CHAPTER 7 MASTER PLAN FOR FRUIT PRODUCTION DEVELOPMENT THROUGH FRUIT QUALITY IMPROVEMENT

7.1 Master Plan

(1) Proposed Programs

In formulating the master plan, various relevant programs were firstly identified taking into in due consideration the development strategies formulated so far. Secondly, these programs were scrutinized in terms of objectives, components and outputs in order to choose the fundamental items of the master plan for improvement in quality of tropical fruits.

Based on the development objectives, basic plan, strategies, and supply-demand analysis as described in Chapter 6, there exist a wide range of requirements for fruit production development through fruit quality improvement. Among others, the following 21 programs were identified at National, Provincial and District levels through the Study. As shown in Table A-7-1, these are deemed instrumental to strategic boost of agribusiness development.

At the Central level, the following seven programs were identified:

- NP-1 Formation of Institutional Linkage for Agribusiness Development;
- NP-2 Strengthening of Intra-ministerial Coordination System for Orchard Development;
- NP-3 Rationalization of Supporting Services for Credit Facilities and Marketing Promotion;
- NP-4 Strengthening of Research and Development Activities for Introduction and Breeding of New High Quality Fruit Varieties;
- NP-5 Strengthening of New Technology Adaptability Trial Operation System;
- NP-6 Rationalization of Fruit Seedling Inspection System; and
- NP-7 Strengthening of Plant Quarantine System.

At the Provincial level, another seven programs were formed as follows:

- PP-1 Strengthening of Project Planning Capacity at Provincial Level;
- PP-2 Strengthening of Management Capability Building of Provincial Staff;
- PP-3 Improvement of High Quality Seedling Propagation and Distribution System;
- PP-4 Institutional and Technical Capability Building of Private Nurseries;
- PP-5 Enhancement of Extension Staff's Knowledge of Agribusiness Development;
- PP-6 Upgrading of Market Information System; and
- PP-7 Institutional Development for Association of Fruit Growers' Groups.

The programs identified at the District level are:

DP-1 Establishment of Orchard as Core of Target Fruit Growing Area (Orchard Development Projects);
DP-2 Introduction and Practice of Market-oriented Quality Fruit Growing Techniques;
DP-3 Establishment of On-farm Level Extension Service System;
DP-4 Development of Post-harvest Handling System;
DP-5 Improvement of Access Facilities to Markets;
DP-6 Improvement of Local Market Facilities; and
DP-7 Institutional Strengthening of Small Landholding Fruit Growers

(2) Scope and Features of the Programs

1) Central level

NP-1 : Formation of Institutional Linkage for Agribusiness Development

a) Objective

This Program aims to establish a much closer linkage connecting MOA with other relevant ministries and agencies focusing on promotion of downstream activities of agribusiness development, particularly agro-processing industry and international trade.

b) Component

- For smooth implementation of the individual development programs, this program is designed to establish and strengthen the overall coordination framework among the government agencies and institutions concerned such as the Ministry of Public Works (Directorate General of Irrigation), Ministry of Home Affairs, Ministry of Industry, Ministry of Cooperatives and Small Enterprise Development, etc. as well as private sectors.
- Under this program, a "Coordination Committee" is to be established under DGFCH, the executing agency, of which organization and task are to be regularized legally. The Committee is to advise the Director General of DGFCH on final decisions concerning coordination and arrangement with other ministries, agencies and intra-ministerial offices, and also on technical and administrative matters relating to the programs' implementation, and so on. The Directorate of Horticulture Production in DGFCH will act as a secretariat of this Committee.

NP-2 : Strengthening of Intra-ministerial Coordination System for Orchard Development

a) Objective

This Program is intended to extend the on-going efforts to upgrade coordination activities between DGFCH and other Directorate Generals and Agencies under MOA as well as Directorates within DGFCH with respect to technical and administrative aspects that are essential for smooth implementation of orchard development programs. Such coordination has been practiced so far in MOA whenever horticultural development is implemented.

b) Component

- A Project Management Office (PMO) will be organized with several representatives from the Directorates concerned under DGFCH. PMO is responsible for preparatory works as well as technical and administrative arrangements to ensure smooth implementation, operation and management of orchard development projects. The scope of functions and competence of this PMO will be prescribed in the stature.

- Based on this stature, the PMO will take charge of the preparation of various draft plans, monitoring of program progress, claim and allocation of annual budget, financial management, holding of meetings at national level, supervision of national training program and so on.

NP-3 : Rationalization of Supporting Services for Credit Facilities and Marketing Promotion

a) Objective

This Program focuses on strengthening of financial and marketing mechanism for the benefit of small landholding fruit growers through rationalization of supporting services for credit facilities and market promotion.

b) Component

- As this program includes a very wide range of complex issues, which are supposed to take a long time to be solved. The Agency for Agribusiness of MOA will take the initiative in formulating an institutional strengthening program consisting of development of an attractive credit system with reasonable interests, increase in access channels to credit handling agencies, introduction of a long-term credit system for perennial tree crops, revolving

credit system, and trade deregulation for export promotion of Indonesian tropical fruits.

- In this program, the strategy for marketing Indonesian tropical fruit in both domestic and international markets will be prepared, so as to support/promote its production development, especially focusing on the establishment of their brands, sales and advertisement activities, and preparation works for globalization of trade (e.g. GATT, WTO, AFTA, etc.).

NP-4 : Strengthening of Research and Development Activities for Introduction and Breeding of New High Quality Fruit Varieties

a) Objective

This Program aims to upgrade the institutional and technical capacities of the research and development organizations responsible for introduction and development of new varieties as the basic material to support fruit production development through fruit quality improvement.

b) Component

- The target institution is the National Research Institute for Fruits in Solok in West Sumatra Province. The capacity of staff in this institute needs to be upgraded for developing new seedling propagation techniques including tissue culture, cutting, root suckers, copping, grafting, air-layering and budding, and supplying the true clone of the target fruits. For this, new varieties will be introduced from the neighboring countries with similar agro-ecological condition such as Thailand and Malaysia in order to accelerate propagation of varieties with higher market demand. As to the disease and pest which may be occurred subsequent to instruction of new varieties, it is required to consider their both preventive and curative measures.

- In this program, the investigations on phytogenes will be carried out to prepare an inventory of the mother plants of recommended variety in cooperation with the institutions concerned. The results of these investigations will be used in establishing in future a fruit seedling production system.

NP-5 : Strengthening of New Technology Adaptability Trial Operation System

a) Objective

This Program is designed for the purpose of strengthening the existing new technology assessment system for tropical fruits.

b) Component

- At present, new technology adaptability tests are carried out only at the Institute for Agricultural Technology Assessment (BPTP) in Sukarami, West Sumatra. In early 1998, BPTPs which assume the implementation of new technology adaptability tests were decided to be established in every province under the supervision of AARD. Consequently, the study for establishment of BPTPs in each of the four provinces will be firstly conducted with a view to establishing in future a nationwide technology adaptability trial operation system for the recommended varieties.

- Each BPTP will undertake the technology adaptability tests to be newly introduced and recommended varieties, taking into consideration the agro-ecological conditions, especially weather conditions and elevation of the respective localities.

- In this program, the standard manuals on farm management and post-harvest handling of each target fruit will be prepared by the relevant BPTP, considering the agro-ecological conditions of the respective areas. These manuals should be designed to be used by the extension workers in charge of technical guidance to the farmers.

NP-6 : Rationalization of Fruit Seedling Inspection System

a) Objective

The main objective is to rationalize the actual seedling inspection system including examination and certification of mother plants, scions, rootstocks, and seedlings of the target fruits in order to guarantee the variety and quality of their seedlings.

b) Component

- This program is designed to improve mainly BPSB of MOA and enable the private nurseries to produce fruit seedlings for ordered development. Its components consist of strengthening of the inspection system, staff capability

upgrading and improvement of examination facilities in branch stations of BPSB. In the Study Area, the stations are located at Medan in North Sumatra, Bandung in West Java, Wonocolo in East Java, and Maros in South Sulawesi.

- Among others, the seedling inspection system for identification of the mother plants and their varieties will be consolidated through capability building of the staff and installation of the inspection facilities for their physical, chemical and botanical examinations.

NP-7 : Strengthening of Plant Quarantine System

a) Objective

This Program aims to continue and extend the ongoing strengthening efforts of the plant quarantine system in Indonesia to support export promotion of Indonesian tropical fruits.

b) Component

- The main activity is to provide a comprehensive package of measures for preventing infestation of fruits by insects and pests, as well as for staff training.

- The target institution to be strengthened is the Center for Agricultural Quarantine of MOA. Its capacity and facilities need to be improved in the field of disinfestation technology and applied research.

- The issues to be urgently solved for export promotion (e.g. in Singapore, Malaysia, Hong Kong, China, Japan and etc.) are determination of admissible maximal limits of chemical residues on fresh fruits and identification of the insects and pests causing their infestations.

- In this program, the insect and pest control system is to be established in the future by installing fumigation facilities in the export-oriented fruit producing centers or shipping ports.

2) Provincial level

PP-1 : Strengthening of Project Planning Capacity at Provincial Level

a) Objective

This Program is designed with a view to upgrading capability and skills of Provincial Government staff on fruit production development planning so that they

can manage and supervise the development programs in accordance with the agricultural policy and strategies.

b) Component

- Capability building will be made to the Provincial staffs in charge of planning, especially those in the Provincial Agricultural Services (PRAS) Office, BAPPEDA and other agencies concerned, through execution of periodical staff training managed by the Project Management Office (PMO).

- The main training subjects will concern the agricultural policy and strategies, especially relating to the fruit production development, planning of fruit production development projects, monitoring and assessment method and practices, feedback system of the obtained information and so on. These training will be implemented by holding seminars and workshops.

- These training courses will be prepared by professional third parties under the guidance of the PMO. The annual training program is to be made up in July before entering into the negotiation about budget allocation.

- To upgrade accuracy and reliability of the data such as socio-economic indicators, agriculture productions, etc. which are necessary to the project planning, an information network system will be established in each province in closer cooperation with the authorities concerned at both Provincial and District levels like statistical, planning and agriculture offices, BAPPEDA, KANWIL, etc.

