Rapport de mission

ADB-IPGRI Project on Asian Tropical Fruit Species
Project Initiation Meeting
Serdang, Malaysia
15-18 February 2000

Philippe CAO-VAN
Cirad-flhor Vietnam

CIRAD-FLHOR, TA 50/04 Avenue Agropolis – 34398 MONTPELLIER Cédex 5

Rapport de Mission

Participation de Philippe CAO-VAN / Cirad-flhor au séminaire :

ADB – IPGRI Project on Asian Tropical Fruit Species
Project Initiation Meeting at Serdang, Malaysia
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Il s'agissait du séminaire de lancement d'un projet initié deux ans auparavant par l'IPGRI (Bureau Régional d'Asie) et soumis à la Banque Asiatique de Développement (ADB) sous l'intitulé « Conservation and use of native tropical fruit species biodiversity ». Ce document, dans sa version révisée de Fév. 1999, figure en annexe 1 de ce rapport.

Plus de 400 espèces fruitières comestibles sont répertoriées en Asie mais ont pris plus ou moins d'importance dans les différents pays. Des contraintes sanitaires parfois très importantes comme la maladie du Huanglongbing des agrumes obligent certains pays (Malaisie en particulier) à se désintéresser scientifiquement de ce genre. D'autres espèces par contre font aujourd'hui l'objet d'enjeux économiques très importants (mangues, ramboutan) et rendent difficiles la collaboration scientifique régionale. Dans ce contexte, les objectifs principaux de ce projet concerne plus particulièrement deux aspects :

- Préserver et promouvoir l'utilisation des principales ressources génétiques fruitières ;
- Renforcer la collaboration nationale et régionale dans les 10 pays d'Asie concernés.

Un projet opérationnel :

Ce projet est opérationnel depuis janvier 2000 et pour une durée de trois (3) ans. Il concerne dix (10) pays d'Asie qui ont donné leur accord pour un soutien financier au travers de leurs programmes nationaux et qui ont désigné leurs coordinateurs nationaux et leurs organismes de référence (cf. Liste des participants en annexe 2) :

. Bangladesh (BGD)
. Chine (CHN)
. Inde (IND)
. Indonésie (IDN)
. Malaisie (MYS)
. Népal (NPL)
. Philippines (PHL)
. Sri Lanka (LKA)
. Thaïlande (THA)
. Vietnam (VNM)

Son budget est couvert par un soutien financier de l'ADB qui a été sollicité et obtenu à hauteur de 1.200.000 USD pour une durée de trois (3) ans. L'IPGRI et les programmes nationaux contribueront également au financement de ce projet, respectivement à hauteur de 257.000 USD et 1.600.000 USD. La participation de l'IPGRI est majoritairement couverte par le temps d'intervention de ses cadres pour l'encadrement et la coordination de ce projet.

La participation de l'ADB implique le strict respect d'une gestion administrative et financière assez lourde et la production de documents de suivi semestriels et annuels :

- Rapport semestriel présentant les aspects techniques et le programme des six mois suivants, un rapport financier et un état des liquidations ;
- Rapport annuel.

Un calendrier strict devra être respecté par les coordinateurs nationaux afin que les documents soient transmis dans les dates imparties et qu'aucun retard de financement ne vienne perturber ce projet.

Outre ce séminaire de lancement, une réunion est prévue chaque année pour faciliter la gestion de ce projet.

Ce projet devrait entraîner des échanges de matériel végétal ce qui a suscité quelques réactions tant sur le plan sanitaire qu'économique :

- les échanges de matériel végétal seront soumis aux réglementations nationales (et notamment au respect des restrictions en faveur de la protection des variétés « commerciales ») ;
- les échanges de matériel végétal se feront dans le respect de la réglementation phytosanitaire, ce qui ne semble pas poser de problème pour la banane ou les agrumes puisque des normes existent, par contre elles font défaut pour la plupart des autres espèces fruitières.

Il est donc convenu, que pour simplifier ce type d'actions, les échanges de matériel végétal se feront exclusivement dans le cadre d'accords bilatéraux..

Un programme ambitieux :

Un programme de travail avait été défini pour permettre :

- Un rappel des statuts actuels des activités concernant les ressources génétiques végétales ;
- Une identification aussi précise que possible des activités à développer en priorité ;
- L'élaboration du programme de travail pour les 3 ans et le budget pour l'année 2000.

Ces tâches étaient d'autant moins évidentes à réaliser que le financement accordé tout récemment par l'ADB n'était pas encore connu des coordinateurs nationaux, qui l'envisageaient bien supérieur comme en témoigne leurs programmes prévisionnels et demandes de budget, que l'ensemble des participants ont été avertis de la tenue de ce séminaire dans les quinze jours précédents et que des changements intervenus dans certains pays ont conduit à la nomination d'un nouveau coordinateur dans un délai encore plus bref.

Quatre (4) grands groupes fruitiers étaient imposés par le projet (Mangues, Agrumes, Ramboutan et Jaquier) auxquels ont été rajoutés au cours de ce séminaire les *Garcinia* et le Litchi. Un tour de table a permis de recueillir les priorités nationales des 10 pays participants, qui n'avaient en aucun cas obligation de traiter l'ensemble des espèces proposées :

Tab. 1 : Ordre de priorité accordé par les programmes nationaux										
	BGD	CHN	IND	IDN	MYS	NPL	PHL	LKA	THA	VNM
Mangifera	1	2	1		2	2	1	1	2	2
Citrus		1	2	2		1	2			1
Ramboutan				1	1				1	
Jacquier	2							2		
Garcinia				3	3		3			
Litchi		3	3							3

Un budget étroit :

Il s'agissait de définir la part de budget ADB qui serait confiée à la gestion directe des coordinateurs nationaux sachant que la majeure partie de celui-ci reste sous la gestion de l'IPGRI. Il a été défini que seuls les lignes budgétaires N°2, 6, 7 et 8 contribueraient au budget géré directement par les coordinateurs nationaux au prorata des activités pour lesquelles ils se seront engagés :

Tab. 2 : Répartition du budget ADB	
Component	**Amount ($US)**
1. Personnel support	185.000
2. Equipments	45.000
3. Travel	45.000
4. Training	85.000
5. Meetings / Workshops	110.000
6. Information, database, Publication	90.000
7. Research support	269.000
8. Technical support	90.000
9. Administrative cost	136.500
10. Contingencies	153.500
TOTAL	**1.200.000**

Il a donc été proposé d'accorder pour les 3 années du projet, pour la gestion directe par les coordinateurs nationaux, les montants suivants :

- 15.000 USD pour les espèces principales (Mangue, Agrumes, Ramboutan et Jacquier)
- 5.000 USD pour les espèces secondaires (Garcinia et Litchi)

Ce qui représente pour chacun des pays impliqués et en fonction de leurs engagements (nombre d'espèces étudié, degré technique de la caractérisation) :

Tab. 3 : Budgets pour 3 ans accordés à la gestion directe des coordinateurs nationaux (en milliers USD)									
BGD	CHN	IND	IDN	MYS	NPL	PHL	LKA	THA	VNM
30	50	50	30	40	30	30	30	40	30

Des objectifs précis et des actions agencées :

Les tâches sont clairement définies en termes d'objectifs et d'activités (cf. Annexe 3). Là encore, les pays participants n'ont pas obligation de s'engager sur l'ensemble des tâches et activités, mais les coordinateurs scientifiques de l'IPGRI ont veillé à ce qu'il y ait une cohérence entre les objectifs fixés et les engagements scientifiques des différents pays. Cet engagement dépend également du niveau scientifique atteint dans les différents pays et des facilités en terme de laboratoire, équipement et personnel compétent pour conduire certain travaux nécessitant une certaine technologie. Ainsi, seules l'Inde et la Chine conduiront des travaux de caractérisation moléculaire, respectivement sur la mangue et les agrumes.

Un programme global pour les 3 années du projet a été tracé dans ses grandes lignes par chaque pays et pour chaque groupe-espèce fruitier les intéressant. Par ailleurs, un programme plus détaillé a été élaboré pour l'exercice 2000. Ces premiers travaux seront principalement orientés sur une évaluation de l'existant et une définition plus approfondies des actions à entreprendre.

Steering Committee :
Il doit permettre la mise en œuvre du programme et son suivi. Les coordinateurs nationaux sont de ce fait membres d'office de même que le Coordinateur du projet et le coordinateur technique. Lors de ce séminaire, le Président et Vice-Président ont été élus par les coordinateurs nationaux :

Président : Dr. S.P. Ghosh (Inde)
Vice Président : Dr. Felipe S. dela Cruz (Philippines)

Conclusions :

Ce séminaire s'est déroulé dans une excellente ambiance dans la mesure où la plupart des participants se connaissaient déjà.

Il aura permis d'établir de nouveaux contacts, tant dans les pays où nous intervenons déjà que dans les autres pays. Ainsi, des contacts ont été établi pour le programme « Clausena » conduit en Guadeloupe.

La première constatation, un peu amère pour tous, est la mise à disposition par l'ADB d'un financement relativement faible compte tenu de l'ampleur du travail et du nombre de pays participants. Les coordinateurs de l'IPGRI estiment toutefois que ce financement, même faible, est suffisant pour initier une action concertée et servir de levier pour de nouvelles demandes qui suivront.

La deuxième constatation est le manque de concertation entre différents projets axés sur la même thématique, conduisant à des doublons. Ainsi, les travaux entrepris depuis 1995 par l' «Under-utilized Tropical Fruits in Asia Network » (UTFANET) sous la houlette de l'ICUC, basé à l'Université de Southampton (UK), portent, entre autre, sur les Agrumes (pamplemousses et mandarines), le Mangoustan et le Jacquier et dans les mêmes pays à l'exception de la Malaisie. La présence à ce séminaire en tant qu'observateur du Dr. Nazmul Haq, Directeur de l'ICUC, a permis de prendre en considération les acquis scientifiques et de mieux gérer avec les coordinateurs nationaux (souvent les mêmes pour les deux projets) les travaux à poursuivre.

Le Cirad-flhor, invité en tant qu'observateur, pourrait, bien entendu, apporter une contribution scientifique à ce projet. Elle est implicitement sollicitée par l'invitation qui nous a été faite. Une partie du budget ADB est d'ailleurs destinée à couvrir des frais d'expertise, de formation...
Les participants à ce projet vont être rapidement confrontés à la gestion des données concernant la caractérisation morphologique des espèces/variétés concernées. Le développement de bases de données est prévu mais il serait certainement plus judicieux de profiter de ce projet pour étendre, au moins dans le domaine des Agrumes, la reconnaissance du logiciel EGID. Celui-ci était connu des participants Indiens (présentation faite par R. Cottin au Congrès agrumicole de Nagpur – Inde en novembre 1999). Il intéresse également les responsables de l'IPGRI, à la fois pour les agrumes, mais également pour essayer de l'adapter à d'autres espèces. Il serait intéressant que Roland COTTIN, concepteur d'EGID, puisse se rapprocher du Dr. Paul QUEK (IPGRI en Malaisie) pour discuter des possibilités de telles adaptations. Un budget est disponible sur ce projet pour une telle opération, qui contribuerait également à promouvoir le Cirad-flhor et son savoir-faire.

Dans le domaine de la biotechnologie et de la génétique, des travaux de caractérisation moléculaire pourraient peut-être nous permettre de développer de nouvelles collaborations scientifiques (Inde, Chine, Indonésie).

Par contre sur les aspects scientifiques plus « basiques », il ne faut pas trop espérer être sollicité. L'Inde semble avoir d'ores et déjà poser de solides jalons sur ce projet (Chairman du Steering Committee, Coordinateurs scientifiques et techniques).

Rapport rédigé à Long Dinh, Vietnam le 11 mars 2000

ANNEXES

1- Document « Conservation and use of native tropical fruit species biodiversity »

2- Tâches, objectifs et activités

3- ICUC et UTFANET

4- Présentation Cirad / Cirad-flhor et EGID

5- Proceedings from IPGRI

- ✓ Summary of proceedings
- ✓ Annexure I : programme
- ✓ Annexure II : List of participants
- ✓ Annexure III : Task and task managers
- ✓ Annexure IV : Sterring Committee, terms of reference
- ✓ Annexure V : Proceeding of 1st meeting of S.C.

Annexe 1

REVISED PROPOSAL

CONSERVATION AND USE OF NATIVE TROPICAL FRUIT SPECIES BIODIVERSITY

SUBMITTED TO

ASIAN DEVELOPMENT BANK

BY THE

INTERNATIONAL PLANT GENETIC RESOURCES INSTITUTE (IPGRI)

February 1999

I Introduction

1. Countries in Asia are becoming increasingly aware of the potential importance of native tropical fruit species as largely unexploited sources of income and employment particularly for women, and as good sources of dietary vitamins, minerals and energy. It is recognized that improved production and marketing can help to meet the rural and urban demand resulting in increased national revenues. In addition, the role of Asia's enormous diversity of fruit species, both cultivated and wild, as components of stable ecosystems, is now becoming clearer.

2. Plant genetic diversity (variation between and within species) is fundamental to human well being and yet it has been seriously threatened with loss due to various human activities. In recent years steps have been taken to mitigate the loss of valuable plant genetic diversity in many parts of the world. The International Plant Genetic Resources Institute (IPGRI) is very concerned with the effective conservation and sustainable utilization of plant genetic resources for the present and future generations and has been doing pioneering work over the last two decades in this area. It has assisted countries in the Asian region and around the world to locate, collect, conserve, document and use native biodiversity, including fruit species (see Appendices 1 and 2). In recent years, it has focused on commodities such as coconut, underutilised crops, fruit species, bamboo and rattan etc. IPGRI has supported collecting and conservation of durian, rambutan, duku, *Citrus* and *Musa* germplasm in the region. Currently IPGRI is the executing agency for the Coconut Gentic Resources Network (COGENT), which includes the Coconut Genetic Resources Network in Asia and the Pacific (CGRNAP), supported by the Asian Development Bank. Through small low-cost networks, efforts are underway to conserve and utilise under utilised crops such as buckwheat, *Lathyrus*, safflower sesame etc. IPGRI is also taking lead in genetic resources conservation of bamboo and rattan in close collaboration with the International Network on Bamboo and Rattan (INBAR).

3. Ten countries in Asia have requested IPGRI to undertake a collaborative project for the Conservation and Use of Native Tropical Fruit Biodiversity in Asia and to seek financial support from the Asian Development Bank.

II Background and Rationale

4. Over 400 edible tropical fruit species are found in Asia. They are important for the well being of the populations in the region, as sources of supplemental food, nutritionally balanced diets, and enhancing both household incomes and national revenues. Some species have specific medicinal uses, while others are used for timber, fuelwood and livestock feed. Diversity present in these species is eroding at a rapid pace.

5. In forest areas, the rich diversity of fruit species plays an important role as sources of food and shelter to other species of plants and animals, providing stability in complex natural ecosystems. In agricultural areas, fruit trees are important components of multi-crop systems, under which other vegetables, cereals, legumes, root and fodder crops and livestock can thrive.

