

**Expert Consultation on
Post-harvest Technologies for Ensuring Food Security
and Value Addition for Enhanced Income
and
The Eighth General Assembly Meeting of APAARI**

**1-3 December 2004
Rama Garden Hotel, Bangkok, Thailand**



PROCEEDINGS



**Asia-Pacific Association of Agricultural Research Institutions
FAO Regional Office for Asia and the Pacific
39 Phra Atit Road, Bangkok 10200
Thailand**

April 2005

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FOREWORD

The Asia-Pacific Association of Agricultural Research Institutions (APAARI) has been addressing diverse emerging concerns related to agricultural research and development in the region since its establishment, focusing on food security, poverty alleviation, agricultural and environmental sustainability. In this context, post-harvest sector was considered important during research prioritization exercise undertaken by APAARI during sub-regional and regional consultations and finally PHT was endorsed by APAARI General Assembly as an important researchable area in the meeting held in Penang in November 2002.

Accordingly, APAARI in collaboration with FAO and GFAR organized an expert consultation on 'Post-harvest Technologies for Ensuring Food Security and Value Addition for Enhanced Income' at Bangkok from 1-3 December 2004. These proceedings deal with the outcome of this meeting which was well represented by CG centres, FAO, GFAR, Ph Action and NARS of the region, including other international organizations.

In general, the PHT sector for economic development has not received required thrust in the agricultural research and development agenda of many of the national programmes. The country reports presented by NARS members and the regional papers presented by invited experts reflected relatively weak status of PhT in the Asia-Pacific. These presentations pointed out that in view of wide differences in the stage of development and economic diversity, differences in terms of needs and capacities among NARS vary considerably vis-à-vis priorities for improvement and strengthening of the PhT sector, while realizing that PhT is an integral part of strategies to improve linkages between farmers and markets and help contribute to food security and economic development.

The deliberations/discussions of this meeting also focused on the need to further address several PhT constraints in the overall regional scenario, namely, research to improve need-based Ph infrastructure and curb Ph losses, develop high food quality and safety standards, integration of commodity chains, strengthen storage facilities, develop farmer-market linkages, improve distribution systems, implement favourable policies, strengthen research on value-addition, promote transfer of technology at grass-root level and capacity building.

The expert consultation was also instrumental in further advancing the FAO/GFAR-Ph Initiative and see whether collaboration in this area could be build in a partnership mode in the Asia-Pacific region with APAARI and Global Forum on Agricultural Research (GFAR) taking the leading role as facilitators.

It is envisaged that the recommendations of this expert consultation will help in developing further collaboration and highlight the importance of PhT sector for the benefit of NARS in the Asia-Pacific region. APAARI thanks all NARS members, CG members, other regional organizations, NGOs, special invitees and experts for their participation and contributions to make this meeting a real good success; and in particular to FAO, GFAR, Ph Action and JIRCAS for their support in organizing this important meeting.



(R.S. Paroda)
Executive Secretary

ACRONYMS AND ABBREVIATIONS

AAACU	Association of Asian Agricultural Colleges and Universities
AARINENA	Association of Agricultural Research Institutions in the Near East and North Africa
ACIAR	Australian Centre for International Agricultural Research
ADB	Asian Development Bank
AFITA	Asian Federation for Information Technology in Agriculture
AIT	Asian Institute of Technology
APAARI	Asia-Pacific Association of Agricultural Research Institutions
APARIS	Asia-Pacific Agricultural Research Information System
APCoAB	Asia-Pacific Consortium on Agricultural Biotechnology
APEC	Asia-Pacific Economic Cooperation
APEDA	Agricultural Products Export Development Authority (India)
APO	Asian Productivity Organization
ARD	Agricultural Research for Development
ARP	Action Research Partnerships
ASEAN	Association of South-East Asian Nations
AVRDC	Asian Vegetable Research and Development Center
BAU	Bangladesh Agriculture University
BRAC	Bangladesh Rural Advancement Committee
CACAARI	Central Asia and the Caucasus Association of Agricultural Research Institutions
CAPSA	Centre for Alleviation of Poverty through Secondary Crops's Development In Asia and the Pacific
CARP	Sri Lankan Council for Agricultural Research Policy
CD-ROM	Compact Disc – Read Only Memory
CFTRI	Central Food Technological Research Institute
CGIAR	Consultative Group on International Agricultural Research
CIPHET	Central Institute of Post-harvest Engineering and Technology
CIRAD	Centre de Cooperation Internationale en Recherche Agronomique pour le Development
CLAN	Cereals and Legumes Asia Network
CLVNET	Cambodia, Laos and Vietnam Network
CORRA	Council for Partnership on Rice Research in Asia
CWANA	Central and West Asia and North Africa
DFID	Department for International Development (UK)
DOA	Department of Agriculture (Thailand)
EGFAR	Electronic Global Forum for Agricultural Research (Homepage of GFAR)
FAO/AGSI	Food and Agriculture Organization/Agro-Industries and Post-harvest Management Service
FAO-RAP	FAO Regional Office for Asia and the Pacific
FBD	Fluidized and Bed drying

GCDT	Global Crop Diversity Trust
GFAR	Global Forum on Agricultural Research
GMO	Genetically Modified Organism
GPhI	Global Post-harvest Initiative
GPP	Global Partnership Programme
HACCP	Hazard Analysis Critical Control Point
IAC	Institut Agronomique Neo-Caledonia
IARI	Indian Agricultural Research Institute
ICAR	Indian Council for Agricultural Research
ICARDA	International Centre for Agricultural Research in the Dry Areas
ICM	Information and Communication Management
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
ICT	Information and Communication Technology
IFAP	International Federation of Agricultural Producers
IFPRI	International Food Policy Research Institute
ILO	International Labour Organization
ILRI	International Livestock Research Institute
INBAR	International Network for Bamboo and Rattan
INCANA	Inter-regional Network on Cotton in Asia and North Africa
INGER	International Network on Germplasm Evolution of Rice
IPGRI	International Plant Genetic Resources Institute
IPPC	International Plant Protection Convention
IPR	Intellectual Property Rights
IRRI	International Rice Research Institute
ISO	International Standards Organization
ITFNet	International Tropical Fruit Network
IT-PGRFA	International Treaty for Plant Genetic Resources for Food and Agriculture
IUMS	International Union of Microbiological Societies
JIRCAS	Japan International Research Centre for Agricultural Sciences
KMUTT	King Mongkut University of Technology Thonburi
LST	Labeling System and Traceability
MDGs	Millennium Development Goals
MoU	Memorandum of Understanding
MPEDA	Marine Products Export Development Authority (India)
NACA	Network on Aquaculture in the Asia-Pacific
NARC	Nepal Agricultural Research Council
NARI	National Agricultural Research Institute
NARS	National Agricultural Research System
NBACFS	National Bureau of Agricultural Commodity and Food Standards (Thailand)
NARO	National Agricultural Research Organization
NFRI	National Food Research Institute (Japan)
NGO	Non-Governmental Organization
NINP	National Information Nodal Point
NRM	Natural Resource Management

NTFPs	Non-Timber Forest Products
NZIC & FR	New Zealand Institute for Crop and Food Research
OIE	Organization for Animal Health
OTOP	One Tamboon One Product (Thailand)
PARC	Pakistan Agricultural Research council
PhT	Post-harvest Technology
PCAARD	Philippines Council for Agriculture, Forestry and Natural Resources Research and Development
PGR	Plant Genetic Resources
POPACA	Farmer Organization for Collective Marketing (Vanuatu)
RAIS	Regional Agricultural Information Service
R&D	Research and Development
RDA	Rural Development Administration (South Korea)
RED/SCM	Rural Enterprise Development/Supply Chain integration Management
RRA	Rapid Rural Appraisal
SAARC	South Asia Association for Regional Cooperation
SAVERNET	South Asia Vegetable Research Network
SEARCA	South-East Asian Regional Centre for Graduate Study and Research in Agriculture
SMEs	Small and Medium-sized Enterprises
SPC	Secretariat of the Pacific Community (Neo-Caledonia)
SPS	Sanitary and Phytosanitary
SSEEA	South and South-East and East Asia
TBT	Technical Barriers to Trade
TERI	The Energy and Resource Institute
TQM	Total Quality Management
UTFANET	Underutilized Tropical Fruits in Asia Network
WAICENT	World Agricultural Information Center
WANA	West Asia and North Africa
WCCA	World Congress on Computer in Agriculture
WHO	World Health Organization
WTO	World Trade Organization



Part I
Expert Consultation on
Post-harvest Technologies for Ensuring Food Security and
Value Addition for Enhanced Income

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Background

The Asia-Pacific Association of Agricultural Research Institutions (APAARI), since its establishment has been addressing concerns on national and regional issues related to agricultural research and development, focusing on food security, poverty alleviation, agricultural and environmental sustainability. Such initiatives of APAARI have largely dealt with common interests of the national agricultural research systems (NARS) within the Asia-Pacific region, for the overall benefit of the national programmes, and have been the outcome of APAARI meetings held earlier to identify and crystallize research priorities at national/regional level. Further, APAARI's research priorities have also matched global concerns such as the need to review in the region, R&D in post-harvest technologies. APAARI General Assembly meeting held in Penang recommended that an Expert Consultation be organized in this important area of post-harvest sector.

More recently, there have been several regional and global meetings addressing post-harvest R&D activities. An International Workshop on Post-harvest Systems was held in FAO Headquarters in Rome in 2003, jointly organized by FAO/AGST, the Global Forum on Agricultural Research (GFAR) and the Global Post-harvest Forum (Ph Action). The 2003 International Workshop was preceded by five Regional Consultations in Asia-Pacific, Africa, Latin America and the Caribbean, West Asia and North Africa, and Central Asia and the Caucasus, that provided an assessment of the needs of the post-harvest sector in each region. Building on the past experiences of the organizing institutions and particularly on the results of five regional consultations, the International Workshop endorsed a new Strategic Framework for a Global Post-harvest Initiative: Linking Farmers to Markets. In the Asia-Pacific region, APAARI played the major role for prioritizing post-harvest research and development as of major importance for the socio-economic development of the region based on an extensive research need assessment exercise.

As a follow up of these activities, an 'Expert Consultation on Post-harvest Technologies for Ensuring Food Security and Value Addition for Enhanced Income' was organized by APAARI in collaboration with JIRCAS, FAO, GFAR and Ph Action from 1 to 3 December 2004 at Bangkok. It provided an

opportunity to further advance the Global Post-harvest Initiatives and see whether future collaboration in this area could be built in a partnership mode in the Asia-Pacific region.

Inaugural Session

Dr. R.S. Paroda, Executive Secretary, APAARI welcomed all the participants, including APAARI members, representatives from support group organizations, special invitees and potential future members of APAARI. He appreciated the overwhelming response to the APAARI invitations for the expert consultation and thanked GFAR and FAO for their active involvement and financial support and their concern for strengthening R&D partnership at regional and global level, with involvement of different stakeholders. Dr. Paroda briefly highlighted APAARI's achievements as a regional neutral Forum and the importance and impact of the expert consultations it has organized earlier to address a wide range of ARD issues for the benefit of NARS in the Asia-Pacific region. Dr. Mutsuo Iwamoto delivered the Chairman's address and presented the objectives of the Expert Consultation. He emphasized that PhT has a significant role to play in poverty and malnutrition reduction by enhancing effective usage of food production, and to ensure that there are effective producer-consumer links through efficient processing in value addition and marketing of all agricultural products so that post-harvest losses, currently ranging between 20-50%, can be reduced considerably. He urged that PhT should be given high priority by NARS.

Dr. Mohammad Roozitalab, Chairman, GFAR presented special remarks. He thanked APAARI and FAO for organizing the expert consultation and emphasized the importance of PhT in uplifting the lives of farmers in accordance with the MDG's of the United Nations. He assured the support of GFAR for a strategic regional initiative on PhT to develop applied policies, strengthen partnerships, and develop equitable sharing mechanisms and networks. Dr. Greg Johnson, representing Ph Action Initiative outlined the mission of this Initiative and the role of agricultural institutions in linking farmers with markets. Dr. Alastair Hicks presented the special remarks on behalf of the ADG, FAO-RAP, reaffirming FAO's support for regional PhT initiative.

Dr. Apichart Pongsrihadulchai, Secretary General of NBACF and the Chief Guest representing the Minister of Agriculture, Thailand, delivered the Minister's speech, urging the PhT experts to provide necessary inputs in food policy formulation under the newly emerging scenarios such as WTO and agricultural biotechnologies. The Chief Guest then formally released the new APAARI publications, including three success stories, namely, on Lentil Production in Bangladesh, Wheat Revolution in India and on Biological Control; a Status Report on ICT/ICM in ARD and APAARI on CD, a compilation of important APAARI publications in a CD-ROM format.

A formal MoU between APAARI and AIT, Bangkok, was signed for future cooperation in the promotion of ICT and ICM in ARD. APAARI Executive Secretary, Dr. R.S. Paroda and Dean of AIT Extension, Prof. Gajendra Singh signed the MoU on behalf of their respective organizations. Also a plaque of appreciation was presented by APAARI to Prof. Gajendra Singh for his long association and support to APAARI.

Mr. P.K. Saha, APAARI Liaison Officer, proposed a vote of thanks to all participants, concerned organizations and the APAARI secretariat staff.

The programme for the PhT Expert Consultation on PhT are given in Annexure I. The participants are listed in Annexure III. In all, about 80 participants representing FAO, GFAR, Ph Action, CG Centres, NARS, special invitees and resource persons, attended this important meeting.

Scientific Deliberations

The deliberations of the Expert Consultation were conducted in five technical sessions, followed by the Plenary session. The highlights and outcome of these have been presented here.