PP-2 : Strengthening of Management Capability Building of Provincial Staff

a) Objective

This Program aims to provide the Provincial Agricultural Services Office staff with management training programs to improve their monitoring and management capacity for fruit production development.

b) Component

- This program can be realized by practicing training courses entrusted to professional third parties like management consultant in collaboration with academic institutions, which have experts specialized in project management. The training program will include, but not be limited to:

- Planning procedure and know-how on identification and assessment of fruit production development programs and projects;
- Financial and budget management for implementation of orchard development projects;
- General strategies for fruit production development through fruit quality improvement:
  + Legal and institutional framework for fruit production development,
  + Supporting services system for participating small landholding farmers, including extension services, long-term credit or material revolving, etc.,
  + Establishment/ strengthening of fruit growers' groups and associations,
  + Post-harvest and agro-industry development and marketing promotion,
  + Environmental management and preventive measures against possible negative impacts;
- General guidance on the fruit production development policy and orchard development projects prior to their construction (i.e. responsibilities, authorities, levels of activities of the institutions concerned).
- Need to monitor the progress of the implemented programs/ projects to acquire useful information for sustainable development.
- Manpower development to assure smooth implementation of the proposed programs.

PP-3 : Improvement of High Quality Seedling Propagation and Distribution System

a) Objective

The main objective is to set up large scale foundation blocks to maintain the mother plants of target fruits as well as multiplication blocks of scions to maintain and multiply the recommended varieties and species as material supply sources to private nurseries.

b) Component

- The main activity is to rehabilitate and renew the facilities and equipment of the Provincial Horticulture BBI and BBU for effective and smooth distribution of seedlings, and to improve the knowledge and skills of the staff involved.

- In this program, a database on the existing mother plants system will be established in each Province.

- The five BBI targeted in this program are located in Karo and Tapanuli Selatan (both in North Sumatra), Sumedang (West Java), Pasuruan (East Java), and Gowa (South Sulawesi), while the number of targeted BBU amounts to twelve in total: 2 in North Sumatra, 2 in West Java, 4 in East Java, and 4 in South Sulawesi. The rehabilitation and/or construction works will be carried out focusing on the Foundation Block in BBI and the Scion Multiplication Block in BBI and/or BBU. In addition, with a view to increasing the staff's knowledge and technical level, the training program on introduction and propagation of new/recommended seedlings, advanced technology like tissue culture, maintenance system of the registered mother plants of recommended varieties, etc. will be provided to them by hiring both at home and abroad the experts competent in seedling propagation and distribution.

- As for avocado, duku and mangosteen, their seedling production system is not yet established. For this, it is needed for each BBI concerned to reproduce them by taking up scions from the mother plants of recommended varieties. The pressing need for implementation of this program is to transplant and maintain the certified mother plants in BBI's farms. In parallel, it is important to carry out the adaptability tests of the proposed varieties in the respective BPTP's, in cooperation with the Seed Certification and Control Services (BPSBs). These tests will be conductive to the seed certification and control to the done by BPSBs.

PP-4 : Institutional and Technical Capability Building of Private Nurseries

a) Objective

This Program is designed to organize private seed growers into cooperatives and to upgrade the propagation capacity of quality fruit seedlings in private nurseries.

b) Component

- This program includes the provision of a systematic training program and establishment of a coordination system with BBI and BPSB for private nurseries in order to strengthen the private seedling growers, organizations, and their capacities. For the purpose of rationalizing the seedling certification and control system, the training courses by target fruit will be given to the interested nurserymen.

- To enable the private nurseries to upgrade their propagation capacity of quality fruit seedlings and improve their facilities, a supporting measure would be taken by the authority concerned. This measure will not include direct financial assistance from the authority, but pricing support in procurement of seedlings so that the private nurseries can keep a certain investment fund for improving their facilities and equipment.

PP-5 : Enhancement of Extension Staff's Knowledge on Agribusiness Development

a) Objective

This Program aims to provide a series of training opportunities to extension workers (PL-1 and PL-2) to improve their knowledge about fruit production development.

b) Component

- The main activity is to enable the extension workers in agriculture sector (PL-1&PL-2) to learn all aspects of agribusiness development and to back up their on-farm level extension activities.

- The training program will include the lectures an practices about seedling production, farm management, post-harvest handling, processing, marketing, training methods to the interested farmers and so on. As to the contents, level and schedule of the training program, they will be determined in advance so as to prepare the common curriculums by target fruit. Based on these curriculums, effective and efficient training will be carried out by professional third parties.

- The training program for extension workers will be carried out jointly with that for field inspection coordinators who are to be assigned in PMUs. As the budget for training the extension workers is generally limited, such joint-holding will help them to have more opportunities for their capability building.

PP-6 : Upgrading of Market Information System

a) Objective

This Program is to enhance the contents of the existing market information services, so far limited to rice, Palawija crops and vegetables, and to expand service areas in order to increase farmers' bargaining position, to decrease both inter-seasonal and inter-regional price fluctuations, to increase inter-regional and international trading flows and to equalize supply and demand.

b) Component

- This program is needed from the middle and long-term standpoint. The Agency for Agribusiness will take the initiative in upgrading the market information system. The operational plan for this program will be worked out by the Agency for Agribusiness and the Directorates concerned of DGFCH.

- The main activity is to provide fruit growers with reliable and timely real time information about kind, variety, grade, quantity, wholesale and retail price of fruit, and so on.

- This program will be realized by linking with the existing service network for end users and enhance the variety of information for service providers. In this respect, it is important to establish a two-way information system between producers and consumers (markets).

PP-7 : Institutional Development for Association of Fruit Growers' Groups

a) Objective

This Program aims to enable the fruit growers' groups or associations to acquire the better bargaining power in fresh fruit markets and engage in processing industry, so as to increase of small landholding farmers' income.

b) Component

- This program will be implemented following the successful organization of fruit growers' group under the DP-7 Program. The main activity is to establish an association of fruit growers' groups in each Province and disseminate useful information on farm-management, post-harvest handling technology and quality requirements of market to member groups.

- In this program, operational guidelines will be prepared so that the association can undertake joint operation and maintenance of the facilities and/or equipment, and engage in agribusiness making use of the reserve funds collected from members.

- As a plan in the distant future, the study on establishment of a "Federation" will be carried out so as to integrate the established fruit growers' association.

3) District level

DP-1 : Establishment of Orchard as Core of Target Fruit Growing Area

("Orchard Development Program")

a) Objective

This Orchard Development Program is designed to establish a core of highly profitable orchards for the target fruits by promoting the optimum use of small landholding farmers' lands, especially in the upland areas presently fallow or exploited for cultivation of secondary crops.

b) Component

- This program is the pivotal or anchor component of this Master Plan.
- To encourage small landholding farmers to participate in such orchard development, the public sector's integrated supports covering on-farm level infrastructure, and planting materials together with the DP-2, DP-3, DP-4, DP-5 and DP-7 Programs are to be provided in one package during the incubating stage of orchard development.
- The development area is set at no more than 500 ha for the initial stage. If it is over 500 ha, the first 500 ha only will be developed with the public investment and the remainder will be developed independently by the fruit growers' group, when the revolving capital from the first public investment is pooled as collateral fund for the next expansion works. When the development area for a target fruit consists of more than one site in one District, the maximum development area of 500 ha will be evenly shared by the number of sites.
- The total orchard development area proposed in this Master Plan amounts to 18,300 ha as shown in Table A-7-2. This area is to be developed using public investment fund and broken down as follows:

  - North Sumatra (3,800 ha in 8 sites) : 1,300 ha for durian (3 sites); 1,000 ha for mangosteen (2 sites); 500 ha for marquisa (1 site); 500 ha for rambutan (1 site); and 500 ha for salak (1 site)

- West Java (3,000 ha in 6 sites) : 500 ha for avocado (1 site); 500 ha for duku (1 site); 500 ha for (1 site); 500 ha for mango (1 site), 500 ha for mangosteen (1 site); and 500 ha for salak (1 site)

- East Java (4,000 ha in 8 sites) : 500 ha for avocado (1 site); 1,000 ha for banana (2 sites); 500 ha for duku (1 site); 1,000 ha for durian (2 sites); 500 ha for mango (1 site); and 500 ha for salak (1 site)

- South Sulawesi (7,500 ha in 15 sites) : 1,000 ha for avocado (2 sites); 2,500 ha for mango (5 sites); 1,000 ha for mangosteen (2 sites); 1,000 ha for marquisa (2 sites); and 2,000 ha for rambutan (4 sites)

- On-farm level infrastructure comprises fruit production field, watering facilities, drainage canal, farm road and animal protection fence, while planting materials comprise fruit seedling, farm inputs such as chemical fertilizer, organic manure, soil conditioner, agro-chemical, seed for inter-crops such as peanut, maize and cassava, fuel for field operation are provided by the program. Table A-7-3 shows the facilities required for each of the 37 orchard development areas.

- Some preparatory works are included in this component such as construction of office buildings, supply of office equipment and transportation, and execution of cadastral and topographic survey, investigation, design and supervision works.

- For implementation of the program, a Project Implementation Unit will be established in a District for preparatory works, arrangement of training, management of implementation activities, monitoring of physical and financial performance, and so on.

- In this program, inter-cropping of annual crops is recommended with a view to assuring a stable livelihood of farmers, particularly during the non-fruit bearing period, and even after entering the full-scale production of fruits if there exists a space suitable for inter-cropping among the trees.

- This Orchard Development Program will be implemented in steps based on the authorized implementation program. However, the public sector's financial support for preparation of on-farm level infrastructure and supply of agricultural

inputs will be provided in one package. This public financial support includes land preparation and planting hole excavation works for planting fruit and inter-crops, provision of such agricultural inputs as fruit seedlings, inter-crop seeds, fertilizers, manure, chemicals and materials for fruit growing, development of water source and installation of watering and drainage facilities, rehabilitation or construction of farm roads, construction of animal protection fences, and so on.

- Seedling requirement and the standard volume of agricultural inputs to be applied for an area of 500 ha are summarized by target fruit in Tables 7.1 and 7.2, respectively.