Fruit Production Systems

6. Asia's fruits are harvested in an extremely wide range of production systems, varying from collecting of wild fruits to intensive commercial plantations. Over 55% of Asia's fruit species are not cultivated, but gathered from forests and other non-cultivated areas. As noted earlier, wild fruit species provide fuel, supplemental food, medicine, shelter and livestock feed to many rural dwellers, who live in the vicinity of forest areas, throughout the region. The economic value of these products is difficult to estimate. In areas where shifting cultivation is practised, in parts of North-Eastern Thailand, Indonesia, Myanmar, Laos, northwest China and Cambodia, North East India and South Western India, fruit trees are planted, or encouraged to grow in swidden fields where they contribute to ecosystem regeneration and used by the local people.

7. Home gardens are the most prevalent production systems for cultivated fruits in Asia. Native species, including citrus, mango, durian, rambutan, langsat and jackfruit are the most commonly found in home gardens, but several locally adapted minor fruit species are also found in home gardens in specific localities. Surveys show that the strength of home gardens lies in the great diversity of species grown and their flexibility in providing for their owners' various needs, including a source of food security and food diversity and some cash income from sales of fruit in local markets. Majority of them is seasonal and well known only within the country or the

province. Although fruit productivity per hectare in home gardens is rather low, a recent IPGRI survey in Vietnam has shown that fruit tree cultivation is increasing faster than any other crop commodity, particularly where linkages with urban markets are developing. A portion of Asia's fruit, particularly in India, is produced in social forestry areas or along roadsides, managed by local government or community organizations. Harvesting of fruits are generally auctioned to a contractor. Mango, tamarind, wood apples and custard apples are often produced in such systems.

8. Intensively managed orchards and commercial plantations are important sources of production of the herbaceous and non-branching fruits including banana, papaya and pineapple, but as yet relatively unimportant for most of the larger tree fruits. Exceptions are in Thailand, where intensive orchard and plantation production of durian and mangoes are now established and in India for citrus and mango. Many countries in the region are now promoting such intensive orchards, where quick returns on investments, predictable yields from small, uniform trees are possible. Orchards and plantations can produce high yields and returns but must match the timing of production with market demands, maintain high fruit quality and carefully control pests and diseases. However, much more can be achieved deploying the available fruit species diversity and managing the orchards efficiently.

Production, Yields, Demand and Consumption of Fruits

9. Although Asia produces great diversity of fruit species, present total production of fruits is 83.9 million tons per annum, which is only about 25.7% of the global production (Appendix 3). The world annual growth rate for total fruits during 1979-88 was 1.4%, while it was 2.9% for Asia-Pacific region during the same period. As regards the individual countries, India with annual production of 24 million tons of fruits was the largest producer with a growth rate of 2.1%. China was the second largest producer with about 17 million tons with a growth rate of 8.7%. Indonesia and Philippines grew at a rate of 3.9%, and 1.7% respectively, while Sri Lanka and Thailand registered negative growth rate of –9.0% and – 1.9%, respectively. The fruit production has significantly increased in many countries in the recent years. As compared to 1989-91, the fruit production during 1997 in China (52.41 m tons), India (37.13 m tons), Indonesia (9.73 m tons), Philippines (9.61 m tons), Thailand 7.14 m tons) and Vietnam (3.77 m ton) was higher by 140.9%, 36.8%, 77.2%, 15.6%, 12.1% and 22.0% respectively indicating the potential for improvement in fruit production in the region. One of the many reasons for slow growth is the low level of utilization of available tropical fruit species diversity in the region. For example, though citrus has originated in Asia, where the major part of diversity is still maintained (Appendix 4), its production has in the region has been on the decline. Global citrus production is more than 65 M tons per year, with only 12.6 M tons or less than 20% being produced in Asia. Combined yield estimates of fruits are variable across countries in the region, but are generally low, averaging well below 10 tons/ha (Appendix 5). National estimates for specific fruits range from 5 to 15 tons/ha for citrus, durian and jackfruit, with a somewhat lower range of 2-10 tons/ha for mangosteen, mango, rambutan and langsat. Potential yields of fleshy fruits are about 50 tons/ha and about 25 tons/ha for fruits with lower moisture content.

10. Although production is relatively low, there is evidence that fruits are in high demand in both urban and rural areas in the region. The demand is mainly due to the increased understanding of the role that the fruits play in the human nutrition and well being. It is also driven by changing food habits of people, demanding greater variation in the foods they consume. However, prices are generally high, too expensive for large sections of the community to enjoy on a regular basis. The demand of fruits in the Asia-Pacific region has been growing by 3.5% to 4.0% per annum during 1980's. Against this, fruit production in the region as a whole grew annually only by 3.0% during the period 1979-88. Therefore, to maintain this level of consumption, which is below the desired level, it is extremely essential to increase the production of fruits. Many developing countries, namely, Bangladesh, Myanmar (Burma), Nepal, Papua New Guinea, Philippines, Samoa, Sri Lanka and Thailand showed growth rates of less than 2% per annum. Of these countries, Thailand and Philippines are exporting countries and their per capita consumption of fruits has been as per the minimum recommended level, while in the remaining countries, the production growth rate has been lower than population growth rate carrying reduction in per capita consumption of fruits. Considering the nutritional significance of fruits, this situation needs to be corrected by increasing domestic production by the fruit deficit countries.

11. There are agroecological, socio-economical and biological constraints to production of fruits in the region. Though the region is rich in tropical fruit species diversity, due to limited resources for research, development

and trained manpower, very little use of it has been made in the improvement. A major contributor to this minimal use of diversity is lack of understanding of the available resource and their diversity. Fruits are generally grown under marginal soil and climatic conditions such as drought, waterlogged, saline-alkali, acidic soils etc. Yields under these adverse conditions are usually low and the fruit quality is poor. Proper evaluation of available diversity for marginal conditions and matching of genotypes for different soil and growing conditions has not been carried out. In addition, very little institutional support has been provided to the development of fruits. Many of the indigenous fruits are attacked by large number of pests and diseases. The citrus industry in Asia is adversely affected due to widespread incidence of *Phytophthora* root rot, citrus canker, and other diseases. Malformation, irregular bearing and spongy tissue are the major threats to mango production in South Asia. Other fruit species also suffer due to specific pests and diseases. Considering the fact that these species originated in this region, there is a strong possibility that the resistant germplasm for various biotic stresses would be still available and careful search for them is necessary. Lack of availability of superior planting materials to growers has been another serious problem. This is compounded by the use of poor planting material and poor cultivation practices, leading to poor production. Fruit germplasm is rapidly disappearing due to logging and clearing of land for various purposes. Thus, many species having potential to become commercial crops and many related species of existing crops which could be important for breeding purposes or for use as rootstocks are getting lost. With increased knowledge on germplasm of tropical fruit species and their judicious use, the scope for increased tropical fruit species production in the region is possible.

Genetic Diversity of Fruit Species

12. The genepool of a given fruit species includes both the related species as well as the genetic diversity that has developed within the species. Knowledge of the variation and location of diversity and an understanding of the relationships between wild and cultivated species are a necessity both for the improvement of the fruit species, as well as for its conservation in sustainable ecosystems. There is fairly good understanding about the diversity in the citrus and mango genepools (see Appendix 4). Although the species in the major Asian fruit genepools have been identified, information on genetic diversity within species is minimal or absent; available information is limited to descriptions of differences in fruit characteristics, or in adaptation of cultivars as in the case of jackfruit or rambutan. Surveys of local knowledge about locally used fruit cultivars reveal rich understanding of differences in fruit quality, adaptation and physical traits. Yet this information has not been systematically recorded or used in fruit improvement efforts. Collections of fruit cultivars conserved in field genebanks in fruit research stations across the region have not been systematically described. Improvement of fruits in Asia has been largely limited to the cultivar selection, with almost no hybridization undertaken.

National Programmes, IPGRI and Regional Collaboration

13. Most countries in the region have made some collections over the last one to two decades of the fruit species available, which are maintained in field genebanks. A few countries, such as China, India, Indonesia, Nepal, Malaysia and Thailand have extensive collections of major fruit species in field genebanks, and in these countries a number of different cultivars have been selected. Some rootstocks and scions have been evaluated for mango, citrus and rambutan. Research and development on improved fruit production systems, processing and marketing have been undertaken in several countries, both by government and private organizations. In some countries, NGO's and local organizations have introduced new fruit species diversity to local farmers. There is now increased interest among countries in the region to increase fruit production and consumption as well as exports. However, progress is slowed by lack of information concerning existing fruit species diversity, incomplete collections of existing genetic resources, loss of collections in genebanks through less-than-optimal conservation methods, lack of documentation of existing collections, and finally lack of collaboration and exchange. Ten countries, Bangladesh, China, India, Indonesia, Malaysia, Nepal, the Philippines, Sri Lanka, Thailand and Vietnam, have requested IPGRI to assist them to document, conserve and effectively use their genetic resources as an essential base for improved production.

14. IPGRI (and its predecessor IBPGR) has provided extensive assistance to countries in Asia to collect, conserve and use the rich genetic resources of fruit species in the region. Other organizations, including RECSEA, PROSEA, UTFANET and FAO have assisted countries in improving production practices, processing, marketing and economic studies on the availability and production of fruits. IPGRI's activities in National programmes and linkages with these organizations are outlined in Appendix 2.

15. The beneficiaries of this project will be the farmers, labourers, consumers, researchers, genebank managers and the fruit industry. The participating countries will be benefited by way of sharing information, technologies and germplasm. Threatened and valuable diversity of target genepools will be collected and placed in genebanks for future use. The project envisages development of refined techniques for fruit germplasm conservation and the researchers and genebank managers will have access to these technologies. Technical and managerial staff involved in fruit conservation research and development activities at national and local levels will have an opportunity to enhance their skills through advanced training and study visits.

Project rationale

16. This project will improve the conservation and use of the native diversity of major and minor fruit species in countries in the Asia region, through strengthened national capacity, including improved methods of conservation and documentation and selection of fruit diversity; community participation and regional collaboration leading to economic growth, rural and semi-urban employment generation, poverty reduction, environment protection, development of women, and maintenance of biodiversity.

17. Fruit production is of major importance to Asia contributing to food security and to meet the nutritional needs of large number of people, especially in rural areas. The target tropical fruit species (citrus, mango, jackfruit and rambutan and one or two underutilised tropical fruit species per participating country) offer tremendous opportunities for increasing current production levels and these fruits have a big demand for consumption in the region as well as for outside the region. All these species have great potential for development of new products based on the rich diversity that is native to the region. The potential to develop a wide range of products augurs well with development of fruit-based small and large-scale enterprises. Due to this, gains on commercial scale will greatly boost the economic growth in the region based on innovative production and marketing of fruits and fruit products. Increased availability of superior varieties, their cultivation and increased production of tropical fruit species can in turn increase both nutrition and incomes of rural poor. Thus conservation of diversity in the target species and selection of superior types for cultivation plays a major role in realising economic gains. The increased national revenues are expected through both increase in local consumption of fruits and export of fruit and fruit products. There is much demand for tropical fruits and fruit products in Americas and Europe, but quality and production need to be increased significantly to meet this demand. Possibilities for exporting to other countries has hardly been explored. Fruit crops provide higher monetary returns compared to cereal crops and play an important role in the overall economy of certain regions of individual countries. For instance, in South China, in Dongavan county of Guangdong Province, the total area of fruits was 5627 ha in 1978 which increased to 38 000 ha in 1986. In the main longan producing districts of Fujian Province, the income from longan accounts for 40-50% of total agricultural income and in some villages as high as 80%. In several countries fruits are a major source of income for farmers. In the Philippines, during 1978-89, about 60 million tons of fruits worth US$ 4.0 billions were produced. Between 1983 and 1987, US$ 93 millions were generated from export of fruits notably mango, banana and pineapple. In general, the monetary returns from fruit cultivation are higher than those from field crops. In the Punjab State of India, rice yielded a return of Rs.1844/ha (1978-79), while orange (kinnow) gave a return of Rs.9529/ha (1983-84). In Himachal Pradesh, apple was the most profitable giving a net return of Rs.11, 326/ha (1983-84). Based on cost-return analysis from selected orchards, net return of Rs.26, 000/ha has been reported from kinnow orchards in Punjab state and Rs.33, 000/ha from mandarin orange orchards in Maharashtra state in India. The benefit-cost ratio has been reported to be 2.65 for mandarin and 2.22 for sweet orange in Tamil Nadu state, while it was 1.85 for lime and 1.76 for sweet orange in Andhra Pradesh.

18. The goal of the proposal is to increase food security, reduce poverty and improve the quality of environment in APO region through better conservation and utilization of tropical fruit genetic resources. The target species, which have great diversity in the region, are extensively grown by small holders (over 80%) and in home gardens, contributing significantly to income generation in the rural and semi-urban areas of many Asian countries. However, yield levels of the target species are currently low, resulting in poor returns to the growers. Even a small increase in the present level of yields is expected to contribute significantly in increasing net returns, thus contributing to the reduction in poverty in the target countries. Improved post-harvest methods will help to save the large quantity from spoilage, along with increased shelf life through exploiting the variability available in the gene pool of target species. Any increase in shelf life (either through genetic manipulation or through appropriate post-harvest technology) will go a long way to help the tropical fruit species growers in the region to be able to derive greater income, since most fruit growers in the region have access to proper storage facilities. Fruit cultivation provides additional employment opportunities through the promotion of fruit based

industries – picking, grading, packing, transportation, storage and processing etc. For example, considering the local demand and export potential of pineapple in Fiji, the target of employment fixed at 1013 in 1986 was raised to 1135 in 1990, while the export target fixed at US$ 232,000 in 1986 was raised to US$ 985,000 in 1990. This amply demonstrated that increased fruit production has the potential for employment generation.

19. It is being increasingly recognised that the vast range of tropical fruit species and their wild relatives are an important part of the stable ecosystems in the APO region. Since the target species and their wild relatives constitute a fairly significant portion of the biota in the region, any effort to conserve these on sustainable basis would represent significant provision of food and shelter to many other plants and animals, thus contributing to the conservation of associated flora and fauna. Even at the level of cultivation, in orchards and homegardens, tropical fruit species can provide an enormous benefit for greening and improving the microenvironment.

20. In subsistence and small farm systems in many Asian countries, women undertake a large part of the labour, and often manage the use and sales of the fruits. This is particularly true in very smallholdings where male members may be forced to seek off-farm employment, leaving the agricultural activities to the women. Women play an important, role in fruit production in subsistence and home gardens in Asia. In such production systems, extensive local knowledge has developed concerning the diversity, selection, adaptation, production and uses of fruits. Through participatory methods, this knowledge can be harnessed to effectively conserve and use fruit diversity.

21. Tropical fruits are rich in vitamins (A, C) and minerals (Calcium, Iron). Diversification towards fruits is essential for nutritional adequacy. Nutritionists advise a daily intake of at least 100 g fruits. To meet this requirement, annual per capita production of at least 37 kg fruits is required but the present level of production in most of the countries in the region is much below this minimum. After attaining a fairly satisfactory situation in grain production in many countries, there is a great need to diversify the food basket by having higher proportion of fruit in the daily diet. Since fruits are the most important source of supplementary nutrients, there is ample justification for increasing production of fruits to meet the nutritional demand and ensure nutritional security.