SESSION I: New opportunities for and the challenges facing post-harvest research and development in the Asia and Pacific region

Chairperson: Dr. M. Roozitalab, GFAR

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

This technical session had 5 presentations, including three by APAARI resource persons on sub-regional PhT status for South and West Asia, South-East Asia and the Pacific Islands and two on regional overview of PhT by FAO-RAP and *GPhI Initiative*.

Dr. V. Prakash of CFTRI, India deliberated on new opportunities and challenges facing post-harvest research and development in South and West Asia. He stressed on sustainability of the system, change in mindset *vis-a-vis* technology adoption, food processing and value addition, current strategies in PhT research and development, improvement in grain storage system, post-harvest protocols for agricultural and horticultural crops, upgradation of cold-storage designs, irradiation preservation, protocols for livestock production, processing and storage, post-harvest management and linkages with R&D institutions and industry, standardization and quality assurance mechanisms, establishment of agri-business centres. He emphasized on the future role of stakeholders in value addition and future plans and programmes to link producers and markets in the region and adopting cost effective measures. He also focused on the role of women in PhT initiatives, concern on public awareness and government policies on food safety.

Dr. Saipin Maneepun of Kasetsart University, Thailand, presented the status of post-harvest technology in South-East Asia. She referred to the post-harvest losses in rice (10-37%), maize (13%), dry legume grains (20-25%), fruits (15-45%) and vegetables (20-50%). She also highlighted the work of ASEAN Network on Fisheries, Post-harvest Technology Centre, the value addition of agricultural farm products, and the plans to link producers with markets, prevailing food safety standards and national policies.

Ms. Valerie Kagy of IAC, New Caledonia in her presentation on 'Post-harvest technology in the Pacific' referred that post-harvest technology has two general aims, namely, (i) reducing waste between harvesting and consumption and (ii) maintaining quality. She expressed concern on the prevailing low standards of post-harvest technology in most of the Pacific countries, though there is increased awareness now on the economic benefits of such technologies both for local, urban and export markets. Also several projects are being carried out in post-harvest technology programme through ACIAR and Ph Action involving diverse national and international agencies, collaboration of national research and development organizations, and farmer's associations.

The paper by Dr. Alastair Hicks of FAO-RAP, 'Status and prospects for post-harvest management in Asia and Pacific region', highlighted FAO's role, achievements and concerns, and the need for integrated R&D and sound policies, strategies for strengthening regional post-harvest management, taking into consideration effective policies for agricultural resource management, crop/livestock production and conservation, quality of production, infrastructure available, marketing aspects, agro-industry post-harvest practices, technology development and application, and human resource development.

The presentation by Dr. Greg Johnson of ACIAR, Australia dealt with post-harvest R&D in the Asia-Pacific region: Regional overview of challenges and opportunities. He stressed that rural communities/governments must become 'market smart', and balance sustainable resource use with the challenges of quality requirements, higher food safety standards and long and complex supply chains. He referred to high (20%) post-harvest losses and stressed that the progress will depend on the efficiency and versatility of their production, processing, distribution and marketing systems. He pointed out to the key opportunities for enhancing international collaboration by bringing together the developed and the developing countries partnership involving NARS, regional/ARD institutions, NGOs and the private sector/industry. He stressed on global post-harvest initiative through supply chain management, networking, institutional strengthening and human resource development, as well as capacity building and information sharing, with focus on improvement of post-harvest systems.

The above presentations largely emphasized that while agricultural research has made substantial contribution to enhance food supplies, the regional trend indicated gradual decline in agricultural population and land devoted to agriculture. Also, dietary patterns are undergoing significant changes as per capita food consumption favours value-added products over traditional foods, which is causing a shift in cultivation practices from low value cereals to high-value horticultural crops such as fruits and vegetables. Massive loss (20-50%) of produce, particularly in perishable commodities such as fruits, vegetables, dairy, livestock and meats, is still common due to poor pre-production and post-harvest management. However, most countries of the region have recognized the importance of minimizing of post-harvest losses and a paradigm shift from production-consumer continuum is taking place to introduce better post-harvest technologies for food security and to reduce poverty in the region.

During the general discussion, some participants were of the view that farmers need low-cost PhT, which can be applied/implemented in many different parts of the region through better networking among ARD institutions. It was also suggested that the scientists needed better social science skills for technology transfer from laboratories to the farms.

SESSION II: Meeting the food safety and quality assurance requirements of emerging markets: rules, regulations and obstacles to compliance

Chairperson: Dr. B. Soomro, PARC

Co-chairperson: Dr. Yutaka Mori, JIRCAS

This session was addressed by three speakers who highlighted concerns on food safety and quality assurance requirements of markets, and compliance to rules and regulations.

Dr. Hidetaka Kobayashi from National Food Research Institute spoke on Codex Alimentarius Commission and food safety. He pointed out that for regulating the food trade to increase food safety, it is important to use Codex standards because not only they are considered important for consumer protection and fair practices in the food trade, but also these are recognized as the reference-guidelines on food safety. He referred to different regulations in different countries, and also on WTO agreement on the application of sanitary and phytosanitary (SPS) measures, and on technical barriers to trade (TBT).

Ms. Warunee Varayanond of Kasetsart University, Thailand spoke in detail about the food safety system being practised in Thailand. She gave detailed presentation on HACCP – Hazard Analysis Critical Control Point which is a systematic approach to the identification, evaluation and control of food safety to prevent hazards and to achieve maximum success in post-harvest protection. She

highlighted the importance of verification, monitoring and documentation to be adopted before any hazard occurs. She emphasized the commitment by the top management and the employees to ensure the implementation of food safety systems, and the need for HACCP education and training.

Third presentation was made by Dr. Tadahiro Nagata of National Food Research Institute Japan on Labeling systems and Traceability to Ensure the Systems. He spoke on topics of consumer concern, laws on food labeling, Surveillance Technology and Traceability System. He presented details on procedure being practised in Japan to know the rice cultivars and place of origin of the product and also the technique to differentiate between GMO and non-GMO crops.

The above presentations were followed by discussions. Several concerns were highlighted and the following major suggestions/recommendations emerged:

1. It is important for developing countries to formulate food safety laws, if not already in practice and also ensure the implementation of these laws at every level.
2. Efforts should be made by countries in the region to be active members of Codex and follow its approved standards in formulating the regulation on food safety.
3. For the satisfaction of consumers, the food products labeling be made accurate with possible cross-checks.

SESSION III: Case studies on the development and adoption of post-harvest interventions that have contributed to ensuring food security: experiences and lessons learned

Chairperson: Mr. Somchai Charnnarongkul, NBAC & FS

Co-chairperson: Dr. S.M. Ilyas, CIPHET

Country status reports from South Asia, South-East Asia and the Pacific and two case studies, from ICRISAT and ICARDA were presented.

Dr. Badaruddin Soomro, Chairman, Pakistan Agricultural Research Council, presented the status report on post-harvest technologies in Pakistan. He referred to post-harvest losses particularly in fruits and vegetables and the projects under investigation to improve PhT, institutions involved in post-harvest management technologies and the current status of various PhT related initiatives; post-harvest processing of field, fruit and vegetable crops, priorities for developing new PhT for rural based value addition, constraints faced by post-harvest industry, plans to link producers to markets, PhT and role of various stakeholders farmers, NGOs, private sector, public awareness and government policies regarding food safety measures, and agribusiness opportunities in Ph sector.

Dr. Rosendo Rapusas of Bureau of Post-harvest Research and Extension, the Philippines presented the country report on behalf of Dr. Faylon of PCARRD, regarding the role of post-harvest sector in meeting adequate food supply in the Philippines. The role of centres of excellence in post-harvest was highlighted *vis-à-vis* technologies developed and the ongoing programmes in research in product development and processing. He also emphasized about the needs for institutional development and capacity building.

Dr. S.M. Ilyas of CIPHET, India in his report on 'Post-harvest engineering and technology in India' expressed concern on post-harvest losses and briefly dealt with the developments in this field in India, and the current status of PhT related initiatives – development of equipment and technology (about 107 items for diverse crops/use), and strengthening of PhT work through more than 250 agro-processing centres located in different parts of the country and operating under the All India Coordinated Project

on PhT. He referred to new PhT for rural based value addition and technology transfer and more emphasis on these aspects in national food processing policy, emphasizing the need for linkages at grass-root level of producers with markets.

Mr. Luke Ratuvuki of the Ministry of Agriculture Sugar & Land Resettlement, Fiji presented the status report for Fiji on various PhT related activities on product development, staff training, marketing of horticultural produce, value added commodities, etc. He referred to lack of technical support as a major constraint as well as shortage of qualified staff, and infrastructure requirements to enhance production/marketing vis-à-vis strategies for their development, and develop guidelines/standards to ensure quality, food safety issues and improved storage facilities.

Dr. M.C. Saxena of ICARDA presented studies on village-level value addition to farm products for enhanced rural income in Central West Asia and North Africa (CWANA). He pointed out that ICARDA promotes village level agro-industry involving two commodities, namely, durum wheat and small-ruminant dairy products; the results achieved on value addition through on-farm durum processing into various products to boost household income, role of women and use of indigenous knowledge, traditional durum wheat products – a case study of 'freka', a base for traditional dishes in WANA, which is made from green (immature) grains of durum wheat harvested at dough stage, that has added substantially to farm income. The other case study presented was on market-oriented improvement of the productivity and income of dairy sheep producers in Syria. He stressed on increased interaction, more cropping areas to cope with feed shortages. He referred to expansion of markets and increased demand for products of small ruminants such as milk processed products; the need for participatory research, farmers training etc.

Dr. C.L.L. Gowda of ICRISAT presented a case study on promoting sorghum for poultry feed undertaken by ICRISAT on building coalitions for producer-market-processor linkages. The main purpose of this DFID supported project is to create marketing opportunities by developing sustainable economic inter-linkages in sorghum-poultry-feed chain through innovative coalition systems. The coalition partners with ICRISAT are Acharya N.G. Ranga Agricultural University, Federation of Farmers Associations, Andhra Pradesh (Sorghum growers); Andhra Pradesh Poultry Federation (Poultry producers); Janaki feeds (feed manufacturer). He referred to the defined role of each partner and the expected project outputs-formation of a sustainable farmer-scientist-industry coalition, improved cultivars developed/grown, technology transfer and access. He stressed that the new sorghum-based poultry feed formulations in lieu of maize-based feed will benefit the poultry producers.

Dr. Somchart Soponronnarit of KMUTT, Thailand presented the studies undertaken in Thailand on paddy drying under hot and humid climate and expressed that consumer preference is very important for the selection of a drying strategy, high temperature drying has been preferred using dryers of different types, the LSU (mixed flow), the fluidized and bed drying (FBD) and the recirculation-batch, respectively. It was pointed out that effects of drying temperature on quality of paddy dried by FBD has been studied. He also explained the technique of in-stored drying, and on paddy drying using absorbent and new techniques for producing parboiled rice.

Ms. S.L. Maskey of NARC, Nepal briefly reported the Nepalese experience in PhT for ensuring food safety and value addition for enhanced income. She pointed out to the nature and causes of post-harvest losses which are estimated to around 17-20% for stable durable commodities such as cereals, and 20-30% in case of perishable commodities like fruits and vegetables. The major Ph loss occurs during the harvesting, threshing, transportation, drying and storage. She expressed concern on the inadequate post-production activities and post value addition of the agro-products in Nepal. She also

referred to national policies and plans, and importance of food safety technologies and institutional involvement in R&D in this field and focused on several emerging concerns.

The presentations pointed out that several of the key issues were common across regions and included post-harvest losses, quality deterioration and food safety concerns, infrastructure, policy and market access, challenges compounded by inadequate access or unreliable post-harvest technologies, storage and distribution systems. Progress and prospects of PhT varied from country to country. Systems-approach was needed to be applied to entire agri-produce system, including traditional crops, fisheries, animal products, fibre crops and forestry. Production and marketing of perishable commodities for income generation, improved nutrition, and supply to urban and export markets offers new challenges and opportunities.

Globalisation and the increasing importance of agribusiness and supermarkets in agri-product processing and marketing were key variables in considering the requirements for post-harvest technology and value addition within agri-produce systems and in assessing what governments, R&D agencies and communities need to do.

It was realized that while global agri-produce reserves were often adequate, poor distribution, losses, system inefficiencies and inadequate policy and regulatory frameworks, as well as the remoteness of communities and difficulties in accessing export markets affected equitable access to products and income opportunities. Labour and land access issues also play a role in influencing response options and strategies under the global security concerns. The special challenges for remote and resource poor communities need to be addressed.

During the general discussion several concerns were raised and it was suggested/recommended that the following major issues need to be further addressed:

1. Supply chain management,
2. Food safety and contaminants (including mycotoxins, varietal purity and GMOs),
3. Attention to human resource development (including motivation and reward), planning and decision making (including planning research for impact),
4. Access to and use of market information and finance,
5. Institutional frameworks, resources and policy, and
6. Information accuracy and access was critical and overarching.

It was noted that the above topics were receiving attention by agribusiness and supermarkets, and that governments and R&D agencies could frame responses around them. A more holistic approach was seen as essential in the post-harvest sector as were links to the private sector. More networking and improved access to better databases were needed. Low cost, but reliable technologies, were needed in food safety, contaminant monitoring and quality control. Delivery pathways and wide dissemination of promising technologies were needed while protecting IP. Regulatory requirements and costs should be streamlined on 'need basis' not to be universally applicable.

Special consideration was needed for locally accepted practices (such as food safety/fermented foods - as in France for cheese from un-pasteurised milk). Ongoing loss documentation was important for baseline data and estimating economic benefits, but could be undertaken using 'rapid rural appraisal (RRA) approaches' for which proper capacity building was needed. Attention to infrastructure was critical - from better transport to provision of basic market places in villages. The success story of

milk in India was noted – involving women and co-operative approaches, and making India the top producer as against its 28th place just 15 years ago. It was felt that for perishable commodities, we could learn more from PhT approaches in meat and dairy industries. PhT and innovation contributed to higher returns (e.g. mango kernel fat, β -carotene from mango skins; office partitions from rice straw). For small scale organic farming, cross monitoring and reporting among the farmers was a viable option. Market information access was critical under the present scenario.

