goals of food security, poverty alleviation, environmental conservation, market competitiveness etc. There are NARS which are advancing much faster than the others in commercializing biotechnologies such as transgenics. Others are approaching it with caution. In countries with more advanced biotechnology work, regulations need to be streamlined and enforced; risks must be effectively assessed, monitored and communicated. Developing NARS need to develop the necessary core competence and infrastructure. National laws and practice related to development and utilization of biotechnology need to be harmonized with international laws/agreements to promote purposeful partnership. The capacity to formulate the legal instruments and regulatory guidelines should be strengthened. APAARI-APCoAB and FAO should assist developing countries to strengthen their capacity so that they too benefit from the tremendous potentials of biotechnology. They should provide them with more opportunities to share information, knowledge and expertise, and network together among themselves, with other regional and international institutions as well as with the private sector that have the skills and the experience. While the process of developing and applying biotechnologies may be long and tedious, food security and poverty alleviation may actually be attainable.

SESSION IV: BIOTECHNOLOGY FOR INTERNATIONAL PUBLIC GOODS

Chairperson: William Dar, ICRISAT
Co-chairperson: Ola Smith, GFAR

In this Session, three papers were presented: two focused on GM food regulations, and one on biotechnology tools other than genetic engineering.

Ingo Potrykus made a presentation on GMO technology and Malnutrition: Public Sector Responsibility and Failure. The message of his paper was based on six years of experience from the Humanitarian Golden Rice project, whose aim is to transfer the benefits of a scientific breakthrough to the needy in developing countries. The initiative is an example of a public-private partnership in which the public gains access to the technology, while the private (Syngenta) gains commercialization rights even though these rights were eventually not claimed. Golden Rice could substantially reduce Vitamin A malnutrition in rice-based societies, but can not yet do so, because its deployment is severely on account of 'extreme precautionary regulations'.

Potrykus emphasised that the technology consisted of biofortifying rice with Vitamin A which became possible through genetic engineering. The potential impact of this technology lies in the fact that one Golden Rice seed has the potential to produce in two years food for 100,000 poor people, who will benefit from a food security as well as health aspect. Ex-ante studies in Bangladesh, India, and the Philippines have suggested that adoption by developing countries in Asia would result in economic gains of US$ 15.2 billion globally. Because of GMO regulations the availability of Golden Rice may be delayed by another six years and will not reach the farmers before 2009. According to him, the present regulations require a thorough safety assessment (for GMOs only) which includes a detailed description of the genetic modification (methods used, function and regulation of the gene(s), characterization of the gene in the modified organism, stability of the genetic changes, general safety issues (history of use, nature of new protein, impact from potential transfer into cells of the human digestive tract), toxicological issues (levels of naturally occurring toxins, potential toxicity of new protein, potential allergenicity of new proteins, level of naturally occurring allergenic proteins), and nutritional issues (nutrient analysis, levels of anti-nutrients, ability to support typical growth and well being). These requirements take a minimum of six years for a team of specialists and cost US$ 20 million.

He further highlighted that the extreme precautionary regulation is unjustified and irrational. The benefits of GMO technology will become available for food security and poverty alleviation only if regulations are changed from the present 'extreme precautionary attitude' to science-based 'rational regulations', and these regulations are applied with 'common sense' and not with ideological attitude.

A paper entitled "International and developed country regulations of genetically modified crops and their effects on developing countries" was presented by Mark W. Rosegrant. His presentation highlighted the interactions between domestic policies on agricultural biotechnology and international agricultural trade for developing countries, offered policy solutions to satisfy domestic and international economic objectives in developing countries, and cited the current research of IFPRI on the matter.

Rosegrant informed that the GMOs to date are cultivated in 17 countries, covering a total of 81 million hectares, and benefiting 8.25 million farmers. About 96% of production is in five countries, namely, USA, Canada, Argentina, China, and Brazil. GMOs are mainly four crops (maize, soybean, cotton and canola) and only one transgenic food crop commercialized (papaya in the US). Many developing countries want to remain "GM free" at any price, even rejecting food aid. Many Asian countries have adopted biosafety regulations for the planting of GM crops, but only a few have implemented policies related to the marketing of GM food, waiting for decisions at the international level.

Trade regulations of GM food include any regulation targeting GM food that directly or indirectly affect trade, such as import approval regulations (safety risk assessment), and marketing regulations (labeling, documentation, traceability and segregation). There is great heterogeneity of domestic regulations among countries. Among developed countries, the EU requires strict import approval,

mandatory labeling for GM food and GM derived products and traceability requirements; the US requires voluntary safety approval, and voluntary labeling on substantially equivalent (all current) GM crops; and Japan, Republic of Korea and Australia adopt intermediate approaches. Among developing countries, China and Brazil require mandatory labeling, while South Africa and Argentina adopt voluntary labeling. In many developing countries, regulations are either not enforced, not implemented, not introduced, or no regulations at all. Many countries are in a "wait and see" position.

There are organizations dealing with international harmonization efforts but only three organizations are directly regulating GM food outputs, namely, UN FAO/WHO Codex Alimentarius, UN Cartagena Protocol on Biosafety (BSP), and World Trade Organization (WTO). Efforts at international harmonization of trade regulations have so far not been successful.

According to him, the effects of international regulations on developing countries are: (1) Fear of export loss to importers with stringent regulations makes certain developing countries reject GM (food) crops; and (2) Adopting stringent labeling requirements to satisfy export markets. Harmonization can facilitate trade through standardization but stringent mandatory labeling likely reduces domestic consumption and production of GM, raises prices of domestic non-GM because of concern over export markets; and voluntary labeling and certification with segregation could provide access to EU/Japan, with price premium for non-GM food. Developing countries could adopt the following economic objectives, to be able to respond accordingly, namely:

(1) Maintain or develop export opportunities,

(2) Lower consumer prices and large food quantities available to consumers,

(3) Manage biosafety risks and consumer acceptance, and

(4) Sustainable increase of agricultural productivity and farmers' revenues.

