OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.

DISCLAIMER

FAIR USE POLICY

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

Project No.: XP/RAS/95/018

Workshop on Promoting Awareness and Opportunities for Appropriate Biotechnologies in Small Scale Agricultural and Industrial Development in Developing Countries

11-14 December 1995
SEARCA, Los Banos, Laguna, Philippines

FINAL REPORT

Sponsored by:

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

Organized by:

Approtech Asia

In collaboration with

National Institutes of Molecular Biology
and Biotechnology (BIOTECH)

Table of Contents

Introduction

This report presents a brief description of the project, the objectives, workshop results and the recommendations made by the participants.

The project aims to increase awareness and opportunities for the integration of new biotechnologies with indigenous biotechnology knowledge in developing countries in Asia through a partnership initiative with the nongovernmental organization network dealing with appropriate technology promotion in the region.

The Workshop on Promoting Awareness and Opportunities for Appropriate Biotechnologies in Small-scale Agricultural and Industrial Development in Developing Countries held from December 11-14, 1995 in Laguna, Philippines was attended by 22 member and partner organizations of Approtech Asia, a regional network of Appropriate Technology Practitioners in Asia. Countries represented were Bangladesh, Cambodia, China, India, Nepal, Philippines, Sri Lanka, Thailand and Vietnam. The members were introduced to UNIDO's various biotechnology resources, especially UNIDO-promoted biotechnology networks in the region, and briefed on the benefits and risks of biotechnology as applied in agriculture and industry. Access to biotechnology resources and databases were demonstrated and promoted using Electronic-mail, specifically the Internet of the BIOTECH-UPLB and the preliminary planning for "Mushnet" was also discussed.

Objective. The main objective of the four-day workshop was to promote the wider dissemination of assessed information on appropriate biotechnology among Asian technology-oriented NGOs, thereby facilitating access to biotechnology resources and future applications of biotechnology in Asia.

Opening Ceremonies. During the opening program, Ms. Lilia O. Ramos, Executive Officer of Approtech Asia, welcomed the participants and emphasized the importance of biotechnology in improving the lives of the people and the nation as a whole. Approtech Asia, being a regional network of NGOs promoting appropriate technology, has provided the venue for scientists, technologists, enablers/promoters and users to come together and discuss the design, implementing mechanisms, assessment and transfer of technology for sustainable development. Dr. Malee Suwana-adth, Chairperson of Approtech Asia, acknowledged the invaluable support of UNIDO, in bringing together nongovernmental organizations involved in sustainable development projects, and the scientists and technologists, to provide the necessary technical assistance. She also informed the group the initiatives Approtech Asia is doing now in expanding and institutionalizing the information technology for the benefits of the members, network and partner organizations. This is a venue for Approtech Asia members and partners to discuss, with the biotechnology research and development community, future areas for collaboration in redirecting and reshaping biotechnology for the benefit of the community. Mr. Markku Kohonen, UNIDO Country Director, discussed the activities of UNIDO and the relevance of this workshop to the other initiatives on biotechnology. He further emphasized the importance of collaboration among academic institutions, government and nongovernment organizations and the

private and business sector and the need to form an association of NGOs in Biotech. Dr. Rey de la Cruz, Director of BIOTECH-UPLB, presented the activities of BIOTECH and its priority areas such as, agriculture and forest biotech, environmental biotech, food and safety products biotech, and biotechnologies for health, malaria vaccine, hepa vaccine and rabbis vaccine.

The Workshop

The workshop was divided into three general topics namely, agricultural production, food and information technologies.

A. Agricultural Technologies

"Orchid Meristem Culture" is a profitable technology-based micro-enterprise among women and families with the increasing demand for fresh flowers in the local and foreign market. This interesting topic was presented by Ms. Susan Reyes of the Plant Biotechnologists, Inc. She stressed the promising future and widening opportunities for housewives to learn the skills of orchid culture for commercialization.