SESSION IV: New opportunities for adding value to regional products to enhance income: markets, technologies and institution building requirements

Chairperson: Dr. Raghunath Ghodake, NARI

Co-chairperson: Dr. Alastair Hicks, FAO-RAP

Seven presentations were made in this session and these covered PhT concerns, developing low cost technologies vis-à-vis value addition to products, income generation, market development/linkages, and capacity building.

Dr. J.F. Rickman, IRRI, presentation dealt with Post-harvest Handling of Rice vis-à-vis options to enhance farmers income and showed how small rice farmers are getting affected by post-harvest losses which in many developing countries range between 25-50%. He expressed the need for proper drying, and for developing secure storage systems in particular. He emphasized the need for improved farmer-market linkages by setting up paddy markets and developing newer technologies which are simpler in implementation at the farm level.

Dr. Amos Omore, ILRI, delivered the presentation entitled ‘Overcoming Post-harvest Policy and Technology Barriers for Small-scale Producers and Traders in Livestock Product Markets’. He emphasized that PhT issues are more relevant to livestock products as they are easily perishable. Per capita consumption of livestock products is increasing at a significant rate as incomes are rising in developing countries. Livestock markets are high value, but also prone to high-risk. Pro-active steps are needed to exploit opportunities presented by the livestock revolution, e.g. establish a network for livestock to facilitate sharing of lessons learnt and other initiatives. Priority focus should be on policy and institutional barriers that discriminate against small-scale producer and market agents, the need for overcoming barriers in technology and policy that requires change in mind set from supply to demand-driven approaches; overall R&D efforts need to be directed on opportunities for income generation and improved livelihood of the poor.

Dr. Hong-sun Yun, National Institute of Agricultural Engineering, RDA Korea; Dr. Katinka Weinberger and Dr. Masaaki Suzuki, AVRDC; emphasized the need for post-harvest technologies for fruits and vegetables. Dr. Weinberger in her presentation on the ‘Need for vegetable post-harvest technologies in South-East Asia’ pointed to high post-harvest losses in vegetables because of higher perishability. She referred to several problems that face vegetable post-harvest sector such as poor handling and storage technologies, undeveloped processing and inadequate marketing information and skills. She projected the work on the post-harvest project by AVRDC in collaboration with Cambodia, Lao PDR and in Vietnam. She recommended that capacity building for all stakeholders in the supply chain, including farmers, traders and processors was important. Market information systems that allow farmers and traders to learn more about their markets, and skills to make use of the information were equally important. Research on development of vegetable varieties with post-harvest properties (resistance against post-harvest diseases, shelf-life, processing properties); low cost, simple technologies at the farm level (pre/post-harvest handling) and identification of value added processing opportunities

was needed. Dr. Masaaki Suzuki also from AVRDC referred to the work on indigenous and other vegetables (amaranth, bitter melon, coriander, Ivy melon, pumpkin), their importance and need to increase value addition by evaluation for food functionalities to create new market for such diverse products.

Dr. Yutaka Mori, JIRCAS, outlined some Non-food Uses of Agricultural Products and introduced the ASEAN Biomass Network, its functions and R&D strategy for a collaborative programme of food institutions in ASEAN countries, also including AIST, and Japanese institutions: JIRCAS, NARO, NIRE, NFRI, FFPRI, RITE and the University of Tokyo. He suggested that the researchers in agricultural sector should contribute to solving the environmental and energy challenges by developing technologies for non-food uses of agricultural products and residues. Biomass utilization can be an effective way for creating new markets for agricultural commodities. Agricultural products and residues should be used for more valuable way and then the products (or wastes) of the first application should be reused for the less valuable purpose, and finally converted to fuel or energy. Use of biomass resources in a cascading manner is very important.

Dr. Didier Montet, CIRAD, made a presentation on pollution due to processing of the fresh water fish from South-East Asia. Fish industry uses chemicals to stabilize their products which could be found in the water and also on the fish if their dosage is not well estimated. The most common chemicals are antioxidants, stabilizers, antibiotics and salts. He also presented the techniques developed by CIRAD for identification of above pollutants, and further pointed out to the research relating to antibiotic resistant microbial flora found on fresh water fish. This resistance is due to the intensive use of antibiotics in aquaculture. He also referred to the effect of processing on microorganisms – the studies are carried out in Thailand and Vietnam with local partners.

The above presentations were followed by general discussion wherein several issues were addressed. More important, concerns on these issues have already been reflected in earlier sessions also. It was pointed out that staple crop production will not decrease but rather continue to increase due to feed and fodder requirements for the livestock. This will be driven by the exploding demand for livestock products. Concern was expressed on the persisting issue of huge losses and wastage (25 to 30%) which needs continued attention. While doing so, the changed/dynamic scenario of enormously increased volume of agricultural produce, complexity of production in terms of breaking seasonal, regional and class barriers (more and generally less informed producers, processors, traders entering into fray), and composition of agricultural produce (fast addition of fruits and vegetables, livestock and fishery products which are more prone to losses) are to be kept in view. While the bold statement that nothing goes waste in our system is generally true, but the issues of who incurs loss and how much and who gains and at what rate and the entire issue of compensation mechanism in the society to adjust this efficiently and equitably are critical for measurement of loss and interventions to optimally manage/minimize losses. Strengthening agricultural research, in general, and PhT in particular is critical for making further advances in alleviating poverty and enhancing rural prosperity. But, this presupposes making continuous improvement in agricultural research productivity. Dr. Paroda suggested that the research institutions in the region need to expand their research portfolio to cover PhT in future as an important priority research area. Similarity, CG centres, ARIs and regional institutions may lay greater emphasis on research relating to PhT and strengthen both capacity building and human resource development in the Asia-Pacific region.

SESSION V: The Global Post-harvest Initiative: where we have come from, where we are and the way forward

Chairperson: Dr. Thierry Mennesson, IAC

Co-chairperson: Dr. Rupert Best, GFAR

This session sought to establish a functional linkage and interaction with the Asian-Pacific region, and with APAARI, thereby creating the basis for the development of concrete actions towards the implementation of the Global Post-harvest Initiative's Strategic Framework.

To this end, the session included:

1. Background presentations on the GPHI and on regional priorities for the Asia-Pacific Region
2. Working Group deliberations around four priority thematic areas
3. Plenary Session on Working Group reports and general discussion on the way forward

Dr. Rosa Rolle made the introductory presentation on the 'Global Post-harvest Initiative (GPHI): Linking Farmers to Markets', wherein she justified the need for the Initiative and presented its principal components. Dr. Rolle highlighted the requirement for an integrated response to addressing the complexity of issues faced by the post-harvest sector if it is to contribute to the developmental goals of sustainable economic growth, poverty alleviation and food security. The GPHI Strategic Framework consists of four interconnected strategies: 1) development of appropriate policies; 2) Institutional strengthening through collaborative research and capacity building; 3) Developing competitive and equitable agri-food systems and 4) Fostering networks, communication and further programme development.

After this introduction, Ms. Nerlita Manalili analyzed in more detail the Strategic Framework relating it to the case of the Asia-Pacific Region. After analyzing the results of the first Asia-Pacific Regional Consultation on Post-harvest held in 2001, the outcomes of the International Workshop held in Rome in 2003, which gave birth to the Strategic Framework, and integrating them all with the recent developments and also taking advantage on the "fresh" information which was introduced by the previous sessions of this Consultation, four main priority areas were identified. The thematic areas deliberated upon included food quality and safety, post-harvest technology storage losses, value addition, capacity building, community marketing initiatives, establishment and development of rural post-harvest enterprises/industries, policy support sensitized systems for the Ph sector and policy focus on food security.

Issues Highlighted:

- (i) PhT are country-specific due to food and cultural habits of population, and we should be aware of not having too much generalization;
- (ii) that economies are developing fast, therefore the GPHI has to keep pace with the changes while designing its work programmes;
- (iii) strategic framework or action plan to link farmers with markets should also focus on farmers' capacity building needs, training aspect;
- (iv) there is urgent need for capacity building in the institutions before they can understand the implications of new PhT and gaps in the national and international standards;

- (v) that national priority and regional priority need to be matched, for which policy harmonization is needed. In this regard it will be necessary to convey the strategic framework to the policy-makers so that appropriate policies are designed, and
- (vi) the concern on addressing supply-chain management implementation at the local level which poses a real challenge, and how to address this challenge.

Dr. Paroda pointed out that there is an obvious need to develop a regional strategy which will eventually support the global partnership programme. This expert consultation should be able to come out with specific recommendations to move forward in this regard.

Subsequently, in order to achieve the output planned, after the deliberations of five sessions, four working groups were formed to crystallize on important concerns for a possible follow up action in the area of PhT.

Thematic Working Group Activities

Dr. Rupert Best outlined the basis for the identification of the four thematic areas for working group discussions and provided discussion guidelines. Thematic areas identified were:

1. **Policy**, this theme was particularly deemed as a priority by the APAARI region and came out prominently during all the presentations and discussions;
2. **Food safety and quality**, whose importance had been expressed strongly during the meeting;
3. **Rural enterprise development and supply chain integration**, with particular attention on mechanisms for profitably and equitably linking resource poor farmers to emerging market opportunities;
4. **Capacity building** of different actors and service providers, linked to the stages of development of the post-harvest sector and emphasising technical, policy development and human resource management dimensions.

The formation of these Working Groups, each having over 15 participants, presented a balance in country representation and also kept in view the specific interest of the respective institutions that each participant was representing. Each WG were given guidelines on how to proceed and were specifically asked to: (i) identify gaps or needs, (ii) define actions that can respond to the gaps or need identified, (iii) identify key institutions and 'model' projects (supply side), (iv) identify interested institutions (demand side) and (v) suggest champion institution(s) for the theme. Also in undertaking this exercise, participants were reminded to consider available experiences, information, thus, building on mainly the ongoing projects, learning from successes and failures and mainly realizing opportunities that exist before us to move forward in this regard.

Working Group I: Policy Issues

Dr. Badaruddin Soomro of Pakistan was elected Chair of the group while Dr. Andrew McNaughton volunteered as rapporteur.

The group first brainstormed on how to approach the task on hand looking into the policy issues related to post-harvest research in the region by stages of development, namely: i) self sufficiency; ii) early stages; iii) developing; iv) mature. This is to be done through the identification of policy gaps, actions to be taken, key institutions and model projects (supply) already into the said activities, as well as to the identification of other interested institutions (demand) which may want to get involved.

This initial discussion alone led to a vibrant exchange of ideas. A number of issues were raised and corresponding clarifications and agreements were reached as follows:

Issues	Agreement/clarifications reached
1. To focus on policies related to post-harvest research and development alone or post-harvest concerns in general.	To look at issues on post-harvest in general first and to look at R&D in particular later
2. To look at development stages across regions or across countries in the region or to look at enterprises per se.	The development stages were characterized by the predominant enterprises present and that while any country/area may be of multi-development stages, the one that predominates will be the focus of the exercise

For the **self sufficiency development stage**, the gaps identified centred mostly on the necessary post-harvest technology, that will either reduce losses or add initial value (drying, storing) and the basic support services that will provide farmers much needed links to markets (information, infrastructure, extension). The lack of incentives to diversification was also an identified gap together with lack of options related to seasonality of produce. It was suggested to address these gaps by building capacities of farmers and enterprises as well as by undertaking research on the integration of supply chains through various institutional modalities of self help groups, cooperatives and corporations.

For the **early development stage**, market orientation and the accompanying technological and business development services (including credit) were the major gaps identified. Action areas suggested are on training and on enterprise related services, particularly technology for both on- and off-farm enterprises.

The gaps identified for the next level, the **developing stage**, focused on the need for a deeper understanding of markets and their requirements, leading to market assessment/analysis and strategy formulation such as integration in supply chains, diversification and on the issue of intellectual property rights. As a consequence, action areas identified focus on the need to forecast consumer demands and meeting market requirements through mass production, particularly by contract manufacturing. The need for a concomitant conducive business environment in terms of incentives to develop new products, appropriate policies (price stabilization) and impact monitoring (policies on SMEs) were likewise cited areas for action.

The gaps for the **mature development stage**, were also very much focused on markets and consumer requirements, but at a higher level: i) enhancing competitiveness through meeting food safety requirements (standards, traceability, certification), ii) technologies to address product seasonality to meet global demands and iii) the need to enhance private sector participation. Consequent actions called for enhancing competitiveness by fostering research and developing a stable policy environment.

A number of national, regional and international institutions and programmes that are actively involved in the enumerated gaps were identified. However, the group did not reach the point of discussion where a lead institution in the region for these activities is to be identified.

Having enumerated post-harvest gaps and required actions in general, the group then proceeded into the identification of specific policy recommendations. These can be clustered as follows:

1. Enhancing competitiveness to:
 - a) Encourage technology dissemination, value addition
 - b) Build capacities of entrepreneurs and enterprises alike and
 - c) Promote regional initiative to harmonize standards
2. Creating a conducive environment that will:
 - a) Promote public private partnerships, networking
 - b) Allow for the provision of support business development services and
 - c) Lead to a stable fiscal and monetary status

The group recognized that all these needed post-harvest initiatives on research and policy promotion should, however, start with a national public sector commitment and allocation of material support and that the participants of the APAARI workshop are in the best position to take the lead in their respective countries and make the initial step to make these recommendations into a reality.