Table 7.1 Annual Requirements of Fruit Seedlings

Fruit	Plant Density (tree/ha)	1st Year New (10%) (tree)	2nd Year New (40%) (tree)	2nd Year Supple. (20%) (tree)	3rd Year New (50%) (tree)	3rd Year Supple. (20%) (tree)	4th Year Supple. (20%) (tree)	Total (tree)
Avocado	100	5,000	20,000	1,000	25,000	4,000	5,000	60,000
Banana	1,000	50,000	200,000	10,000	250,000	40,000	50,000	600,000
Duku	100	5,000	20,000	1,000	25,000	4,000	5,000	60,000
Durian	100	5,000	20,000	1,000	25,000	4,000	5,000	60,000
Mango	100	5,000	20,000	1,000	25,000	4,000	5,000	60,000
Mangosteen	100	5,000	20,000	1,000	25,000	4,000	5,000	60,000
Marquisa	500	25,000	100,000	5,000	125,000	20,000	25,000	500,000
Rambutan	100	5,000	20,000	1,000	25,000	4,000	5,000	60,000
Salak	2,000	100,000	400,000	20,000	500,000	80,000	100,000	1,200,000

Note: Supplemental planting requires 20% of total trees planted in the previous year
Source: JICA Study Team

Table 7.2 Standard Volumes of Agricultural Inputs by Target Fruit Tree

(Unit : volume per 500 ha)

Target Fruit Trees	Seedlings (no.)	Urea (ton)	Phosphate (ton)	Potassium (ton)	Manure (ton)
- Avocado	50,000	10.5	25.0	20.1	-
- Banana	500,000	250.0	250.0	250.0	20,000
- Duku	50,000	22.5	22.5	33.8	-
- Durian	50,000	0.8	1.6	1.6	2,000
- Mango	50,000	10.0	2.5	10.0	1,000
- Mangosteen	50,000	6.0	2.0	4.0	1,000
- Marquisa	400,000	300.0	225.0	75.0	8,000
- Rambutan	50,000	3.8	2.5	7.5	750
- Salak	1,000,000	75.0	50.0	25.0	10,000

Source: JICA Study Team

DP-2 : Introduction and Practice of Market-oriented Quality Fruit Growing Techniques

a) Objective

This Program aims to train participating farmers to produce and market quality fruits through the provision of a series of training programs in the technical and financial aspects.

b) Component

- Training covering farm management, post-harvest handling and marketing aspects is to be provided to participating farmers by extension workers to be newly recruited/trained under the DP-3 program. This training program will include the theoretical lectures and practices about market oriented farm management, farming technology following the management calendar of each fruit tree, post-harvest handling technology such as collection, sorting, storage and packing, marketing, management of fruit grower's group and so on.

- As this program is closely related to DP-3 and PP-5, it is important to coordinate them in determining their respective schedule, contents, level, and duration. In this program, the "curriculums by target fruit" common to the above three programs will be prepared and, based on these curriculums, practical and effective training in all respects related to the orchard management will be carried out by a third party specializing in this field on a contractual basis.

DP-3 : Establishment of On-farm Level Extension Service System

a) Objective

This Program is designed to establish a new on-farm level extension service system taking into account the difficult mobilization of the existing PL-1 and PL-2.

b) Plan

- The main activity is to provide fruit growers' groups with intensive extension services on farm management, post-harvest handling, and marketing.

- For this purpose, special staff are to be recruited in the initial stage, and specifically trained under orchard development programs following the case of on-going IHDUA/P2AH. One field inspection coordinator will be assigned for each development area, and one inspector will be per 100 participatory farm-households. They will be responsible for daily monitoring and technical assistance at the field level. Training will be carried out by a third party.

- As to the extension service to farmers at on-farm level, it is proposed to select one contact farmer (a leader of farmer's group) per 20 participating farm-households and conduct the transfer of technology to member farmers through these selected contact farmers.

DP-4 : Development of Post-harvest Handling System

a) Objective

This Program aims to make the fruit growers' groups engage in post-harvest handling to produce higher value-added commodities resulting in the threatening of the bargaining position of farmers and more profit.

b) Component

- The main activity is to provide facilities and equipment such as collection and packing houses for sorting, grading and packaging system, as well as processing facilities, if necessary, to each fruit growers' group. One collection house will be provided for every 100 ha, while one packing house and processing house will be for every development areas. The field inspection coordinators assigned in each area (PMU) will be responsible for management of these post-harvest handling systems.

- For each development area, a set of facilities and equipment for collection and sorting will be provided. For banana, mango and marquisa which are easy for handling, a sorting and cleaning equipment will be installed. It is also planned to construct a storehouse for preservation of banana after collection. The large bamboo baskets being used for transportation of fruit will be replaced by small and medium size baskets fitting the fruit size (or plastic cases for the repeated uses). As to marquisa, if its orchard is located far from the processing factory, a simple juicing facility will be installed within or near the orchard to reduce the loss of fresh fruits during their transport and to curtail their transportation cost.

- Operation and maintenance of post-harvest handling facilities will be done by the fruit growers' groups. The training programs for both the staff in charge and participating farmers will be prepared with a view to establishing an on-farm level extension service system and introducing market-oriented fruit growing technology. As the training system has been already established under the on-going IHDUA/P2AH Project and put in practice at all levels from Central to Provincial and District, such system will be adopted in the implementation of this Orchard Development Program.

DP-5 : Improvement of Access Facilities to Markets

a) Objective

This Program is to link newly developed fruit growing areas with local markets for ensuring timely delivery of planting materials, and smooth transportation of harvested fruits under the all-weather condition.

b) Component

- The main activity is to rehabilitate or construct the road network. In this program, an inventory or investigation will be conducted on the public road sections to be rehabilitated and their repair works. To implement such rehabilitation works, it is necessary to submit a request letter to the Provincial Road Services Office.

DP-6 : Improvement of Local Market Facilities

a) Objective

The main objective is to reduce handling losses in local markets by improving the fresh fruit collection, storage and distribution system, especially their capacities and functions.

b) Component

- This Program focuses on local markets. It consists of the establishment of fruit commodity distribution centers with dual functions: information services on fruit quality requirements in markets, and rationalization of the loading and unloading system between fruit growers groups or collectors and market traders to reduce handling losses.

- In the case harvested fruits are forwarded from orchards to the regional and/or mega-cities like Jakarta, Surabaya, Medan, etc. by the way of local markets, the marketing system will be established and/or improved by installing the facilities for transshipment, collection and distribution, and storage of the goods in addition to the post-harvest handling facilities to be equipped in the orchards. For this respect, a trading center will be constructed in each of the major regional cities concerned for collecting and distributing the fruits.

DP-7 : Institutional Strengthening of Smallholder Fruit Growers

a) Objective

This Program aims to improve the living standards of the participating small landholding farmers and assure their better bargaining position through recognition of the brand names of fruits in the market.

b) Component

- The main activity is to organize participating farmers into a fruit growers' group and to provide a series of management training programs.

- The fruit growers' groups will be established by regrouping at least 20 participating farmers for one unit. To form and strengthen these groups in every orchard development areas, guidance services and several programs will be provided by the authorities concerned (mainly by PMUs). The established groups will be entrusted by PMUs to operate and maintain watering facilities and post harvest/processing facilities and equipment. Moreover, the groups will deal with accounts for selling fruits and buying agricultural inputs on behalf of member farmers.

7.2 Organization for Implementation of the Proposed Programs

As shown in Figure AT-7-1, DGFCH is the executing agency at the central level responsible for implementation of the programs relating to the inter-sectoral and inter-provincial issues. For overall supervision of the programs implementation, it is recommended to establish two organizations: a "Coordination Committee (CC)" and a "Project Management Office (PMO)" under the control of DGFCH. The substantial management activities for the both organizations are to be entrusted to the Director of the Directorate of Horticulture Production Development, who will act as the superior supervisor of the above two organizations on behalf of the Director General of DGFCH.

The Coordination Committee will be composed of representatives from the following government agencies and ministries: BAPPENAS, Ministry of Industry, Ministry of Transmigration, Ministry of Cooperatives and Small Enterprises Development (MOCSED), Ministry of Public Works, and those from MOA, namely the Bureau of Planning under the Secretariat General, Agency for Agribusiness and AARD, and Directorates of DGFCH: Programming Development, Seed Development, Plant Protection, Food Crops Production, and Farm Business and Processing Development. The Directorate of Horticulture Production

Development will function as the "Secretariat" of the Committee. The major duties and responsibilities of each member ministry concerned are as follows:

– BAPPENAS	:	Overall planning and budgeting
– Ministry of Industry	:	Agro-industry and processing
– Ministry of Transmigration	:	Orchard development in transmigration areas
– Ministry of Cooperatives	:	KUD-related matters
– Ministry of Public Works	:	Rehabilitation or construction of public roads, and water right for agricultural use including fruit growing

The Bureau of Planning in MOA will be responsible for coordination of all matters relating to the overall agricultural policy and its framework. AARD and the Agency for Agribusiness will take charge of the works in their respective competence. The Directorates of DGFCH will give advice for smooth and efficient implementation of the programs in each of their proper concerns.

The Coordination Committee will also advise the Director General of DGFCH on technical and managerial issues in the implementation of the programs and keep contact with the similar committees to be established at the Provincial and District levels.

The main activities of the Project Management Office are coordination among the agencies and authorities concerned in charge of programs implementation, control of the program performance, application and allocation of annual budgets, holding of nationwide conferences, execution of training programs at the national level, and so on.

At the Provincial level, a "Provincial Coordination Committee (PCC)" will be established for coordinating the program and project management. The Provincial Governor will be designated as the overall responsible person and the head of the Provincial Agricultural Services Office will be appointed as the Committee's Secretary. The main agenda to be discussed in this Committee will be the technical and managerial matters including production of high quality seedlings, training of extension workers, association or federation of fruit growers' groups and others. Besides, under the direction of the Project Management Office, a "Project Implementation Unit (PIU)" will be created at the provincial level. In cooperation with the Provincial Agricultural Services Office, this Unit will assume managerial activities for the programs to be conducted at the Provincial level.

At the District level, a "District Coordination Committee (DCC)" will be set up under the control of Bupati. To implement an orchard development program, a "Project Management Unit

(PMU)" will be established for each development area. This Management Unit will implement the orchard development program in close cooperation with the District Agricultural Services Office and following the instructions of the Project Management Office.

In parallel with the restructuring and implementing arrangements at both the central and local government levels, the establishment and strengthening of fruit growers' organizations are a "must" for successful implementation of the orchard development programs. At the preparatory stage prior to the commencement of implementation, social design or social preparation study will be carried out, together with cadastral survey, so as to assess the farmers' participation and make preparations for grouping the fruit growing farmers. Activities of the established fruit growers' groups will be institutionally and financially consolidated by regrouping them into "Associations" and/or "Federations" and through their engagement in agribusiness and agro-processing industry. It is however true that in view of the existing legislation relating to the formation and activities of the cooperatives in Indonesia, there exist several legal issues and points to be clarified as to the establishment and strengthening of the fruit growers' groups and associations. Consequently, such issues need to be scrutinized in implementing the two institutional development programs (DP-7 & PP-7) and referring to the performance of the on-going IHDUA Project.