The trend in Asia now is to propagate plant by tissue culture and market temperate plants while in Europe tropical plants are grown and marketed for export. Another plant propagated by tissue culture is banana. This was presented by Dr. Saturnina C. Halos of the Natural Science and Research Institute of the University of the Philippines in Diliman. She discussed the potentials and profitability of banana tissue culture. The fruiting time is shorter compared to natural grown plants. Also, the taste is improved. However, technical input and economic aspects of the business is not yet well-defined.

One sucker, according to Dr. Halos, can produce 200,000 plants. In a laboratory with one technical staff and 3 laborers 1 million plants can be produced.

Tissue-cultured plants are clean materials but once introduced in the field, they get infected again. There is a need to change the seed every one to three years for better growth and production.

Plant tissue-culture requires the use of laboratory facilities and equipment. Interested NGOs must link with the academic institutions for the use of the laboratory, the farmers for field trials, and, the market network. This scheme will facilitate field testing, technology transfer and commercialization of the tissue-cultured plants by the project beneficiaries.

According to Dr. Bayani Espiritu of BIOTECH-UPLB, the conversion of agricultural and agro-industrial wastes into organic fertilizers through microbial action and enrichment through processing and microbial inoculation requires simple techniques but high scientific inputs. Continuing research is necessary to identify suitable microbial

associations for various crops. The stage has been reached when bio/organic fertilizers or inoculated composts are now accepted as general-purpose fertilizers. Yield increases with the use of bio/organic fertilizer and its compatibility with minimal amounts of chemical fertilizers have been demonstrated in the field. The addition of selected inoculants into composts at mesophilic temperatures has been shown by studies conducted that to enhance inoculant survival and effects on target crops. More studies are needed to determine the survival and growth of other beneficial inoculants in composts. Possible improvement in the present bio/organic fertilizer formulations are now being explored at BIOTECH particularly those on minimal chemical enrichment, separation of active fractions, and use of other beneficial micro-organisms as inoculants.

B. Food Biotechechnologies

Dr. Emerlito Borromeo discussed mushroom production as an attractive technology-based business enterprise. It is popular not only because mushroom highly nutritious and palatable but also because it is not laborious, can be grown in a small space in a short period of time using agricultural waste materials. He also emphasized the existence of a healthy market for mushroom and its by-products.

Mushroom can be sold fresh in the market or dried. Dried mushrooms commands higher prices in the market. It has longer shelf life and many uses.

As technology disseminators, government agencies and non-government organizations concerned in the promotion of biotechnology and its commercialization should facilitate the technical and financial assistance to small and medium producers as well as in marketing the product. The small growers do not like to be bothered with the intricacies of marketing.

The Transfer and Adoption of Nata De Coco Technology at the Village Level was discussed by Professor Erlinda Dizon. She emphasized that investment in research is only worthwhile if the technology derived from it is effectively transferred, adopted and commercialized. Nata de Coco is a product of research conducted by the Institute of Food Science and Technology, College of Agriculture, University of the Philippines Los Banos which started in 1971 under the SEARCA-JICA-UPLB collaborative research on Fermented Foods of Southeast Asia. It was basically a cottage industry but because of the phenomenal increase in the demand of nata for local and Japanese market there was a sudden shift in scale of production from small to medium and large nata producers. The nata de coco became a multi-million dollar industry in 1992.

The transfer of technology within and outside of the country was faster than expected. Because the technology is simple, easy to learn and business is booming, many enterprising families tried their luck in the business even without sure market. After a year, the producers were faced with problems on poor or inconsistent quality of product, limited capital investment, lack of raw materials or ingredients, poor management and handling of operations, and environmental pollution and health hazards among workers. These problems resulted in the decrease in export demands starting 1995.

Looking back to the pitfalls of the nata industry, it has been recommended that a contract growing scheme be adopted wherein the nata processor/exporter provides the inputs of production to contract nata producer. The contract producer in turn provides the labor and facilities. In this scheme, the contract producer is assured of a market at a predetermined price and the nata processor/exporter is assured in return of enough supply of nata. This scheme has automatic safety valve for over-production as the processor/exporter will only provide production inputs sufficient for the production of nata that is needed for his operation.