22. In developing countries, field crops occupy bulk of the cultivated land to meet the demand of food and raw materials for the industry and very limited area is devoted to fruit crops. For example, in India, which has one of the largest cultivated area in Asia-pacific, only about 4% area is under fruits and vegetables. Some of the countries, namely, Malaysia, Republic of Korea and China are now diverting the lands from cereal crops to high value fruit crops due to economic reasons, social changes, and availability of food grains on low price in the world market. In food deficit countries, adopting multiple cropping or inter-cropping approach for which there are good examples especially for banana and pineapple can increase area under fruits. All the target species are very amenable for intercropping and intensive farming, which can further help in attaining this objective. To meet this demand, suitable varieties need to be developed for which germplasm collection and evaluation as well as breeding efforts need to be intensified. Hence, greater attention needs to be given to fruit crops.

23. Vast land areas in the region are classified as wastelands and degraded lands. An estimated 10 million ha are saline/alkaline soils in India alone. In Indonesia, about 16 million ha are classified as peat and acid sulfate soil. Bulk of the land in Nepal, Bhutan and mountainous regions of other countries of Asia-Pacific has steep slopes and prone to erosion if sown with annual crops. In Thailand, for example, many kinds of fruit trees are grown on barren lands, such as sala in low wetlands and tamarind in dry uplands. The use of fruit crops in agro-forestry system is prevalent in Thailand and other countries, which is in line with FAO's initiative 'Food from the Forest'. There are some successful experiences of fruit growing in wastelands in China. In hills, there are large areas under marginal lands, which can be brought into cultivation profitably under fruit crops. Several fruit species are ideally suited for such difficult habitats for not only giving economic returns, food nutrition, fuel and fodder but also for environmental protection. Therefore, concerted efforts should be made to expand fruit area in such habitats. Moreover, the tropical fruit species are well suited for diversified agriculture and are very efficient in exploiting natural resources leading to environmental protection and development of productive and sustainable ecosystem. In all these cases, there is the need to match germplasm with different ecophysiological needs for successful production.

24. Improvement of fruit species will be mainly through the widened genetic base available for improvement. Since most countries are interdependent on the germplasm needed for improvement, the project will promote exchange of fruit species germplasm, the corner stone for enhanced collaboration.

III The Technical Assistance

A. Objective and Scope

25. The objective of the project is to improve the conservation and use of the genetic resources of priority tropical fruit species in 10 countries of Asia.

26. The project will focus on the genepools of 4 major tropical fruit species namely (i) *Citrus* (ii) Rambutan (iii) Jackfruit and (iv) Mango, as well as selected local species in Bangladesh, China, India, Indonesia, Malaysia, Nepal, Philippines, Sri Lanka, Thailand and Vietnam. The scope of the activities include: locating, collecting and evaluating existing biodiversity in the target genepools; implementing practical and effective conservation methods; selection and improvement of native fruit diversity in national programmes; use of improved diversity in local communities; strengthening human resources and national fruit research and development programmes and collaboration and sharing of technologies and fruit germplasm.

27. The priority activities of this proposed project for 3 years in the 10 participating countries include locating and measuring the diversity of the selected major and local native fruits, either in existing collections or *in situ*; collecting the diversity which may be threatened or which possess specific useful traits; undertaking the most cost-effective conservation; identifying useful types to be tested as improved cultivars, rootstocks or parents; and undertaking practical training to ensure that the counties can carry out and sustain this work. These are considered to be essential initial activities, which will provide countries with a stronger base for genetic improvement, long term production increases and benefits to both rural producers and urban consumers.

The Key Fruit Genepools:

28. Four key fruits, as well as selected local minor species are included in this proposed project. The choice is based on interest expressed by partners, potential for effective conservation and improved production, and on differences between genepools in patterns of diversity and use. A consultation workshop, during which initial priorities were identified, is described briefly in Appendix 2. Concise description of the selected genepools is given below while details on each of the key genepools are mentioned in Appendix 4.

29. *Citrus:* The citrus genepool possesses a remarkable range of related species. Several of these species have been fairly well studied and used globally, particularly in highly developed citrus improvement programmes in Israel, Spain and California. Although India and China have exploited the diversity in a number of *Citrus* species for commercial production, most Asian countries have not undertaken systematic documentation, conservation and use of the native diversity. Identifying pest and disease resistance is a high priority. Thus, documentation, conservation and evaluation of native citrus diversity will be the focus in this genepool, including evaluation of rootstock/scion diversity and their interactions.

30. Mango: Both the diversity in the mango gene pool, as well as mango production are primarily in Asia. Although several commercial M. *indica* cultivars have been developed in India, the diversity in other locally important species in South and Southeast Asia remains virtually unexploited. This project will focus on documenting and assessing the diversity in these species. There are excellent prospects for increased production for both local and global markets.

31. Rambutan: The rambutan genepool is confined largely to Southeast Asia. While some superior clones have been identified in countries where diversity exists, there has been very little documentation or exchange of this diversity. Increased efforts on documenting the diversity, conservation and assessment for desirable traits, including root stock-scion interactions will be undertaken in the project.

32. Jackfruit: Diversity in this genepool occurs across both South and Southeast Asia, but most production occurs in South Asia. The diversity in this genepool has been poorly documented, but potential is likely to be there for improving fruit quality, productivity and availability in local rural communities.

33. Local and minor species: Of the documented 400 tropical fruit species in Asia, only about 30 are widely cultivated. The remaining are used to some extent on a very localized basis. Production of these fruit species is mainly at subsistence level and through collecting of fruit from natural stands of tropical fruit trees in forests or agroforestry systems. An assessment will be made in each of the 10 countries to identify 1-2 fruits that are important only locally, but with prospects for increased production and improvement. Using local knowledge and community participation, this diversity will be evaluated, documented and conserved, and promising accessions will be identified for further testing. Therefore, it is proposed to work on 1-2 species in each country as models.

34. Justification for work on key genepools: The target gene pools include citrus, mango, jackfruit and rambutan and one or two underutilised tropical fruit species in each country. Depending on the minor fruits chosen, the species number would probably rise to 8-10. Considering that there are well over 400 native fruit species in APO region and that it is not possible to work on all of them due to human and other resource constraints, establishing priorities is essential. The following criteria have been used to select the four major target species:

- Common species: The four major species selected are important in almost all the participant countries as identified through various consultations. Selecting such common species to work with is expected to promote a network mode of operation of the project, which in turn will promote sharing of information, technology and germplasm and this will improve the efficiency of implementation of the project.
- Nativity of species: All the target species are indigenous to the region. This is directly related to questions of adaptation, availability of large diversity and staff that are well versed with the crops under consideration.
- Potential for improvement: All the species selected have vast potential to contribute to economic gains, poverty reduction and environment protection in the region. For example, though enormous diversity exists in the region for citrus, most of the commercial benefits from this gene pool are derived elsewhere. Very little effort has been made to make use of the great diversity in the region. In the case of mango and rambutan, there are excellent prospects for increased production for both local and global markets. Being a multipurpose species, jackfruit has tremendous potential to benefit the rural poor.

35. Conservation and exchange of the diversity: The participating countries will undertake conservation of the diversity of these priority species. *Ex situ* field genebanks at the national level will be the main focus for medium-term conservation, complemented by *in vitro* and cryopreservation and *in situ* conservation. Agreements, including material transfer agreements (MTAs), consistent with the Convention on of Biological Diversity, will be used as needed to facilitate the exchange and use of germplasm among the countries.

36. Sustainability of efforts: All the participating countries have recognised the importance of conservation and use of germplasm of the target tropical fruit species. Thus, the conservation and use activities as outlined in this proposal directly benefit the national PGR systems. Once the Steering Committee is established, the concept of developing regional subregional genebanks would be suggested for individual species. Additionally, the perenniality of the species involved makes them very much amenable to long-term conservation in field genebanks as well conservation in *in situ*, on-farms and in orchards. Sustainability of field genebanks would be promoted through commercialization of part of the establishment through production and sale of improved, high quality and high-yielding cultivars.

37. IPGRI has provided extensive assistance to countries in Asia to conserve and use the rich genetic resources of fruit species in the region particularly for collecting and conservation of durian, rambutan, duku, citrus and Musa germplasm in the region. Through this project, IPGRI envisages to assist NPs to collect and evaluate the diversity of target genepools, bring improvement through selection, develop and promote suitable techniques for conservation, develop guidelines for complimentary conservation, promote community participation, support capacity building and foster collaboration amongst the members in the area of research and germplasm exchange. IPGRI will continue its efforts to maintain the sustainability of conservation initiated under the project. It will provide technical support on continuing basis. It will also support activities that may arise from the present efforts in the areas of improvement and varietal development, and thus contribute to the continuing efforts for conserving and using the germplasm that are identified and assembled during the present project. It will participate in the development of future projects on tropical fruit species conservation and use in the region and will support them in anyway it can. The present proposal, if approved, will help to establish a platform to assess the present needs, plan and implement the programmes in near future.

38. IPGRI and the Underutilized Tropical Fruit Network (UTFANET) are now finalizing a Memorandum of Understanding under which IPGRI is to take leadership for activities on genetic resources, while UTFANET includes activities on production, processing, economics and marketing of tropical fruits long term funding, which DFID, IFAD and other donors have indicated, will help insure the development impacts from this project are sustained under this broader network.

B. Expected Outputs

39. Locating and collecting diversity:

(i) Existing diversity of the target genepools located and documented through ecogeographic studies and documentation of existing collections. Survey and constraints analysis undertaken in orchards and home gardens. Information accessible through shared databases.

(ii) Threatened and valuable diversity of target genepools collected and placed in genebanks.

40. Conservation:

(iii) Complementary conservation techniques including *in situ* conservation, seed conservation, field genebanks, *in vitro* conservation and cryopreservation evaluated and developed for the target genepools.

(iv) Representative and unique germplasm effectively conserved at national and local community levels.

41. Selection and improvement of diversity:

(v) Collections in genebanks characterised and evaluated; accessions possessing desirable traits including improved rootstocks, disease resistance and fruit quality, traits identified for further testing. Potential breeding stocks and improved clones identified; information accessible through shared databases.

(vi) Diversity maintained in local communities and assessed using indigenous knowledge; local preferences, needs and market opportunities identified.

42. Strengthening National Capacity:

(vii) Technical and managerial staff trained in fruit conservation and use activities at both national and local levels in each of the ten countries. Workshops, advanced training and study visits undertaken with community, research and development workers.

(viii) Research capacity, conservation and community level capability strengthened in carrying out the priority activities, including strengthening fruit genebanks management, evaluation, selection and practical conservation methodology.

43. Collaboration:

(ix) Information, technologies and germplasm shared among participating countries and partner organizations through existing regional plant genetic resources networks including Regional Cooperation in Southeast Asia on Plant Genetic Resources (RECSEA-PGR) in Southeast Asia, East Asia Network on Plant Genetic Resources (EA-PGR) in East Asia, and South Asia Network on Plant Genetic Resources (SANPGR) in South Asia.

(x) Priority activities in related areas including fruit production systems, marketing, processing and economic assessments undertaken through collaboration with other organizations including the Underutilized Tropical Fruits of Asia Network (UTFANET), the Coopération Internationale de Recherché Agronomique, France (CIRAD), and the Food and Agricultural Organisation (FAO). Taxonomy and related studies undertaken in collaboration with Plant Resources of South-East Asia (PROSEA). Common conservation activities including database and germplasm exchange undertaken in collaboration with existing sub-regional plant genetic resources networks: RECSEA, SANPGR and EA-PGR (see Appendix 2 for more details).

43. The project framework is presented in Table 1.

C. Cost Estimates and Financing Plan

44.The total cost of the study is estimated at US$ 3.147 million over a period of 3 years, of which the ADB is requested to provide a grant of $1.2 million (Table 2). The ADB's fund will finance the project activities dealing with research on measuring, locating and collecting diversity, on conservation techniques, use of diversity, collaboration, documentation and information dissemination and human resource development, consultancy and part of the administrative and office support. IPGRI will provide for staff costs and other costs estimated as US$ 0.257 million. The ten participating countries will also contribute towards the cost of staff and administration, in the respective national programmes, amounting to a total of US$ 1.690 million (Table 2).

D. Implementation Arrangements

45. IPGRI, a CGIAR centre, with a mandate to manage, conserve and use the plant genetic resources for the benefit of present and future generations, has provided the global leadership on plant genetic resources for over the past two decades. IPGRI has helped to organize and run a number of crop networks to ensure better conservation and wider use of under exploited germplasm, to provide better support to crop improvement programmes, and to strengthen links among and between developed and developing countries. IPGRI has already established working relationships with organizations concerned with fruit tree genetic resources in the ten participating countries. IPGRI staff with highly relevant expertise has been selected to participate in this activity.

46. The IPGRI will be the executing agency (EA) for the project. IPGRI has proven its ability to successfully implement the past and ongoing ADB technical assistance grants to the Coconut Genetic Resources Network for Asia-Pacific from its regional office for Asia, the Pacific and Oceania (APO) based in Kuala Lumpur, Malaysia. The proposed Tropical Fruits project would also be based at IPGRI-APO, together with the IPGRI-APO coordinating offices in Delhi and Beijing, which are included in the APO Regional Group. The proposed project will be implemented as part of ongoing IPGRI activities on tropical fruit genetic resources, in the APO region. Such work is part of IPGRI's Medium Term Plans for both 1997-1998 and 1999-2003. IPGRI staff with highly relevant expertise have been selected to participate in this activity (Appendix 6).

47. IPGRI has already established working relationships with organizations concerned with fruit tree genetic resources in the ten participating countries (Appendix 7). In order to implement the project with these countries, a Steering Committee (SC) will be set up with a member from each participating country and IPGRI. Each country will be requested to nominate a leading fruit worker to the SC as Country Coordinator. The Country Coordinators will elect, by consensus, the Chair of the SC for a period of two years. The Steering Committee will work with IPGRI and execute the agreed programme in consultation with the country coordinators. A series of technical working groups will be set up under the Steering Committee to undertake the specific technical tasks. The Steering Committee will meet annually and correspond frequently. To keep up to date with project activities, IPGRI will appoint a project coordinator who will be an *ex-officio* member of the Steering Committee. A representative from ADB will be invited to attend project meetings. Other collaborating organizations including UFANET, CIRAD, PROSEA and FAO will be invited to participate using their own funds. Representatives of the regional and subregional genetic resources networks (APAARI, EA-PGR, SANPGR and RECSEA) will also be invited to attend the Steering Committee meetings.

48. The inception meeting will provide an opportunity to set priorities, discuss the work plans, and make detailed implementation arrangements, including reporting and monitoring mechanisms. Accountabilities for achievements and annual milestones for the outputs will be set in place. The allocation of budget to carry out specific activities to achieve the outputs will be decided at the inception meeting. Some tentative allocation of activities to different countries is shown in Appendix 8. These suggestions are based on the existing needs expressed by countries. These will be confirmed, prioritised and budgeted during the workplan development at the inception meeting.

49. As in the case of the ongoing ADB supported Coconut Genetic Resources Network project, IPGRI staff will be closely involved in providing technical back stopping to the agreed activities. IPGRI will implement funding to the countries concerned through Letters of Agreement, and will provide all necessary financial and technical reports to ADB. IPGRI will be responsible for procurement of any equipment in accordance with ADB's "Guidelines for procurement" and for the engagement of international experts in accordance with ADB's guidelines on the use of consultants or through other arrangements satisfactory to ADB on the engagement of national consultant.

50. IPGRI will prepare semi-annual reports, based on the semi-annual reports prepared by the participating countries. The main monitoring system will involve a Coordinator (IPGRI staff) who carries out the planned activities and annual planning workshops. The disbursement of funds by the Asian Development Bank will be on annual basis with liquidation at six monthly intervals.