Table 1 provides the framework for deliberations relating to WG1. The following recommendations were made by this group:

- Increase national public sector commitment and material support to promote post-harvest research
- Encourage increased involvement of private sector in Ph research and development through appropriate incentives from the respective governments
- Promote research on integration of supply chain (self-help groups, co-operatives)
- Establish international network on post-harvest research for the Asia-Pacific region
- Promote a regional initiative to harmonize product standards
- Encourage technology transfer, dissemination and training of household entrepreneurs in PhT
- Create stable and supportive fiscal and monetary policies for Ph sector to link producers with markets
- Policy to encourage value addition to various by-products and other new products development and diversification, and promote market driven approach
- Policy to provide a mechanism for upgrading existing enterprises
- Promote public-private sector partnership and implement joint projects
- Create and support BDS providers in rural areas (single window resource centres, farm clinics, internet kiosks etc.)

Working Group 2: Food Safety and Quality

Dr. S. Shanmugasundaram was elected working group Chair and Dr. M. Saxena as rapporteur.

Discussion followed the consideration of gaps in policy, institutional strengthening, supply chain performance and networking, followed by actions to be taken etc. Reference was made to the Asia-Pacific priority paper from Session I that emphasized key areas of supply chain management, human resource dimensions and food safety. Time to fully consider institutional roles and interests was inadequate.

Discussion was stimulating and there was a good cross section of comment/involvement by group members. A key issue was that there already exists a high level of attention to necessary interventions

for food safety through the Sanitary and Phytosanitary (SPS) Agreement and relevant working groups under FAO. It was also noted that there is a strong global interest in supply chain approaches which incorporate attention to food safety. Therefore the strategic framework of the Global Post-harvest Initiative could, under the food safety theme, focus on 'gap analysis' in relation to policy, institutional strengthening, supply chain performance and networking focusing on:

- Fostering integration of food safety considerations into the other three strategy areas (Policy, Rural enterprise development and supply chain integration management, Capacity Building);
- Encouraging avoidance of over-bureaucratization and cost disincentives in relation to regulatory compliance;
- Fostering attention to human resource dimensions as these were critical to ensued implementation and compliance with the technical requirements;
- Industry liaison as a 'reality check' on economic and technical feasibility;
- Networking to match with policy, RED/SCM and Capacity building dimensions.

Discussions concerning institutional interest confirmed the overarching role of SPS/FAO of CODEX and the technical expert committees such as those under the International Union of Microbiological Societies (IUMS) as well as the International Standards Organization and the HACCP. It was generally agreed that most partner institutions had an interest in the topic and that there were often conflicts between national agriculture and health agencies over responsibilities and regulation.

It was emphasized that most of the countries in the region see a need for greater intervention and support for issues related to food safety and quality for all the four thematic areas, but at different levels. Policy gaps on food safety and quality do exist despite having CODEX, SPS, ISO, HACCP, etc. Global, regional and national standards can also be set up by the private sector (e.g. supermarkets). Issues to be considered include: GMOs, mycotoxins, contaminants, micro-organisms, trace-back, cheap tests, quality, flavour, animal feeds, consumer protection; export vs. local markets; special requirements (halal; kosher; vegetarian; organic); labelling; food aid; consumer training and education, review and revision of food laws; inadequate harmonisation in regions; and appeal procedures.

FAO, IFPRI and WHO were identified as institutions for food safety and policy reforms. Several countries and regions have their own models such as Japan, Thailand, India, Rep. of Korea, European Food Safety Authority, France, etc. Other institutions interested in food safety policies are ASEAN, SAARC and SPC. However, most institutions have insufficient resources and personnel. Also, farmer level knowledge/capacity is insufficient. Institutional strengthening required actions to focus on human resource development including technical expertise, links with health personnel, facilitate training and equipment sharing, improve regulatory and quality testing requirements, establish service centres and needed PhT networks. The deliberations of this WG are summarized in Table 2.

The group highlighted, in particular, the following concerns:

- reduce costs/complexity
- web availability
- avoid over-regulation
- regional/global harmonization
- well informed stakeholders
- global standards for food aid

- reduce informal taxes
- promote awareness, education and training
- institutional strengthening
- network requirement

Working Group 3: Rural Enterprise Development and Supply Chain Integration

Dr. Katinka Weinberger was nominated as Chair and Dr. Abdur Rob as rapporteur of the group.

The discussions were organized around four areas of intervention that were deemed priority for this theme: i) Policy, ii) Institutional strengthening through research and capacity building, iii) Enhanced supply chain performance, iv) Networking (information exchange, learning and sharing from past experience, etc.), areas which correspond to the four strategies of the GPHI Strategic Framework.

Participants initiated brainstorming discussion, focusing on each of the priority areas, which led to the identification of many gaps and actions needed. All the ideas were recorded and placed on cards and fitted into the matrix (Table 3).

In the Policy area, for example, participants observed the lack of government policies for investment in post-harvest infrastructure. In some countries such as Bangladesh high taxes on the small scale producers are producing distortions and difficulties. Actions to be taken were identified in trying to ensure a stronger involvement of post-harvest scientists and experts in the government bodies, or to create a focal point for post-harvest development in an appropriate ministry. Obviously, the most concerned institutions would be governments (from local to national) and the universities and research centres as being the most interested.

As per the second priority area, Institutional Strengthening and Capacity Building, the participants identified gaps in the lack of post-harvest marketing expertise and also for the need of ensuring well-trained personnel for Business Development Centres (BDC). A first response to these concerns could be provided by developing the marketing capacities of producers associations, and by undertaking research geared to favouring small scale farmers' integration into and optimization of the production to consumption chain. Also, within this priority area the universities were generally seen as potential interested institutions that could be involved.

The third priority area, Enhanced Supply Chain Performance, particularly captured the attention of the participants and many gaps and activities were identified. Among others the need to improve the ability to use market information, but also the existence in some cases of too many intermediary steps between production and consumption (farmer, village, distribution, processor, and exporter) which can in some cases produce disadvantages. A special mention was also made by the various types of contract farming which were seen to be prone to farmer exploitation, as the latter are not sufficiently well organized. Lack of infrastructures and high cost of input supplies (such as electricity) are also seen as a major obstacle in some countries (e.g. Cambodia). In terms of activities the group suggested intervening in forming farmer organizations and encouraging the establishment of processing plants that would lead to higher demand for and also foster more investment by banks and other credit institutions, to overcome the lack and difficult access to credit faced by small scale producers. A number of supply side institutions were mentioned and among the demand side, national extension services, NGOs and FOs were identified.

In Networking, participants stressed the need to enhance the exchange of experiences to take advantage of new lessons learned. As an action (and consequence) there is a need to organize a regional information-sharing system. On the supply side the convening role of IFAP was mentioned.

At the end of the discussions participants were asked to name a number of institutions that could potentially play a convening role in coordinating efforts of developing this information into concrete action oriented project proposals in the enterprise development theme. The group named the following potential institutions: FAO, CIAT, CIRDAP (Bangladesh).

The following recommendations emerged based on group discussion:

- Improve infrastructure for rural enterprise development
- Promote training and capacity building at institutional and rural sector level, especially the training of BDS
- Promote research into whole chain optimisation with focus on small farmers
- Develop marketing capacity of producers, rural entrepreneurs, farmers
- Establish processing units and promote coordination among farmer-groups to generate funds/ investment through banks to strengthen demand based local venture
- Promote/strengthen marketing to share expertise and available information.

Working Group 4: Capacity Building for Post-Harvest R&D

The Working Group session was chaired by Dr. S.M. Ilyas with Ms. V. Kagy as rapporteur.

Human resource development at all levels was considered as a basic need in strengthening PhT research and development. Some of the specific needs have already been reflected in the recommendations of the earlier three groups relating to policy domain, food safety and quality and rural enterprise-linked issues and requirements, given that capacity building is a cross cutting theme. Visible gaps exist in the areas of food safety regulations, total quality management, standards, awareness on policy issues related to WTO/IPR, TRIPS related options, trade/market related issues, appropriate value added transformation technologies, product diversification, business management (Table 4).

The following specific recommendations emerged from group discussions:

- A gradient approach is required to address capacity building requirements of the region
- Training is required in a number of areas (post-harvest management, business management, etc.) and at all levels of post-harvest development
- R&D institutions (public, private, NGOs) must be identified to provide general and specific training in order to meet the requirements of the various target groups, and in accordance with the various levels of development within Asia-Pacific region
- Infrastructure (cold chains, packing houses, laboratories etc.) and logistical support systems are required for post-harvest development in the region
- Technologies which are appropriate to the situation and context (e.g. low/appropriate technology for early stages of development; intermediate technologies for developing countries, and more advanced technologies for countries at mature stages of development), must be developed and disseminated.
- Where appropriate promote product diversification and product innovation

- Involve financial institutions in commodity-oriented demand based enterprises *vis-à-vis* training and education
- Develop linkages among farmer groups, other partners for marketing/technology sharing.

Plenary Session

This session was chaired by Dr. R.S. Paroda, Executive Secretary, APAARI.

The deliberations of the Plenary Session focused on summary reports of the five technical sessions which were summarized by the respective chairpersons or their representative/rapporteurs, and in particular on Session V, which dealt with the Global Post-harvest Initiative as reported above. An overall synthesis of the issues/concerns raised during this plenary session is summarized below in the form of recommendations for a follow up action by global/regional organizations involved and the NARS in the Asia-Pacific for research and development in this priority sector.

General Recommendations:

The important recommendations that emerged during the deliberations are summarized here:

1. The perceived need for greater understanding of, and attention to achieving links between small holder farmers and markets, and the options for intervention, directly through farmers and farmer's organizations, or through traders, or other supply chain actors has to be explored and put in place.
2. The need for an appropriate regulatory framework for meeting emerging market demands was recognized since such a framework has yet to evolve in many developing countries of Asia-Pacific region.
3. Tremendous capacity exists for PhT research and development in the region. This capacity must, however, be mobilized effectively for the regional public goods. However, the agricultural research and development (ARD) knowledge, expertise and infrastructure differs in different NARS of the Asia-Pacific region, and even within larger NARS. Thus, flexibility in R&D activities to formulate project/PhT programmes at national/regional level is required within the prioritized areas.
4. Concern was expressed as to how best to support the research needs of the less developed farming sector, since the technical developments, by and large, are favouring mostly the resourceful farmers and especially the big enterprises.
5. Increased collaboration in the region with the Global Post-harvest Initiative (GPHI), FAO and GFAR initiated activities was fully endorsed by the participants.
6. The important role of APAARI in catalyzing national and other regional organizations in raising awareness and developing appropriate regional interventions to improve the effectiveness of agricultural research concerning Ph sector was duly recognized.

Specific Recommendations

The specific recommendations for PhT related R&D and policy issues are summarized as follows:

I. Research and Development needs: NARS-based emphasis

- R&D in the area of PhT is a critical need at the present juncture and hence increased research support is fully justified to strengthen PhT institutions and develop much needed expertise and human resource.
- Integrate and mobilize effectively the existing institutional infrastructure for PhT related R&D needs. Expertise does exist at the national level in research centres/universities/private sector/NGOs and other local bodies. A well integrated approach among all ARD sectors is necessary to address the complexity of this sector.
- Need to gear research toward the integration of small scale farmers into the production to consumption chain through improved management systems and enhanced supply of market information, including market distribution systems to the farmers.
- Encourage development of varieties with post-harvest properties (resistance against post-harvest diseases, shelf-life, processing properties); low cost, simple technologies at the farm level (pre/post-harvest handling) and identification of value added processing opportunities.
- Need to increase public-private sector linkages for Ph research. Catalyze research partners and policy makers promoting awareness and concern through such deliberations for increased R&D support.

II. Policy

- An appropriate policy environment is needed at the national level with desired infrastructure and appropriate incentives for both research and development activities relating to PhT support in rural areas.

III. Food safety and quality needs

- Development of internationally acceptable food safety/quality standards/laws, harmonizing of standards, regulations to be followed/introduced in the developing countries (codex, food labeling) are required to be put in place soon.
- Develop food safety Website for increased knowledge-base for NARS and establish such ICT link with APAARI/APARIS and GFAR/EGFAR as well as FAO/WAICENT.

IV. New Ph opportunities: Value addition, product development, market, technologies

- Alleviating poverty in rural areas through income and employment generation requires the identification and development of opportunities for diversification and adding values to on and off-farm activities and integrating these in an equitable manner into supply chain with expected growth potential.
- Need to create market oriented rural production and value addition enterprises that are well developed with required market actors and service providers.
- Encourage the development of low-cost, practically feasible and simple technologies that are relatively easy to use and locally implementable; that will help farmers to safely store their products for a longer period.

- Development of effective local information and technology transfer mechanisms so as to benefit the resource poor farmers.
- Need for technology generation and commercialization at small scale rural enterprises for promoting value addition and market orientation/development, market analysis study and the new products development, its value addition and diversification.
- For developing low cost technologies for rural communities/farmers, the role of Public Sector institutions has to be recognized and further supported in addition to the important role being played by the Private Sector.
- Market-oriented agricultural production linked in a sustainable and equitable manner to changing agro-industrial and consumer trends need a higher level of skills and shift in the attitudes of service providers that intervene in the supply chain of agricultural produce and products. Farmer enterprises are to be fully integrated into supply chain especially considering the fact that market demands are for quality and supply of diversified products.

V. Capacity building/training needs

- Need for institutional strengthening and capacity building to address specific training requirements both at the higher level and for rural sector/farmer communities and training for enterprises such as technology upgrading, food safety, quality etc.
- Capacity building for all stakeholders in the supply chain needed, including farmers, traders and the processors. Market information systems that allow farmers and traders to learn more about their markets, and skills to make use of the market information system will have to be put in place.