7.3 Implementation Schedule of the Proposed Programs

As shown in Figure AT-7-2, the planning period up to the target year 2018 is divided into three phases covering the coming four Five-Year Development Plans: Phase I up to 2003 (Repelita VII), Phase II for 2004 - 2008(Repelita VIII), and Phase III for 2009 - 2018 (Repelita IX & X).

The programs relating to the upstream enterprises like fruit quality improvement and institutional strengthening will be commenced from the very early stage of Phase I, because these programs contain the introduction and development of the new varieties which usually extend over a long period of time, and the institutional arrangements indispensable to ensure sound implementation of the programs proposed in the Master Plan. In addition, such programs as strengthening of new technology adaptability trial operation system, rationalization of fruit seedling inspection system and strengthening of plant guarantee system will be also commenced in phase-I.

As to the implementation of 37 orchard development projects (DP-1) and eight related programs like DP-2, DP-3, DR-4, DP-5, DP-6, PP-7, PP-5, and PP-7, they will be executed in three phases as per the prioritized order, and development scale determined in Table AT-7-2. The development areas for each of the 37 orchards were fixed taking into consideration the

annual budget available for the horticultural sub-sector and regional and provincial balance in the nationwide orchard development. The total development areas by phase are as follows:

- Phase I (Repelita VII) : 6,000 ha in 12 sites
- Phase II (Repelita VIII) : 5,800 ha in 12 sites
- Phase III (Repelita IX&X) : 6,500 ha in 13 sites

In the first year of Phase I, subsequent to the approval of the implementation program and establishment of the implementation organization, the programs relating to human resource development will be firstly set about concentrating on the training of staff in charge and participating farmers. And then the procurement of materials and construction of facilities are to follow successively in the second and third years. As described in Section 6.8, the orchard development schedule extends over three years. In the case the development scale is 500 ha, 50 ha will be developed as a pilot model farm in the fist year, 200 ha in the second year, and 250 ha in the third year. As the non-fruit bearing period varies from two to seven years according to plant characteristics of the target fruits, the full-scale operation of an orchard will require a maximum term of eight years after starting the construction works. This means that a last part of the preceding phase works would be overlapped with a first part of the following phase works.

7.4 Tentative Cost and Investment Schedule by Phase

The total investment cost for the programs proposed in this Master Plan is estimated based on the following basic assumptions:

1) All prices expressed in 1998 price level
2) Exchange rate (as of February 1998): US$1.00 = Rp.9,000 = ¥125
3) Price contingency: 10% per annum
4) Physical contingency: 10% of the infrastructure cost
5) Value Added Tax (VAT): 10% of the total investment cost

As shown in Table 7.3, the total amount of investments necessary to attain the development objectives of this Master Plan is estimated at US$119.14 million. The cost of each program is presented in Table AT-7-4.

Table 7.3 Tentative Investment Cost for the Programs Proposed in the Master Plan

(Unit: million US$)

Description	Phase I	Phase II	Phase III	Total
1 Programs at National Level	12.40	2.33	3.75	18.48
2 Programs at Provincial and District Levels	23.49	27.87	49.30	100.66
- North Sumatra	5.50	7.47	7.51	20.48
- West Java	5.67	2.37	6.19	14.23
- East Java	7.50	7.69	0.36	15.55
- South Sulawesi	4.82	10.34	35.24	50.40
Total Investment Cost	35.89	30.20	53.05	119.14

Source: JICA Study Team

7.5 Project Sustainability Assessment

(Farm Economy)

With a view to assessing the implementation effects of the orchard development proposed in this Study, a farm budget analysis was conducted by comparing the two cases of "with" and "without" fruit growing conditions and based on the following assumptions :

- Financial comparison is done with a maximum development unit of 1.0 ha per participating fruit growing farmer;
- Marketed volumes of the target fruits and inter-crops are estimated using the annual expected yields indicated in Table H-1-1 of Appendix H;
- The farm gate prices of fresh fruits shown in Table 7.4 were assumed referring to their actual average trading prices and applied in calculating the respective fruit productions for all the four Provinces. In these prices, the differential factors like the grade and size of fruits, distance to markets, price fluctuations are taken into account.
- Production costs include the expenditures for planting the fruit trees and inter-crops, farm management, and harvesting of fruit crops, but exclude the indirect costs like membership fees for fruit growers' groups and expenses required for construction and O&M of the post-harvest handling facilities;
- The costs for annual farming practices of the perennial crops (or fruit trees) increase in proportion as they grow. These expenditures continue to augment until their yields come up to the respective peaks.
- To compare the profitability of (perennial) fruit crops with that of annual inter-crops under the same conditions, the increment net incomes by target fruit are calculated

converting the agricultural incomes from both fruit and inter-crop productions over 25 years into the net present values.

As compiled in Table 7.4, the annual net on-farm income of farmers with 1.0 ha of unit farm size is expected to increase by 10.1 times in the case of banana, 7.1 times for salak, 5.5 times for marquisa, 5.1 times for mango, 4.2 times for durian, 3.4 times for rambutan, 2.7 times for avocado, 2.2 times for mangosteen, and 1.8 times for duku, in comparison with the case of "without fruit growing condition" where maize is cultivated in wet season and groundnut in dry season (For details, refer to Tables H-2-4 of Appendix H). Such increments in net incomes from fruit growing will be more larger at the harvesting peak times and bring about a good deal of positive effects on the living of participating fruit growers.

Table 7.4 Key Indicators for Evaluating the Incomes of Fruit Growers

Fruit Crops	Planted Area of Intercrop (ha)	Farm Gate Price (Rp./kg)	Annual Net Income of Target Fruit (Rp.'000)	Total Annual Net Income (Rp.'000)	NPV for 25 years (Rp.'000)	Increase Rate (%)
Avocado	0.60	1,300	5,240	5,680	17,982	2.7
Banana	0.30	650	9,500	9,647	67,236	10.1
Duku	0.60	900	4,252	4,692	12,060	1.8
Durian	0.60	1,200	6,803	7,243	27,745	4.2
Mango	0.60	850	8,407	8,847	33,668	5.1
Mangosteen	0.60	1,100	4,255	4,695	14,872	2.2
Marquisa	0.45	1,350	7,531	7,861	36,631	5.5
Rambutan	0.60	750	6,305	6,745	22,910	3.4
Salak	0.15	1,500	12,390	12,500	47,349	7.1
Intercrop	1.00	1,100	0	733	6,653	-

Source : JICA Study Team

However, if the yields of fruit productions fall by more than 45% in the case of avocado, duku and mangosteen, 50% for marquisa, and 70% for banana, durian, mango and salak, and 80% for rambutan as a result of damages due to the outbreak of the pests and diseases and/or abnormal weather, their annual net income balances at peak times go into the red. In addition, it is supposed that the above incidents cause some subsidiary negative impacts like degradation of fruit quality and price decrease of the products as a result of severe sales competitions among the producing areas. The minimum farm gate prices at profit and loss points for each of the nine target fruits are at Rp.750 per kg for avocado, Rp.215 per kg for banana, Rp.530 per kg for duku, Rp.390 per kg for durian, Rp.260 per kg for mango, Rp.640 per kg for mangosteen, Rp.710 per kg for marquisa, Rp.160 per kg for rambutan, and Rp.560 per kg for salak.

The fruit growers can not expect any income from fruit growing during the non-fruit bearing years which vary with the respective target fruits. When the farmers participate in the fruit production project proposed in this Study, it is estimated that their invested amount by target fruit will be recovered after 2 years for banana, 4 years for mangosteen, 5 years for durian,

mango and marquisa, 6 years for rambutan and salak, and 9 years for duku, respectively. In case the orchard is used for inter-cropping with a view to supplementing their income during the on-fruit bearing period, the invested amount in a single year balance will be recovered after 1 year for banana. durian, mango, mangosteen and rambutan, 2 years for duku, 3 years for marquisa and salak, and 4 years for avocado. To assure the above income increase of farmers, it is required to give them the loans of agricultural inputs in kind which are equivalent to those estimated in Table 7.5. With such financial supporting services at the initial stage, the bases for farm management of fruit growers could be strengthened.

Table 7.5 Summary of Farm Budget Analyses

Fruit Crops	Period to Compensate Cumulative Deficit (year)	Period to Compensate Cumulative Deficit with Intercropping (year)	Period to Compensate Single Year Deficit with Intercropping (year)	Period to Loan Agricultural Input (year)	Amount to Procure Agricultural Input (Rp.1,000)
Avocado	7	5	4	4	2,353
Banana	2	2	1	1	3,212
Duku	9	6	2	4	2,784
Durian	5	4	1	4	1,258
Mango	5	4	1	4	2,003
Mangosteen	4	4	1	4	1,471
Marquisa	5	5	3	1	3,193
Rambutan	6	4	1	4	1,203
Salak	6	6	3	3	14,157
Intercrop					

Source : JICA Study Team

(Environmental Impacts)

In addition to the above-mentioned direct benefits derived from incremental fruit production, the following indirect effects and socio-economic and cultural impacts would be induced by the implementation of the programs in the Master Plan.

Physical impacts

The orchard development programs proposed in this Master Plan will generally have a positive impact on the environment. The rehabilitation and construction works of farm roads and watering facilities are mostly designed to improve environmental conditions in the orchard development areas. The improvement of such basic infrastructure will reduce soil erosion, water losses, waterlogging, and so on.

Socio-economic and Cultural Impacts

Subsequent to the implementation of the proposed orchard development programs, the following socio-economic and cultural impacts will be brought about:

- Improvement of farmers' living standards
- Increase in employment opportunities
- Expansion of business chances
- Promotion of WID (women in development)
- Other socio-economic (multiplier) effects
  - contribution to national food security and public health;
  - Promotion of regional development by activating the local market system; including farm inputs and outputs markets;
  - Acceleration of agribusiness development in rural areas; and
  - Alleviation of regional disparities and poverty.