Under the contract production scheme, transfer and adoption of technology of nata de coco should be directed largely to the small producers at the village-level. To realize this end, it is necessary that the government and the non-government organizations should link up and organize the small producers to facilitate financial and technical assistance.

The team of Professors Shaoxian Yue and Hongliang Sun of the Chinese Academy of Agricultural Sciences in Beijing gave a convincing lecture on the feasibility of growing and processing grain amaranth for soysauce, vinegar and flour in the Philippines and other Asian countries. Grain amaranth is a fast growing and stress resistant plant. It was a staple food in ancient Aztec and is still cultivated as a minor food crop in Central and South America and some areas in Asia and Africa. In China, grain amaranth is processed into amaranth soysauce.

Amaranth soysauce is profitable in Asia. It requires low production cost. The fermentation technique is simple and easy to follow and requires short production time. There is popular market demand because of its natural flavor, aroma and color and rich nutritional content.

The amaranth soysauce technology can be transferred to the rural people through simple training courses. This is a profitable family-based small-scale livelihood project which can be facilitated by non-government organizations like Approtech Asia and its partner organizations.

The grain amaranth can easily be grown even in poor soil conditions in the Philippines and in other Asian countries. The development of the amaranth soysauce industry in the rural areas can easily be realized given the wide tract of idle and unproductive lands.

C. Information Technology.

Dr. Mariechel Navarro, University Extension Specialist, University of the Philippines at Los Banos, Laguna and Philippine Focal Point for Bioinformatics, emphasized the fact that interaction between and among people is still the most popular and effective means of communication. However, because of the exponential growth of information in the world today and extent of specialization, it is difficult to keep track of developments. A formidable amount of information in just our own individual field

of specialization is already something to reckon with. Dr. Navarro discussed further the electronic network, internet, e-mail, telnet, netscape and usenet and demonstrate the use of e-mail and access to Internet.

Dr. Navarro's demonstration on e-mail and internet focused on the potential of the mushroom network or Mushnet. Mr. Ogie Santos assisted Dr. Navarro in the demonstration on the use of e-mail. Approtech Asia's member and partner organizations with the e-mail facilities can benefit from updated information on mushroom through Mushnet.

Also on information, Dr. Josie Sison of SEARCA, showed how the CD-ROM is globally used to store and retrieve information easily. Approtech Asia is part of the information program of the International Development Research Centre (IDRC) and has contributed database information on Water and Sanitation on CD-ROM. The participants were excited listening to the use of CD-ROM - one of the widely used information packaging technology today. The technology which comes in handy and practical, revolutionizes the packaging and delivery of information to the users. The capability of the technology to hold combined text, audio and video information enhances users' satisfaction in an information searching facility.

The Field Visit

The participants visited the INFARMCO bio-fertilizer farm in Laguna where they saw and experience the processing of the bacteria to hasten decomposition of the agricultural wastes to produce the bio/organic fertilizer for local farmers.

The culminating activity was the planting of tissue-cultured banana at the Ramos' Farm by the workshop participants. The Certificates of Participation were distributed to the participants by Ms. Lilia Ramos and Dr. Malee Suwana-adth.

Results of the Workshop

1. As a result of the workshop, the participants gained better awareness of biotechnology, both its potential and risks, and up-to-date information resources within the region in the areas of agricultural and food biotechnologies and information technology.

2. Approtech Asia and BIOTECH-UPLB agreed to provide updated information both at the regional and national levels as focal point of biotechnology network in Asia to its member and partner organizations. Those who have e-mail facilities will use the system while those who are still in the process of upgrading their information facilities will use the conventional communication system.

3. Directory of Participating NGOs

(see Appendix)

Conclusions and Recommendations for follow-up action

The participants recommend that:

1. Interested NGOs engaged in biotechnology activities should be organized and gathered to address the concerns of the biotechnology users and bridge the gap between the scientists and users of biotechnology.

Biotechnology-oriented NGOs should link the technology developers (researchers in the academe) with the technology users (farmers). They should identify the technology needs of the technology users and assist them in their market network. They should also identify countries with better advanced technology and, through Approtech Asia network, facilitate the sharing of the technology.