VI. Strengthen networking/partnership: Global/regional collaboration

- Networking was recognized as very potential instrument to promote and strengthen diverse, need based, post-harvest activities both at the national and regional level, for information exchange/dissemination, developing data-bases, learning and sharing of past experiences, technology transfer/undertaking/developing collaborative projects/programmes etc.
- Specific activities to be taken up within the identified *GPhI* priority areas, need to be well defined. There is need to compliment ongoing programmes in the region, address gaps and priorities in Ph development. Also, Ph lead institutions/centres in Asia-Pacific regions (within NARS) be identified for collaboration in priority areas activities.
- Need for developing a coherent regional programme to link regional activities with global initiatives as demonstrated by FAO/GFAR/Ph Action. Regional fora such as APAARI has to catalyze and monitor such activities under its overall umbrella through effective partnership with these organizations.
- Regional Network namely, Asia-Pacific Network on Post-harvest Technology (APNPHT) could be a possible alternative with specific support and leading role of Ph Action, FAO, GFAR and APAARI – involving some leading institutions to play the facilitation role. Such a network could eventually become a Global Partnership Programme (GPP) under GFAR, involving other regional Fora.
- Any post-harvest regional network under the auspices of APAARI could synergise with the ASEAN/APEC biennial seminars on post-harvest technology which are coordinated by SEARCA – the next Seminar is to be held in Perth, Australia in 2006.

- Need to assess ongoing projects in Ph sector in the region, which can serve as good base to learn experiences to take up future work and develop projects and identify interested donors for specific support in a network mode.
- Need to catalyze research institutions in the region, to expand their research portfolio to cover PhT as an important priority area to be addressed in future. Similarly, CG centres, ARIs and regional institutions to also lay greater emphasis on research relating to PhT and strengthen both capacity building and human resources development of developing NARS in the Asia-Pacific region.

VII. Addressing other actions

- A number of success stories (low cost, rural based know-how) and lessons learnt have been identified but precise information on their PhT aspects is lacking. For the benefit of NARS, such information with focus on low cost technology development and its application need to be synthesized and published jointly by APAARI and GFAR.
- Relatively less information is available on PhT in livestock sector. Hence, it was recommended to take pro-active steps to create a network for livestock to facilitate sharing of available Ph experiences. Also, both feed and fodder production aspects be considered important in this regard. ILRI could play a key role as facilitator for such a network.
- More efforts are needed to have data base on key institutions/centres at the national, sub-regional, regional and global levels with requisite PhT infrastructure and expertise for expanding R&D programmes in the Ph sector: and that such centres stand committed to accept challenges to undertake further research based on gaps identified.

Concluding Remarks

In concluding the deliberations, Chairman of the plenary session Dr. R.S. Paroda acknowledged the keen interest generated by the Consultation, which reaffirmed the long felt need for strengthening R&D needs and urgency to take up specific actions in the post-harvest sector by developing NARS and all concerned institutions/organizations. He assured that following this Consultation, and seeing the overwhelming response and support from APAARI members, needed follow up action is required to be taken at the national, regional and international level, with specific support and partnership of institutions such as FAO, GFAR, Ph Action, APAARI, CG Centres etc. so that priority recommendations of this expert consultation are properly addressed.

It was also suggested that for proper implementation of various important recommendations of this Expert Consultation, a working group of active participants and concerned organizations be constituted to examine the possibilities of future collaboration in the field of post-harvest technology. FAO, GFAR and APAARI are the best placed organizations to catalyze this process further and participants urged them to move forward in this regard.

Part II

Special Session on Current Status of Regional Programmes and Research Networks

Chairperson: Dr. William Dar, ICRISAT

Co-chairperson: Prof. H.P.M. Gunasena, CARP

The presentations in this session highlighted the role of diverse networks operating in the Asia-Pacific region such as on crop improvement, PGR conservation, agricultural information technology, biotechnology, aquaculture and others. These are briefly dealt with here.

Dr. William Dar, ICRISAT, presented the CG System's Future Harvest Alliance: Collective Action Framework. The 15 CG Centres are being aligned to address complex challenges such as the commitments of the Millennium Development Goals, poverty, food and environment. The guiding principles of the future harvest alliance include: allegiance to the poor; Centres to abide by formal decisions of future harvest alliance; ensure transparency and open communication; accountability to stakeholders; partnerships among equals; no hierarchy of Centres, mutual respect; priority setting using open, transparent practices and stakeholder consultation; better resources utilization, and shared standards and practices. He referred to enhancing regional integration in the proposed collective activities to build on existing regional forums such as APAARI in the Asia-Pacific and other key partners.

Dr. S. Mruthyunjaya, ICAR, presented a report on 'Gap Analysis for South Asia,' an outcome of the workshop on 'Research Need Assessment and Prioritization of Agricultural Research for Development in South and West Asia' jointly organized by APAARI, ICRISAT and ICAR and held at ICRISAT in October 2004. Over 40 participants including country representatives, NARS of Bangladesh, India, Nepal, Sri Lanka and Iran, CGIAR institutions, SAUs, NGO, private sectors attended the meeting. The key issues identified included networking, multi-disciplinarity, planning and monitoring, participatory methods, capacity building, improved delivery of services and supplies and improved governance. Donors endorsed the discussion group reports and suggested that future challenges be factored into the present exercise; priorities should match with millennium development goals; progress be made to arrest wide spread malnutrition, stagnating agriculture, threats of HIV/AIDS on agriculture, and inclusion of socially excluded groups. Emphasis should also be placed on climate change, integrated genetic and NRM regional information management, and quality competitiveness. The workshop was useful to flag micro-priorities in genetic improvement, NRM and socio-economic and policy research.

Dr. Sahdev Singh, APAARI, reported status and progress of Asia-Pacific Agricultural Research Information System/APARIS initiative during 2004. Based on the recommendations of the APAARI Expert Consultation on ICT/ICM in ARD during December 2003 and 2nd & 3rd APARIS Steering Committee meetings during the last year, APARIS successfully completed a number of activities. These include training of National Information Nodal Points (NINPs) to strengthen APARIS network; organizing 3rd APARIS Steering Committee Meeting; participation in meeting such as AFITA/WCCA 2004, 15th AAACU Biennial Convention, FAO Roundtable Meeting on Networking of Networks, publication of the proceedings of Regional Status Report on ICT/ICM in ARD, and making significant improvements in APAARI Website and production of all APAARI documents, reports and success stories on a CD for wider dissemination. Future activities for 2005-2007 were projected and need for strengthening collaboration among NARS, regional and international partnership highlighted.

Dr. Vibha Dhawan, APAARI presented the first year progress of APCoAB initiative. APAARI organized the first APCoAB Steering Committee meeting on 8 April 2004 to finalize the road map and workplan for 2004-2006. Subsequently, the second APCoAB Steering Committee meeting was held on 30 November 2004 to review the progress of the initiative. The initiative has established its Secretariat at ICRISAT, New Delhi office. In the first year, APCoAB website (www.apaari.org/APCoAB/) has been set up for information dissemination in the area of agricultural biotechnology and also to publicize APCoAB goals, objectives and activities. APCoAB future plans stress on greater need for policy advocacy, research partnership, knowledge resources and dissemination and capacity building. APCoAB along with The Energy and Resources Institute (TERI) has jointly organized a seminar 'Agricultural Biotechnology in the context of the third Millennium & Developing Nations' on 13 September 2004. A brochure on APCoAB has been published and circulated. Two case studies: one on Transgenic Maize in the Philippines by Dr. Reynaldo Ebor, Ms. Ampil, Ms. Merle Palacpac and Mr. Carlo Custodio; and the other on Bt. Cotton in India by Dr. S.R. Rao and Mr. Raju Barwale are currently being attempted for publication.

Dr. William Padolina, IRRI, presented the activities of International Network on Germplasm Evolution of Rice (INGER) and germplasm exchange under the network Council for Partnerships on Rice Research in Asia (CORRA). He also briefed the participants on various activities undertaken during the International Year of Rice 2004, and achievements of rice research focusing on rice improvement, hybrid rice development, enhancing the nutritional values of rice, and information dissemination. He also reported that INGER activities are eligible for Global Crop Diversity Trust (GCDT) crop strategies funding support and CORRA supports INGER participation in the GCDT. Referring to International Year for Rice – IYR activities, it was pointed out that IRRI is being recognized by ASEAN as a partner and this was a significant achievement.

Dr. M. Roozitalab, AARINENA, presented the status of the Inter-regional Network on Cotton in Asia and North Africa (INCANA) which was established on the basis of the recommendations of the First Inter-regional Workshop on Cotton Research held in October 2002 at AREO, Tehran, Iran. Cotton Research Institute of Iran was selected and given the responsibility for establishing the INCANA Secretariat. The INCANA mission is to increase cotton productivity in the member countries through research collaboration and exchange of scientific knowledge and human resource development. The second meeting was held from 6-8 September 2004 in Tashkent, Uzbekistan. The Meeting was organized by CACAARI and co-sponsored by GFAR, AARINENA, APAARI, and ICARDA Office in Tashkent. About 35 scientists from Iran, India, Egypt, Syria, Jordan, Greece, Kazakhstan, Tajikistan, Azerbaijan and Uzbekistan participated. INCANA website is operational (www.irnc.net) and provides information on this newly created network.

Special Session (contd.)

Chairperson: Dr. William Padolina, IRRI

Co-chairperson: Dr. Mohan Saxena, ICARDA

Dr. C.L.L. Gowda, ICRISAT, described the expanded Cereals and Legumes Asia Network (CLAN) and its impact on cereal and legume production in the region through exchange of germplasm as breeding material in sorghum, pearl millet, chick pea, pigeon pea, groundnut, small millets, mung bean and lentil in the varieties released. The network is now co-facilitated by ICRISAT, AVRDC and ICARDA. Its objectives are to strengthen regional R&D collaboration; promote participatory varietal selection, adoption and integrated crop management (ICM), establish village-based community seed production systems and enhance partners capacity in technology development and dissemination. He also put

forward a proposal for coordination of regional research and capacity building under CLAN. Member countries were urged to provide funding support and APAARI was requested to consider providing bridging grants.

Dr. S. Shanmugasundaram, AVRDC presented the status of SAVERNET, the South Asia Vegetable Research Network considered as a vehicle for AVRDC partnership with NARS in this region for research on vegetables. SAVERNET has four subnetworks, namely, two under SAVERNET.I – Exchange and evaluation of elite varieties; Crop and pest management research; and two under SAVERNET.II – On-farm evaluation of elite varieties; and Crop and pest management research. He referred to the achievements in vegetable improvement through exchange and evaluation of elite varieties, varieties released through SAVERNET in tomato, eggplant, chilli, onion; technology development for increased production of vegetables in the off season, and capacity building for specific skills, and several other research activities/programmes. It was stressed that AVRDC serves as a catalyst, while the network is a vehicle for collaboration. He concluded that the network approach is better with limited resources to implement required resource oriented to achieve common objectives and that interaction and collaboration strengthens the networks partnership.

Dr. Bhag Mal, IPGRI, provided the current status of various PGR Networks, both regional and crop-specific, and suggested that APAARI and IPGRI should promote and ensure sustainable development of effective and efficient regional networking on PGR. APAARI and IPGRI should develop a joint action plan for implementing Conservation and utilization strategy on plant genetic resources for South, South-East and East Asia (SSEEA strategy) and other activities agreed by the two organizations, updating the policy makers on International Treaty for Plant Genetic Resources for Food and Agriculture (IT-PGRFA) and Global Crop Diversity Trust (GCDT) and make joint efforts for sourcing the funds for PGR networks.

Prof. H.P.M. Gunasena, CARP reported that UTFANET's goal is to contribute in the socio-economic development and poverty alleviation of people in Asia through increased production, processing, marketing and utilization of underutilized crops. Currently, there are six member countries in the network: Sri Lanka, the Philippines, Bangladesh, Vietnam, Pakistan and Nepal. He presented the organizational structure of UTFANET and various activities undertaken such as seminars and workshops, projects, action plans, and publications.

Dr. Julian Heyes, NZIC & FR, made a presentation on International Tropical Fruit Network (ITFNet). The network was formed for promoting sustainable development of the tropical fruit industry globally in relation to production, consumption, processing, marketing and international trade. It currently has more than 60 members throughout the world. Dr. Heyes described various projects including post-harvest activities in tropical and sub-tropical fruits, workshops/meetings organized, publications of the network and demonstrated the services provided by the network website.

Mr. Simon Wilkinson, presented an overview of the Network on Aquaculture in the Asia-Pacific (NACA) and its various activities. NACA, an APAARI member, is an intergovernmental organization of 16 members with a focus on aquaculture and aquatic resource management for rural development. It promotes technical exchange between developing countries and also members share expertise to avoid duplication of efforts. He referred to post-harvest activities on shrimp farming and concerns on food safety. Governing Council amended the NACA Agreement to allow for Associate Membership of organizations with similar interests and accepted a proposal for reciprocal Associate membership. NACA looks forward to a closer relationship and collaboration with APAARI and its members.

Dr. Ramanuja Rao presented a new proposal for GFAR Global Partnership Programme (GPP) on Non-Timber Forest Products (NTFPs) for livelihood development. He referred to the International Network for Bamboo and Rattan (INBAR), based at Beijing, which is recognized as an International organization with 29 member countries. He urged APAARI members for Institutional expression of interest in NTFPs GPP within its institutional format work information about any NTFP projects and the Action Research Partnerships (ARP) sites that they could write to and co-opt into the umbrella of the GPP, views on five priority NTFPs for Asia and five for the Pacific, information on financing, co-financing, parallel financing, in-kind contribution and support as the GPP develops, and advice on how to build on the needed linkages into the Regional Agricultural Information Service (RAIS) and Farmers to Markets initiatives.

Dr. Bill Thorpe, ILRI Asia Representative presented a proposal for the establishing of a joint APAARI-ILRI Livestock Network for Supporting Livestock R-for-D in Asia-Pacific for information exchange, sharing research results, address priority issues to develop collaborative projects and looking into resource mobilization. He stressed on the need for a multi-disciplinary research partnership in the livestock sector.