The policies recommended to meet these four economic objectives are: (1) Adopt international scientifically based standards for safety approval (food and imports) regulations, (2) Develop segregation options for GM and export sensitive non-GM crops and domestic niche markets, (3) Adopt adequate information provision without raising costs of food (voluntary labeling, minimum necessary information for traded commodities), and (4) Authorize use and import of beneficial and safe GM crops that are adapted to regional constraints, with high income potential for farmers.

Rosegrant cautioned that the international regulations will continue to affect future expansions of the technology. WTO dispute and BSP information requirements are likely to have a direct impact on the use of transgenic (food) crops in many developing countries. Full international harmonization is unlikely especially on labeling. Trade linkages confer a large power to importers, affecting regulations and technology choice in many developing countries. As a result, we can expect that the global future of GM food crops will depend significantly on large developing countries' decisions such as GM rice in China. With often unenforceable regulations, increasing evidence of profitability of GM crops, there will be likely increase of illegal movements of GM seeds, and more DNA tests in countries by NGOs, private seed companies, governmental agencies or international institutions. It is recommended that (1) potential solutions such as segregation be adopted to respond to a dual demand if exports are jeopardized and adequate information policies that are not excessively costly; (2) food trade issues should be explicitly taken into account within the Biosafety Protocol; and (3) more quantitative policy studies need to be conducted. IFPRI's current research work provides (a) quantitative analysis of effects of international regulations on developing countries such as India, Bangladesh, Indonesia, Philippines, and Kenya; and (b) quantitative evaluation of the global effects of Biosafety Protocol's proposed stringent information requirements.

Claire Lanaud presented her paper on "From Genetic Resources to Marker Assisted Selection". This paper focused on biotechnology application other than genetic engineering and demonstrated their usefulness on three specific crops, i.e. sugarcane, cocoa and rice. The techniques used include molecular marker approaches such as marker-assisted selection (MAS), genetic mapping, quantitative trait loci (QTL), gene discovery, and functional genomics. Some of the outcomes were: tracing origin and domestication history, traits characterization, construction of new varieties, and improved quality traits.

She further mentioned that biotechnology provides powerful tools to increase our knowledge on crop diversity and on trait's determinism. Genetic resources (GR) provide the foundation for sustaining agricultural production; biotechnology could provide tools to better exploit and valorize GR collections and characterization data, encouraging their maintenance. With advances made on model species, many orphan or complex species could benefit from this information to facilitate their improvement. They will allow controlling the construction of new varieties and improving them for resistance, productivity or other complex traits. They will be more powerful if they are integrated in classical breeding activities, and linked with other agronomical and biochemical approaches.

SESSION V: GLOBAL/REGIONAL PARTNERSHIP INITIATIVES

Chairperson: Shinobu Inanaga, JIRCAS
Co-chairperson: Gabrielle Persley, Doyle Foundation

In this Session, four papers were presented: one on global, two on regional, and one on inter-regional partnerships. The salient features, current status and future directions to strengthen such partnerships were discussed.

Ola Smith made a presentation on "Global Partnership Programs". He stated that the Global Forum on Agricultural Research for Development (GFAR) was founded in October 1996 by a group of stakeholders to promote the development of new knowledge and capacity based on Partnership and Innovation approach that relies on the building of strategic alliances among various stakeholders. The thematic areas of research being addressed are: (1) genetic resources management and biotechnology, (2) natural resources management and agro-ecology, (3) commodity chains and under-utilized species, and (4) policies, management and institutional development. GFAR stakeholders currently have two specific tools to foster partnerships, namely (1) Competitive Funding Mechanism, and (2) the Global Partnership Program (GPP).

A GPP is a collaborative program, project or activity initiated, developed and implemented by recognized GFAR stakeholder groups, and which remains open to participation by other stakeholders as and when they find a suitable niche. It exploits the comparative advantages of participating stakeholders, does not reinvent the wheel, and is implemented at the most effective level – local, regional or global. GPPs reflect and demonstrate the GFAR guiding principles of partnership, complementarity, additionality, and subsidiarity. Priority GPPs have so far been selected based on the four criteria: (1) relevance of the program to the goals and objectives of food security, poverty alleviation and environmental sustainability; (2) existence of a lead stakeholder institution that will drive the initiative; (3) adoption of an integrated approach that covers not only research activities but also post-harvest and marketing development efforts or policy framework that promotes impact; and (4) potential for the development of a coordinating mechanism that facilitates dialogue among stakeholders and donors for the development of the program. The four biotechnology related proposals discussed for GPP have been: a global network on trait discovery in rice, a global initiative for the improvement of livestock productivity through the control of Trypanosomiasis, an initiative for the development of a common

vision for the role of biotechnology in food and agriculture and the Bio-collecting Society Initiative for protecting indigenous knowledge on genetic resources. So far, none of them has moved to the stage of a GPP.

Smith highlighted that currently, there are two GPPs on natural resource management and agro-ecology and one on the commodity chains. These are: Promoting Local Innovation in Ecologically-oriented Agriculture and Natural Resource Management (PROLINNOVA www.prolinnova.net), Direct Sowing, Mulch-based Systems and Conservation Agriculture (DMC), and the Under-utilized Species (www.underutilized-species.org), respectively. The Global Post-harvest Initiative (GPhI) is now close to becoming a full-fledged GPP. The glaring absence of a GPP on biotechnology is surprising, because it is the area of inquiry that should foster the type of partnership required to develop and implement a GPP, given its complexity and the high level of expertise required to develop appropriate interventions. The APAARI region was identified in Dresden to take the lead in fostering partnerships around the utilization of biotechnologies for poverty alleviation, food security and conservation of our natural resources. More recently, within the context of developing inter-regional collaboration around a prioritized set of activities, APAARI has offered to champion activities to which biotechnology applications could be applied.

The recent establishment of the Asia-Pacific Consortium on Agricultural Biotechnology (APCoAB) is a step in the right direction for playing this lead role within GFAR. GFAR looks forward to the continuous development of the Consortium including the development and implementation of concrete activities focused on plant (including trees) and livestock (including fish) improvement which safeguard intellectual property rights and which do not compromise human and environmental safety.