51. Efforts will be made in include the private sector and this will be done at the country level.

Cost estimates and financing plans of the proposed 3-year project
(US$) (10 Countries)

Component	ADB	National Programmes	IPGRI	Total
Equipment (Laboratory/ genebank/computers/printers)	45,000	250,000	6,000	301,000
Travel (international/local)	45,000	25,000	6,000	76,000
Training	85,000	45,000	6,000	136,000
Meetings/Workshops	110,000	60,000	5,000	175,000
Information, Databases and Publications	90,000	30,000	5,000	125,000
Research Support	260,000	250,000	12,000	522,000
Technical Support	90,000	80,000	15,000	185,000

Production figures for some fruits in the Asia-Pacific Region and the World
('000 metric tons)

Crop	Asia-Pacific	World	Asia-Pacific as % of World Production
Banana	16 425	40 087	41.0
Pineapple	6 380	10 354	61.6
Citrus	12 609	63 295	19.9
Mango	11 381	14 563	78.2
Apple	9 130	39 643	23.0
Grapes	3 728	65 202	5.7
Minor fruits	11 350	16 679	68.0
Others	9 287	67 121	13.8
Total	83 996	326 886	25.7

Appendix 4

Patterns of diversity and prospects for improvement in the 4 key fruit genepools

Citrus spp.

The 13 genera of *Citrinae* includes primitive citrus relatives and the true citrus group of six genera: *Citrus*, *Poncirus*, *Eremocitrus*, *Microcitrus*, *Fortunella* and *Clymenia*. Species of these genera are mostly evergreen trees, only exception being genus *Poncirus* which is deciduous. *Citrus*, *Fortunella* and *Poncirus* are the most closely related, but all the five genera can be crossed with *Citrus* and hence this group can be regarded as the primary genepool of citrus fruits. In the most commonly used classification *Fortunella* species and *Poncirus trifoliata* are, however, placed in the secondary genepool and *Microcitrus*, *Clymenia* and *Eremocitrus* in the tertiary genepool.

The taxonomy of *Citrus* genus is still open to question. The most commonly used taxonomic scheme (Swingle's) identifies 16 species; the other proposed subdivisions of the genus recognize from 1 up to 162 species. Recent studies applying biochemical and molecular methods have identified rhree affinity groups within the commercially important citrus species: C. *medica* -group (lemon and lime) consisting of *Citrus medica* (citron), *Citrus aurantifolia* (lime, in Swingle) and *Citrus limon* (lemon in Swingle). C. *reticulata* -group (sweet orange, grapefruit, mandarins) which includes *Citrus reticulata* (mandarins in Swingle), *Citrus sinensis* (sweet orange in Swingle), *Citrus paradisi* (grapefruit in Swingle), *Citrus aurantium* (sour orange, not in Swingle) and *Citrus jambhiri* (rough lemon, not in Swingle); and C. *maxima* -group consisting of only *Citrus maxima* (pummelo, pomelo, shaddock, C. *grandis*, in Swingle).

Citron (C. *medica*) originates from southwest Asia, possibly from India, but south China has also been suggested as the area of its origin. Pummelo (C. *maxima* or C. *grandis*) is proposed to be South-East Asian origin, but it is also reported to be native to southern China, to Indian archipelagos and to be widely distributed also in Fiji Islands. The area of origin for mandarins is most probably the region comprising Indo-China, south China and the Philippines; Japan is now considered as the secondary center of its diversity. Sweet orange (C. *sinensis*) originates from southern China and possibly also from Indonesia and Indo-China, especially southern Vietnam; Israel and Spain have become the secondary centers of diversity. Sour orange (C. *aurantium*) comes from area comprising Southeast Asia, Indo-China and India. Grapefruit (C. *paradisi*) is quite recent in origin and the only citrus fruit originating from the New World, West Indies, most probably in Barbados. Lemon (C. *limon*) is suggested to be of East Asian origin, from the northern Myanmar and southern China area, but the origin of this species is also reported to be unknown. Lime (C. *aurantifolia*) originated apparently in the east Indian archipelago; the area of eastern India and west Malaysian archipelago is the primary center of its diversity.

Eremocitrus and *Microcitrus* are of Australian origin. Of the six species in *Microcitrus*, five grow wild in Queensland and northern New South Wales and one species in southeastern Papua New Guinea. *Eremocitrus*, monospecific *(E. glauca)*, is native in Australian deserts. *Poncirus* consists of two species (*P. trifoliata* and *P. polyandra*) both of which are native to northern and eastern China. *Clymenia* consists of one species, which is geographically isolated from the other genera, and the exact area of its origin is unknown.

At the moment, more than 80% of the world production of citrus fruits originates outside Asia (Mediterranean, North/Central America, and South America). However, the vast genepool diversity exists almost entirely in the Asian region and provides excellent possibilities and prospects to broaden and improve the fruit germplasm and enhance its use in Asian countries. Most of *Citrus* breeding programmes, separated for scions and rootstocks, are carried outside Asia. The diversity within primary genepool in Asia (*Citrus* genus) has a very great potential to improve the various fruit quality traits (rich colour, higher total soluble solids and seedlessness), to diversify maturing for expanding the marketing season, and to improve the fruit structure and storability to expand the distribution potential. Freeze-hardiness and virus resistance are also very important characteristics which have been identified in the primary genepool. The five genera in secondary and tertiary genepools have been identified to have important prospects especially in rootstock

improvement. Rootstock breeding (started in the other regions, especially in USA) emphasizes soil-related objectives, freeze-hardiness and tree size control; all of these characters are found mainly in *Fortunella*, *Poncirus* and *Eremocitrus*. *Microcitrus* is obviously an excellent source to develop or induce diseases and pest resistance, such as tolerance or resistance to viruses (especially citrus tristeza virus), citrus leaf miner, citrus greening, bacterial canker and *Phytophthora* common on rootstock related varieties.

Mango

According the recent taxonomic studies, the genus *Mangifera* consists of 69 species, but the subdivision of the genus is still controversial and the number of identified species varies from 39 to 69. The crossing barriers within the genus are not known, and consequently the structure of the genepool is largely unknown. However, it seems that several of the species within the genus can cross naturally or be crossed artificially: the prospects in improvement are therefore excellent both by using the very wide diversity of the major species (common mango, *Mangifera indica*) and through exploitation of the variation in other species of the genus which are almost completely unused so far.

The genus *Mangifera* is of South and South East Asian in its origin, although the common mango has quite recently been introduced into other regions. Only one of the species in the genus, *M. gedebe*, has a quite wide distribution from Myanmar to Malaysia and Papua New Guinea. The other species have been divided to two groups: those adapted to monsoon climates (Myanmar, India, Thailand, Indochina, parts of Indonesia) and the larger part of species, which are adapted to the ever-wet tropical rain forests. The common mango, *Mangifera indica*, originates from geographical area comprising India and Myanmar. The highest concentration of species is found in western part of Malaysia (29 species of which 1 is endemic), Sumatra (14 species), Java (30 species, 2 endemic) and Borneo (31 species, 3 endemic). In India 6 species have been found of which 2 are endemic, in China 4 (3 endemic), in the Philippines 8 (2 endemic), in Thailand 12 (2 endemic) and in Myanmar 5 species of *Mangifera* occur.

Almost all of the mango cultivars belong to a single species, *Mangifera indica*. The widest and well-characterized diversity of mango cultivars is in India, where around 1000 local varieties have been estimated to exist; in other Asian countries the reported number of local cultivars varies from tens to more than one hundred. These cultivars are almost entirely direct selections of desirable trees found in natural habitats; recognized by fruit qualities and in some cases on the adaptation to specific growing conditions. At the moment, only a few cultivars in South East Asia belong to other species of *Mangifera*, although there are many species in *Mangifera*, locally often well known, with excellent edible fruit and sometimes equivalent or even of better taste than that of the common mango. These species possess other important characters, such as disease resistance, lacking in the currently used fruit germplasm. The prospects in larger use and improvement of mango are excellent: action is needed to locate the most useful variation in the entire genepool, to collect and evaluate it efficiently, and subsequently to exploit the most useful diversity both directly under cultivation as well as through hybridization.

Rambutan

The genus *Nephelium* has 22 species: 5 of them occur in Myanmar, Thailand and Indo-China, 13 in Peninsular Malaysia, 16 in Borneo, 4 in the Philippines, 3 in western Java and 1 in Sulawesi. From the different *Nephelium* species, *N. cuspidatum*, *N. hypoleucum*, *N. maingayi*, *N. ramboutan-ake* (pulasan) and *N. uncinatum* have some importance as fruit crops in addition to the major species *N. lappaceum*. All these species are very variable and difficult to distinguish from each other; *N. lappaceum* especially from *N. ramboutan-ake* and *N. cuspidatum*. The structures of the primary genepool is unclear, although it is likely that several of the other *Nephelium* species may cross naturally or can be crossed artificially with rambutan. Three different forms of rambutan are recognized by their leaflet characteristics: var. *lappaceum* (the commonly cultivated form, distribution: Thailand, Malaysia, Sumatra, Java, Kalimantan, the Philippines), var. *pallen* (distribution: China, Thailand, Laos, Cambodia, Vietnam, Malaysia, Sumatra, Kalimantan, the southern Philippines) and var. *xanthioides* (distribution: Borneo).

The rambutan occurs from southern China through the Indo-China region, Malaysia, Indonesia (Sumatra, Java, Kalimantan, Sulawesi) and in the Philippines; it is assumed to originate in Malaysian archipelago, but its origin is unclear because of the escapes from cultivation blur the original distribution. The center of origin of the genus *Nephelium* is suggested to be the Indo-China-Indonesia region, having its specific diversity hot-spot in Peninsular Malaysia: *N. cuspidatum* occurs in Myanmar, Thailand and Indo-China and in the whole Malaysian region; *N. hypoleucum* in Myanmar, Thailand and Indo-China; *N. maingayi* and *N. uncinatum* in Peninsular Malaysia, Sumatra and Borneo; and *N. ramboutan-ake* can be found in India, Myanmar, Indonesia, Malaysia and the Philippines.

Cloning superior trees found in natural habitats has produced all cultivars of rambutan. Most cultivars originate from the form var. *lappaceum;* the use of the two other forms, *pallens* and *xanthioides* is not efficiently investigated so far. Selections of the cultivars are based on the fruit characteristics (even within *lappaceum* the fruit quality is highly variable), productivity and tree size. Testing of a wide selection of potential rootstocks for reduction of tree size and the cloning of the stocks are among the current research objectives in some South East Asian countries, especially in Malaysia. However, the more intensive research aimed to locate, collect and exploit of the diversity of the rambutan, and later the other *Nephelium* species, which are likely to possess characteristics important for the future improvement of the fruit, is the key issue to meet the excellent prospects of rambutan.

Jackfruit

Although jackfruit (*Artocarpus heterophyllus*) is a major fruit in South and South East Asia, very little information is available on the patterns of its diversity so far. The *Artocarpus* genus is native to South and South East Asia, New Guinea and the southern Pacific and comprises around 50 species. From these species *A. altilis* (breadfruit) and *A. heterophyllus* are cultivated throughout the tropics. Jackfruit is most probably indigenous to the rain forests of Western Ghats in India, but since time immemorial it was introduced and become naturalised in several parts of tropics, particularly in Southeast Asia. Today it is a major commercial fruit in Bangladesh and also commonly grown also in Indonesia, Malaysia, Myanmar, Philippines, Thailand, eastern and southern parts of India, Sri Lanka, and outside of Asia especially in Brazil. Earlier, jackfruit was often confused with chempedak (*A. integer*), a species which is native to western parts of Malaysia and with which jackfruit occasionally hybridize. Jackfruits are usually classified to two major types based on the quality of edible pulp. Many cultivars exist within both of these types, but no specialization or adaptation of these types to specific environments has been reported.

All the currently used cultivars are direct selections of desirable trees found in natural habitats. As in the case of rambutan, the prospects of this poorly investigated fruit are very promising, but demand action focused firstly on the locating, collecting and evaluation of the diversity of major species in the genus.

Appendix 5

Area and production of selected tropical fruits in APO
(10 selected countries)

Country	Fruit species	Area (ha)	Production (t)
Bangladesh	Mango	50 109	186 255
	Citrus	10 107	33 445
	Jackfruit	22 900[1]	225 400
	Rambutan	NA	NA
China	Mango	213 500	2 107 552
	Citrus	1 376 800	9 307 409
	Jackfruit	NA	NA
	Rambutan	NA	NA
India	Mango	1 280 500	10 800 000
	Citrus	230 500	2 250 000
	Jackfruit	26 000	NA
	Rambutan	NA	NA
Indonesia	Mango	250 000	1 000 000
	Citrus	35 000	250 000
	Jackfruit	NA	NA
	Rambutan	50 000	773 000
Malaysia	Mango	5 728	28 640
	Citrus	4 575	24 780
	Jackfruit	1 879	NA
	Rambutan	19 000	55 000
Nepal	Mango	10 100	82 720
	Citrus	18 000	102 231
	Jackfruit	NA	NA
	Rambutan	NA	NA
Philippines	Mango	75 000	480 000
	Citrus	20 720	156 000
	Jackfruit	13 000	68 000
	Rambutan	NA	NA
Sri Lanka	Mango	25 763	97 600
	Citrus	10 394	22 800
	Jackfruit	[1]	NA
	Rambutan	NA	NA
Thailand	Mango	138 000	1 400 000
	Citrus	67 000	743 000
	Jackfruit	NA	NA
	Rambutan	67 852	607 559
Vietnam	Mango	13 367	152 546
	Citrus	37 133	389 409
	Jackfruit	NA	NA
	Rambutan	NA	NA

Source: FAO. 1997. http://www.apps.fao.org and
Asia Regional AgriBusiness at http://www.milcom.com/rap/

[1] Area and production difficult is difficult to estimate, especially for jackfruit, as much of it is in homes gardens

NA: not available/not applicable

Suggested Activities to be carried out in different countries and different species

Activity	Species	Countries[1]
Documentation of existing information on genetic resources	Mango	BGD, IND, IDN, MYS, PHL, THA
	Citrus	BGD, CHN, IND, IDN, MYS, NPL, PHL, LKA, THA, VNM
	Jackfruit	BGD, IND, LKA
	Rambutan	CHN, IDN, MYS, PHL, THA, VNM
Ecogeographic studies and determination of the extent and distribution of genetic diversity	Mango	BGD, IND, IDN, MYS, PHL, THA
	Citrus	BGD, CHN, IND, IDN, MYS, NPL, PHL, LKA, THA, VNM
	Jackfruit	BGD, IND, LKA
	Rambutan	CHN, IDN, MYS, PHL, THA, VNM
Constraint analysis	Mango	IND, THA, PHL
	Citrus	NPL, VNM
	Jackfruit	BGD, IND
	Rambutan	CHN, IDN, MYS,
Germplasm collecting	Mango	BGD, IND, IDN, MYS, PHL, THA
	Citrus	BGD, CHN, IND, IDN, MYS, NPL, PHL, LKA, THA, VNM
	Jackfruit	BGD, IND, LKA
	Rambutan	CHN, IDN, MYS, PHL, THA, VNM
Assessment, evaluation and characterization of genetic diversity	Mango	BGD, IND, IDN, MYS, PHL, THA
	Citrus	BGD, CHN, IND, IDN, MYS, NPL, PHL, LKA, THA, VNM
	Jackfruit	BGD, IND, LKA
	Rambutan	CHN, IDN, MYS, PHL, THA, VNM
Development of cost-effective and sustainable conservation methods	Mango	IND, IDN
	Citrus	CHN, IND, VNM
	Jackfruit	BGD, LKA
	Rambutan	MYS, PHL, THA
Developing and adopting tools to help make decisions to implement complementary conservation strategies	Mango	BGD, IND, IDN, MYS, PHL, THA
	Citrus	BGD, CHN, IND, IDN, MYS, NPL, PHL, LKA, THA, VNM
	Jackfruit	BGD, IND, LKA
	Rambutan	CHN, IDN, MYS, PHL, THA, VNM
Strengthening germplasm use activities	Mango	BGD, IND, IDN, MYS, PHL, THA
	Citrus	BGD, CHN, IND, IDN, MYS, NPL, PHL, LKA, THA, VNM
	Jackfruit	BGD, IND, LKA
	Rambutan	CHN, IDN, MYS, PHL, THA, VNM
Developing national capacity for conservation and use	Mango	BGD, IND, IDN, MYS, PHL, THA
	Citrus	BGD, CHN, IND, IDN, MYS, NPL, PHL, LKA, THA, VNM
	Jackfruit	BGD, IND, LKA
	Rambutan	CHN, IDN, MYS, PHL, THA, VNM
Collaboration	Mango	BGD, IND, IDN, MYS, PHL, THA
	Citrus	BGD, CHN, IND, IDN, MYS, NPL, PHL, LKA, THA, VNM
	Jackfruit	BGD, IND, LKA
	Rambutan	CHN, IDN, MYS, PHL, THA, VNM

1 BGD = Bangladesh, CHN= China, IND= India, IDN= Indonesia, MYS= Malaysia, NPL= Nepal, PHL= Philippines, LKA= Sri Lanka THA= Thailand, VNM= Vietnam

NOTE: All activities will not be undertaken in all countries.