General Discussion

The role of networks was appreciated and participants felt that collaboration through networks, which was cost-effective, was serving very useful purpose by bringing diverse partners together, especially the CG Centres, Regional Organizations and the NARS. Increased commitment of NARS was still required and promoting these activities under APAARI was needed for further strengthening. However, for their sustainability, better funding support was critical for which organizations such as FAO, GFAR, APAARI, CGIAR/IARCs, ACIAR, JIRCAS and other such global/regional organizations could play an important role. Donor organizations such as World Bank, Asian Development Bank, European Union, IFAD and others could be approached to support these very important networks in the Asia-Pacific region.

It was observed that the operating networks have done exceedingly well towards increased sharing of information, expertise, technology transfer and capacity building. Crop and commodity oriented networks have made good impact and are contributing effectively to meet the goals of food security, poverty alleviation, and environmental sustainability, in tune with the Millennium Development Goals/Future Harvest Alliance. In this context, increased collaboration of CG Centres, such as ICRISAT, IRRI, IPGRI, and other Centres like AVDRC, NACA with regional NARS was much appreciated. Also, it was encouraging to note the role being played by the recently established Global Crop Diversity Trust (GCDDT) in providing support to PGR networks activities. Participants were very pleased to see facilitators' role of APAARI in the region for the mobility, effectiveness and sustainability of these research networks.

In their concluding remarks, Dr. William Dar, Prof. H.P.M. Gunasena, Dr. William Padolina and Dr. Mohan Saxena, co-chairing the two sessions on networks appreciated the efforts of various NARS and CG Centres in supporting these regional networks and felt that programmes on genetic resources, livestock improvement and fruits and horticulture as well as fishery could be further strengthened or initiated. Involvement of CG Centres as facilitators was considered critical for their long-term sustainability and hence they strongly urged for continued support to these research networks under over all umbrella of APAARI. It was also suggested that for continuous review of progress made by the existing networks, a similar technical session be included in all future meetings of APAARI.

Table 1. Deliberations of Working Group 1 on Policy Issues

STAGE OF DEVELOPMENT	Gaps	Actions to be taken	KEY INSTITUTIONS AND MODEL PROJECTS		INTERESTED INSTITUTIONS
			Supply	Demand	
1. Mature (farmer enterprises are fully integrated into supply chains producing products that meet market demands in terms of quality and frequency of supply)	<ul style="list-style-type: none"> Food Safety implementation: Testing, certification, traceability, standards (conventional & organic), implementation Acceptance of private sector role Processing varieties (e.g. LTS tomatoes, off-season) 	<ul style="list-style-type: none"> Research to respond to private sector needs Stable policy environment 	<ul style="list-style-type: none"> NFRI Japan CFTRI India Pakistan PARC, Ministry of Food and Livestock, Min. of Environment. Vietnam, Min. of Ag. & Rural Development, 	<ul style="list-style-type: none"> Everyone 	
2. Developing (commercially oriented enterprises are adding value to and diversifying their products)	<ul style="list-style-type: none"> Market assessment/analysis, strategy and new product development Supply chain integration, diversification & by-product utilization Intellectual Property regimes 	<ul style="list-style-type: none"> Linking production by masses to mass production (contract manufacturing) Forecast of consumer demand and future market Legal framework of contracts and disputes Incentives for new product development Monitoring and analysis of impacts of policies on SME development Price stabilization and outsourced insurance 	<ul style="list-style-type: none"> India: APEDA, CSIR, IIFT, Export Development Board VN Agric. Economics Inst. SEARCA SME development study to more countries India MFPI food parks (49) Traditional Knowledge Digital Library (IPRs) 		

Table 1. (continued)

STAGE OF DEVELOPMENT	Gaps	Actions to be taken	KEY INSTITUTIONS AND MODEL PROJECTS		INTERESTED INSTITUTIONS
			Supply	Demand	
3. Early stage (small-scale rural enterprises with low levels of value addition and weak business orientation)	<ul style="list-style-type: none"> • Access to low interest credit • Market orientation • Technology multiplication/commercialization • Business Development Services 	<ul style="list-style-type: none"> • Enterprise associations • On-farm and off-farm enterprise services • Multi-product enterprise incubators • Continuous training 	<ul style="list-style-type: none"> • Mini-dhal mill • Quedancor rural lending model P'pines • Low capacity feed mills Pakistan • Small-Holder Nucleus estate (poultry-Fiji) • (See list below) • Vietnam MARD Post-harvest handling programme 	<ul style="list-style-type: none"> • India (CFTRI) • Sri Lanka Ph Institute 	
4. Self-sufficiency (high proportion of individual farmers producing predominantly for their own consumption)	<ul style="list-style-type: none"> • Ph technologies for initial value addition to reduce losses on-farm (e.g. drying and storing) • Farmer to Market linkages, information and extension, infrastructure to reach target markets • incentives to increase and diversify • seasonal options 	<ul style="list-style-type: none"> • Capacity building for farmers and for enterprises • Research on integration of supply chains (self-help groups, cooperatives or corporations) • Policy analysis 	<ul style="list-style-type: none"> • PARC (Grain Storage Directorate) • ICAR (Indian Grain Storage Research Inst.) • Private sector • Mother dairy • National Dairy Cooperative • National Dairy Development Board 	<ul style="list-style-type: none"> • IFPRI (Policy & markets) • ILRI, CIAT, ICRISAT • VN Ag. Engineering & Ph Tech. Inst. • India ICAR • Sri Lanka PhD 	

Table 2. Deliberations of Working Group 2 on Food Safety and Quality

AREA OF INTERVENTION	Gaps	Actions to be taken	KEY INSTITUTIONS AND MODEL PROJECTS		INTERESTED INSTITUTIONS
			Supply side	Demand side	
Policy	<ul style="list-style-type: none"> we have codex; SPS; ISO; HACCP etc. global, regional, national standards can also be set by private sector (e.g. supermarkets) GMOs, mycotoxins, contaminants, micro-organisms trace-back, cheap tests, quality, flavour, appeal procedures, animal feed, consumer protection; export vs. local markets; special requirements (halal; kosher; vegetarian; organic); labelling; food aid; consumer training and education, review and revision of food laws; inadequate harmonization in regions 	<ul style="list-style-type: none"> reduce costs/complexity web available avoid overregulation regional/global harmonization education global standard for food aid reduce informal taxes 	<ul style="list-style-type: none"> IFPRI; FAO, WHO JAPAN, THAILAND, INDIA, Rep. of KOREA, EUROPEAN FOOD SAFETY AUTHORITY, FSANZ 	<ul style="list-style-type: none"> ASEAN SOUTH ASIA REGIONAL PNG/PACIFIC – SPC 	
Institutional strengthening through research and capacity building	<ul style="list-style-type: none"> insufficient resources, personnel, farmer knowledge/capacity, women's knowledge/empowerment Ph, processing, breeding for quality, storage life, supply chain analysis R&D analysis, regulatory, inspection and monitoring, accreditation for auditing and certification – food safety, GAP, HACCP, QA, ISO etc. policy analysis; international regulation – knowledge interpretation, law, codex negotiation contingency planning and crisis management 	<ul style="list-style-type: none"> focus on hr dimensions as well as technical link with health personnel training and equipment regulatory and quality testing improvement review focus and use of existing resources network establishment establish service centres 	<ul style="list-style-type: none"> SPS FORUM, CABI, GIRAD, CFTRI REGIONAL ORGANIZATIONS APEC, ASEAN. SPS (Biotrop, SEARCA) Lead nations EU FUNDING (PCRD-6) ASIA LINK 	<ul style="list-style-type: none"> CAMBODIA, LAOS, VIETNAM PACIFIC/PNG 	

Table 2. (continued)

AREA OF INTERVENTION	Gaps	Actions to be taken	KEY INSTITUTIONS AND MODEL PROJECTS		INTERESTED INSTITUTIONS
			Supply side	Demand side	
Enhanced supply chain performance, and infrastructure	<ul style="list-style-type: none"> process validation certification, link to product integrity risk assessment methodology, traceability supply chain maps, quality producer, trader, consumer associations market info, prices and analysis food safety network website, validation procedures, networks packaging, transport, finance and infrastructure analytic and standards labs and methods markets, co-ops, storage etc. 	<ul style="list-style-type: none"> industry liaison, foster industry associations, create training modules for industry develop contract frameworks, improve access to finance facilitate private sector links, bioremediation establish certification schemes foster public and private sector and donor investment for Ph sectors 	<ul style="list-style-type: none"> UNIV. WAGENINGEN, AUSTRALIA DEPT AFF, NRL, CIRAD, THAILAND SUPERMARKET CHAINS, MULTINATIONALS, COMMODITY ORGANIZATIONS (ICCO) LOCAL INITIATIVES (e.g. KVIG, ROYAL PROJECT) NGO – TRAIDAID, FAIRTRADE EUREPGAP, FRESHCARE WORLD BANK, ADB, NATIONAL GOVTS. AND INVESTMENT BANKS CLVNET, ACIAR, ADB 	<ul style="list-style-type: none"> CAMBODIA, LAOS, VIETNAM, CHINA, PNG/PACIFIC 	
Networking (information exchange, learning and sharing from past experience, etc.)	<ul style="list-style-type: none"> lack of attention by IARCs, future harvest, world bank ADB web links; databases regional lobby groups (codex negotiation) multidisciplinary tertiary training (food law, certification, quarantine microbiology) consumer warning systems, recall procedures, trace back, legal liability frameworks and education 	<ul style="list-style-type: none"> give more emphasis to Ph on IARC Websites ensure that Ph is championed to CG science council add Ph dimension to existing networks create websites, build on INPhO, APAARI website links research planning for impacts with emphasis on food safety and quality publications, how-to manuals 	<ul style="list-style-type: none"> FAO-INPhO, APAARI, e-newsletters, conferences (LFWM) CTA (FRANCOPHONE) 	<ul style="list-style-type: none"> CAMBODIA, LAOS, VIETNAM, CHINA, PACIFIC/PNG 	

Table 3. Deliberations of Working Group 3 on Rural Enterprise Development and Supply Chain Integration

AREA OF INTERVENTION	Gaps	Actions to be taken	KEY INSTITUTIONS AND MODEL PROJECTS		INTERESTED INSTITUTIONS
			Supply side	Demand side	
Policy	<ul style="list-style-type: none"> • lack of funds for R&D in post-harvest • weak policies from govt. for Ph 	<ul style="list-style-type: none"> • involvement of experts and scientist in policy making • improve infrastructure for enterprise development 	<ul style="list-style-type: none"> • National Governments • Min. of Agriculture 	<ul style="list-style-type: none"> • Universities and research institutions in the region 	
Institutional strengthening through research and capacity building	<ul style="list-style-type: none"> • lack of trained BDS provider frontline workers • lack of post-harvest and marketing expertise local and national levels 	<ul style="list-style-type: none"> • training on BDS • research into whole chain optimisation which favours small farmers • develop marketing capacity of producers associations 		<ul style="list-style-type: none"> • Universities in the region 	
Enhanced supply chain performance	<ul style="list-style-type: none"> • lack of ability to use market information • processors can train growers in production and post-harvest technique • support systems • Rural finance • cluster development approach and help to organize producers organization 	<ul style="list-style-type: none"> • middle man plays a useful role...coordinate several farmers • establish processing plants creates demand for farmers and bank will invest/lend 	<ul style="list-style-type: none"> • Taiwanese farmer association • OTOP and IFRPD Thailand • ARBOFRUITS (New Caledonia) • FCTE • BAU • BIRRI • ITDG • Federation of free farmers • CAPSA Bogor Indonesia • SEEP network on BDS (ILO) 	<ul style="list-style-type: none"> • national extension services (DAE Bangladesh, Sect. of Pacific Commission) • farmer organizations 	
Networking (information exchange, learning and sharing from past experience, etc.)	<ul style="list-style-type: none"> • Learning from experiences 	<ul style="list-style-type: none"> • organize regional information sharing activities 	<ul style="list-style-type: none"> • IFAP regional collaboration among farmer groups 		

Table 4. Deliberations of Working Group 4 on Capacity Building for Post-harvest Research and Development

AREA OF INTERVENTION	Gaps	Actions to be taken	KEY INSTITUTIONS AND MODEL PROJECTS		INTERESTED INSTITUTIONS
			Supply side		
Mature (farmer enterprises are fully integrated into supply chains producing products that meet market demands in terms of quality and frequency of supply)	<ul style="list-style-type: none"> • Food safety and HACCP certification, Codex, OIE, IPPC, SBSm TBT, standard regulation, TRIPS, IPR issues • Information • Cold chain • Traceability • Innovation in products development 	<ul style="list-style-type: none"> • Training • Codes and standards • Laboratory services • Development of high value food (organic, green products, health) • Expansion of market • ICT 	<ul style="list-style-type: none"> • Multinationals • Private corporations, ITC, BRAC • Project (Nestle, Pepsu, Foods, Supermarkets) • References laboratories private, public. Regional laboratories • R&D • WIPO • FAO WMO, AVRDC 	<ul style="list-style-type: none"> • NFI (Thailand) • BARC (Bangladesh) • BSTI (Bangladesh) • NFRI (Japan) • RDA (Rep. of Korea) • ARI (Taiwan) • NIPE (Vietnam) 	
Developing (commercially oriented enterprises are adding value to and diversifying their products)	<ul style="list-style-type: none"> • Quality control • TQM • Technology up gradation • Marketing support • Infrastructures and logistics • Value addition diversification 	<ul style="list-style-type: none"> • Development of standards • Harmonization of standards • Regulatory framework • Establishment of laboratories (testing) services • Training and post harvest quality management in post-harvest chain • Training in business management • Development of technology 	<ul style="list-style-type: none"> • Bureaus of standards (BLS) • FDA (Thailand), PFA (India), BFD (Philippines) • Training institutions (CFTRI India) • Business management • IRMA (India), BOI (Bangladesh), SME (Thailand), SME (Philippines), NCSQ (Vietnam) • R&D institutions • Min. of Commerce (MPED, MPEDA) 	<ul style="list-style-type: none"> • BSTI (Bangladesh) 	