- As to the increase in employment opportunities, which is becoming the most imminent socio-economic issue to be addressed and conducive to the improvement of farmers' living standards, it is expected to generate 18,492 man-days of job opportunities per day on an average for farm management under the proposed 37 orchard development projects up to the target year 2018, as summarized in Table 7.6 (for more detailed information, refer to Table AT-7-5).

Table 7.6 Expected Job Creation for Farm Management of 37 Orchard Development Projects*

(Unit : man-days)

Province	Labor Requirements by Phase			
	Phase I** (Repelita VII)	Phase II (Repelita VIII)	Phase III (Repelita IX&X)	Total Average
1. North Sumatra (Dev. Area)	(1,500 ha)	(1,300 ha)	(1,000 ha)	(3,800 ha)
- Per-day Labor Requirement	448	1,433	2,802	1,871
2. West Java (Dev. Area)	(1,500 ha)	(500 ha)	(1,000 ha)	(3,000 ha)
- Per-day Labor Requirement	450	1,215	2,913	1,873
3. East Java (Dev. Area)	(2,000 ha)	(2,000 ha)	(0 ha)	(4,000 ha)
- Per-day Labor Requirement	1,844	2,488	4,635	3,400
4. South Sulawesi (Dev. Area)	(1,000 ha)	(2,000 ha)	(4,500 ha)	(7,500 ha)
- Per-day Labor Requirement	119	734	22,268	11,347
- Total Development Area	(6,000 ha)	(5,800 ha)	(6,500 ha)	(18,300 ha)
- Per-day Labor Requirement	2,861	5,870	32,618	18,492

Notes: 1) * The standard orchard development scale is set at 500 ha, except 300 ha in Dairi (North Sumatra).
2) ** The Phase I projects are to be implemented as priority ones in the Action Plan.
3) To estimate the total labor requirements for operation of the orchards, the previously developed areas are accumulated in the subsequent development ones.

CHAPTER 8 ACTION PLAN AND RECOMMENDATIONS

8.1 Action Plan

In consideration of the administrative procedures and formalities to be followed in GOI and MOA for formulation and adoption of the new development project, allocation of the development budget, establishment of the project organization, and set-up of the project monitoring and management system, the Master Plan is formulated so as to implement abreast twenty one programs for fruit production development. The programs recommended to be immediately executed in this Master Plan are packaged as "Action Plan".

The Action Plan consists of twelve orchard development projects and other institutional and supporting services strengthening programs. Under the orchard development program (DP-1), 12 potential sites were selected as the Phase I priority projects from the four Study Provinces. These sites were judged to be the most suitable areas for growing of the target fruits. The total orchard development area amounts to 6,000 ha for cultivation of the six target fruits of banana, durian, mango, marquisa, rambutan, and salak.

The programs to be taken up in this Action Plan are the following:

1. Establishment of Orchards as the Core of the Target Fruit Growing Area (DP-1):

   The proposed twelve orchards will be developed in the following prioritized areas. The development area is set at 500 ha for each site, totaling 6,000 ha.

Province	Fruit	District
- North Sumatra	Durian	Tapanuli Tengah
	Marquisa	Karo
	Rambutan	Langkat
- West Java	Durian	Bogor
	Mango	Sumedang
	Salak	Tasikmalaya
- East Java	Banana	Jombang and Lumajang
	Durian	Jombang
	Salak	Malang
- South Sulawesi	Rambutan	Mamuju and Barru

2. Human Resource Development of On-farm Level Extension Workers and Farmers (DP-2, DP-3, and PP-5):

   These programs aim to improve the technical knowledge of the existing extension workers engaging in fruit trees cultivation and management, recruit and train on-farm

level extension workers, and train participating farmers on fruit growing technology by entrusting to a third party specializing in this field. Training will be done by on-the-job training method for 20 members and lasts three weeks per course.

3. Development of Post-harvest Handling System (DP-4):

This program aims to make the fruit growers' groups engage in post-harvest handling such as grading and sorting of fresh fruits and raw materials for processing, adoption of market demand, and decrease of post-harvest losses during the transportation. Coordination with private collectors/traders is to be established. One collection house is to be provided for every 100 ha, and one packing house is for every 500 ha of orchard.

4. Improvement of Access Facilities to Markets and Local Market Facilities (DP-5 & DP-6):

The first program (DP-5) is to clarify the work requirements for rehabilitation of public roads, and request the Provincial Government to satisfy such requirements. The second program aims to improve local market facilities.

5. Institutional Development of Small Landholding Fruit Growers and Association of Fruit Growers Groups (DP-7 & PP-7):

These programs are to establish/strengthen the fruit growers' groups and associations. Through their united activities, they could establish their own fruit brand, expand the market network, undertake the operation and maintenance of post-harvest facilities, and accumulate profits and collateral funds for future expansion. Fruit growers' groups will be regrouped into associations and finally into federations.

6. Strengthening of Institutional Linkage among Ministries and Agencies, Intra-ministerial Coordination System in MOA (NP-1 & NP-2):

Legal arrangements are required to establish the cooperation and coordination framework among the relevant ministries and agencies, as well as intra-ministerial agencies.

7. Capability Building of Provincial Staff (PP-1 & PP-2):

Workshops or seminars will be held four times a year. These will be organized by MOA for capability building of Provincial staff in charge of planning and implementation of the programs/projects.

8. Rationalization of Supporting Services for Credit Facilities and Upgrading of Market Information System (NP-3 & PP-6):

The Agency for Agribusiness of the MOA will take the initiative in formulating the supporting programs relating to rural credit and market information system. In closer cooperation with the Directorates concerned in MOA, this Agency will be responsible for the establishment/strengthening of the financial and marketing mechanism for the benefit of small landholding farmers. This mechanism, however, needs to be established based on the market principle, especially focusing on the establishment of a feedback system of the market needs and demand.

9. Strengthening of Research and Development Activities for Introduction and Breeding of New High Quality Fruit Varieties (NP-4):

This program aims to upgrade the National Fruit Research Institute in Solok for development/adaptation of new propagation techniques and introduction/propagation of new varieties.

10. Strengthening of Regional Adaptability Trial Operation System (NP-5):

At present, new technology adaptability tests are carried out only by the Assessment Institute for Agricultural Technology in Sukarami, West Sumatra. In addition to this Institute, this program aims to upgrade another two Institutes in Malang and Kendari. Under this program, the improvement of facilities and staff training will be carried out together with the preparation of manuals for farm management and post-harvest handling of the target fruits.

11. Improvement of High Quality Seedling Propagation and Distribution System (PP-3):

This program is to be implemented in 12 BBI/BBU located in the four Study Provinces to improve Foundation Blocks and Scion Multiplication Blocks, establish a database of mother plants, and strengthen the staff capability.

12. Institutional and Technical Capability Building of Private Nurseries (PP-4):

This program aims to support the capability building of private nurseries so as to strengthen their structures and enable them to produce a good deal of high quality seedlings. A price supporting (or incentive) system will be introduced in the determination of the seedling purchasing cost.

13. Rationalization of Fruit Seedling Inspection System (NP-6):

    This program is designed to improve the facilities and equipment, staff capability building, and rationalization of the inspection system of BPSB.

14. Strengthening of Plant Quarantine System (NP-7):

    This programs aims to strengthen the quarantine system in conformity with the regulations of both exporting and importing countries especially for fresh fruits, as well as to develop disinfestation technology.

The Action Plan is to be implemented during Repelita VII (1999/2000 to 2003/2004), but before its implementation, at least 2 years are needed for administrative preparations such as formulation and approval of the programs as well as budgetary arrangement. For the programs related to fruit quality improvement (NP-4, NP-5, NP-6, NP-7, PP-3 and PP-4), the detailed plan of each program is to be prepared in the first year of implementation of this Action Plan, and the implementation schedule should be finalized. For the programs closely related to orchard development, the "Final Definite Development Plan" will be prepared early in the first year of implementation by adopting the farmers' participatory approach, and from the second year procurement and construction of facilities and equipment are to be commenced. The maximum development scale of each orchard is set at 500 ha, of which 50 ha is to be developed as a pilot model area in the initial year, followed by 200 ha in the second year, and 250 ha in the third year. Planting of fruit seedlings in the pilot model area will be done in the wet season of the second year. This pilot model area will be used for farmers' training.

DGFCH will be responsible for preparatory works as well as technical and administrative arrangements as an executing agency. At the beginning of the fiscal year, DGFCH will establish the Project Management Office (PMO) at the central level, a Project Implementation Unit (PIU) in each Province, and a Project Management Unit (PMU) in each District.

The cost for implementation of the Action Plan is tentatively estimated at US$35.9 million as presented below.

Table 8.1 Tentative Investment Cost for the Action Plan

(Unit: 1,000 US$)

	Programs	Amount
1.	Establishment of Orchards as Core of Target Fruit Growing Area	15,246
2.	Development of Post-harvest Handling System	389
3.	Improvement of Access Facilities to Markets	133
4.	Improvement of Local Market Facilities	2,578
5.	Enhancement of Extension Staff's Knowledge on Agribusiness Development	86
6.	Establishment of On-farm Level Extension Services System	1,537
7.	Introduction and Practice of Market-oriented Quality Fruit Growing Techniques	250
8.	Institutional Strengthening of Small Landholding Fruit Growers	77
9.	Institutional Development for Association of Fruit Growers' Groups	115
10.	Formation of Institutional Linkage for Agribusiness Development	556
11.	Strengthening of Intra-ministerial Coordination System for Orchard Development	556
12.	Strengthening of Project Planning Capacity at Provincial Level	167
13.	Strengthening of Management Capability Building of Provincial Staff	167
14.	Rationalization of Supporting Services for Credit Facilities and Marketing Promotion	1,667
15.	Upgrading of Market Information System	333
16.	Strengthening of Research and Development Activities for Introduction and Breeding of New High Quality Fruit Varieties	4,056
17.	Strengthening of Regional Adaptability Trial Operation System	757
18.	Improvement of High Quality Seedling Propagation and Distribution System	1,956
19.	Institutional and Technical Capability Building of Private Nurseries	458
20.	Rationalization of Fruit Seedling Inspection System	367
21.	Strengthening of Plant Quarantine System	4,444
	Total	35,895

Source: JICA Study Team

8.2 Recommendations

The El Nino phenomenon, occurred in 1997 and spreading on a worldwide scale, brought about a long spell of drought in Indonesia and caused lasting forest fires in Sumatra and Kalimantan islands, serious haze problem to neighboring countries in the dry season, and less rainfall in outer Java even in the 1997/98 wet season. Consequently, paddy cultivation was carried out only once during the 1997/98 paddy cropping season due to shortage of water, where double cropping is usually practiced. This drought problem undermines the Indonesian food security system, resulting in nationwide food shortage. Under such condition, GOI decided to import one million tons of paddy from Thailand by making shift with the limited available foreign currency, and also requested GOJ to grant more than 1.0 million tons of rice. Furthermore due to the current economic crisis, it is reported that more than two million workers have lost their jobs. To create job opportunities for these workers, it is necessary to make the best use of the non-irrigated lands in rural areas.