Annexe 2

ADB – TFT PROJECT

TASKS

1. LOCATING AND COLLECTING DIVERSITY
2. GERMPLASM EVALUATION, CHARACTERIZATION AND UTILISATION
3. *IN SITU* CONSERVATION
4. *EX SITU* CONSERVATION
5. INFORMATION AND DOCUMENTATION
6. SOCIO-ECONOMIC STUDIES
7. HUMAN RESOURCE and CAPACITY BUILDING
8. COORDINATION AND COLLABORATION

ADB – TFT PROJECT

TASK: LOCATING AND COLLECTING DIVERSITY

- **OBJECTIVES**

  - Determine the extent and distribution of diversity of target genepools
  - Collect threatened and valuable diversity
  - Estimate genetic diversity in collected materials

- **ACTIVITIES**

  - Conducting ecogeographic studies to locate genetic diversity to determine its extent and distribution
    Mango – India, Indonesia
    Citrus – China, Vietnam
    Jackfruit – Sri Lanka
    Rambutan - Malaysia
  - Distribution maps
    - Prepare 10-20 distribution maps based on ecogeographic and other surveys
  - Exploration and collecting genetic diversity
    - Identify priorities for germplasm collecting based on ecogeographic surveys
    - Carry out targeted collecting of germplasm
    - Estimate genetic diversity in collected materials
    - Develop additional funding support for genetic diveristy using molecular methods

ADB – TFT PROJECT

TASK: GERMPLASM EVALUATION, CHARACTERIZATION AND UTILIZATION

- **OBJECTIVES**
  - Assess, evaluate and characterize genetic resources in target species
  - Identify elite germplasm with valuable traits
  - Promote diversity in orchards and housesteads
  - Identify promising types for use as rootstock and scion

- **ACTIVITIES**
  - Assess, evaluate and characterize genetic resources and identify elite material
    Mango – Bangladesh, India, Indonesia, Malaysia, Philippines, Thailand and China
    Citrus – Bangladesh, China, India, Indonesia, Malaysia, Nepal, Philippines, Sri Lanka, Thailand and Vietnam
    Rambutan – Indonesia, Malaysia, Philippines, Thailand and Vietnam
    Jackfruit – Bangladesh, India and Sri Lanka
  - Identify germplasm with valuable traits in 6-10 species
    Mango – Bangladesh, India, Indonesia, Malaysia. Philippines, Thailand and China
    Citrus – Bangladesh, China, India, Indonesia, Malaysia, Nepal, Philippines, Sri Lanka, Thailand and Vietnam
    Rambutan – Indonesia, Malaysia, Philippines, Thailand and Vietnam
    Jackfruit – Bangladesh, India and Sri Lanka
  - Diversity in orchards and homesteads
  - Promote diversity in one orchard/homestead in each country
    Rootstock and scion evaluation
  - Carryout evaluation for identification of better rootstock or scion
  - Genetic diversity in material with communities and home gardens
  - Use indigenous knowledge to assess genetic diversity in one species in each countries

ADB – TFT PROJECT

TASK: *IN SITU* CONSERVATION

- **OBJECTIVES**

  - Develop guidelines for establishing *in situ* sites
  - Develop potential methods of *in situ* conservation
  - Undertake conservation at community level

- **ACTIVITIES**

  - Sites for *in situ* conservation
    - Identify sites (one per country) for *in situ* conservation
    - Develop guidelines to establish *in situ* sites and monitoring
  - Specific research to develop potential methods
    - Identify links with in situ conservation sites
    - Develop case studies on community based conservation of homegardens
  - Complementary conservation strategies at national level
    - Facilitate implementation of CCS at NP level for target species
  - Conservation at community level
    - Develop guidelines for community-based conservation
    - Facilitate implementation of guidelines

ADB – TFT PROJECT

TASK: *EX SITU* CONSERVATION

- **OBJECTIVES**

  - Develop/improve *ex situ* conservation methods in target species
  - Assist National Programmes in establishing *ex situ* genebanks
  - Develop guidelines for management of Field Gene Banks
  - Develop complementary conservation strategies

- **ACTIVITIES**

  - Potential conservation methods
    - Gathering and compiling information on current practices and potential conservation methods
    - Identify potential areas for research
    - Undertake specific research to develop/improve conservation methods

      Mango – Seed conservation, *In vitro* conservation, Cryopreservation (Indonesia, India, Philippines)

      Citrus – Seed conservation, *In vitro* conservation, Cryopreservation (India, China, Malaysia)

      Rambutan - Seed conservation, *In vitro* conservation, Cryopreservation (Malaysia, Thailand)

      Jackfruit - *In vitro* conservation, Cryopreservation (India, Bangladesh)
  - Complementary Conservation Strategies (CCS)
    - Develop guidelines for CCS for target species
    - Improve field and other genebank management practices

      Assist NPs in implementing guidelines for establishing and managing FGB
    - Establish genebanks for collected germplasm
    - Develop guidelines for FGB management & facilitate implementation

ADB – TFT PROJECT

TASK: INFORMATION AND DOCUMENTATION

- **OBJECTIVES**

  - Document existing information and set up databases
  - Promote information exchange among partners
  - Document indigenous knowledge

- **ACTIVITIES**

  - Documentation on existing information on genetic resources of the selected tropical fruit species
  - Updating existing databases
  - Preparing and publication of catalogues
  - Sharing databases of accession information
  - Setting up a database on selected species
  - Providing access to partners
  - Partners exchange information and germplasm
    Mango
    Citrus
    Rambutan
    Jackfruit
  - Documentation of indigenous knowledge
  - Collect and document indigenous knowledge atleast in one species in each country

ADB – TFT PROJECT

TASK: SOCIO-ECONOMICS

- **OBJECTIVES**
  - Identify production constraints in orchards and housesteads
  - Study growers and consumers preferences

- **ACTIVITIES**
  - Surveys and constraints analyses in orchards and home gardens
  - Undertake Constraint Analysis (4) in orchards/home gardens
    Mango – Philippines
    Citrus – Nepal
    Jackfruit – Bangladesh
    Rambutan - Indonesia
  - Surveys of grower and consumer preferences and market surveys
  - Carry out 2-3 surveys of grower and consumer preferences and market surveys
    Mango – Thailand
    Citrus – India
    Rambutan – Philippines
    Jackfruit – Bangladesh

ADB – TFT PROJECT

TASK: HRD and Capacity Building

▪ OBJECTIVES

- Improve human resource capacity for undertaking work on TFT
- Strengthen infrastructural facilities
- Facilitate NPs in developing proposals for funds support

▪ ACTIVITIES

- Improve human resource capability in PGR conservation and use through training courses, study visits and workshops
  - Conduct advanced training courses on conservation and use of genetic resources in target crops
  - Identify and organize study visits on specific topics
  - Organize workshops
  - Support participation of key partners for specific workshops organized during project period
  - Develop proposal for funding to support MSPGR scholars to work on key problems
- Improving existing laboratories and other facilities in 6-7 countries
  - Identify constraints in carrying out research on tropical fruit species in key institutes
  - Upgrade key facilities
  - Develop proposals for additional support

ADB – TFT PROJECT

TASK: COORDINATION AND COLLABORATION

- **OBJECTIVES**
  - Coordinate and facilitate inter-country, inter-regional and inter-institutional collaboration
  - Generate sustainable technical and financial support

- **ACTIVITIES**
  - Collaboration for work on tropical fruit species among participating countries through 3 networks, SANPGR, RECSEA-PGR and EA-PGR
    Keep TFT work as one of the theme in subregional network meetings
    Make specific presentations on progress of work at network meetings
  - Collaboration with UTFANET, CIRAD, FAO, PROSEA etc. to improve use of tropical fruits through a) production systems, b) marketing, c) processing, and d) nutrition
    Collaborate with regional/international organizations to support project work
    Develop specific proposals with UTFANET and other organizations
    Involve other regional/international organizations to participate in project meeting
  - Organize Annual Project Meeting

ANNEXE 3

WHO WE ARE

- ESTABLISHED IN APRIL 1988 WITH THE RECOMMENDATIONS OF REPRESENTATIVES OF 33 COUNTRIES AT A MEETING HELD IN SOUTHAMPTON, UK.

- ICUC IS AN AUTONOMOUS, NON-PROFIT, SCIENTIFIC RESEARCH AND TRAINING CO-ORDINATING CENTRE. IT IS REGISTERED AS A CHARITY IN THE UK AND IS GOVERNED BY AN INTERNATIONAL BOARD OF TRUSTEES. THE BOARD CONSISTS OF A CHAIRMAN, SECRETARY AND TREASURER AND HAS NOMINATED A MANAGEMENT AND PROGRAMME COMMITTEE CONSISTING OF 6 MEMBERS TO MANAGE THE AFFAIRS OF THE CENTRE.

- THE CENTRE'S ACTIVITIES ARE DIRECTED AND ADMINSITRERED BY AN EXECUTIVE DIRECTOR WITH THE HELP OF A PERSONAL SECRETARY AND TWO PROJECT STAFF.

- ICUC IS CURRENTLY BASED AT THE UNIVERSITY OF SOUTHAMPTON.

O/H 8

ICUC's STRATEGIC PROGRAMMES INCLUDE INDIGENOUS SPECIES OF:

FRUIT & NUT TREES

VEGETABLES, PULSES, ROOTS & TUBERS

CEREALS & PSEUDOCEREALS

OILSEED & INDUSTRIAL CROPS

FORAGE, FODDER AND ENERGY CROPS.

OUR WEB SITE

http://www.soton.ac.uk/~icuc

- **STAFF**
- **COMMITTEE**
- **PUBLICATIONS**
- **ACTIVITIES**
- **OPPORTUNITIES**

ICUC's MAIN OBJECTIVES:

- Domestication (where necessary) and improvement of underutilized plant species
- Introduction of improved underutilized species in appropriate farming systems
- Development of products and marketing, locally, regionally and internationally
- Development of human resources on propagation, production & management, postharvest processing & marketing and technology transfer
- Develop technology transfer to beneficiaries
- Provision of information services on underutilized [illegible]

IMPROVEMENT OF TROPICAL FRUITS THROUGH STRENGTHENING REGIONAL COLLABORATION

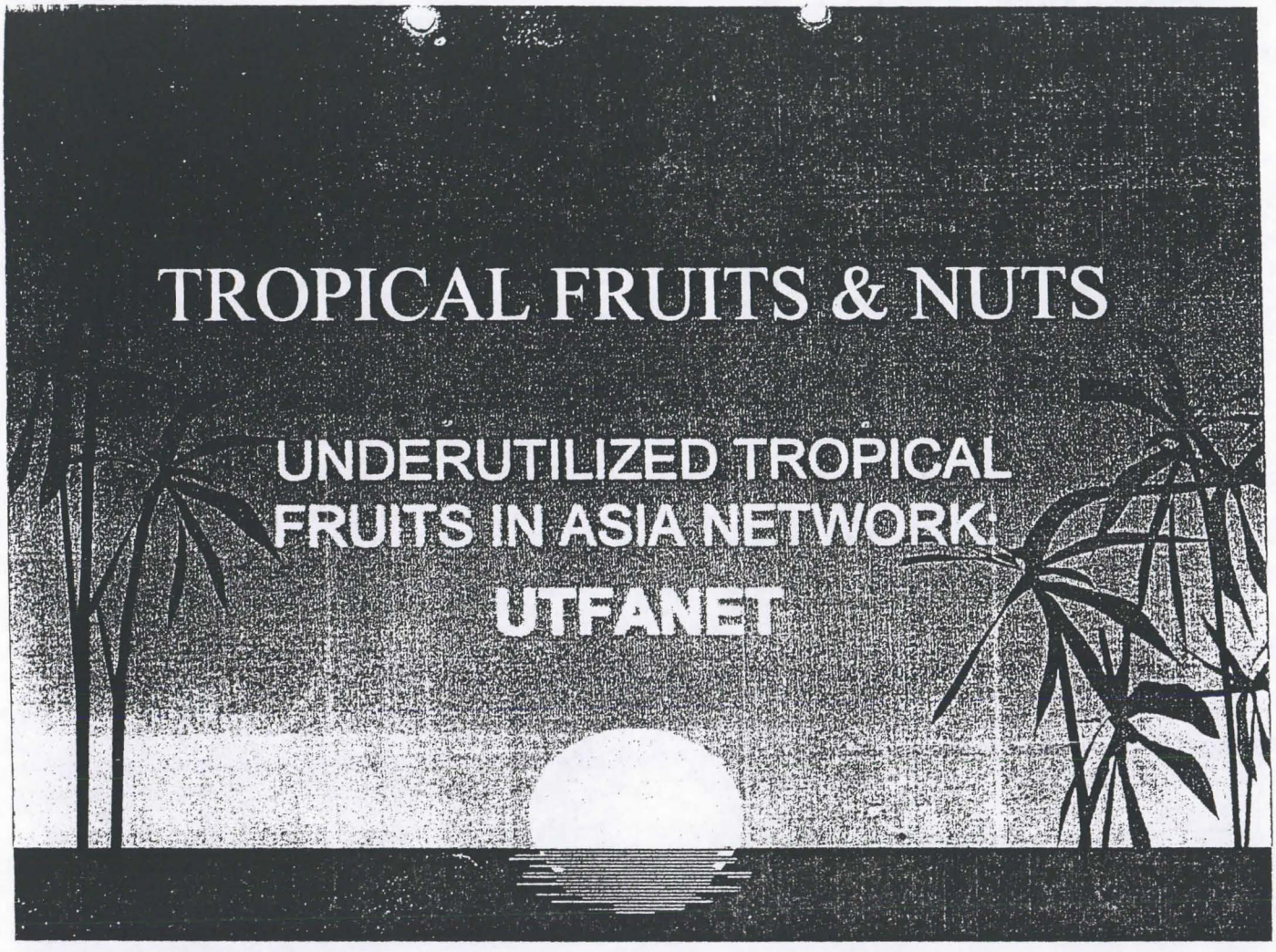
- Project intiation meeting.
- Training on Propagation for Regional scientists & beneficiaries.
- Farmers participatory survey and collecton of elite clones. Characterization will be carried out during survey.
- Propagation and distribution of elite clones to farmers for multiplication.
- Development of optimum water and nutrient [illegible]
- Production of extension materials.