This can be made possible through:

a) publication of a directory of women inventors and their inventions in cooperation with the Women Inventors Association of the Philippines (WIAPI) which Approtech Asia organized. Selected biotechnologies with potential for transfer and commercialization in other countries will be included in the directory. Approtech Asia will facilitate the biotechnology transfer and adaptation.

b) exchange visits and sharing of technical expertise and experience among technology developers and users of biotechnology in Asia. Approtech Asia will facilitate the exchange visits through its WIDTECH Network (Women in Science and Technology Development and Transfer Program).

c) exchange of information on the latest biotechnologies using E-mail and the Internet. Approtech Asia's members in Bangladesh, India and Indonesia have e-mail service which can be tapped for faster communication and exchange of information.

2. The workshop made possible meaningful discussion between the biotechnologists and entrepreneurs and the resource persons from China - Professors Shaoxian Yue and Hongliang Sun regarding future collaboration in the field of research and development on the potentials of propagation of Grain Amaranth in the "lahar" covered provinces in the country and its potential by-products using biotechnology.

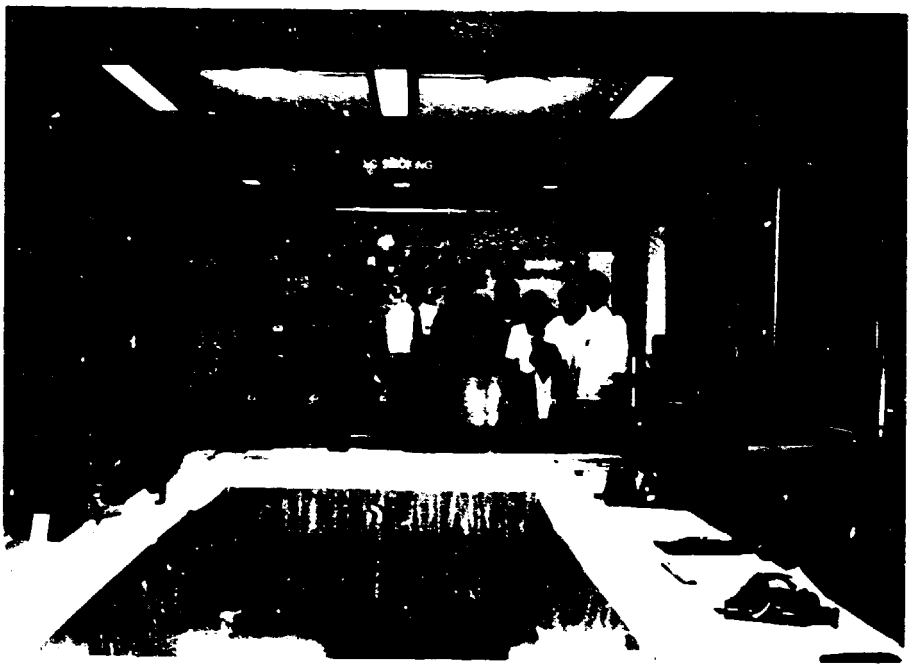
The resource persons on Grain Amaranth discussed in a small group meeting with the Women Inventors Association of the Philippines (WIAPI) the possibility of propagating amaranth in the unproductive "lahar" areas and processing the grain into soysauce, vinegar, flour and other by-products by the resettled families for their home consumption and as a means of livelihood.

3. Learnings and insights gained from the workshop will be applied in the conduct of the Regional Training Orientation Course on the Principles and Practices of Appropriate Technology Development on Agricultural Biotechnologies which will be held from September 4 to October 2, 1996 in the selected provinces in the Philippines. Approtech Asia's partner in implementing the course are the International Rice Research Institute (IRRI) through its Asia Rice Biotechnology Network (ARBN), BIOTECH-UPLB and INFARMCO with technical assistance from the Japan International Cooperation Agency.

   Initial discussions between Approtech Asia's Executive Officer and IRRI-ARBN Secretary and Coordinator for day-to-day Operation Dr. John Bennett has been made. IRRI-ARBN will discuss with participants the biofertilizer, integrated pest management system, simple farm machineries and transgenic rice. Approtech Asia and its member organizations will also be involved in the policy formulation and conduct of activities of ARBN in Asian countries for future collaboration, especially on feedbacking to IRRI the results of rice biotechnology at the farmer field.