In view of such current drastic changes in the Indonesian socio-economic background, it is pertinent to take countermeasures for increasing production of paddy and palawija in wetland areas, and promote orchard development in upland areas which is conducive to the increase of small landholding farmers' income, creation of job opportunities, food security, and so on. It is therefore recommended that the programs selected in the Action Plan be implemented as early as possible.

At the preparatory stage prior to the implementation of the Action Plan, it is recommended to undertake the following works:

- For preparation of the Implementation Program, DGFCH should take practical measures and actions in consultation with BAPPENAS;
- The Implementation Program will be prepared so as to assure smooth implementation of the programs and realization of their respective objectives. Especially for successful implementation of the orchard development programs, DGFCH should attach importance not only to implement extension and training programs to participant farmers concerning farm management and fruit growing technique, to assure quality improvement programs, but also to establish proper marketing strategies.
- Since the programs related to fruit quality improvement are to be implemented by the relevant government agencies, DGFCH will formulate the detailed and substantial coordination program with these agencies;
- At the initial stage of implementation of the orchard development programs, it is necessary to identify the participating farmers as well as development areas through "socialization meetings" and then explain to them about the project objectives, advantages, required activities and obligations, and so on. Afterwards, the Final Definite Development Plan will be prepared in cooperation with the participating farmers;
- DGFCH will establish an implementation organization so as to assure institutional linkage with other relevant ministries and agencies, intra-ministerial coordination system in MOA as well as administrative coordination with the Provincial and District authorities; and
- The programs related to institutional and human resources development (DP-2, DP-3, DP-7, PP-1, PP-2 and PP-7) are also very important for successful implementation of the Action Plan. Hence these programs should be put into practice immediately after preparation of the Final Definite Development Plan.

- Before the completion of this Action Plan or Phase I programs/projects, the Implementation Program of the next Phase II programs/projects should be duly formulated to ensure smooth continuation of the Master Plan, and the same is to be done for the final Phase III to realize its ultimate objectives up to the target year 2018.

Tables

Table AT-1-1 Member List of JICA Study Team and Indonesian Counterparts

Name	Expertise/ Position	Institution
JICA Study Team		
1. Yutaka MATSUMOTO	Team Leader	JICA
2. Fumihiko FURUICHI	Farm Economy	JICA
3. Hiroshi DAITOU	Seedling Production	JICA
4. Mochd. BAGA KALIE	Cultivation/ Extension	JICA
5. Takeshi SATTO	Post-harvest & Marketing	JICA
6. Ridwan D. MAERWY	Rural Society/ Gender	JICA
7. Masafumi IKENO	Institutional Development/ Farmers' Organization	JICA
8. Irlan SOEJONO	Market Analysis	JICA
9. Kenji KYOIZUMI	Infrastructure & Facilities	JICA
DGFCH Counterpart		
1. Yul H. Bahar	Environmentalist and Crops Product Processing	Directorate of Programming Development, DGFCH
2. Sri Wijayanti	Agronomist and Horticulturist	Directorate of Programming Development, DGFCH
3. Winny D. Wibawa	Soil Scientist and Horticulturist	Directorate of Horticulture Production Development, DGFCH
4. Muhammad	Horticulture Seed Production Specialist	Directorate of Seed Development, DGFCH
5. Kismo Satmoro	Post-harvest Processing and Social-economist	Directorate of Farm Business and Processing Development, DGFCH
Provincial Counterpart		
1. L. H. Dalimunthe	Agricultural Production	North Sumatra, PRAS
2. Sugeng	Post-harvest and Marketing	ditto
3. Balk Pinem	Social Analysis & Farm Economy	ditto
4. Ida Noerdiyati	Agricultural Production	West Java, PRAS
5. Sodikin	Post-harvest and Marketing	ditto
6. Almursyid	Social Analysis & Farm Economy	ditto
7. Suhardjo	Agricultural Production	East Java, PRAS
8. Sadono	Post-harvest and Marketing	ditto
9. Tony	Social Analysis & Farm Economy	ditto
10. Achmad Kasiyani	Agricultural Production	South Sulawesi, PRAS
11. Nufri Esten	Post-harvest and Marketing	ditto
12. Syafnimar	Social Analysis & Farm Economy	ditto

Table AT-2-1 Production Targets of Food and Horticultural Crops, 1994/95-1998/99

(Unit : 1,000 tons)

No.	Target Crops	End of Repelita V (1993/94) *	1994/95	1995/96	1996/97	1997/98	1998/99	Growth Rate (% / year)	Average 1993/94-1998/99 (%)	
1.	Unhusked Rice **	48,200	49,169	50,157	51,165	52,194	53,243	(2.01)	50,688	(40.44)
2.	Milled Rice	31,330	31,960	32,602	33,257	33,926	34,608	(2.01)	32,947	(26.29)
3.	Corn	7,987	8,788	8,601	8,925	9,261	9,611	(3.77)	8,862	(7.07)
4.	Soybean	1,792	1,840	1,907	1,968	2,030	2,095	(3.17)	1,939	(1.55)
5.	Cassava	16,356	16,384	16,412	16,439	16,467	16,495	(0.17)	16,426	(13.11)
6.	Sweet Potato	2,277	2,334	2,381	2,424	2,467	2,509	(1.96)	2,399	(1.91)
7.	Peanut	703	723	744	770	800	840	(3.64)	763	(0.61)
8.	Mungbean	310	335	352	359	388	407	(5.00)	359	(0.29)
9.	Vegetables	4,377	4,600	4,835	5,081	5,341	5,613	(5.10)	4,975	(3.97)
10.	**Fruits**	**5,388**	**5,609**	**5,839**	**6,078**	**6,327**	**6,587**	**(4.10)**	**5,971**	**(4.76)**
	Total	118,720	121,742	123,830	126,466	129,201	132,008	(2.14)	125,328	(100.00)

Notes : * Estimated realization values (last year of Replita V)
** Milled dry rice grain

Source : Policy and Development Pattern of Food Crop and Horticulture Crops, DGFCH, Ministry of Agriculture.

Table AT-2-2 Gross Domestic Product (GDP) by Industrial Origin, 1994-1996

Industrial Origin	At Current Market Price						At Constant 1993 Market Price					
	1994 (Billon Rp.)	Percentage Distribution in 1994 (%)	1995 (Billion Rp.)	Percentage Distribution in 1995 (%)	1996 (Billion Rp.)	Percentage Distribution in 1996 (%)	1994 (Billon Rp.)	Growth Rate (%)	1995 (Billon Rp.)	Growth Rate (%)	1996 (Billon Rp.)	Growth Rate (%)
1. Agriculure, livestock, forestry and fishery	66,071.5	(17.3)	77,896.2	(17.1)	88,040.8	(16.5)	59,291.2	(0.56)	61,885.2	(4.38)	63,742.6	(3.00)
- *Farm food crops*	*34,941.0*	*(9.1)*	*42,199.6*	*(9.3)*	*47,622.1*	*(8.9)*	*31,407.8*	*(2.14)*	*32,951.7*	*(4.92)*	*33,647.0*	*(2.11)*
- *Non food crops*	*10,587.2*	*(2.8)*	*12,666.6*	*(2.8)*	*14,147.8*	*(2.7)*	*9,471.6*	*(5.07)*	*9,912.0*	*(4.65)*	*10,530.6*	*(4.22)*
- *Livestock and products*	*7,102.3*	*(1.9)*	*8,078.7*	*(1.8)*	*9,347.1*	*(1.8)*	*6,451.4*	*(4.01)*	*6,789.5*	*(5.24)*	*7,132.8*	*(5.05)*
- *Forestry*	*6,897.4*	*(1.8)*	*7,390.4*	*(1.6)*	*7,885.0*	*(1.5)*	*6,300.9*	*(0.53)*	*6,303.6*	*(0.04)*	*6,384.2*	*(1.28)*
- *Fishery*	*6,543.6*	*(1.7)*	*7,560.9*	*(1.7)*	*9,040.8*	*(1.7)*	*5,659.5*	*(5.10)*	*5,928.4*	*(4.75)*	*6,248.4*	*(5.40)*
2. Mining and quarrying	33,507.1	(8.8)	40,194.7	(8.8)	45,915.7	(8.6)	33,261.6	(5.60)	35,502.2	(6.74)	37,568.6	(5.82)
3. Manufacturing industry	89,240.7	(23.3)	109,688.7	(24.1)	135,580.9	(25.5)	82,649.0	(12.36)	91,637.1	(10.88)	102,259.7	(11.59)
4. Electricity, gas and water supply	4,577.1	(1.2)	5,655.4	(1.2)	6,593.7	(1.2)	3,702.7	(12.54)	4,291.9	(15.91)	4,840.5	(12.78)
5. Construction	28,016.9	(7.3)	34,451.9	(7.6)	42,024.8	(7.9)	25,857.5	(14.86)	29,197.8	(12.92)	32,923.7	(12.76)
6. Trade, hotels and restaurants	63,858.7	(16.7)	75,639.8	(16.6)	88,877.8	(16.7)	59,504.1	(7.61)	64,230.8	(7.94)	69,372.0	(8.00)
7. *Transport & communication*	27,352.7	(7.2)	30,795.1	(6.8)	34,926.3	(6.6)	25,188.6	(8.34)	27,328.6	(8.50)	29,701.1	(8.68)
8. Financial, ownership & buisiness	34,505.6	(9.0)	39,510.4	(8.7)	44,371.4	(8.3)	30,901.0	(10.17)	34,313.0	(11.04)	37,400.6	(9.00)
9. Services	35,089.4	(9.2)	40,681.9	(9.0)	46,299.4	(8.7)	34,285.1	(2.77)	35,405.7	(3.27)	36,610.1	(3.40)
Gross Domestic Product (GDP)	382,219.7	(100.0)	454,514.1	(100.0)	532,630.8	(100.0)	354,640.8	(7.54)	383,792.3	(8.22)	414,418.9	(7.98)

Source : Statistical Year Book of Indonesia, 1995 & 1996, CBS.