Raj Paroda gave A Brief Update on APCoAB's Activities, being a new regional initiative. The Asia-Pacific Consortium on Agricultural Biotechnology (APCoAB) was established in 2003 under the umbrella of the Asia-Pacific Association of Agricultural Research Institution (APAARI) – an initiative of Food and Agriculture Organization (FAO) that has been promoting appropriate use of emerging agri-technologies and tools in the region. APCoAB's mission is " To harness the benefits of agricultural biotechnology for human and animal welfare through the application of latest scientific technologies while safeguarding the environment for the advancement of society in the Asia-Pacific region". It serves as a neutral platform to harness the benefits of agricultural biotechnology in Asia-Pacific. The strategic areas are on thematic research networks for crop, livestock and fisheries sectors, information and communication technology, agricultural biotechnology, and post-harvest technology. APCoAB is expected to assist members in research prioritization and partnerships, conduct public awareness and capability building, provide policy advice, and facilitate knowledge dissemination online.

Paroda mentioned that APCoAB has organized workshops on regulatory mechanisms, public-private sector partnerships, and this high level policy dialogue. The salient points raised during the workshop on public-private partnerships are: the need of a mutual trust between the public and private partners; the need to change the mindset and bring in corporate culture in public sector institutions; capacity building should be done in the field of scientific policy and legal matters; private sector must invest in basic research and must have a balance between their profits and meeting their social obligations; the need to set up incubation facilities specially for nurturing start-up companies thereby encouraging early stage innovations through appropriate partnership mechanisms. APCoAB and JIRCAS supported training of scientists on marker assisted selection in Japan. It has expanded collaboration with networks such as INCANA to promote hybrid cotton and Bt cotton. It has published a status report on Commercialization of Bt Corn in the Philippines co-authored by four Philippine scientists. The draft status report on "Bt Cotton in India" is now almost ready for publication.

APCoAB is supported by APAARI, ACIAR, the Rockefeller Foundation, Monsanto and Mahyco. It is hosted by ICRISAT in India. The Steering Committee is composed of ten members representing public, international and regional institutions, as well as the private sector and NGO, namely: JIRCAS, ICRISAT, ICAR, GFAR, FAO RAP, APAARI, ISAAA, ANGOC, Thailand Department of Agriculture, and Monsanto. The ASEAN, SAARC and SPC have been approached for effective partnership.

According to him, the challenges to APCoAB are: (1) strengthen R&D collaboration among NARS, regional and international organizations and develop private-public sector partnership models; (2) strengthen national and regional capability on biosafety/regulatory aspects, and IPR related issues; (3) improve public awareness through website updating/upgrading, e-newsletter, translation of publication into local languages, publication of status reports/success stories on conventional biotechnologies and GM crops; and (4) expand inter-regional partnerships (APAARI-AARINENA-CACAARI-FARA).

Banpot Napompeth presented an account of Asian BioNet. Asian BioNet is a Project on Capacity building in Biosafety of GM Crops in Asia (GCP/RAS/185/JPN), participated in by ten countries, namely Bangladesh, China, India, Indonesia, Malaysia, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam. It was formulated to assist countries in the region in safe handling of GM crops and harnessing of the benefits derived from modern biotechnology in accordance with relevant global agreements, namely, the Convention on Biological Diversity (CBD) of 1992 and the Cartagena Protocol on Biosafety (CPB) to the CBD of 2003. The general objective was to establish and strengthen technical cooperation among Asian countries to realize the potential benefits of modern biotechnology in a safe and environmentally friendly manner through transparent and science-based principle and approach. Current activities revolve on promoting the development of national biosafety measures, intensifying an Asian network on biotechnology for harmonizing biosafety measures, and supporting and promoting R&D for safe and sustainable use of GM crops. Specifically, national stakeholders' workshops, study tours were conducted, and an Asian Biosafety Encyclopedia was published documenting the basic concepts, related instruments, current status and situation in participating countries. National and regional training workshops on various aspects include analyzing, monitoring and communicating risks associated with GM crops, GMO detection, and promotion of collaborative research on benefits of GM crops such as those concerning post-release monitoring, environmental impacts and food safety. Regional consultation meetings, Focal points/Technical experts' group meetings and internet-based information sharing were also held. An official website www.asianbionet.org was developed.

Napompeth also highlighted the challenge to institutionalize Asian BioNet after the project is completed in December 2005.

Gabrielle Persley presented a paper on Mobilizing Biosciences for Africa's Development and Prospects for Linkages between Africa and Asia. She mentioned that the Biosciences eastern and central Africa (BecA) is a New Partnership for Africa's Development (NEPAD) network of "centres of excellence". The BecA Hub is at the International Livestock Research Institute (ILRI) with new/refurbished labs and greenhouse open to scientists from region and internationally. The core competencies are identified, and biosafety and containment facilities for GM crops and animal pathogens are in place. In terms of research scope, there are four priority farming systems in Africa, 12 priority crops (maize, sorghum, cassava, sweet potato, tef and others.), five priority livestock (cattle, sheep, goats, chickens, camels), and priority traits such as drought tolerance, pest and disease resistance. On capacity building, it initiated the development of network of nodes in national institutions and universities to complement Hub, conduct of Ph.D. thesis in hosted projects, provision of short term fellowships, and creation of African Biosciences Fund for fellowships and grants at Hub and nodes. Africa and Asia share common

interests on the following: (1) research agenda such as genomics (cereals improvement – e.g. rice, sorghum, millets), trait identification (marker identification and gene discovery, e.g. drought tolerance), and livestock diseases (diagnostics and vaccines, e.g. Newcastle disease and Avian flu in chickens); (2) environmental risk assessments specifically environmental impact assessment, risk assessment methodologies and costs, and specific applications data and dossiers, e.g. Bt corn and Bt cotton in Asia; (3) human health risks (methodologies of assessing food safety and food safety of GM maize) and human health benefits (improved quality such as reduced mycotoxins in maize, and improved nutrition content such as vitamins and proteins); (4) product delivery (from discovery to delivery pathways for products; and (5) communications (risk/benefit analysis, stakeholder communications, communications with policy makers). According to her, the future challenges are (1) functioning national regulatory systems, (2) regional and international regulatory compatibility, and (3) public policy and the political will.