FARMERS PARTICIPATORY SURVEY, COLLECTION, CHARACTERIZATION OF GERMPLASM AND SELECTION OF POTENTIAL CLONAL LINES

- Jackfruit: Bangladesh, India, Indonesia, Pakistan, Philippines, Thailand, Sri Lanka, Vietnam
- Mangosteen: India, Philippines, Thailand, Sri Lanka, Vietnam
- Pummelo: Bangladesh, India, Indonesia, Pakistan, Philippines, Thailand, Sri Lanka, Vietnam

PRESENT STATUS OF UTFANET

- Steering Committee agreed to establish a Regional Secretariat for UTFANET in Asia
- ICUC accepted a bid from PCARRD to establish the Secretariat
- MOU are being agreed between ICUC & PCARRD
- Post for the Regional Coordinator has been advertised locally
- Appointment will be made from March and project will start as soon as NLCB releases funds



PROCESS OF UTFANET

- 1993 - ICUC & CSC jointly organised a regional meeting in Dhaka
- 1994 - ICUC in collaboration with IPGRI carried out a survey to identify priority species and to establish research gaps for promotion and utilization of underutilized crops
- 1995 - UTFANET was established

MEMBER COUNTRIES

- Bangladesh
- India
- Indonesia
- Nepal
- Pakistan
- Philippines
- Thailand
- Sri Lanka
- Vietnam

IDENTIFIED PRIORITY SPECIES

- Jackfruit
- Pummelo/Mandarin
- Mangosteen
- Ber (*Ziziphus*)
- Guava
- Lime
- Soursop
- Emblic
- Salak
- Carambola
- Durian

PROCESS OF UTFANET

1996 -1999 Annual Steering Committee Meetings

- Set Policy (1996)
- Evaluated Country Status Report (1997)
- Developed R & D (1997-1998)
- ICUC Secured Funds for approved project (1999)
- Developed 2nd Project (1999)
- ICUC prepared PCN for DFID,UK

ACTIVITY: RESEARCH & DEVELOPMENT

- Status Report on Jackfruit, Mangosteen and Pummelo - by all member countries
- Genetic diversity of Jackfruit in Bangladesh and Pummelo in Nepal
- Jackfruit Product development in Bangladesh
- Diversity of tropical fruits in homestead gardens in Bangladesh

ACTIVITY: HUMAN RESOURCE DEVELOPMENT

- 1995 Training on production of tropical fruits in Thailand
- 1996 Training on genetic resources and utilization of tropical fruits in Malaysia
- 1996 -1999 Two Ph.D studentships to work on genetic diversity and development of propagation methods on Jackfruit & Pummelo
- 1997 Training course jointly with IPGRI on conservation and use of genetic resources in India

ACTIVITY: INFORMATION DISSEMINATION

- Newsletter
- Germpalsm Catalogues (Jackfruit & Pummelo)
- Annotated Bibliography (all 3 species)
- Monographs
- Reports of meetings and Training Workshops
- Through web site: http://www.soton.ac.uk/~icuc

DEVELOPMENT OF VIABLE & SOCIALLY ACCEPTABLE PRODUCTS AND MARKETING STRATEGIES FOR UNDERUTILIZED FRUITS IN ASIA

- ▲ Manadarin Orange
- ▲ Jackfruit
- ▲ Guava
- ▲ Aonla
- ▲ Durian
- ▲ Rambutan
- ▲ Mangosteen

UNDERUTILIZED TROPICAL FRUITS PROGRAMME

COLLABORATION & LINKAGES:

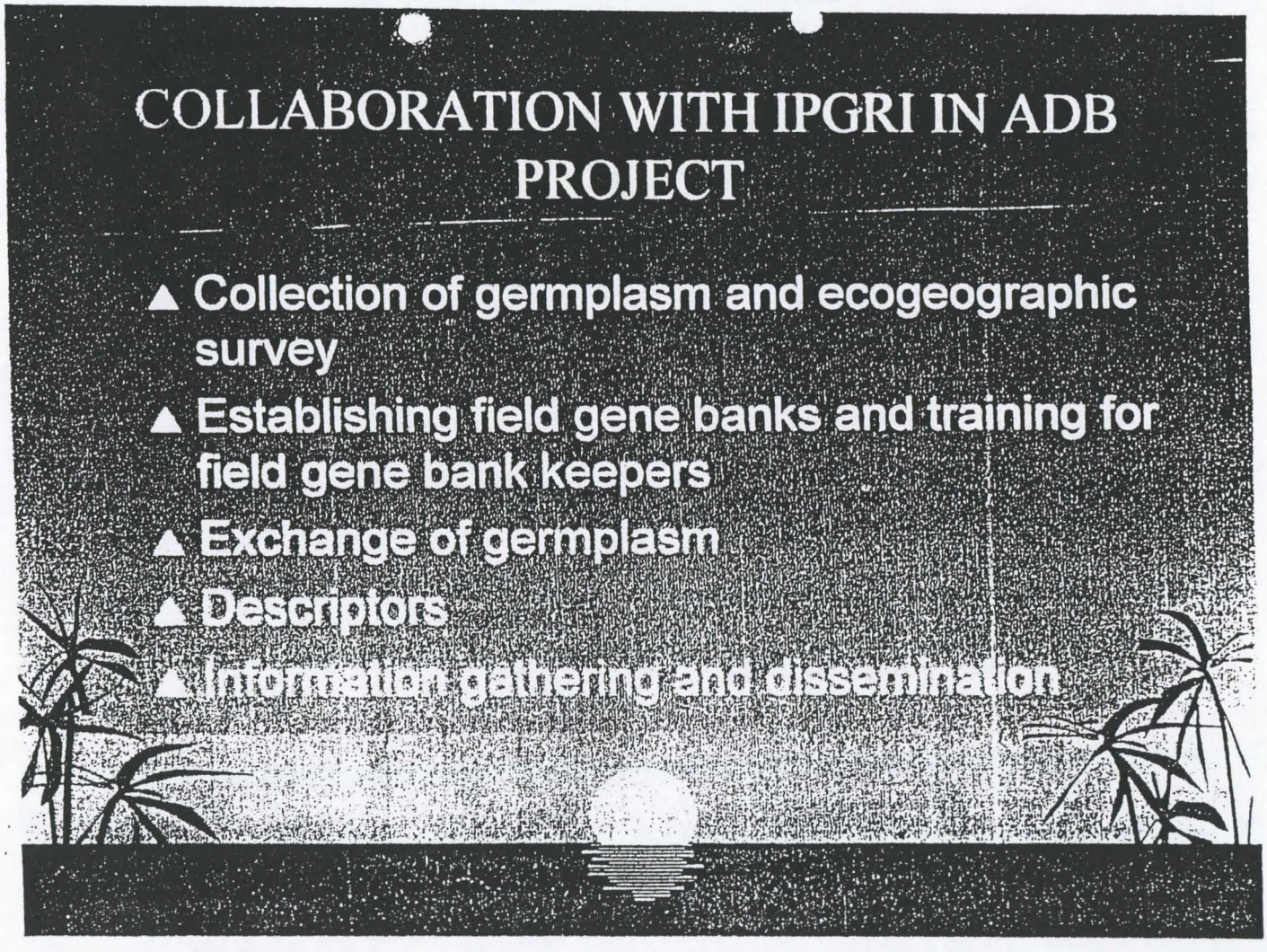
- IPGRI
- FAO
- ICRAF
- COMMONWEALTH SCIENCE COUNCIL
- In addition to UTFANET, ICUC is involved with:

SEANUC MESFIN

WAFNET REMUFRUT

5 taxa included in the Fruits for the Future project:

Tamarindus indica
Ziziphus mauritiana
Dacryodes edulis
Adansonia digitata
Annona spp. - *A. cherimola*
A. muricata
A. squamosa
A. reticulata
A. senegalensis



Annexe 4

① CIRAD

The « Centre de coopération internationale en recherche agronomique pour le développement »

- A French scientific organization specializing in development-oriented agricultural research for the tropics and subtropics
- To contribute to the economic development of these regions through research, experiments, training, and dissemination of scientific and technical information.

② CIRAD : At a glance

- 7 departments + Administration
- 28 research programmes
- 1800 persons including
  - 900 senior staff
  - 400 senior staff overseas
- working in more than 50 countries
- Budget : about 1 billion French Francs (67 % from public funds)

③ CIRAD : Its seven departments

1. CIRAD-CA : annual crops
2. CIRAD-CP : tree/perennial crops
3. CIRAD-FLHOR : fruit and horticultural crops
4. CIRAD-EMVT : animal production and veterinary medicine
5. CIRAD-FORÊT : forestry
6. CIRAD-TERA : territories, environment and people
7. CIRAD-AMIS : advanced methods for innovation in Science

④ CIRAD in Asia

Geographical distribution of research staff in 1999 :

China :	2	Thailand :	7
Vietnam :	8	Malaysia :	2
Laos :	1	Philippines :	2
Cambodia :	1	Indonesia :	15

⑤ CIRAD-FLHOR : Fruit & Horticultural crops

☞ **3 research programmes :**
Fruit trees
Banana & plantain
Horticultural production (vegetable / flowers)

☞ **disciplinary fields :**
Agronomy & production systems
Genetic & plant breeding
Plant protection
Technology & quality control
Economy & management
Biometry & computer science

⑥ CIRAD-FLHOR in S-E Asia

Ongoing programmes under bilateral cooperation :

- Vietnam : since 1994 with MARD (Sofri)
  → technical & scientific assistance on Citrus & deciduous
- Philippines : since 1997 with USM
  → scientific assistance on Citrus
- Thailand : since 1998 with DOA-HRI
  → focusing on Citrus, Pineapple and Grape
- Cambodia : since 1999 with MoA
  → to analyse a potential development of fruit crops

⑦ CIRAD-FLHOR in Vietnam

A partnership to improve the Citrus production

Current situation :

- ✓ 2nd fruit crop : 60.000 ha / 450.000 t/y
- ✓ 65 % in Mekong River Delta region
  - → fast development : area x 5 within 5 years
  - → small holders for nurseries & orchards
- ✓ A serious problem of tree decline caused by a bacterial disease
  - → Huanglongbing or Greening disease
- ✓ Economical losses
  - → orchard sustainability < 3-7 years
  - → incidence on yields
  - → incidence on fruit quality

⑧ CIRAD-FLHOR in Vietnam

A partnership to improve the Citrus production

1st step : supplying disease-free plants

- ▶ Sanitation of selected local cultivars
- ▶ Introduction of certified cultivars
- ▶ Amplification
- ▶ Disease-free plant production

⑨ CIRAD-FLHOR in Vietnam

A partnership to improve the Citrus production

2nd step : environment and insect vectors

- Selection of favourable areas
  - → good agronomical potential
  - → suitable phytosanitary status
  - → socio-economic interest
- Control / monitoring of *Diaphorina citri*

⑩ CIRAD-FLHOR in Vietnam

A partnership to improve the Citrus production

Supplementary steps :

- Rootstock selection
  - → Effect on yield, fruit size and quality, soil adaptability, pest & disease tolerance
- Cultural practices (fertilization, irrigation, pruning)
  - → Effect on yield, fruit size and quality
- Pest & disease control
  - → Effect on yield, fruit quality with respect for consumers & environment

11. Citrus in Vietnam

The future in brief

Planning from year 2000 to 2010 :

- ➤ Increasing Citrus crop up to
  - → 200.000 ha
  - → 2.000.000 t
- ➤ Developing processing and exportation

12. CIRAD-FLHOR

Plant Genetic Resource Management

- Germplasm collections for characterization, evaluation and breeding programmes
  - → Citrus : in Corsica (F), Martinique (FWI), Reunion, New Caledonia
  - → Mango : in Guadeloupe and Ivory Coast
  - → Pineapple : in Martinique
  - → Banana : in Guadeloupe
  - → Minor tropical fruits

- Scientific assistance to IPGRI : 1 senior researcher based at IPGRI – South America

13. CIRAD-FLHOR

Plant Genetic Resource Management

A network for Citrus evaluation :

- A Citrus research Centre in Corsica (F) under Mediterranean climate
  - → A germplasm collection (+ 500 accessions)
  - → International Data Base management (EGID)
  - → Sanitation (STG, indexing)
  - → Breeding and selection of mandarins
  - → Building up crop yield and quality of Clementine
  - → Training

- Citrus research programmes in several locations
  - → Martinique : evaluation under humid tropical climate
  - → New Caledonia : evaluation under sub-tropical climate
  - → Reunion : focusing on IPDM
  - → Cooperation programmes : Vietnam, Ivory Coast, ...

A database for management of Citrus germplasm

Based on IPGRI Citrus descriptor II

EGID-Citrus Network, a toolbox for management of Citrus germplasm

R. Cottin
SRA INRA-CIRAD
F-20230 San Guiliano

As soon as one is interested in citrus fruits, the complexity of this genepool appears very quickly. Since more than 300 years, the Citrus genera led to numerous botanical classifications on which was added an important wealth of local names coming from the oral tradition. More recently, it increased again when the commercial names appeared in order to emphasize the marketing of these fruits, ranking the second place in the fruit world exchanges. Nothing is simple in the garden of the Hesperides!

Actually, the French Citrus genetic resources are managed jointly by two national agencies, INRA and CIRAD, at the "Station de Recherche Agronomique" (SRA) in San Giuliano, Corsica - France. Its insular character and its climate create a set of favorable conditions which allow to maintain numerous varieties and species of *Rutaceae* in open fields.
Since the creation of the SRA in 1958, an important work dealing with quarantine measures for introduced material and sanitation (STG and up dated indexing techniques) has permitted to establish a germplasm collection free of any debilitating disease related to Citrus. The initial goal of this repository was to evaluate the best pomological selections from the producing countries around the Mediterranean basin. Thereafter, numerous species or varieties continued to be introduced and regarded with interest for the local citriculture. At this day, about 1300 accessions are preserved. This invaluable collection contributes every year to supply budwood to producers, nurserymen or official agencies from about thirty countries which aim to implement research and development programmes on Citrus production based on certified disease free material.

The evaluation and the management of these Citrus genetic resources constitute an interesting theme of research at the SRA INRA-CIRAD with four objectives:

- the standardization of the nomenclature to homogenize, as much at the national than international level, the denomination of species, varieties and the commercial appellations, in order to avoid the inopportune multiplication of a same genotype.
- the setting up of cards describing pomological characters, from descriptors completed in relation to those of IPGRI and permitting to identify the different genotypes.
- the survey of the organization of the genetic diversity of citrus fruits and genera related with the help of phenotypic and genetic scorers in view of the establishment of a «core» collection.
- the constitution of a database for Citrus fruits to be extended to an international data networking.