Table AT-2-3 Number of Staff by Subdirectorate relating to the Fruit Production in DGFCH

(Unit: Person)

	Number of Head	Number of Staff	Total
[Directorate of Horticulture Production]			
Subdirectorate of Fruit Production:	**1**	**10**	**11**
– Head of Subdirectorate	**1**		**1**
• Section of Land Cultivation	**1**	**3**	**4**
• Section of Production Input & Facilities	**1**	**2**	**3**
• Section of Technology Application	**1**	**2**	**3**
Total	4	7	11
[Directorate of Seeds]			
[Subdirectorate of Horticulture Seeds]			
Head of Subdirectorate	1		1
• Section of Fruit	**1**	**2**	**3**
• Section of Vegetables	1	2	3
• Section of Ornamental	1	2	3
• Section of Medical Plants	1	2	3
Total	5	8	13
[Directorate of Plant Protection]			
Subdirectorate of Integrated Pest			
Head of Subdirectorate	**1**		**1**
• Section of Pest Control	**1**	**1**	**2**
• Section of Disease Control	**1**	**2**	**3**
• Section of Storage Pest	**1**	**2**	**3**
• Section of Weed Control	**1**	**1**	**2**
Total	5	6	11
[Directorate of Farm Business and Processing]			
[Subdirectorate of Horticulture Post Harvest]			
Head of Subdirectorate	**1**		**1**
• Section of Quality	**1**	**3**	**4**
• Section of Processing Technique	**1**	**2**	**3**
• Section of Post Harvest	**1**	**2**	**3**
• Section of Machine and Infrastructure Technique	**1**	**1**	**2**
Total	5	8	13

Source: DGFCH, 1998

Table AT-3-1 Recommended Varieties of the Target Fruits

No.	Crops		Varieties	Origin / Location	Recommended Year
1.	Avocado	1)	Ijo Panjang	Tlekung, Batu Malang, East Jawa	1987
		2)	Ijo Bundar	Tlekung, Batu Malang, East Jawa	1987
2.	Banana	1)	Barangan Merah	Desa Selamat, Sibiru-biru, Deli, North Sumatra	1997
		*	Lately, the recommended varieties of banana were reviewed by MOA and they include Ambong kuning, Ambong jepang (Giant Cavendish), Ambung lumut, Barangan, Raja besar, Badak, Kepok kuning, Nangka, Susu, and Faduk agung.		
3.	Duku (Lanzon)	1)	Palembang	Batu Ampar, O. Komeering Ilir, South Surawesi	1995
		2)	Rasuan	Rasuan, O. Komering Ulu, South Surawesi	1995
		3)	Pontianak	Punggur, West Kalimantan	1995
4.	Durian	1)	Sunan	Gondol Boyolali, Central Jawa	1984
		2)	Sukun	Gempolan Karanganyar, Central Jawa	1984
		3)	*Petruk*	*Randusari Jepara, Central Jawa*	1984
		4)	Sitokong	Ragunan Ps. Minggu, Jakarta	1984
		5)	Mas	Rancamaya, Bogor, East Jawa	1984
		6)	Otong	Introduksi Thailand	1987
		7)	*Kani*	*Introduksi Thailand*	1987
		8)	Sawerigading	Wara Utara, Luwu, South Surawesi	1992
		9)	Lalong	Wara, Luwu, South Surawesi	1992
		10)	Tamalatea	Wara Utara, Luwu, South Surawesi	1992
		11)	Tembaga	Kab. Kampar, Riau	1992
		12)	Sijapang	Karang Intan, South Kalimentan	1992
		13)	Sidodol	Karang Intan, South Kalimentan	1992
		14)	Sihijau	Karang Intan, South Kalimentan	1992
		15)	Perwira	Sinapel Majalengka, West Jawa	1993
		16)	Bokor	Sukahati, Majalengka, West Jawa	1993
		17)	Siriwig	Rajagaluh, Majalengka, West Jawa	1993
		18)	Kakapet	Kayu Tanam, West Kalimentan	1995
		19)	Mansau	Nanga Pinoh, West Kalimentan	1995
		20)	Raja Mabah	Mabah, West Kalimentan	1995
		21)	Sawah Mas	Mabah, West Kalimentan	1995
		22)	Aspar	Pelanan Mabah, West Kalimentan	1995
		23)	Matahari	Cimahpar, Bogor, West Jawa	1995
		24)	Hepi	Jonggol, Bogor, West Jawa	1995
		25)	Bakul	Ujan Mas, Pinang Belarik, South Sumatra	1995
		26)	Bantal	Kikim, Tj. Beringin, M. Enim, South Sumatra	1995
5.	Mango	1)	Arumanis 143	Probolinggo, East Jawa	1984
		2)	Manalagi 69	Pasuruan East Jawa	1984
		3)	Golek 31	Probolinggo, East Jawa	1984
		4)	Gedong Gincu	Majalengka, West Jawa	1995
		5)	Sukku	Masemba, Enrekang, South Sulawesi	1995
		6)	Lanabbu	Liorong, Mattrobulu, Pinrang, South Sulawesi	1995
6.	Mangosteen	1)	Kaligesing	Kakigesing, Purworejo, Central Jawa	1995
7.	Marquisa	1)	Malino	Malino, Tinggi Moncong, Gowa, South Sulawesi	1994
8.	Rambutan	1)	Binjai	Pasar Minggu, Jakarta	1985
		2)	*Rapiah*	*Pasar Minggu, Jakarta*	1985
		3)	Lebak Bulus	Pasar Minggu, Jakarta	1985
		4)	Nona	Kampar, Riau	1992
		5)	Antalagi	Sungai Andai, South Kalimentan	1992
		6)	*Garuda*	*Sungai Andai, South Kalimentan*	1992
		7)	Sibatuk Ganal	Sungai Andai, South Kalimentan	1992
		8)	Sibongkok	Sungai Lulut, South Kalimentan	1992
9.	Salak	1)	Enrekang	Kalimbua-Bontangan, Baraka, Masemba Solanta, Enrekang, South Sulawesi	1992
		2)	Nglumut	Kab. Magelang, Central Jawa	1992
		3)	Pondoh	Lokal Sleman, D.I. Yogyakarta	1987
		4)	Suwaru	Lakal Suwaru, Malang, East Jawa	1992
		5)	Bali	Kab. Karang Asem, Bali	1994
		6)	Gula Pasir	Kab. Karang Asem, Bali	1994

Source : Directorate of Seed Production, 1995-1997.

Table AT-3-2 Production, Harvested Area and Yield of Each Fruit (1984 - 1996)

Production Unit : ton

Year	Avocado	Banana	Duku	Durian	Mango	Rambutan	Salak
1984	58,097	1,991,698	69,614	146,866	442,244	108,328	46,456
1985	62,802	1,908,627	53,032	150,575	416,444	93,282	94,889
1986	72,234	2,079,058	75,688	200,222	415,041	199,207	87,605
1987	71,530	2,192,322	62,522	199,361	515,949	184,643	114,861
1988	62,520	2,046,379	101,464	193,200	531,968	226,850	114,861
1989	61,303	2,192,060	46,985	139,193	445,014	146,889	97,458
1990	84,592	2,410,999	79,899	242,585	508,889	270,686	160,782
1991	91,420	2,471,925	79,779	205,341	640,459	335,792	186,394
1992	93,267	2,650,841	81,014	152,501	484,782	273,425	197,586
1993	93,999	2,643,812	59,610	170,871	460,357	277,790	348,728
1994	102,037	3,086,557	88,214	268,562	668,048	323,495	292,246
1995	162,697	3,805,431	143,060	289,648	888,960	364,036	* 662,547
1996	197,871	3,007,743	111,542	341,635	839,285	* 987,953	285,746
Average	93,413	2,499,035	80,956	207,735	558,265	233,702	168,968

Harvested Area Unit : ha

Year	Avocado	Banana	Duku	Durian	Mango	Rambutan	Salak
1984	16,897	187,627	15,777	31,851	89,326	39,928	8,261
1985	20,030	159,593	13,117	31,769	87,831	28,303	9,605
1986	20,816	128,319	25,287	38,814	97,113	* 194,874	10,362
1987	22,543	175,616	16,734	41,618	121,284	47,909	20,396
1988	* 203,665	169,663	16,409	36,054	104,861	51,102	17,878
1989	21,709	127,843	5,746	24,859	112,113	46,105	23,110
1990	23,828	132,454	11,371	43,756	124,790	66,574	22,704
1991	26,871	135,065	10,956	42,758	159,031	77,069	15,309
1992	27,744	76,535	10,461	36,024	139,563	73,676	8,599
1993	19,185	70,721	8,349	31,383	126,184	66,423	14,626
1994	14,856	50,041	25,428	56,318	133,454	66,250	16,752
1995	19,377	49,044	15,636	46,341	196,604	80,666	18,775
1996	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Average	21,260	121,877	14,606	38,462	124,346	58,546	15,531

Yield Unit : ton/ha

Year	Avocado	Banana	Duku	Durian	Mango	Rambutan	Salak
1984	3.44	10.62	4.41	4.61	4.95	2.71	5.62
1985	3.14	11.96	4.04	4.74	4.74	3.30	9.88
1986	3.47	16.20	2.99	5.16	4.27	1.02	8.45
1987	3.17	12.48	3.74	4.79	4.25	3.85	5.63
1988	0.31	12.06	6.15	5.36	5.07	4.44	6.42
1989	2.82	17.15	8.18	5.60	3.97	3.19	4.57
1990	3.55	18.20	7.03	5.54	4.08	4.07	7.08
1991	3.40	18.30	7.28	4.80	4.03	4.36	12.18
1992	3.36	34.64	7.74	4.23	3.47	3.71	22.98
1993	4.90	37.38	7.14	5.44	3.65	4.18	23.84
1994	6.90	61.70	3.50	4.80	5.00	4.90	17.40
1995	8.40	77.60	9.10	6.30	4.50	4.50	35.30
1996	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Average	3.91	27.36	5.94	5.11	4.33	3.69	13.28