SESSION VI: BRAINSTORMING ON FUTURE STRATEGY

The participants were divided into two working groups to brainstorm on future strategy. The Group I consisted of countries with advanced stage of biotechnology development, whereas Group II consisted of countries in the initial stage of biotechnology development. Group I (China, India, Japan, Republic of Korea, the Philippines, Thailand, Iran, and private sector) addressed issues related to partnerships for R&D, IPR, and regulatory mechanisms, whereas Group II (all other countries) discussed issues such as partnership, capacity building and legal framework. Following are the highlights of their discussions and salient recommendations:

Group I: Countries with More Advanced Stage of Biotechnology Development

Chairperson: Andrew Bennett, Syngenta Foundation
Rapporteur: Anupam Varma, IARI

Detailed deliberations in Group I clearly highlighted that a very good progress has been made in some of the countries of the region, like China, India, Indonesia, Iran, Japan, Republic of Korea, the Philippines, and Thailand in the application of biotechnology for improving agriculture. These technologies range from micro-propagation of vegetatively propagated crops, advanced diagnostics, development of GM crops and commercialization of GM crops. In some countries, the negative perception of GM crops is very strong, due to which some Governments were forced to withdraw the approval of field release and commercialization of GM crops. Examining the present position, the following recommendations emerged:

- Biotechnological developments should address the problems identified in collaboration with the farming community, particularly the resource poor farmers of the region and these should also address gender issues.
- The overall objective of these technologies should be to help in achieving the Millennium Development goals (MDGs) of the United Nations by reducing poverty through improved productivity and income generation and equitable benefit sharing between the farmers, industry and consumers.
- To achieve the MDGs, the priority areas to be addressed in future are: to develop GM crops, as a complementary tool to traditional breeding, that are tolerant/resistant to abiotic and biotic stresses, and have better quality and use through value addition.

- The potential for improving nutritional status of the crops such as 'Golden rice' is a good example. Such efforts will play an important role in providing solution to malnutrition and deficiency diseases that are much prevalent in the region.
- The new technologies need to be robust and provide sustainable agricultural growth, while protecting the available natural resources.
- The available genetic resources must be conserved through effective use and breeding of new crop varieties using marker-assisted selection technique.
- There is a strong need to develop intra-regional, inter-regional and private-public partnership for sharing information, expertise, infrastructure and materials (under specific material transfer agreements) in order to ensure quick delivery of products. It is recommended that APAARI needs to be strengthened so that it plays a key role in ensuring active partnerships among stakeholders for achieving MDGs in the region.
- The countries in the region must play a proactive role in the capacity building.
- For the success of bio technology programs in the region, well structured dialogues be organized to change the public perception through dissemination of science-based information which is easily understandable and convincing.
- All efforts should be made at the national level to engage the decision makers, politicians, technocrats and society, for promoting bio technologies so as to meet the present and future needs of our society.
- These important recommendations should be presented in the Regional Conference of the FAO and other Regional Organizations.

Group II: Countries at Initial Stage of Biotechnology Development

Chairperson: William G. Padolina, IRRI
Rapporteur: Betty del Rosario, APAARI

This Group deliberated at length various issues that would help in building much needed capabilities in the field of bio technology especially in those developing countries that have not yet moved forward to reap the available benefits of this technology. The Group decided to address this concern in the context of the following:

1. Framework: A framework is adopted to allow the promotion of bio technology products and favorable growth of bio technology industry in countries which have made some initial investments in agricultural biotechnology research and development. The framework considers the following elements: rapid advances in science, measures to regulate the movement and release including conflict and dispute resolution, communication strategy to create public awareness, technology delivery to farmers and technical information dissemination among R&D workers, and resource mobilization at national and international levels.

The framework recognizes that countries will have to put in place their national policy on bio technology and create an enabling environment that will allow them access to new information, new knowledge and technology, develop their capacity (S&T, legal and regulatory) for national innovation systems, and regulate environment for bio technology application.

Framework for the promotion of biotechnology in Asia-Pacific: Countries at initial stage of biotechnology development

	Science	Regulation	Communication	Resources
I. Partnership				
II. Capacity Building				
III. Legal and Policy framework				
IV. Plans and Strategies				

2. Recommendations:

a. Partnerships

The development and effective utilization of biotechnologies (or products of biotechnology) would require strong partnership among several stakeholders at the national, regional and international levels. Such partnerships may involve sharing of information and experiences among NARS regarding "best practice" in developing a national policy and legal framework on biotechnology which could serve as inputs to a country's Coordinated/Integrated National Program on Biotechnology. Available advanced technologies could be shared among NARS, and capacities could be developed through existing networks within the region (intra-regional) and across other regions (inter-regional). The challenge is to find ways of promoting such partnerships so that expected benefits are reaped by the farming community at the national, regional and global levels.

(i) National level – There is a need to formulate a National Coordinated/Integrated Program on Biotechnology consistent with the national policy and national development objectives. This activity could be convened by appropriate government body and should involve different stakeholders: farmers, government ministries (agriculture, health, environment, education, science and technology, trade and industry), universities, NGO's, the private sector and consumer groups. The idea is to communicate and promote public understanding right from the start. The National Biotechnology Program shall have the following components: the Science (Research), Regulation, Communication and Funding requirement. The implementing strategies shall include partnership, capacity building and resource mobilization.

FAO and APAARI-APCoAB should formulate a simple guideline to develop a National Biotechnology Program as desired by the NARS. They should assist countries in advocating for increase in R&D investment to at least 1% of GDP as recommended by ECOSOC. The proportion of R&D investment for biotechnology will depend, however, on the country's absorptive capacity.