Table 4. (continued)

AREA OF INTERVENTION	Gaps	Actions to be taken	KEY INSTITUTIONS AND MODEL PROJECTS	
			Supply side	Demand side
Early stage (small-scale rural enterprises with low levels of value addition and weak business orientation)	<ul style="list-style-type: none"> • Business management • Marketing • Low technology for handling and value addition • Linkage • Credit 	<ul style="list-style-type: none"> • Development of appropriate technology • Involvement of financial institutions • Training in Ph management at an appropriate level • Collaborative initiatives (farmers groups) 	<ul style="list-style-type: none"> • Business promotion institutions • R&D institutions (CIPHET, BPRE) • Public, private and NGOs • Rural banks 	<ul style="list-style-type: none"> • R&D institutions and universities • IRRI, Kasetart University, UPLB • GRAMIN Bank (Bangladesh) • APO (Japan) • POPACA (Vanuatu)
Self-sufficiency (high proportion of individual farmers producing predominantly for their own consumption)	<ul style="list-style-type: none"> • Extension • Appropriate technology 	<ul style="list-style-type: none"> • Village level training and education 	<ul style="list-style-type: none"> • Advisory services in national institutions • NGOs 	<ul style="list-style-type: none"> • IRRI • IARI, NIRD • BPRE • University of Agriculture • Farmers' Field School (Bangladesh)

Annexure I



**Expert Consultation on
Post-harvest Technologies for Ensuring Food Security and
Value Addition for Enhanced Income**

1-3 December 2004, Rama Garden Hotel, Bangkok, Thailand

Programme

1 December 2004 (Wednesday)

8:00-9:00	Registration	
	Inaugural Session	
	<i>Chairperson:</i> Dr. Mutsuo Iwamoto, Chairman, APAARI	
	<i>Co-chairperson:</i> *Dr. Nurul Alam, Vice-Chairman, APAARI	
9:00-9:10	Welcome Address	Dr. Raj Paroda Executive Secretary, APAARI
9:10-9:20	Chairman's Remarks and Objectives of Expert Consultation	Dr. Mutsuo Iwamoto Chairman, APAARI
9:20-9:35	Special Remarks on behalf of GFAR	Dr. Mohammad Roozitalab Chairman, GFAR
9:35-9:45	Special Remarks on behalf of Ph Action: the Global Post-harvest Initiative	Dr. Greg Johnson Ph Action
9:45-9:55	Special Remarks on behalf of FAO ADG and RR, FAO-RAP	Dr. Alastair Hicks FAO-RAP, Thailand
9:55-10:05	Inaugural Address on behalf of the Minister of Agriculture and Cooperatives, Thailand	Dr. Apichart Pongsrihadulchai, Secretary General, National Bureau of Agricultural Commodity and Food Standards

* Represented by Dr. Md. Muslem Uddin Miah, Director BARC, Bangladesh

10:05–10:10	Release of APAARI Publications and Presentation of APAARI Mementos	
10:10–10:15	Vote of Thanks	Mr. P.K. Saha Liaison Officer, APAARI
10:15–10:30	Coffee Break and Group Photograph	
Session I: New opportunities for and the challenges facing post-harvest research and development in the Asia and Pacific region		
<i>Chairperson: Dr. M. Roozitalab, GFAR</i>		
<i>Co-chairperson: Prof. H.P.M. Gunasena</i>		
10:30–10:50	South and West Asia Perspective	Dr. V. Prakash, India
10:50–11:10	South-East Asia Perspective	Dr. Saipin Maneepun, Thailand
11:10–11:30	The Pacific Region Perspective	Ms. Valerie Kagy-Cargnelli, New Caledonia
11:30–11:50	FAO-RAP Perspective on PhT	Dr. Alastair Hicks, FAO-RAP
11:50–12:10	Regional Overview	Dr. Greg Johnson, ACIAR
12:10–12:30	General Discussion: Similarities and Differences Among Regions	
12:30–13:30	Lunch	
Session II: Meeting the food safety and quality assurance requirements of emerging markets: rules, regulations and obstacles to compliance		
<i>Chairperson: Dr. Badaruddin Soomro, PARC</i>		
<i>Co-chairperson: Dr. Yutaka Mori, JIRCAS</i>		
13:30–13:50	Codex Alimentarius Commission and Food Safety	Dr. Hidetaka Kobayashi, National Food Research Institute, Japan
13:50–14:10	Systems to Ensure Food Safety – HACCP,	Ms. Warunnee Varanyanond, Kasetsart University, Thailand
14:10–14:30	Labeling Systems and Traceability to Ensure the Systems	Dr. Tadahiro Nagata, National Food Research Institute, Japan
14:30–15:00	General Discussion	
15.30–16:00	Coffee Break	

Session III: Case studies on the development and adoption of post-harvest interventions that have contributed to ensuring food security: experiences and lessons learned

Chairperson: Mr. Somchai Charnnarongkul, NBAC & FS

Co-chairperson: Dr. S.M. Ilyas, CIPHET

- 16:00–18:00** Presentation of 3 Country Reports (one each from South Asia, South-East Asia and Pacific) and 2 Case Studies (one from ICRISAT and one from ICARDA) (10-15 minutes each)
- 18:00–18:30** General Discussion
- 19:30–22.00** Reception Dinner by APAARI

2 December 2004 (Thursday)

Session IV: New opportunities for adding value to regional products to enhance income: markets, technologies and institution building requirements

Chairperson: Dr. Raghunath Ghodake, NARI

Co-chairperson: Dr. Alastair Hicks, FAO-RAP

- 8:30–8:45** Post-harvest Handling of Rice Dr. J.F. Rickman, IRRI
- 8:45–9:00** Overcoming Post-harvest policy and Technology Barriers for Small-scale Producers and Traders in Livestock Product Markets Dr. Amos Omore, ILRI
- 9:00–9:15** Post-harvest Technologies for Fruits and Vegetables Dr. Hong-sun Yun, National Institute of Agricultural Engineering, RDA Korea
- 9:15–9:30** Non-food Uses of Agricultural Products Dr. Yutaka Mori, JIRCAS
- 9:30–9:45** Need of PhT for Vegetables in South-East Asia Dr. Katinka Weinberger, AVRDC and Dr. Masaaki Suzuki, AVRDC
- 9:45–10:00** Effect of Fish Processing Pollution on the Fresh Water Fish from South-East Asia Dr. Didier Montet, CIRAD
- 10:00–10:30** General Discussion
- 10:30–11:00** Coffee Break

Session V: The Global Post-harvest Initiative: where we have come from, where we are and the way forward

Chairperson: Dr. Thierry Mennesson, IAC

Co-chairperson: Dr. Rupert Best, GFAR

11:00–11:20	Overview of the Global Post-harvest Initiative: Linking Farmers to Markets	Dr. Rosa Rolle and Mr. Antonio Schiavone
11:20–11:40	The Strategic Framework: Asia and Pacific Regional Priorities	Ms. Nerlita Manalili
11:40–12:00	Questions and Answers	
12:00–12:15	Formation of Working Groups and Guidelines	Dr. Rupert Best and Dr. Rosa Rolle
12:15–13:30	Working Group Discussions	
13:30–14:30	Lunch	
14:30–16:00	Working Group Discussions (contd.)	
16:00–16:30	Coffee Break	

Plenary Session

Chairperson: Dr. Mutsuo Iwamoto, JIRCAS

Co-chairperson: Dr. Raj Paroda, APAARI

16:30–17:15	Working Groups Report to Plenary	
17:15–17:45	General Discussion	
17:45–18:30	Summary of recommendations on actions to be taken on the issues discussed during the consultation, including moving the Global Post-harvest Initiative forward in Asia and the Pacific, and concluding remarks	

3 December 2004 (Friday)

Special Session on Current Status of Regional Programmes and Research Networks

Chairperson: Dr. William Dar, ICRISAT

Co-chairperson: Prof. H.P.M. Gunasena, CARP

8:30–8:50	Future Harvest Alliance: Collective Action Framework	Dr. William Dar, ICRISAT
8:50–9:10	Report on “Gap Analysis for South Asia”	Dr. S. Mruthyunjaya, ICAR
9:10–9:30	APARIS: Status & Progress	Dr. Sahdev Singh, APAARI

9:30-9:50	APCoAB: The First Year	Dr. Vibha Dhawan, APCoAB
9:50-10:10	CORRA	Dr. William Padolina, IRRI
10:10-10:30	INCANA	Dr. M. Roozitalab, AARINENA
10:30-10:50	Coffee Break	

Special Session on Current Status of Regional Programmes and Research Networks (*contd.*)

Chairperson: Dr. William Padolina, IRRI

Co-chairperson: Dr. Mohan Saxena, ICARDA

10:50-11:05	CLAN	Dr. C.L.L. Gowda, ICRISAT
11:05-11:20	SAVERNET	Dr. S. Shanmugasundaram, AVRDC
11:20-11:50	PGR Networks	Dr. Bhag Mal, IPGRI
11:50-12:05	UTFANET	Prof. H.P.M. Gunasena, CARP
12:05-12:20	International Tropical Fruits Network	Dr. Julian Heyes, NZIC & FR
12:20-12:30	Overview of NACA	Mr. Simon Wilkinson, NACA
12:30-12:40	GPP on Non-Timber Forest Products (NTFPs)	Dr. Ramanuja Rao, INBAR
12:40-12:45	APAARI-ILRI Livestock Network	Dr. Bill Thorpe, ILRI
12:45-13:00	General Discussion	
13:00-14:00	Lunch	

Annexure II. List of participants (Attached as Annexure III with Part III: General Assembly Proceedings)



Part III

Asia-Pacific Association of Agricultural Research Institutions Eighth General Assembly Meeting

3rd December 2004, Rama Garden Hotel, Bangkok, Thailand

PROCEEDINGS

1. Welcome Remarks

Dr. Mutsuo Iwamoto, Chairman, APAARI welcomed the members and thanked for their cooperation during his tenure as APAARI Chairman from 2003 to 2004. He pointed out that based on his participation in GFAR and other global/regional meetings, APAARI seemed to be one of the most progressive regional fora that could serve as an example for others. He referred to the outstanding progress of APAARI and urged the members for continued support and active participation in its mandated activities. He invited the comments from members on the draft agenda of the general assembly and the same was approved (Annexure II). Dr. Md. Muslem Uddin Miah, Member Director Bangladesh Agricultural Research Council (BARC) was requested to represent vice-chair, Dr. Nurul Alam. The members present in the meeting as well as special invitees, mostly those who attended the APAARI Expert Consultation on Post-harvest sector, are listed in Annexure III.

2. Progress Report

Dr. R.S. Paroda, Executive Secretary APAARI, briefed the members on the various activities undertaken during the year relating to APARIS, APCoAB and APAARI under its umbrella. During 2004, APARIS steering committee met once and the APCoAB steering committee met twice to review and plan activities of these two APAARI initiatives. An ICT/ICM training of 9 National Information Nodal Points of 7 developing NARS, one sub-regional Research Need Assessment Workshop for South and West Asia and one inter-regional Cotton Research Network Meeting were also organized by APAARI. The Proceedings of last Expert Consultation on ICT/ICM in ARD held in December 2003 at Asian Institute of Technology, Bangkok, were published and circulated widely, including all the members and support group organizations. Two issues of APAARI Newsletter, 3 APAARI Success Stories namely, on lentil improvement in Bangladesh, Classical Biological Control in India and on Sustaining the Green Revolution in India, and a Regional Report on the Status of ICT/ICM in ARD were published. The success story on Rainbow Trout Culture in Nepal is under publication. Further, all important APAARI publications are also now available on the redesigned APAARI website and a new CD named "APAARI on CD" is a compilation of all important APAARI documents/publications since its inception. APAARI on CD has been mailed to all APAARI contacts. As per earlier decision of the General

Assembly in 2002 in Penang, Malaysia, APCoAB was also established with effect from 1st January 2004 and several activities were undertaken, including formalization of partnerships with other organizations and identification of collaborative programmes with NARS, FAO, GFAR, CG Centres, ACIAR, JIRCAS, and other ARD organizations. Members were quite satisfied and appreciative of the progress made by APAARI since the last General Assembly in Penang, Malaysia in December 2002.

3. Membership Status

The members were briefed by Mr. P.K. Saha, Liaison Officer, APAARI, on the APAARI initiative to facilitate the membership of smaller, developing NARS such as Laos, Cambodia, Myanmar, East-Timor and Bhutan. It was suggested that GFAR and other similar global partners of APAARI should come forward to help these NARS benefit from APAARI organized technical events such as trainings, workshops, seminars and expert consultations. The progress of membership discussion with ARIs such as CIRAD was also presented.

4. Executive Committee Formation for 2005-2006

The Election of Eighth Executive Committee was taken up in the meeting as the two year term of the Seventh Executive Committee constituted for the period 2003-2004 was to expire on 31 December 2004.

Dr. Paroda explained the underlying considerations in electing the Executive Committee as has been practised since APAARI inception in 1991. He stated that all efforts are made to balance the representation from the South & West Asia, South-East Asia and the Pacific sub-regions of APAARI. Accordingly, the three sub-regional groups held separate discussions during the coffee break regarding the possible candidates representing their sub-regions in the executive committee. The composition of the previous Executive Committees (from 1991 to 2004) was also made available to the members for easy reference as given here in Annexure VII.