On an international scale, some dates marked the more and more important investment of the SRA for the genetic resources:

- December 1993 in Adana (Turkey) : FAO indicates France (SRA, INRA-CIRAD) and Spain (IVIA) as organizers of a Citrus genetic resource network within the MECINET (Mediterranean Citrus Network).
- March 95 : under the setting of this network, a symposium on tangerines was organized at SRA (05-11 March) which was attended by160 Citrusmen from 22 countries. This event permitted to throw the basis of the EGID - Citrus network when regrouping most of the national curators of Citrus collections in the world.

- October 1997 : EGID is presented during a workshop in Brisbane (Australia) involving researchers from the Asia - Pacific region. The findings of this workshop specify that features of EGID must be processed in the choice of a software for Citrus genetic resources management under the downstream of IPGRI.
- November 1997 : EGID - Citrus Network became operational with the diffusion of the software EGIDS to persons in charge of citrus fruit collections.
- December 97 : the last evolution took place during the meeting in Acireale, Sicily, organized by FAO to initiate the MECINET, when the setting up of a global network on the genetic resources (Global Citrus Germplasm Network), including the regional networks (MECINET - Mediterranean, IACNET - America, NESCRA - Asia and the future sub - of the Sahara network) was decided. Four working groups were constituted of which one on the computerization and the Citrus genetic resource networking for which the animation devolved on Roland COTTIN (SRA INRA/CIRAD).

EGID is a set of software permitting to manage in network numerous collections of Citrus. They run under a Windows environment, from a PC station or within a network of Novell type. The main module allows to enter, to publish and to print pomological cards of varieties from a given site collection. Each user is allowed to a restricted number of operations on data of its site or the other sites; it runs from the "guest" account which only offers the possibility to visualize "free" accessions, to the "administrator" account that is alone to be allowed to modify the common part of the database. This organization guarantees the consistency of information between the different sites.

The identification of accessions is done by a common numbering to the different site members of the EGID network. Its use passes by its translation code - bars of EAN 13 type identifying in an unique way the variety, its sanitary status, its collection of origin. A reliable management of movements of the plant material is thus possible.
It allows to distribute information contained in the database on support paper of reports, whose list can be modified in an external way to the program, but also under electronic shape, to the formats most current of word processors, spreadsheets or database. Risks of mistakes at the time of news seizures are reduced thus to the minimum.

Another module of EGID permits to extract a present information part from the database to be re-coded to the HTML format and to be published on the Web through the server located at INRA in Corsica.

All actions can be achieved of independent way of language : through a simple choice from the program, the display, the printing moves from a language to another (currently French, Italian, English and soon, Spanish, Portuguese and Turkish). Other languages should be added according to the needs of users.

Besides, the internal structure of the database does not freeze : some phenotypical or genetic describers can be added comfortably, without putting back in question the already achieved data.
A connection by FTP, on a specialized server, permits to do some automatic update. A specific module, after being connected, verifies the presence of news versions, download them and proceed to the necessary modifications, without intervention of the user, if this one wishes it. These update can be about programs constituting EGID, and also on data managed by the system or on the structures of the basis.

Several servers support the EGID network, as much at the local level in the SRA, than at the level of the network members or at a «public» level. Several machines are used, mainly for reasons of security :

- A Novell server assures the stake for disposition of the set of database for all agents from SRA and permits a simultaneous access to programs constituting EGID.
- A Unix server works for updating the network members through FTP and for managing the mailing list dedicated to citrus news.
- A second Unix server shelters the Web server that proposes, among others, a thousand of descriptive cards on the present citrus accessions in collection of the SRA.

This last server networks daily requests and answers from the whole world (more than 1000 requests were recorded until now). It is referenced on the majority of motors of research and servers dealing with genetic resources or botany.

Currently, the data coming from eighteen collections are managed by EGID; more than 5700 Citrus varieties are referenced with information on their origins and their pomological descriptions under contrasted climatic conditions.
A common system of variety numbering (International Citrus Varieties Numbering) is used and permits an unique identification of every accession.
All these varieties can be described according to the same protocol, formalized in «Citrus descriptors II». This new version, proposed by the SRA, is based on the IPGRI publication of December 1988 ; it has been adapted and has been enriched to better answer to constraints of the land and the diversity of Citrus. Its validation at the international level is in progress, within one of the working groups of the Global Citrus Germplasm Network and IPGRI.

Bound to data related to every collection, a knowledge base on Citrus is managed by EGID. 4500 passports of varieties are available, keeping a high attention to the range of local denominations, various commercial and synonymous appellations.
This basis provides information on both genetic (creation, mutation, selection,...) and geographical origin of each variety. The identity of the possible prospector, as well as information about its commercial status (protected variety) complete the passport of each variety.
As for data of collections, the printing of these information is possible in several languages.
From these data, a first publication of "Citrus of the World" was done in January 1997. This manual, is the first step on the way to standardize the Citrus appellations or identification. It is the result of a collaboration work between researchers/curators of several countries of Citrus tradition, sharing a common interest for citrus fruits. This document, enriched by regular contributions from experts in taxonomy and botany of the *Rutaceae* (great thanks to them), has already been distributed in about fifty countries.
In the same way, a work on appellations from Arabic, Chinese, Japanese, Thai and Vietnamese spellings is under process at the University of Melbourne (Australia).

Roland Cottin
SRA INRA-CIRAD
20230 San Giuliano
France

Telephone : (33) 4 95 59 59 21
Fax : (33) 4 95 59 59 37
E-mail : egid@corse.inra.fr
Web : http://www.corse.inra.fr/sra/egide.htm
Mailing list : citrus@corse.inra.fr

Annexe 5

Project Planning Meeting of ADB Project on Conservation and Use of Native Tropical Fruit Species Biodiversity in Asia

Held at
Mines Beach Resort & SPA, Selangor, Malaysia
15-18 February 2000

SUMMARY OF PROCEEDINGS

A Project Planning Meeting of the ADB-TFT Project on Conservation and Use of the Native Tropical Fruit Species Biodiversity in Asia approved under technical assistance agreement between the Asian Development Bank (ADB) and the International Plant Genetic Resources Institute (IPGRI) was organized at The Mines Beach Resort and SPA, Selangor, Malaysia from 15-18 February 2000. The objectives of this Meeting were i) to apprise the country coordinators from 10 collaborating countries, about the logistic arrangements regarding administrative and financial aspects, ii) to interact and understand about the ongoing research activities in their respective countries, iii) to explain to them the project implementation arrangements and iv) to discuss and finalize the workplan for 3 years. The meeting was organized into five technical sessions, namely, i) Logistic arrangements, ii) Current status and workplans, iii) Developing workplans, iv) International/Regional collaboration and v) finalization of workplans, and budget. The programme of the Meeting is given in Annexure-I. Twenty one participants comprising country coordinators from 10 countries, representatives from international/regional organizations, IPGRI staff and observers attended the Meeting. The list of participants is given in Annexure II. The salient points and highlights of the Meeting are as under:

1. Dr. V. Ramanatha Rao, Project Coordinator welcomed the participants and gave a brief background of the project. Dr. Percy Sajise, Regional Director, IPGRI-APO region gave opening remarks and mentioned the importance of tropical fruit species in Asia and the urgent need to conserve and use this diversity. Dr. Bhag Mal, Coordinator for South Asia, who is the Technical Coordinator of this project, extended vote of thanks and appreciated the good support provided by ADB and also the commitment made by the national governments of the collaborating countries for joint efforts in collaboration with IPGRI for conservation and use of native tropical fruit species diversity in the region.

2. The technical session on logistic arrangements was basically aimed at providing to the partners the details regarding the administrative, financial and technical aspects and the implementation arrangements for effective functioning of the project. The administrative and financial aspects will be co-ordinated from APO, Serdang, Malaysia by Dr. V. Ramanatha Rao who is

the Project Coordinator and technical aspects will be coordinated from IPGRI South Asia Office, New Delhi, India by Dr. Bhag Mal who is the Technical Coordinator of this project.

3. Dr. V. Ramanatha Rao explained that the project activities would be implemented through the Letters of Agreements (LOAs) between IPGRI and the concerned countries. The proposals on specific activities on different crops as agreed in the workplan will be submitted by the country coordinators which will be examined by IPGRI and money will be provided for approved proposals and activities. The reporting procedure will include six monthly and annual progress reports as well as financial reports. The monitoring of project expenditure will be done through project track system presented and demonstrated by Dr. Paul Quek, Documentation Specialist. Dr. Bhag Mal explained that for effective and efficient implementation of the project, the activities envisaged to be undertaken have been regrouped into different tasks, which have been assigned to IPGRI Professional Staff who have the expertise in the relevant field and will be working as Task Managers. List of various tasks and task managers responsible for particular tasks in IPGRI is given in Annexure-III.

4. The presentations by country coordinators reflected very clearly that efforts on tropical fruits are not well organized and that very little work has been done in the area of plant genetic resources. It was pointed out that there is a great need for concerted efforts on germplasm collecting; evaluation, characterization and utilization; database development; and developing appropriate conservation techniques. The country coordinators appreciated the initiative taken by IPGRI and the funding support by ADB for research on PGR related activities on selected priority fruit species genepools, namely, mango, citrus, rambutan and jackfruit and in addition 1-2 locally important potential species.

5. The country coordinators clearly expressed that the funds available under the project are not commensurate with the outputs expected and it is not possible to undertake all activities in all the 4 crop genepools in all the 10 countries. Hence, it was decided to concentrate on a few specific activities only on two priority crops in each country. Based on this criterion, the crop groups identified were mango (9 countries), citrus (6 countries), rambutan (3 countries), jackfruit (3 countries), litchi (3 countries) and *Garcinia* (3 countries). However, the comprehensive exercise on all species was very useful and it was felt that the activities proposed by each country are important and could be the basis for developing additional funding proposals subsequently. Intensive deliberations for two days jointly and in groups resulted in finalization of a draft plan of activities for 3 years and also for the

year 2000. The country coordinators agreed to go back to their colleagues and finalize the plans and budget within next 2-3 weeks.

6. In view of the training needs of all the countries, it was felt that human resource development aspect for training, study visits etc., should be coordinated by IPGRI with the budget earmarked for that activity. The common areas of training identified were i) Germplasm collecting, evaluation, characterization, documentation and conservation, ii) Molecular characterization and DNA finger printing, iii) *In vitro* conservation and cryopreservation, and iv) Database development. Besides this, need for field genebank management training for technicians was also expressed. Database development was considered as a high priority by all the 10 national programmes. It was stressed that a format may be developed by IPGRI and provided to the collaborators for developing databases in different countries on a uniform pattern. For studies on constraint analysis, a questionnaire needs to be developed and provided to the partners.

7. It was also decided to avoid any duplication of efforts on PGR activities that are being supported under UTFANET and other funding sources. Instead, the resources be utilized for those activities on which not much work has been done. This will help in rational use of funds coming from different sources and there will be a greater degree of complementarity between different programmes. It was agreed that the work on the tropical fruit species in the region should be seen as a comprehensive effort, funding coming from different sources, including respective national programmes. This will be kept in mind and all items of work and activities will be included while developing the reports to be sent to ADB.

8. The presentations made by the representatives of International/Regional organizations were very useful. Dr. Nazmul Haq, Director, International Centre for Underutilized Crops (ICUC), Southampton, U.K., who represented UTFANET explained about UTFANET's activities which are being supported in 8 out of 10 participating countries and expressed interest in further collaboration. Dr. Philippe Cao-Van highlighted CIRAD's activities supporting tropical fruit work in Asia and indicated that CIRAD's data documentation software could be very useful for this project also. He also briefly summarised the work being done on tropical fruits in Americas and mentioned the need for clear linkage. There would clearly be opportunities for linking with CIRAD and Dr Cao-Van invited IPGRI suggestions for future collaborative work. An interesting presentation was made by Dr. Loke Wai Hong, Regional Representative on the role of CAB International in promoting the conservation and use of tropical fruit species through information dissemination. On behalf of Dr. Saharan Anang, Dr. Mohamad M. Salleh

made a presentation highlighting the objectives, role, area of operation and the focussed activities of Tropical Fruits Network (TFNET) which will be formally launched in March 2000.

9. The Steering Committee (SC) for this project was constituted which will have the responsibility for monitoring the activities, providing direction and developing funding proposals. All the country coordinators are the members of SC. The Project Coordinator and the Technical Coordinator from IPGRI will be the Ex-Officio members. The Technical Coordinator will also act as the Secretary of Steering Committee. The country coordinators/SC members elected, by consensus, Dr. S.P. Ghosh (India) as the Chairperson and Dr. Felipe S. dela Cruz (Philippines) as the Vice-Chairperson for a two year term. IPGRI staff opted out during the election process so as to give the country coordinators a free hand. The terms of reference of the Steering Committee discussed and agreed by all members as given in Annexure IV.

10. The first meeting of the Steering Committee was also held where the chairperson explained the role and responsibilities of steering committee and asked the SC members to make it fully effective. The SC discussed the workplan for 3 years and identified the major activities in each crop on which the thrust is to be given during the year 2000. SC also endorsed the current country coordinators as the SC members. Any changes should be formally communicated. The minutes of the meeting of the Steering Committee are given in Annexure V.

11. A visit to the Field Genebank at the Malaysian Agricultural Research and Development Institute (MARDI), Serdang was organized. The Scientist In-charge of Tropical Fruits at MARDI apprised the participants about the research and development activities on tropical fruit tree species being undertaken at MARDI. During the discussions in the field visit, a strong need was expressed for exchange of useful germplasm of different fruit species between the participating countries.

12. In the plenary session, the country coordinators presented the draft workplans for 3 years as well as for the first year. It was emphasized that the financial support being provided by ADB for specific agreed activities will supplement the national efforts on tropical fruit tree species. The session ended with the concluding remarks by Dr. Percy Sajise who mentioned that working on tropical fruit tree species is a challenging area and with a firm commitment and support from the Governments of respective countries, these joint collaborative efforts in partnership mode will certainly bring spectacular success in achieving the expected project outputs.