(ii) Intra-regional level – Each country will have to identify which will be its partner(s) based on its national interest and its development objectives. It could partner with stronger NARS in the region, such as China, India, Japan, and Republic of Korea. It could also partner with those sub-regional/regional grouping of GFAR and other regional fora, taking cognizance of the existence of other sub-regional groupings such as the ASEAN and SAARC which are based on eco-political cooperation, trade areas and networks. The following

regional networks may be considered: APAARI- APCoAB, Asian BioNet and APGREN-Secretariat of Pacific Community.

The facilitative role of APAARI-APCoAB should be fully harnessed. In collaboration with FAO, APAARI-APCoAB should help countries build capacity in biotechnology, put the regulatory measures in place, communicate for public understanding and confidence building, and act as funding broker. Specifically, APAARI-APCoAB should promote technology transfer through exchange of scientists, research materials and technologies. It should inventory research facilities so that these can be accessible for partnership. It should endorse proposals put together by countries for external funding.

(iii) Inter-regional level – There is a need to broaden partnership so that countries are not only confined within the NARS, and to take advantage of the tools available elsewhere including the non-agricultural sector. The partnership should focus on the mechanism already established by FAO and GFAR with other advanced research institutions in developed countries, including the CGIAR Centers. Linkages with other regions such as Africa (Biosciences in Eastern and Central Africa, BecA, and African Development Bank) and Latin America (REDBIO) should be fully explored.

b. Capacity Building

The country's capability in exploiting agricultural biotechnology for economic development is based on its manpower capabilities and infrastructure complements. In many countries in the Asia-Pacific region, the local technology base is weak. They have limited competence and facilities to do biotechnology research, limited capacity to do risk analysis (risk assessment, risk management, and risk communication), limited skills to communicate science-based information to policy makers and the general public, and rather weak technology transfer delivery system. As national capabilities improve and local innovative capacity is demonstrated, the limited competence of lawyers and scientists on intellectual property protection need to be addressed.

(i) Institution Development – Different institutions will play different roles in the whole biotech RDE and commercialization continuum. Their capacities to do biotech research, regulate the environment for biotech applications and disseminate information should be upgraded and enhanced. FAO should help countries raise funds to strengthen existing capacity or create new R&D Centers of Excellence (COEs). Institutions of higher learning such as universities should develop learning materials for risk communication and integrate biotechnology to enhance existing curriculum. A communication system through quarterly journals, newsletter, web sites and other media must be set up within the institution to communicate both for the technical aspects and public understanding. A feedback mechanism must be provided so that technology developers and scientists will be duly informed.

(ii) Human Resource Development – Scientists should be trained (either short term or long-term) on new trends/advances in science within the country or abroad. They should be trained in communication skills to simplify the technical concepts without losing science accuracy. APAARI-APCoAB and GFAR should assist countries look for appropriate training institutions in important areas in advanced sciences, regulation and legal aspects, and communication. Networking should be sustained to foster mutual learning through sharing of best practice. Sensitization for leaders, policy makers and decision makers (legislative,

executive and judiciary) should be conducted to raise awareness, enhance their interest, gain and sustain support to National Biotechnology Program.

c. Legal Framework

The set of regulations and norms to regulate the environment for biotechnology application shall provide an enabling framework within which biotechnology activities in a particular country will operate. This framework should have provisions for biotechnology activities from R&D, importation of biotechnology materials, to commercialization. This set of norms include the following: International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), Biosafety, IPR (PVP, patents, licenses), Bioethics, Access to genetic resources (or Bioprospecting), other related laws such as Seed Laws, Quarantine, Agro-chemicals (pesticides and fertilizers), Trade Laws, Consumer Protection, Environment Laws, Product/Process Certification/Standards, and Veterinary Medicine Laws.

Most countries lack the component of this framework, especially IPR, and would need technical assistance, on-the-job training (for instance in PVP office in another country), and internship (for instance in EU for IPR). They would need negotiation and implementation skills and competence in consensus building on harmonization protocols at the national and regional levels. FAO, APAARI and GFAR should provide support for these much needed assistance.

Conclusions:

There is a promising development of agricultural biotechnology in the Asia-Pacific region. However, countries are faced with the challenge of creating an enabling environment within which biotechnology activities will operate. Some countries lack the component of the legal framework; others lack the capacity to implement them. The higher goals of biotechnology R&D are good health, equity, and security. Biotechnology can contribute to achieve these goals through utilization of its products and technologies. However, consumer and commercial confidence must be gained before utilization can occur. To create a critical level of trust, public awareness and education should be conducted on the safety and benefits of biotech products, biosafety regulations and IPR protection. These activities should be present all throughout the biotechnology, extension, commercialization, and utilization continuum. The inputs to these activities are the clients/stakeholders, the resources, and the raw materials.

The development and effective utilization of biotechnologies (or products of biotechnology) would require strong partnership among several stakeholders at the national, regional and international levels. Such partnerships may involve sharing of information and experiences among NARS regarding "best practice" in developing a national policy and legal framework on biotechnology which could serve as inputs to a country's Coordinated/Integrated National Program on Biotechnology. Available advanced technologies could be shared among NARS, and capacities could be developed through existing networks within the region (intra-regional) and across other regions (inter-regional). There is a strong need to develop intra-regional, inter-regional and private-public partnership for sharing information, expertise, infrastructure and materials under specific material transfer agreements, and delivery of products. It is recommended that APAARI be strengthened so that it plays a key role in arranging active partnerships for achieving the common goals. The challenge is to find ways of promoting such partnerships so that expected benefits are reaped by the farming community at the national, regional and global levels. FAO, APAARI-APCoAB and GFAR can assist developing countries in the region by taking proactive role in policy advocacy, increasing public understanding, putting up the necessary legal and regulatory framework, harmonization of regulatory procedures, capacity building, and

mobilizing resources for the promotion of biotechnology to address the needs of the poor people in the region. The above recommendations should be presented to the policy makers during the Regional Conference of the FAO and other fora to draw attention of donors so that investments in R&D in general could be increased to a desired level of 1% of GDP.