A new Executive Committee of APAARI for the period 2005-2006 was unanimously elected by the General Assembly. The composition of the Eighth Executive Committee is as follows:

Elected Executive Committee of APAARI for the biennium 2005-2006

Dr. H.P.M. Gunasena <i>DG, CARP, Sri Lanka</i>	Chairman
Dr. T. Mennesson <i>DG, IAC, New Caledonia</i>	Vice-Chair
Dr. Mutsuo Iwamoto <i>President, JIRCAS, Japan</i>	Member
Dr. Badaruddin Soomro <i>Chairman, PARC, Pakistan</i>	Member
Dr. Nicomedes P. Eleazar <i>Director, BAR, Philippines</i>	Member
Mr. Luke Ratuvuki <i>CEO, MASLR, Fiji</i>	Member
Dr. R.S. Paroda	Executive Secretary

5. Presentation of Audited Accounts for 2003-2004

Audited financial statements of APAARI for the years 2003 (Annexure IV) and 2004 (up to October 31, 2004) were presented in the meeting (Annexure V). The members expressed their satisfaction on APAARI functioning and its accounting practices, which are in-line with the other international bodies. They were also pleased that as per earlier decision, new auditor has been appointed with effect from 2004 and the expenses incurred were well within approved budget of APAARI.

6. Work Plan for 2005

The budget proposal of US\$ 310,000 for the year 2005 and US\$ 320,000 for the year 2006 (Annexure VI) was placed for consideration and approval of the General Assembly. The General Assembly was informed that even though APAARI activities are increasing, the fixed deposits of APAARI had reached US\$ 750,000. It was mentioned that APAARI was among the few fora that had become self sustaining. Dr. Paroda attributed this achievement to the continued support of members and all support group organizations.

Members expressed appreciation on the judicious use of funds and the excellent control and guidance provided by Dr. R.S. Paroda as Executive Secretary and also approved the budget proposal for the years 2003 and 2004 as given in Annexure VI.

The following major activities were also approved for the year 2005.

Activities
Organization of two Sub-Regional Need Assessment Workshops: South-East Asia (April-May 2005) and the Pacific Countries (August-September 2005)
APARIS Regional Workshop (August 2005) of NINPs to develop and strengthen capacity for National Agricultural Information Systems (NAIS) of region's NARS
APCoAB Activities on biosafety and advocacy workshop for policy makers
Publication of Success Stories, APAARI Newsletters and Proceedings/Reports
Executive Committee Meeting and Expert Consultation
Training and Support to Research Networks
APAARI Secretariat Functions

7. Venue for the next General Assembly and Expert Consultation

Dr. Paroda requested the members to provide inputs for possible venues of the next general assembly meeting and topics for the next expert consultation and also topics of the future success stories to be published in the year 2005. It was suggested that the next General Assembly could be organized back-to-back with GFAR's Global Conference to be tentatively held in India. In response to GFAR invitation for hosting its next global conference, members endorsed ICAR, India as potential venue. Integrated Pest Management (IPM) and Impact of Globalization on Resource-Poor Farmers were suggested as tentative topics for consideration for the next Expert Consultation. For meeting in 2005, the Executive Committee was authorized to decide both the Venue and the topic of Expert Consultation, depending on requests received from members of APAARI.

8. Other Items

The members also discussed and approved the recruitment of a new Assistant Executive Secretary (in place of Dr. Sahdev Singh), and the representation as Associate Members, especially one from CGIAR Centres on rotational basis of two years and the other from GFAR in the Executive Committee. It was also agreed to continue inviting representatives of CSO's (NGO's and Farmers' Groups) in future APAARI Meetings.

9. Concluding Remarks

The Chairman Dr. Iwamoto, presented closing remarks and expressed his satisfaction with the APAARI achievements during 2003-2004. He wished APAARI even greater success in future and assured of continued support of JIRCAS, under the newly formed Executive Committee. In appreciation of valuable services of some of the members, who were getting superannuated from their parent organizations such as Dr. Mohan Saxena of ICARDA, Dr. Gajendra Singh of AIT and Dr. R.K. Arora of IPGRI, Chairman presented Mementos to them and thanked for their valuable services to APAARI.

10. Vote of Thanks

The Vice-Chair, represented by Dr. Md. Muslem Uddin Miah of BARC, Bangladesh proposed a vote of thanks. He thanked all the members for their active participation and appreciated the cooperation extended by the host country Thailand in organizing the General Assembly meeting. He recognized and appreciated the hard work of the APAARI Secretariat staff for smooth conduct of the expert consultation as well as the General Assembly meeting.

Annexure II



The Eighth General Assembly Meeting of APAARI

3rd December 2004, Rama Garden Hotel, Bangkok, Thailand

Chairperson: *Dr. Mutsuo Iwamoto, Chairman, APAARI*

Co-chairperson: **Dr. Nurul Alam, Vice-Chairman, APAARI*

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|-------------|--|--|
| 14:00-15:30 | <ul style="list-style-type: none">● Welcome Remarks● Progress Report● Membership Status● Executive Committee Formation for 2005-2006 | <ul style="list-style-type: none">● Chairman● Executive Secretary● Liaison Officer● Executive Secretary |
| 15:30-16:00 | Coffee Break and Group Photograph | |
| 16:00-18:00 | <ul style="list-style-type: none">● Presentation of Audited Accounts for 2003-2004● Work Plan for 2005● Venue of next General Assembly
And Expert Consultation● Other Items● Concluding Remarks● Vote of Thanks | <ul style="list-style-type: none">● Liaison Officer● Executive Secretary
● Chairman● Vice Chairman |

* Represented by Dr. Md. Muslem Uddin Miah, Director BARC, Bangladesh

Annexure III

**Expert Consultation on
Post-harvest Technologies for Ensuring Food Security and
Value Addition for Enhanced Income**

and

The Eighth General Assembly Meeting of APAARI

1-3 December 2004, Rama Garden Hotel, Bangkok, Thailand

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Annexure IV



Summary Account Statement of APAARI

01 January – 31 December 2003

(Amount in US Dollar)

ITEMS	RECEIVED	DISBURSEMENTS		BALANCE
		Budget	Actual Used	
31/12/2002 Balance B/F:				713,207.00
1. Membership Fee	161,427.25			
2. Contributions	98,520.23			
3. Interest Income	3,084.62			
4. Other Income:				
4.1 Refund	405.71			
4.2 Profit and Loss on Transfer	1,742.45			
5. Publications		25,000.00	7,411.39	
6. APAARI Secretariat Support:				
6.1 Assistt. Executive Secretary, Secretary		60,000.00	47,975.10	
6.2 Office Stationary & Office equipment		20,000.00	20,473.88	
6.3 Miscellaneous/Communication		20,000.00	18,259.70	
7. Consultancy/Travel/SSA		50,000.00	56,834.66	
8. Training/Selected Research Projects/Network Support		45,000.00	13,940.00	
9. Meetings		50,000.00		
9.1 Expenses for APCoAB Meeting			7,567.46	
9.2 Expenses for Ex-Com Expert Consultaion Meeting			46,625.92	
9.3 Expenses of General Assembly meeting				
TOTAL	265,180.26	270,000.00	219,088.11	
				759,299.15
Total amount in BKK office:		US\$ 754,592.21*		
Total amount in New Delhi office:		US\$ 75.91		
Total amount in Tashkent office:		US\$ 4,631.03		
Grand Total:		US\$ 759,299.15		

signed

.....
Dr. R.S. Paroda
Executive Secretary APAARI

.....
Ms. Urairat Rujirek
Secretary & Accountant APAARI

.....
Ms. Chavalit Sasananan
External Auditor

* Amount in Fixed Account (US Dollar)	\$	752,904.03
Amount in Saving Account (US Dollar)	\$	896.38
Amount in Current Account (Baht: 30,096.19)	\$	708.15
Cash in hand (Baht: 893.00)	\$	21.02
Amount in Saving Account (Baht: 2,661.69)	\$	62.63
Total	\$	754,592.21

Annexure V



Summary Account Statement of APAARI

01 January – 31 October 2004

(Amount in US Dollar)

ITEMS	RECEIVED	DISBURSEMENTS		BALANCE
		Budget	Actual Used	
31/12/2003 Balance B/F:				759,294.28
1. Membership Fee	93,321.40			
2. Contributions	85,272.91			
3. Interest Income	5,246.04			
4. Other Income:				
4.1 Refund	50,206.00			
4.2 Profit and Loss on Transfer	970.75			
5. Publications		25,000.00	6,403.85	
6. APAARI Secretariat Support:				
6.1 Assistt. Executive Secretary, Accountant & Secretary		60,000.00	35,373.41	
6.2 Office Stationery & Office equipment		20,000.00	7,262.20	
6.3 Miscellaneous/Communication		20,000.00	11,281.87	
7. Consultancy/Travel/SSA		50,000.00	31,369.63	
8. Training/Selected Research Projects/Network Support		45,000.00	40,947.44	
9. Meetings		50,000.00		
9.1 Expenses for APARIS Meeting			19,350.53	
9.2 Expenses for General, Expert Consultation Meeting				
TOTAL	235,017.10	270,000.00	151,988.93	
				842,322.45
Total amount in BKK office:		US\$ 836,063.72*		
Total amount in Tashkent office:		US\$ 6,258.73		
Grand Total:		US\$ 842,322.45		

signed

.....
Dr. R.S. Paroda
Executive Secretary APAARI

.....
Ms. Urairat Rujirek
Secretary & Accountant APAARI

.....
Mr. Rattanachai Dumnersawat
External Auditor

* Details of total amount in BKK office:

Amount in Fixed Account (US Dollar)	\$	758,072.73
Amount in Saving Account (US Dollar)	\$	74,691.76
Amount in Current Account (Baht: 85,815.69)	\$	2,200.39
Amount cash in hand (Baht: 2,312.00)	\$	59.27
Amount in Saving Account (Baht: 40,543.60)	\$	1,039.57
Total	\$	836,063.72

Annexure VI



Asia-Pacific Association of Agricultural Research Institutions (APAARI)
Proposed Budget for 2005-2006
(Amount in US Dollar)

S. No.	Items	Approved		Proposed	
		2003	2004	2005	2006
1.	Publications (Newsletter, Success Stories, Directory, Technical Reports, etc.)	25,000	25,000	25,000	25,000
2.	APAARI Secretariat Support				
	i. Assistant Executive Secretary & Office Secretary	60,000	60,000	60,000	70,000
	ii. Office Stationary & Postage	20,000	20,000	25,000	25,000
	iii. Miscellaneous Items	20,000	20,000	20,000	20,000
3.	Consultancy/Travel/SSA	50,000	50,000	50,000	50,000
4.	Training/Selected Research Projects/Network Support	45,000	45,000	70,000	70,000
5.	Expert Consultation(s)/General Assembly, Executive Committee meetings of APAARIs	50,000	50,000	60,000	60,000
	Total	270,000	270,000	310,000	320,000

Annexure VII

APAARI Executive Committees during 1991-2004

Executive Committee for 1991-1992

Chairman	:	Dr. Md. Yusof bin Hashim	Malaysia
Vice-Chairman	:	Dr. Keith W. Steele	New Zealand
Members	:	Prof. W. Lianzheng	China
		Mr. C.R. Mahapatra	India
		Dr. Maripaz I. Perez	Philippines
		Mr. Tubuola Tavita	Western Samoa
Executive Secretary	:	Dr. R.B. Singh	India

Executive Committee for 1993-1994

Chairman	:	Dr. Young Sang Kim	Rep. of Korea
Vice-Chairman	:	Mr. Balthasar M. Wayi	PNG
Members	:	Prof. Wang Lianzheng	China
		Dr. Zafar Altaf	Pakistan
		Dr. William D. Dar	Philippines
		Mr Montri Rumakom	Thailand
Executive Secretary	:	Dr. R.S. Paroda	India

Executive Committee for 1995-1996

Chairman	:	Dr. William D. Dar	Philippines
Vice-Chairman	:	Mr. Abbas Keshavarz	Iran
Members	:	Dr. Md. Sharif Bin Ahmad	Malaysia
		Dr. Shiva Bahadur Nepali	Nepal
		Dr. Young Sang Kim	Rep. of Korea
		Dr. S.T. Semisi	Western Samoa
Executive Secretary	:	Dr. R.S. Paroda	India

Executive Committee for 1997-1998

Chairman	:	Dr. M. Akbar	Pakistan
Vice-Chairman	:	Dr. Nobuyoshi Maeno	Japan
Members	:	Dr. Z. Karim	Bangladesh
		Dr. Ananta Doladom	Thailand
		Mr. J. Kumar	Fiji
		Dr. William D. Dar	Philippines
Executive Secretary	:	Dr R.S. Paroda	India

Executive Committee for 1999-2000

Chairman	:	Dr. Ian Bevege	Australia
Vice-Chairman	:	Dr. Ananta Dalodom	Thailand
Members	:	Dr. Seong-Hee Lee	Rep. of Korea
		Dr. K.A. Malik	Pakistan
		Dr. R.D. Ghodake	PNG
		Dr. D. Kirtisinghe	Sri Lanka
Executive Secretary	:	Dr. R.S. Paroda	India

Executive Committee for 2001-2002

Chairman	:	Dr. Dhruv Joshi	Nepal
		Dr. R.N. Sapkota	Nepal
Vice-Chairman	:	Mr. J. Kumar	Fiji
Members	:	Dr. M. Nurul Alam	Bangladesh
		Dr. Patricio S. Faylon	Philippines
		Dr. S.H. Anang	Malaysia
		Dr. Ian Bevege	Australia
		Dr. Robert Clements	Australia
Executive Secretary	:	Dr. R.S. Paroda	India

Executive Committee for 2003-2004

Chairman	:	Dr. Mutsuo Iwamoto	Japan
Vice-Chairman	:	Dr. M. Nurul Alam	Bangladesh
Members	:	Mr. S. Charnnarongkul	Thailand
		Dr. T. Mennesson	New Caledonia
		Dr. Nguyen Van Bo	Vietnam
		Dr. R.N. Sapkota	Nepal
Executive Secretary	:	Dr. R.S. Paroda	India