Annexure-I

Project Planning Meeting of ADB Project on Tropical Fruit Species

Held at
The Mines Beach Resort & Spa, Serdang, Malaysia

15 -18 February 2000

PROGRAMME

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15 February 2000, Tuesday

0830 - 0930	**Inaugural Session**	
	Welcome & brief background	V. Ramanatha Rao
	Opening Remarks	Percy Sajise
	Vote of thanks	Bhag Mal
0930 - 1000	*Tea*	
1000 - 1100	**Technical Session I: Logistic Arrangements**	
	Chairperson: Dr. Percy Sajise	
	Administrative arrangements & Financial aspects	V. Ramanatha Rao
	Project implementation - Technical Aspects	Bhag Mal
	Use of Project track for TFT project Discussions	Paul Quek
1130 - 1230	**Technical Session II: Current Status and Workplans**	
	Chairperson: Dato M. Senawi	
	Presentations by Country Coordinators	
	Bangladesh	N.N. Saha
	China	Chen Zhusheng
	India	S.P. Ghosh
1230 - 1330	*Lunch*	
1330 - 1500	**Technical Session II (Contd.)**	
	Chairperson: S.P. Ghosh	
	Indonesia	S. Kusumo

	Malaysia	Dato M. Senawi
	Nepal	K.P Paudel
	Philippines	F.S. dela Cruz
1500 - 1520	*Tea*	
1520 - 1620	**Technical Session II (Contd.)**	
	Chairperson: S. Kusumo	
	Sri Lanka	I. Medagoda
	Thailand	Songpol Somsri
	Vietnam	Nguyen Thi Ngoc Hue
	Identification of Groups for developing workplans	Bhag Mal (Moderator)

16 February 2000, Wednesday

	Technical Session III: Developing Workplans	
0830 - 0900	Task structure and workplans	Bhag Mal
0900 - 1030	*Group discussions* - Mango (Chairperson: S. Kusumo)	
1030 - 1100	Tea	
1100 - 1230	*Group discussions* (contd.) - Citrus (Chairperson: S.P. Ghosh)	
12.30-1330	*Lunch*	
1330 - 1430	*Group discussions* (contd.) - Rambutan (Chairperson: M.Senawi/Salmah Idris)] - Jackfruit (Chairperson: I. Medagoda)] concurrent	
1430 -1530	- Garcinia (Chairperson: Felipe D. Cruz)] concurrent - Litchi (Chairperson: Nguyen T.N. Hue)]	
1530 - 1600	Tea	
1600 - 1730	**Technical Session IV: International/Regional Collaboration**	
	Chairperson: Chen Zhuzheng	
	Presentations - International organisations	
	UTFANET - Nazmul Haque, ICUC CIRAD - Philippe Cao-Van IPGRI-Americas - Philippe Cao-Van Discussions	

17 February 2000, Thursday

0830 - 0900	**Technical Session IV: International/Regional Collaboration** (contd.)
	TFNET - Mohd Mohd Salleh, MARDI
0900 - 1030	**Technical Session V: Finalization of Workplans and Budget**
	Finalization of Workplans (3 years and 2000) by Country Coordinators and budget allocations
1030 - 1100	Tea
1100 - 1230	Finalization of Workplans (3 years and 2000) by Country Coordintors and budget allocations (contd.)
12.30 - 13.30	*Lunch*
1330 - 1530	**Country Coordinators Interaction and Constituting Steering Committee** (SC)
	Introduction: V. Ramanatha Rao *Election/Nomination of Chairperson* *Election/Nomination of Vice-Chairperson*
1600 - 1700	Steering Committee Meeting
	Chairperson: S.P. Ghosh
	Presentation of final workplans Discussions
1830	Cocktail/Dinner

18 February 2000, Friday

0830 - 1000	Visit to the Field Genebank and discussion at MARDI
1010 - 1030	Tea at IPGRI-APO Office
1030 - 1100	Appraisal of IPGRI-APO Activities
1130 - 1300	**Plenary Session**
	Chairperson: Percy Sajise

	Presentation of final workplans along with Budget Allocations	Country Coordinators
	Concluding remaks	Percy Sajise
	Vote of thanks	Bhag Mal
1300 - 1400	Lunch	
1400 - 1700	Individual discussions of Country Coordinator with Project Coordinators and Technical Coordinator on technical and financial aspects	

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Annexure-II

ADB TFT Project on Conservation and Use of Native Tropical Fruit Species Biodiversity in Asia

List of Participants

A. COUNTRY COORDINATORS

1. **Dr. Narendra Nath Saha**
   Chief Scientific Officer and Director
   Horticulture Research Centre
   Bangladesh Agricultural Research Institute
   GPO Box 2235, Joydebpur, Gazipur 1701, Bangladesh
   Tel: 00-88-02-933-2340; Fax: 00-88-02-935-3395; Email: baridg@bttb.net

2. **Prof. Chen Zhusheng**
   Citrus Research Centre
   C/o. Chinese Academy of Agricultural Sciences (CAAS)
   Beibei District, Chongquing City 400712; P.R. China
   Fax: +86-23-68242912; Email: citrusgr@cta.cq.cn

3. **Dr. S.P. Ghosh**
   Deputy Director General (Hort.)
   Indian Council of Agricultural Research
   Dr. Rajendra Prasad Road
   Krishi Bhavan, New Delhi 110 001
   Tel: 91-11-3382534; Fax: 91-11-3387293; Email: spg@icar.delhi.nic.in

4. **Dr. Surachmat Kusumo**
   Senior Researcher (Fruits) & Member
   National Committee on Genetic Resources
   Jalan Merdeka, No.147 Bogor; 1611 Indonesia
   Tel: 62-251-327-031/321-426; Fax: 62-251-312755/62-251-327031;
   Email: genres@indo.net.id

5. **Dr. Mohamed Senawi b Dato' M Tamin**
   Deputy Director
   Strategic Environment and Natural Resources Research Centre (SENR)
   Malaysian Agricultural Research and Development Institute (MARDI)
   43400 Serdang, Selangor, Malaysia
   Fax No: 60-3-9483664; Email: senawi@mardi.my

6. **Dr. K.B. Paudyal**
Senior Scientist
Regional Agricultural Research Station
Parwanipur, Birgunja, PO Box No.4, Nepal
Tel: 00-977-51-21460; Email: rarspar@atenet.com.np

7. **Dr. Felipe S. dela Cruz, Jr., PhD**
University Researcher and Head, Fruit & Ornamental Crops Division
National Plant Genetic Resources Laboratory (NPGRL),
Institute of Plant Breeding (IPB)
Los Baños, Philippines, College, Laguna 4031, Philippines
Tel: 63-49-536-2298; Fax: 63-49-536-3438; Email: fsdej@ipb.uplb.edu.ph

8. **Dr. (Ms.) I. Medagoda**
Head – Fruits Division
Horticultural Crop Research and Development Institute (HORDI)
Peradeniya, Sri Lanka
Tel: +94-8-388333; Fax +94-8-388234/388042; Email: hordi@ids.lk

9. **Dr. Songpol Somsri**
Horticulture Research Institute
Department of Agriculture
Chatuchak, Bangkok 10900, Thailand
Tel: +662-579-9545/2759; Fax: +662-561-4667; Email: Songpol@doa.go.th

10. **Dr. (Ms.) Nguyen Thi Ngoc Hue**
Deputy Head – PGR Centre
Vietnam Agricultural Science Institute
Thanh Tri, Vandien-Hanoi, Vietnam
Tel: +84-4-861-4326; Fax: +84-4-861-3937; Email: vasi@hn.vnn.vn

B. International Organizations

11. **Dr. Nazmul Haq**
Director
International centre for Underutilized Crops
University of Southampton
Southampton S017 1BJ, United Kingdom
Tel: +44-(0)1703 594229; Fax: +44(0)1703 677519; Email: Haq@soton.ac.uk

12. **Dr. Philippe CAO-VAN**
Agronome Fruitiers
CIRAD-FLHOR, C/O SOFRI
BP 203, MY THO-Tien Giang, Vietnam
Tel: +84-73-834-691; Email: philippe.cao_van@cirad.fr/caovan@netnam2.org.vn

13. **Dr. LOKE Wai Hong**
Regional Representative
CAB International, South East Asia Regional Office
Glasshouse No.2 (Block G)
MARDI, 43400 Serdang, Selangor, Malaysia
Tel: +60-3-943-2921/3641; Fax: +60-3-943-6400/942 6490;
Email: LOKE@CABI.ORG

14. **Dr. Soetikno S. Sastroutomo**
Senior Project Officer
CAB International, South East Asia Regional Office
Glasshouse No.2 (Block G)
MARDI, 43400 Serdang, Selangor, Malaysia
Tel: +60-3-943-2921/3641, Fax: +60-3-943-6400/942 6490
Email: S.SOETIKNO@CABI.ORG

15. **Dr. Mohamed Mohd. Salleh**
Entomologist, Horticulture Research Centre
MARDI, GPO Box 12301
50774 Kuala Lumpur, Malaysia
Tel: +60-3-9437015; Fax: +60-3-9483664

16. **Dr. Salmah Idris**
Malaysian Agricultural Research and Development Institute (MARDI)
GPO Box 12301
50774 Kuala Lumpur, Malaysia
Tel: +60-3-9437015; Fax: +60-3-9483664

B. IPGRI Staff

17. **Dr. Percy Sajise**
Regional Director
IPGRI-APO
PO Box 236, UPM Post Office
Serdang, 43400 Selangor Darul Ehsan, Malaysia
Tel: +60-3-942-3891; Fax: +60-3-9487655; Email: p.sajise@cgiar.org

18. **Dr. V. Ramanatha Rao**
Senior Scientist - Genetic Diversity/Conservation
IPGRI-APO, PO Box 236, UPM Post Office
Serdang, 43400 Selangor Darul Ehsan, Malaysia
Tel: +60-3-942-3891; Fax: +60-3-9487655; Email: v.rao@cgiar.org

19. **Dr. Bhag Mal**
Coordinator for South Asia
IPGRI South Asia Office
Pusa Campus, New Delhi, India
Tel: +91-11-5786112; Fax: +91-11-5819899, Email: B.Mal@cgiar.org

20. **Dr. Paul Quek**
Scientist, Documentation/Information
IPGRI-APO, PO Box 236, UPM Post Office
Serdang, 43400 Selangor Darul Ehsan, Malaysia
Tel: +60-3-942-3891; Fax: +60-3-9487655; Email: p.quek@cgiar.org

21. **Dr. Cho Eun-Gi**
Associate Scientist, Citrus Cryopreservation
IPGRI-APO, PO Box 236, UPM Post Office
Serdang, 43400 Selangor Darul Ehsan, Malaysia
Tel: +60-3-942-3891; Fax: +60-3-9487655; Email: E.cho@cgiar.org

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ADB-TFT PROJECT ON CONSERVATION AND USE OF NATIVE TROPICAL FRUIT SPECIES BIODIVERSITY IN ASIA

TASKS AND TASK MANAGERS

Coordination and collaboration	R. Rao
Locating and collecting diversity	R. Rao
Germplasm evaluation, characterization and utilization	Bhag Mal
In situ conservation	P. Sajise
Ex situ conservation	F. Engelmann
Information & documentation	P. Mathur
Socio-economics	P. Eyzaguirre
HRD & capacity building	P. Sajise

ADB-TFT PROJECT ON CONSERVATION AND USE OF NATIVE TROPICAL FRUIT SPECIES BIODIVERSITY IN ASIA

STEERING COMMITTEE – COMPOSITION AND TERMS OF REFERENCE

In order to implement the Project, a Steering Committee (SC) will be set up. The Steering Committee will work with IPGRI and execute agreed programme in consultation with national team leaders (Country Coordinators). Technical Working Groups will be set up, if required, under SC to conduct specific technical tasks. Details about SC are given as under:

I. Composition

Members: Country Coordinators from the participating countries and the Project Coordinators and Technical Coordinator of the Project from IPGRI as Ex-Officio members.

Chairperson: To be elected by consensus by Country Coordinators

Vice-Chairperson: To be elected by consensus by Country Coordinators

Secretary: Technical Coordinator will be the Secretary of SC

II. Tenure 2 Years

III. Meetings Once a year

IV. Terms of Reference

The SC has the general task of providing direction for the Project. More specifically the Committee will have the following functions.

1. To set priorities on research areas to be covered taking into account the research gaps
2. To identify priority training needs of individual countries
3. To facilitate implementation of project activities by different member countries
4. To provide advice on workplans and budget
5. To provide input and advise IPGRI on issues relating to project evaluation and impact assessment
6. To conceptualize and propose research projects which are of common interest to the region
7. To develop the project proposals and generate additional funding
8. To facilitate constituting Technical Working Groups to undertake specific technical tasks and monitor their functions.

Annexure-V

Proceedings of the first Meeting of Steering Committee of ADB Project on Tropical Fruit Species held at Selangor, Malaysia on 18 February 2000

The representative Country Coordinators were considered as the Members of Steering Committee of the Project. The Country Coordinators unanimously elected Dr. S.P. Ghosh from India as the Chairperson for the Steering Committee and Dr. Felipe S. dela Cruz Jr. of Philippines as the Vice Chairperson of the Steering Committee for the biennium 2000-2001. It was agreed that Dr. Bhag Mal, Technical Coordinator, ADB-TFT Project will be the Member Secretary of the Steering Committee. After the election of the Chairperson, the first meeting of the Steering Committee was held under the chairmanship of Dr. S.P. Ghosh.

The following Country Coordinators from 10 participating countries and two Ex-Officio Members from IPGRI attended the meeting:

	Name	Country	
1.	Dr. S. P. Ghosh	India.	Chairperson
2.	Dr. Felipe S. dela Cruz	Philippines	Vice Chairperson
3.	Dr. Narendra Nath Saha	Bangladesh	Member
4.	Prof. Chen Zhusheng	P.R. China	Member
5.	Dr. Surachmat Kusumo	Indonesia	Member
6.	Dr. Mohamed Senawi b Dato'	Malaysia	Member
7.	Dr. K.P. Paudel	Nepal	Member
8.	Dr. (Mrs.) I. Medagoda	Sri Lanka	Member
9.	Dr. Songpol Somsri	Thailand	Member
10.	Dr. (Mrs.) Nguyen Thi Ngoc Hue	Vietnam	Member
11.	Dr. V. Ramanatha Rao	IPGRI-APO, Malaysia	Ex-Officio
12.	Dr. Bhag Mal	IPGRI, New Delhi	Member-Secretary

After the election of the office bearers, the Chairperson apprised the members about the functions of the Steering Committee as follows:

- To set priorities on research areas to be covered taking into account the research gaps
- To identify priority training needs of individual countries
- To facilitate implementation of project activities by different member countries
- To provide advice on workplans and budget
- To provide inputs and advice IPGRI on issues relating to project evaluation and impact assessment
- To conceptualize and propose research projects which are of common interest to the region
- To develop the project proposals and generate additional funding
- To finalize constituting Technical Working Groups to undertake specific technical tasks and monitors their functions

The Steering Committee deliberated on several issues and the following decisions were taken:

1. The respective Country Coordinators have already presented the technical programmes of the crops identified for the respective countries and it was decided that the action plan for next 3 years to be drawn up carefully and submitted to Member Secretary of the Steering Committee at the earliest.

2. Compilation of available data on existing germplasm and documentation using a common format for development of computerized database for priority crops in the respective countries will be a priority item for completion positively during the year 2000. The Steering Committee requested IPGRI Regional Office to provide required format to the Country Coordinators at the earliest.

3. Each Country Coordinator will be required to identify the institutions where the programmes are to be implemented along with the names of the Scientists/officials responsible for major activities. The activity milestones are to be developed along with the budgetary break ups for three years (2000, 2001, 2002) for submission to the Member Secretary at an early date.

4. Dr. Mohamed Senawi, National Coordinator for Malaysia indicated that he is not likely to continue as the Member of the Steering Committee and a new name will be suggested from Malaysia. The Chairman requested Dr. Senawi to take up the matter formally with the Technical Coordinator of the Project and the Member Secretary of the Steering Committee for necessary amendments.

The Steering Committee recorded its appreciation for the active role played by the IPGRI-APO Regional Office in developing this important network project on tropical fruits for Asia and for organizing the Project Planning Meeting so effectively. It also thanked ADB for providing necessary funding support.

The Members of the Steering Committee were requested to suggest a suitable title of this Network on fruits along with the short abbreviation for future use as it has been done for similar Network Projects in the past (namely, COGENT, INIBAP, UTFANET etc.)

The meeting ended with the vote of thanks to the Chair.

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