PLENARY SESSION: SUMMARY RECOMMENDATIONS AND CONCLUSION

Chairperson: He Changchui, FAO RAP
Co-chairperson: H.P.M. Gunasena, CARP

The Plenary Session Chairperson Dr. He Changchui drew attention of the participants to the three expected outcomes of the dialogue as follows: (i) identification of the major priorities in biotechnology that FAO and its partners should focus on to enhance its contribution to food security and poverty reduction, (ii) recommended roles for different stakeholders in meeting these priorities, and (iii) mechanisms and modalities of enhanced cooperation and partnership among stakeholders.

Based on the reports of the different session Chairpersons and the discussions which ensued, the following major recommendations were endorsed:

1. Considering important role of biotechnology in meeting the Millennium Development Goals (MDGs), both conventional and GM biotechnological approaches need to be promoted in the developing countries of Asia-Pacific region so as to ensure effective conservation of valuable genetic resources, increased productivity of crops and income of the resource poor farmers, while ensuring environmental safety as well as agricultural sustainability.
2. Exciting developments in some countries such as China, India, Philippines, and others are clear indicators of potential benefits of biotechnology in agriculture. Other developing countries also need to move forward by adopting appropriate policies, regulatory framework and needed capacity building.
3. Agenda for research in biotechnology and National Framework should be developed keeping in view the priorities that are defined through active involvement of all stakeholders, especially the NGOs and farmers (especially the women farmers).
4. There is need to examine existing regulatory/legal framework of different countries, especially in the context of biosafety, and to ensure proper harmonization at the regional level in order to build much needed public confidence.
5. All aspects of biosafety must be given top priority, including capacity building and development of competent human resource.
6. For reaping the benefits of biotechnology at a faster pace, strengthening of Public-Private Partnership (PPP) becomes critical for which appropriate facilitation mechanisms and encouragement through high level policy interventions is critical. Existing models of partnership be examined for identifying "bright spots" for confidence building.
7. Both policy dialogues and public awareness campaigns are needed for greater support and better understanding at all levels. For future success, all existing apprehensions and fears will have to be dispelled through scientific evidences and understanding. All interested governments and stakeholders must play a proactive role to build much needed public confidence. In this context, role of media is important in disseminating proper knowledge

citing examples of "Success Stories" and "best practices". Hence, media need to be well informed.

8. For accelerating scientific progress in the field of agricultural biotechnology, it is essential that government funding for R&D is increased substantially. Role of donor community in ensuring this objective need not be overemphasized.

9. Need for building regional cooperation through active involvement of regional/sub-regional Fora such as APAARI, ASEAN, and SAARC was highlighted to be crucial for promoting agricultural biotechnology. All participants, while appreciating the establishment of APCoAB under APAARI umbrella, and Asia BioNet by FAO, reaffirmed the need to strengthen such Consortia in the Asia-Pacific region.

10. Also it was strongly recommended that organizations such as FAO, GFAR, APAARI should hence forth play a proactive role with regard to facilitation functions such as: advice in regulatory mechanisms and their harmonization; biosafety issues; proper knowledge dissemination and public awareness; catalyzing policy makers for more support for R&D; enabling environment for building strong public-private partnerships; and the capacity building especially in those developing countries that are to move forward in order to harness the benefits of biotechnology.

11. It was agreed to share these recommendations of High Level Policy Dialogue with all concerned policy makers and stakeholders in the region. These recommendations should also be put up before the various Agricultural Ministers and Government officials during the next FAO Regional Conference as well as other political bodies such as ASEAN, SAARC and APEC.

In addition to above, specific priorities, roles of stakeholders and mechanisms of partnership were defined for appropriate action by the concerned key stakeholders. These are provided in the table attached.

In his concluding remarks, Dr. Raj Paroda, Executive Secretary of APAARI, thanked the Ministers, all APAARI members (regular, associate, reciprocal), the FAO ADG Dr. He Changchui and his colleagues, the APAARI Secretariat, and all the distinguished resource persons from the public, private sector, international institutions, and NGOs for a highly satisfactory policy dialogue. He also thanked GFAR and FAO for supporting this activity. The recommendations and proceedings will be circulated to all.

Prof. H.P.M. Gunasena, Chairman of APAARI, expressed that he was very pleased and impressed about the way the meeting progressed. The meeting made a very clear message that biotechnology could be powerful tool to address MDGs. The presence of the NGOs and the private sector are quite encouraging. He noted the tremendous progress by countries to move biotechnology forward through their identified COEs. He acknowledged FAO's interest, support and capacity to help and requested the FAO ADG to initiate some activities recommended by this dialogue. He thanked the Ministers for the political will demonstrated to support biotechnology. He expressed hope that FAO will continue to support APCoAB which it initiated to assist developing countries foster new technologies for the developing world.

FAO ADG Dr. He Changchui affirmed that the Ministers' commitment inspired the views of the participants to this dialogue. He was impressed by the intellectual inputs during the discussion and was quite pleased that the presentation and discussion generated the three major outcomes he pointed out during his inaugural address, namely, (1) the major priorities in biotechnology that FAO and its

partners should focus on to enhance its contribution to food security and poverty reduction, (2) recommended roles for the different stakeholders, and (3) mechanisms and modalities of enhanced cooperation and partnership amongst stakeholders. He acknowledged that the technical dimensions, policies and legal framework are the major factors that either facilitate or hinder biotechnology development and utilization. Identification of the gaps and priority interventions to address them are critical in formulating knowledge-and science-based policy decisions, educating the public, capacity building, information sharing, and advice on policy and regulatory framework. He recognized that countries can make their own decisions and reiterated that APAARI, GFAR and FAO shall play a proactive role in policy dialogues, exchange of information and country experiences, and continue to provide relevant policy and technical advice either directly or through regional organizations such as ASEAN and SAARC, doing more follow-through, and drawing attention of donors to promote initiatives in Asia to achieve MDGs. FAO will do so recognizing its honest broker and facilitative role. Finally, the ADG thanked all participants and FAO's partners in organizing this high level policy dialogue: Prof. Gunasena, Dr. Paroda, Dr. Ola Smith, the APAARI Secretariat, and everyone for the collaboration in organizing this meeting.