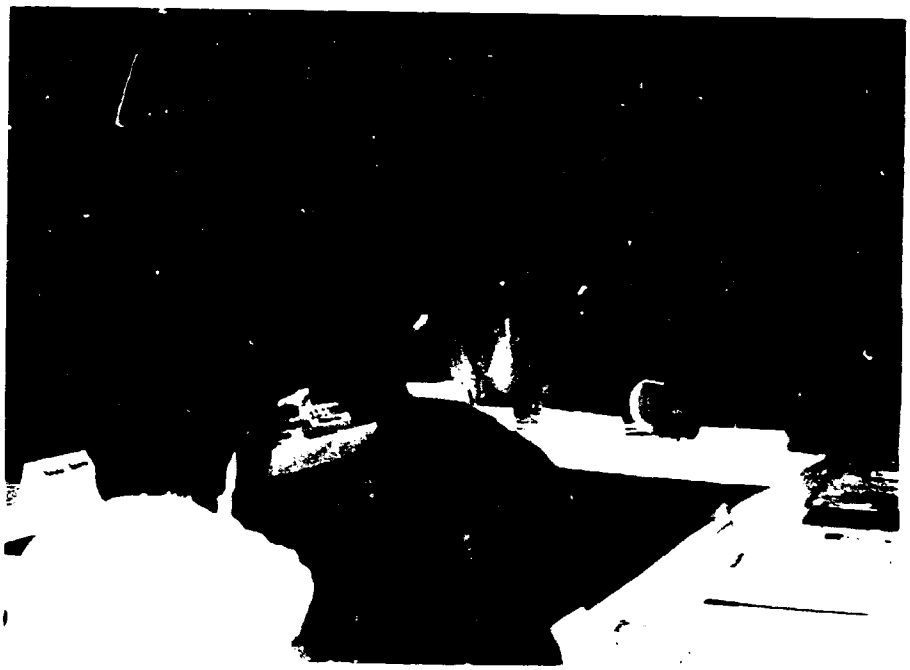
4. Approtech Asia plans to establish a farm where tissue-culture plants like banana and indigenous plant species will be grown, socio-economic benefits to the community assessed, technology potential for more value-added products upgraded and information will be shared through the BIOTECH-UPLB, Approtech Asia and the Department of Science and Technology (DOST) information linkages.

Photo-Documentation



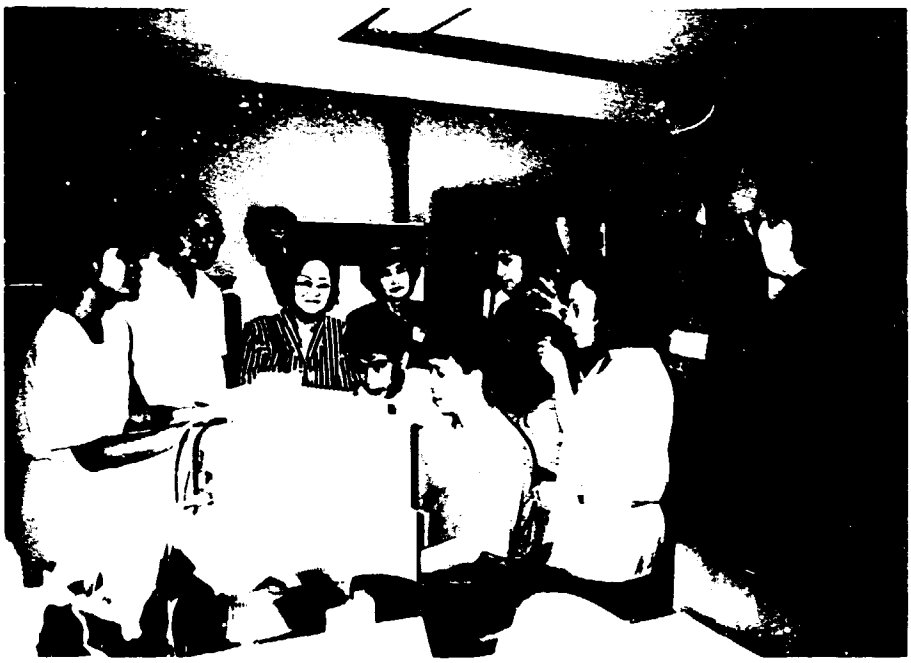
The Organizers and the Participants to the Workshop.

Mr. Markku Kohonen, Country Director of UNIDO, introduces the activities of UNIDO in the Philippines and in Asia. Dr. Rey de la Cruz, Director of BIOTECH-UPLB (right), Dr. Malee Suwana-adth, Approtech Asia Chairperson and Ms. Feri G. Lumampao, Approtech Asia Programme Coordinator (left) listen.



Dr. Malee Suwana-adth acknowledges the support of UNIDO in bringing together the scientists, technologists and enablers and discuss the ways of working together for sustainable development.

Dr. Josie Sison, SEARCA, demonstrates the capacity of her new laptop. Dr. B.V. Parameswara Rao (BCT-India), Dr. Salehuddin Ahmed (BRAC-Bangladesh), Rolly Corpuz (PBSP-Philippines) and Prof. Hongliang Sun (CAAS-China) look on.



Mr. Ogie Santos shows the participants the mechanics in electronic-mail while Dr. Mariechel Navarro (extreme right) explains the benefits of using the e-mail.

Mr. Chavez of INFARMCO explains the processes involved in the production of Lakas Ani Bio-organic Fertilizer. Dr. Violeta Arida (President, WIAPI), Dr. Malee Suwana-adth, Dr. Bayani Espiritu (BIOTECH-UPLB) and Mr. Vic Chua (President, RISE) listen.

Ms. Lilian Patena shows the seeds of shallot and the tissue-cultured banana to the participants.

Ms. Anita Manandhar, Centre for Rural Development, Nepal, plants the tissue-cultured banana at the Ramos' Farm.

Prof. Shaoxian Yue explains the fermentation technique used in the making of amaranth soysauce and vinegar while Prof. Hongliang Sun looks on. The latter is the authority on amaranth production and processing.

Profs. Shaoxian Yue and Hongliang Sun meet the Women Inventors Association of the Philippines for future collaboration in the production and processing of grain amaranth in the "lahar" covered provinces of Pampanga and Tarlac.

APPENDIX

WORKSHOP ON PROMOTING AWARENESS AND OPPORTUNITIES FOR APPROPRIATE BIOTECHNOLOGIES IN SMALL SCALE AGRICULTURAL AND INDUSTRIAL DEVELOPMENT IN DEVELOPING COUNTRIES

List of Participants

I. Foreign Participants

Bangladesh

1. **Dr. Salehuddin Ahmed**
   Director/Programmes
   Bangladesh Rural Advancement Committee (BRAC)
   Mohakhali Commercial Area
   Dhaka 12, Bangladesh
   Phone No.: (02) 600106-[illegible] 600161-4, 600204
   Fax No.: 880-2-883542 66 883614, 863633

Sri Lanka

2. **Brig. S.D.N. Hapugalle, VSV**
   Honorary Executive Director
   Community Development Services
   62-62, Dr. N.M. Perera Mawatha
   Colombo 8, Sri Lanka
   Phone No.: 697731, 694102
   Fax No.: 94-1-697731

Nepal

3. **Ms. Anita Manandhar**
   Deputy Director
   Centre for Rural Technology
   P.O. Box 3628
   Tripureswore, Kathmandu, Nepal
   Phone No.: 211919
   Fax No.: 977-1-225212

Cambodia

4. **Dr. Napasri Maneewong**
   Executive Director
   c/o Social & Human Resource Development Institute (SHRDI)
   100/65 Kosumnives Soi 3
   Vipavadee Rangsit Road
   Laksi Bangkok 10210, Thailand
   Phone No.: 573-8414 to 15
   Tel/Fax No.: (662) 5732056