Table 1. Expected Role of Concerned Stakeholders

Issues to be addressed	National Governments	Private sector, advanced research institutions, academes, NGOs	APAARI-APCoAB	GFAR	FAO
National policy on biotechnology	Formulate clear, science-based, effective biotechnology policy framework involving all stakeholders, that is compatible with international agreements, and which provide for an effective IPR regime, incentives for local investment and innovation, and enforceable science-based regulations	Provide science- and knowledge-based information	Assist members in policy formulation; provide science- and knowledge-based information; provide information on countries' "best practices" in policy formulation and enforcement	Policy advocacy, awareness raising, facilitation role	Promote policy analysis and dialogue; catalyze policy makers for science-and knowledge-based policy decisions; provide advisory role directly or through regional organizations such as ASEAN, APEC, SAARC, APAARI etc.
National Biotechnology Agenda	Develop and update medium and long term National Biotechnology Agenda	Generate, synthesize, share knowledge- and science-based information; address orphan crops and gender issues, important traits such as nutrition, tolerance/ resistance to abiotic and biotic stresses, sustainable	Provide simple guidelines in developing and updating national biotechnology agenda	Information and knowledge sharing	Assist in formulating guidelines in developing and updating National Biotechnology Agenda; Draw attention of donors to promote initiatives to achieve MDGs

Table 1. *(continued)*

Issues to be addressed	National Governments	Private sector, advanced research institutions, academes, NGOs	APAARI-APCoAB	GFAR	FAO
		agricultural growth and environmental protection; complement modern biotechnology with conventional methods such as classical breeding, and link with other agronomic and biochemical approaches; provide access to new genetic materials, new genes and training opportunities			
Legal and Regulatory Framework	Establish legal and rational regulatory framework addressing both the production and marketing/ commercialization of GM products; define and clarify roles of the different regulatory agencies (environmental safety, food safety, feed safety, biopiracy, etc.)	Create at the institutional level biosafety committee, adopt, implement protocols/ guidelines; capacity building and awareness raising	Capacity building for both the technical, legal/ regulatory aspects for researchers and legal experts, policy makers, media, and professional associations/ bodies	Information and knowledge sharing; capacity building; policy level dialogue	Technical assistance and direct support in drafting national legislation and framework; training; information and knowledge sharing; catalyzing policy makers on legal and regulatory aspects
	Streamline regulatory procedures; harmonize regulations with regional standards, and international laws and agreements; take into account food trade issues within the biosafety protocol; ensure efficient system for	Information and knowledge sharing	Capacity building; information and knowledge sharing	Capacity building; information and knowledge sharing	Facilitate harmonization at the national, regional and international levels

Table 1 *(continued)*

Issues to be addressed	National Governments	Private sector, advanced research institutions, academes, NGOs	APAARI-APCoAB	GFAR	FAO
	risk management (assessment, monitoring and communication)				
Capacity Building	Needs assessment for both institutional and human resources; establishment or strengthening of Centers of Excellence for R&D, legal and regulatory bodies, and educational institutions, the media, and community-based producer organizations	Capacity building-fellowships, internships; participatory research and monitoring; academe should also develop learning materials for risk communication and integrate biotechnology to enhance appropriate existing curriculum; policy briefs for policy makers	Assist in fund raising; inventory of existing infrastructure and core competence; provide access to training opportunities; exchange of scientists, information and knowledge sharing; Networking	Assist in fund raising, provide access to training opportunities; information and knowledge sharing; Networking	Technical assistance; assist in fund raising; information and knowledge sharing; training for developing countries
Partnership	South-South collaboration-among 10 Asian countries in the area of capacity building	Information, knowledge and expert sharing	Assist further in identifying appropriate mode of institutionalizing APCoAB, Asian BioNet and other networks	Assist in fund raising for institutionalizing Regional or Global Partnership Programs (GPPs) on biotechnology	Facilitate further institutionalization and strengthening of regional fora/networks such as APCoAB, and Asian BioNet
	Inter-regional partnership between Asia and Africa through the Biosciences eastern and central Africa (BecA) Hub.	Share research agenda, information, knowledge, materials, expertise, facilities	Take lead in fostering inter-regional partnership; assist in fund raising; strengthen collaborative R&D; document and synthesize lessons learned; foster mutual learning and nurture partnership	Facilitate partnership, assist in fund raising, foster mutual learning, and nurture partnership; build GPP on biotechnology	Mobilize resources to implement and nurture the partnership networks both for R&D and public awareness

Table 1 *(continued)*

Issues to be addressed	National Governments	Private sector, advanced research institutions, academes, NGOs	APAARI-APCoAB	GFAR	FAO
	Public–private partnership-better negotiations for mutual benefit; fast and effective delivery of technology	Inventory intellectual property assets, publicly disclose least controversial ones; create new opportunities to make new technologies available to the rural poor with as few restrictions as possible	Foster partnership; document, and synthesize lessons; foster mutual learning; nurture partnerships	Foster partnership; assist in fund raising; information and knowledge sharing; support to GPP on agricultural biotechnology	Mobilize resources, policy advice, information and knowledge sharing; generating awareness for effective Public-Private Partnerships (PPP)

Annex I

High Level Policy Dialogue on Biotechnology for Food Security and Poverty Alleviation: Opportunities and Challenges

Jointly Organized by APAARI, FAO and GFAR

7-9 November 2005
Rama Gardens, Bangkok, Thailand

Agenda

7 November 2005 (Monday)

8:00-9:00 **Registration**

Opening Session

9:00-9:10 **Welcome Remarks**

Dr. Raj Paroda, Executive Secretary, APAARI

9:10-9:20 **Opening Remarks**

Prof. H.P.M. Gunasena, Chairman, APAARI

9:20-9:30 **General Remarks**

Dr. Ola Smith, Executive Secretary, GFAR

9:30-9:40 **Opening Statement by H.E. Charal Trinvuthipong**

Vice Minister, Ministry of Agriculture, Thailand

9:40-9:55 **Inaugural Address**

Dr. He Changchui, FAO Assistant Director-General & Regional Representative for Asia and the Pacific