India

5. **Dr. B.V. Parameswara Rao**
   Secretary & Director
   Bhagavatula Charitable Trust
   Yellamanchili-531 055
   Visakha Dist., A.P. India
   Phone No.: (8924) 51029
   Fax No.: 91-891-547190

Vietnam

6. **Dr. Bui Thi Sy**
   Vice Director
   Center for Rural Development
   & Environmental Protection
   61 Hang Chuoi, Hanoi, Vietnam
   Phone No.: 213926
   Fax No.: 84-42-5300[illegible]

China

7. **Prof. Hongliang Sun**
   Deputy Chairman
   China National Coordination Committee
   for Grain Amaranth
   Phone No.: (10) 218531[illegible]
   Fax No.: 86-10-2174142

8. **Prof. Shaoxian Yue**
   Dean, Department of Genetics
   Institute of Crop Breeding & Cultivation
   Chinese Academy of Agricultural Sciences
   30 Baishiqiao Road, West Suburbs
   Beijing 100031, China

Thailand

9. **Dr. Malee Suwana-adth**
   Honorary Secretary-General
   SVITA Foundation
   49/70 Soi Thanpuying Pahon
   Ngarmvongvarn Rd., Chatuchak
   Bangkok, Thailand 10900
   Phone No.: 5792481, 5[illegible]
   Fax No.: 662-5[illegible]

II. Local Participants

1. **Mr. Ronnie S. Mataga**
   Program Officer
   Ayala Foundation, Inc.
   Ayala Museum, Makati Avenue
   Makati City, Metro Manila
   Phone No.: 8183403, 8134487
   Fax No.: (632) 81[illegible]

2. **Dr. Ignacio S. Pablo**
   Executive Director
   Barangay Technology Center (BATEK)
   and Vice-President for External Affairs
   Philippine Women's University
   Taft Avenue, Malate, Manila, Philippines
   Phone No.: 506285, 8150068
   Fax No.: (632) 5224002

3. **Ms. Angela Ma. Pangan**
   Executive Director
   NORFIL Foundation
   No. 16, Mother Ignacia Street
   Quezon City
   Phone Nos.: 996902, 98[illegible]
   Fax. No.: (632) 9980005

4. **Ms. Lilia O. Ramos**
Executive Officer
APPROTECH ASIA
Philippine Social Development Center
Magallanes corner Real Streets
Intramuros, Manila 1002, Philippines
Phone No.: 527-3744, 52 -6514
Fax No.: (632) 527-

5. **Ms. Aurora F. Tolentino**
Executive Director
Philippine Business for Social Progress
Phone No.: 527-7741
Fax No.: (632) 527-3743

6. **Mr. Rolly Corpuz** (alternate)
Center for Rural Technology Development
Philippine Business for Social Progress
Magallanes corner Real Streets
Intramuros, Manila 1003, Philippines

III. Participant-Observer

1. **Mr. Victor Chua**
Responsible Inventors, Scientists and Engineers (RISE)
Tel/Fax No.: 242-35-

2. **Dr. Violeta P. Arida**
President
Women Inventors Association of the Philippines, Inc. (WIAPI)
Women in Science and Technology Development Foundation (WISTDF)
Tel/Fax No.: 89-

3. **Ms. Erlinda C. Sanqui**
Women Inventors Association of the Philippines, Inc. (WIAPI)
Phone No.: 9262280, 92 -8534
Fax No.: (632) 928-50 2

4. **Ms. Rita Carmela Sanqui-Santiago**, WIAPI

5. **Ms. Maja Prevendido**
Women Inventors Association of the Philippines, Inc. (WIAPI)

6. **Ms. Ma. Carlita Rex-Doran**
Women Inventors Association of the Philippines, Inc. (WIAPI)/WISTDF
Women Association of Scientists of the Philippines (WASP)
Phone No.: 9381763

7. **Dr. Minda Desamito**
Women Inventors Association of the
Philippines, Inc. (WIAPI)/WISTDF

8. **Dr. Sonia Y. de Leon** Phone No.: 924-0863
Women Inventors Association of the Fax No.: (632) 921-2388
Philippines, Inc. (WIAPI)/WISTDF/WASP