9:55-10:00 **Group Photograph**

10:00-10:20	**Coffee Break**	
	Business Session: Briefing on the Policy Dialogue and Adoption of Agenda	
10:20-10:30	**Policy Dialogue Objectives and Expectations**	
	Dr. Purushottam Mudbhary Senior Policy Officer & Acting Chief, Policy Assistance Branch, FAO RAP	
10:30-10:40	**Adoption of Agenda and Election of Rapporteur**	
	Session I: Status on Agricultural Biotechnology	
	Chairperson: *Dr. Andrew Bennett, Syngenta Foundation*	
	Co-chairperson: *Dr. Thierry Mennesson, IAC*	
10:40-11:10	Global Developments on Agricultural Biotechnology	Dr. Clive James Chair, ISAAA
11:10-11:40	Regional Scenario	Prof. Anupam Varma National Professor, Indian Agricultural Research Institute New Delhi
11:40-12:00	Developments in China	Dr. Chen Zhangliang President China Agricultural University
12:00-12:20	Developments in India	Dr. G. Kalloo Deputy Director General ICAR, India
12:20-12:40	CGIAR Approach to Biotechnology and Biosafety	Dr. Robert Zeigler Director General, IRRI
12:40-13:00	Discussion	
13:00-14:00	Lunch	
	Session II: Issues (Biosafety, IPR, Regulatory Measures)	
	Chairperson: *Dr. Robert Zeigler, IRRI*	
	Co-chairperson: *Dr. Thomas Lumpkin, AVRDC*	
14:00-14:20	Biotechnology and Biosafety Capacity Building	Dr. Andrea Sonnino, FAO
14:20-14:40	Regulatory Measures	Dr. Manju Sharma Former Secretary, DBT, India
14:40-15:00	IPR Related Developments	Dr. Victoria Henson-Apollonio Project Manager, the CGIAR CAS-IP, IPGRI

15:00-15:20	A Corporate Foundation Perspective for Access to Biotechnological Innovations	Dr. Andrew Bennett President Syngenta Foundation
15:20-15:40	Coffee Break	

Session III: Ministerial Round Table on National Developments

Chairperson: *Secretary Domingo Panganiban, Philippines*

Co-chairperson: *Dr. Jafar Khalghani, Deputy Minister, Iran*

15:40-16:30 Presentation by Agriculture Ministers/Secretary of Agriculture:

- Iran — Dr. Jafar Khalghani, Deputy Minis ter
- Philippines — Mr. Domingo Panganiban
Secretary of Agriculture
- Sri Lanka: — Mr. Tissa Warnasuriya,
Secretary of Agriculture
- Thailand — Dr. Supranee Impithuksa
Deputy Director General, DOA

16:30-17:00 **General Discussion and Conclusions**

19:00 Reception Dinner hosted by ADG-FAO

8 November 2005 (Tuesday)

Session IV: Biotechnology for International Public Goods

Chairperson: *Dr. William Dar, ICRISAT*

Co-chairperson: *Dr. Ola Smith, GFAR*

9:00-9:30	Developments on Golden Rice	Prof. Ingo Potrykus Swiss Federal Institute of Technology
9:30-10:00	Genetically Modified Food Regulations and International Trade for Developing Countries	Dr. Mark W. Rosegrant, IFPRI
10:00-10:30	From Genetic Resources to Marker-Assisted Selection	Dr. Claire Lanaud, CIRAD
10:30-11:00	Coffee Break	

Session V: Global/Regional Partnership Initiatives

Chairperson: *Dr. Shinobu Inanaga, JIRCAS*

Co-chairperson: *Dr. Gabrielle Persley, Doyle Foundation*

11:00-11:20	Global Partnership Program Initiative	Dr. Ola Smith Executive Secretary GFAR
11:20-11:40	APCoAB – A Regional Consortium	Dr. R.S. Paroda Executive Secretary APAARI
11:40-12:00	Asian BioNet	Dr. Banpot Napompeth
12:00-12:20	Mobilizing Biosciences for Africa's Development and Prospects for Linkages between Africa and Asia	Dr. Gabrielle Persley Chair, Doyle Foundation
12:20-13:00	Discussion	
13:00-14:00	Lunch	

Session VI: Brainstorming on Future Strategy

14:00-17:00 Interactive Sessions on Way Forward through Group Discussions

Group I: Countries with More Advanced Stage of Biotechnology Development (China, India, Japan, Republic of Korea, Philippines, Thailand, and Iran)

Suggested issues to be covered to accelerate delivery of biotechnology: Partnerships for R&D, IPR, and Regulatory

Chair: Dr. Andrew Bennett
Rapporteur: Prof. Anupam Varma

Group II: Countries at Initial Stage of Biotechnology Development (Other Countries)

Suggested issues to be covered: Assessment of and Partnerships for R&D, Capacity Building and Legal Framework

Chair: Dr. William G. Padolina
Rapporteur: Dr. Betty del Rosario

19:30 Reception Dinner hosted by APAARI

9 November 2005 (Wednesday)

8:30-10:30 Joint Panel Discussion *Moderator:* Dr. Raj Paroda

10:30-11:00 Coffee Break

Plenary Session

Chairperson: *Dr. He Changchui*

Co-chairperson: *Prof. H.P.M. Gunasena*

11:00-12:00 Recommendations of Each Session and Conclusions

Session Chair/Co-Chair report:

Session I: *Dr. Thierry Mennesson*

Session II: *Dr. Thomas Lumpkin*

Session III: *Dr. Betty del Rosario*

Session IV: *Dr. Raj Paroda*

Session V: *Dr. Shinobu Inanaga*

Session VI: *Prof. Anupam Varma (Group I)*

Dr. William G. Padolina (Group II)

12:00-13:00 Lunch and Adjournment

Annex II

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