Source : DGFCH

Note : * : rejected due to extraordinary figure
n.a. : not available

Table AT-3-3 Quantity and Value of Food Processing, 1995

Manufacture Code	Item	Unit	Quantity	Value (million Rp.)
31121	Fruit concentrate	1,000 l	12,553	16,947
31131	Canned Pineapple	ton	199,789	109,883
	Canned Fruits	ton	941	3,993
	Sweetend Fruit	ton	125	349
	Papaya Juice	ton	93	69
	Jam	ton	1	6
31133	Sweetened Fruits	ton	357	285
	Salted Fruits	ton	4	6
31134	Jam	ton	312	865
	Papaya Paste	ton	335	301
31141	Canned Fruit	ton	97.4	341
31179	Banana Cake Chip	ton	50	243
	Banana Jam	ton	22	46
	Pineapple Jam	ton	15	29
31184	Syrup Marquisa	1,000 l	12	34
31222	Sun Dry Banana	ton	17	134
31241	Fruit Juice	1,000 l	148	178
31246	Banana Chips	ton	50	150
31249	Banana Chips	ton	4	13
31320	Marquisa Juice	l	650	2
31330	Fruit Juice	1,000 l	1,672	841
31340	Fruit Juice	1,000 l	10,068	2,215
	Marquisa Juice	1,000 l	337	504
	Orange Juice	1,000 l	247	62
	Orange Paste Drink	1,000 l	493	61

Source : Manufacturing Statistics; Manufacture of Food, Beverage and Tobacco 1995; BPS

Table AT-3-4 Trend of Per Capita Fruit Consumption

(Unit kg/year)

Fruit	Nationwide			Urban			Rural		
	1987	1993	1996	1987	1993	1996	1987	1993	1996
Orange	0.73	0.94	1.3	1.3	1.72	2.34	0.57	0.52	0.78
Mango	0.99	0.52	2.13	0.83	0.47	2.29	1.04	0.52	2.03
Apple		0.21	0.68	0.26	0.52	1.4		0.05	0.26
Avocado	0.16	0.16	0.21	0.26	0.31	0.31	0.16	0.12	0.16
Rambutan		3.48	2.44		4.94	3.22		2.76	2.03
Duku		0.16	0.16		0.21	0.26		0.12	0.12
Durian		0.52	0.52		0.68	0.57		0.47	0.52
Salak		0.62	1.2		0.83	1.46		0.52	1.09
Pineapple	0.99	1.04	0.94	0.73	0.73	0.68	1.09	1.2	1.04
Banana	12.95	12.58	9.05	10.61	9.67	6.81	13.78	13.99	10.3
Papaya	4.68	3.02	2.86	4.73	4.26	3.95	4.73	2.39	2.29
Watermelon		0.47	0.78		0.88	1.2		0.21	0.52
Others	11.18	2.29	2.24	11.02	1.51	1.92	10.19	2.65	2.39
Total	30.95	26	24.49	29.75	26.76	26.47	30.56	25.48	23.5

Source : Expenditure for Consumption of Indonesia, 1987, 1993 & 1996, National Economic Survey; BPS

Table AT-3-5 Average Monthly Per Capita Expenditure for Fruit and Food

(Unit : Rp.)

Year	Urban		Rural		Nationwide	
1993	Food	31,908	Food	21,228	Food	24,772
	Fruit	1,766	Fruit	905	Fruit	1,191
		(5.5%)		(4.3%)		(4.8%)
1996	Food	48,278	Food	33,345	Food	38,725
	Fruit	3,000	Fruit	1,469	Fruit	2,021
		(6.2%)		(4.4%)		(5.2%)

Source : Statistical Year Book, 1995 & 1996; BPS

Table AT-3-6 Export Quantity and Value of Fruits (Fresh or Chilled), 1996

Fruit	Weight (tons)	FOB Value (US$ 1,000)	Rate ($/ton)
Bananas including Plantains, Fresh	101,495.1	19,287.2	190
Bananas including Plantains, Dried	806.1	776.2	963
Pineapples, Fresh or Dried	11,336.8	6,905.1	609
Avocado, Fresh or Dried	5.1	5.3	1,039
Guava, Fresh or Chilled	5.9	5.7	966
Mango, Fresh or Chilled	566.3	543.5	960
Mangosteen, Fresh or Chilled	1,981.4	1,523.8	769
Papaya, Fresh	14.0	13.6	971
Durian, Fresh	307.1	212.2	691
Langsat/Duku, Fresh	32.9	43.5	1,322
Rambutan, Fresh	67.0	175.6	2,621
Other Tropical Fruits, Fresh	565.4	785.0	1,388

Source : Indonesia Foreign Trade Statistics, Exports, 1996, Vol.2; BPS

Table AT-3-7 Import Quantity and Value of Tropical and Sub-Tropical Fruits

Fruit	Weight (tons)	CIF Value (US$1,000)
Mango, Fresh or Chilled	40.5	75.7
Avocado, Fresh or Dried	14.5	33.1
Langsat/Duku Fresh	7.4	7.7
Other Tropical Fruit, Fresh	5,019.3	4,264.0
Apples, Fresh	37,638.7	28,813.5
Mandarin, Fresh	34,850.8	18,615.8
Pear and Quince, Fresh	22,155.5	17,061.7
Orange, Fresh	14,952.3	8,739.6
Date, Fresh	12,304.7	3,887.7
Kiwifruit, Fresh	709.9	757.2
Coconut in shell	625.0	958.4

Source : Indonesia Foreign Trade Statistics, Imports 1996, Vol. 2; BPS

Table AT-4-1 Population Data in the Study Area

Province	Area (km^2)	Population (1,000)			Population Density in 1996	Annual Growth Rate	No. of Households		Average Household	Working Population		No. of Workers in Primary Sector*		Migrant Status in 1995	
		1990	1996	(%)	(Persons /km^2)	1990-96 (%)	1995	(%)	Member ('96)	No. in 1996	(%)	1996	(%)**	Migrant	(%)***
- North Sumatra	70,787	10,252	11,306	(5.70)	160	(1.64)	2,346,000	(5.14)	4.8	4,607,166	(5.38)	2,506,947	(2.93)	1,025,451	(9.07)
- West Java	46,300	35,382	40,118	(20.23)	866	(2.12)	9,453,000	(20.71)	4.2	15,176,561	(17.71)	4,672,419	(5.45)	1,891,615	(4.72)
- East Java	47,921	32,488	34,124	(17.20)	712	(0.82)	8,648,000	(18.94)	3.9	16,414,278	(19.15)	7,024,431	(8.20)	2,879,389	(8.44)
- South Sulawesi	72,781	6,980	7,693	(3.88)	106	(1.63)	1,635,000	(3.58)	4.7	3,031,873	(3.54)	1,751,904	(2.04)	792,342	(10.30)
Study Area	237,789	85,102	93,241	(47.01)	392	(1.53)	22,082,000	(48.37)	4.2	39,229,878	(45.77)	15,955,701	(18.62)	6,588,797	(7.07)
(% to Total)	(12.39)	(47.48)	(47.01)		(388.24)	-	(48.37)	-		(45.77)	-	(42.30)	-	(36.74)	-
Indonesia	1,919,317	179,248	198,343	(100.00)	101	(1.70)	45,653,000	(100.00)	4.3	85,701,813	(100.00)	37,720,251	(44.01)	17,935,599	(9.04)

Note : * Population aged 10 years and over who are working in Primary Sector including Agriculture, Forestry, Hunting and Fishery.
** % to the total working population.
*** % to the national total population in 1996.

Source : Statistical Year Book of Indonesia, 1995 & 1996.

Table AT-4-2 Land Utilized for Agricultural Development, 1995

Land Use / Province	North Sumatra		West Java		East Java		South Sulawesi		Study Area		Indonesia (by Category)	
	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)
House compounds and Surroundings	309,186	(7.36)	466,015	(13.83)	587,984	(18.38)	167,517	(5.50)	1,530,702	(11.08)	5,155,422	(8.91)
(% to Indonesia Total)		*(6.0)*		*(9.0)*		*(11.4)*		*(3.2)*		*(29.7)*		*(100.0)*
Dryland & garden for crop cultivation	**663,205**	**(15.78)**	**997,590**	**(29.60)**	**1,164,452**	**(36.40)**	**662,960**	**(21.79)**	**3,488,207**	**(25.25)**	**11,368,507**	**(19.65)**
(% to Indonesia Total)		*(5.8)*		*(8.8)*		*(10.2)*		*(5.8)*		*(30.7)*		*(100.0)*
Meadows	197,953	(4.71)	38,619	(1.15)	2,872	(0.09)	285,569	(9.38)	525,013	(3.80)	1,889,399	(3.27)
(% to Indonesia Total)		*(10.5)*		*(2.0)*		*(0.2)*		*(15.1)*		*(27.8)*		*(100.0)*
Dyke (Brackish fishery)	9,653	(0.23)	35,212	(1.04)	51,914	(1.62)	107,298	(3.53)	204,077	(1.48)	422,564	(0.73)
(% to Indonesia Total)		*(2.3)*		*(8.3)*		*(12.3)*		*(25.4)*		*(48.3)*		*(100.0)*
Water pond (Inland fishery)	7,530	(0.18)	30,853	(0.92)	2,012	(0.06)	12,858	(0.42)	53,253	(0.39)	182,156	(0.31)
(% to Indonesia Total)		*(4.1)*		*(16.9)*		*(1.1)*		*(7.1)*		*(29.2)*		*(100.0)*
Temporarily fallow land	400,089	(9.52)	50,959	(1.51)	20,095	(0.63)	178,166	(5.85)	649,309	(4.70)	6,967,938	(12.04)
(% to Indonesia Total)		*(5.7)*		*(0.7)*		*(0.3)*		*(2.6)*		*(9.3)*		*(100.0)*
Wood land	429,593	(10.22)	212,900	(6.32)	54,409	(1.70)	490,718	(16.13)	1,187,620	(8.60)	9,555,010	(16.51)
(% to Indonesia Total)		*(4.5)*		*(2.2)*		*(0.6)*		*(5.1)*		*(12.4)*		*(100.0)*
Agricultural estates	1,643,920	(39.13)	385,057	(11.43)	167,498	(5.24)	507,217	(16.67)	2,703,692	(19.57)	13,835,746	(23.91)
(% to Indonesia Total)		*(11.9)*		*(2.8)*		*(1.2)*		*(3.7)*		*(19.5)*		*(100.0)*
Wetland (Paddy field)	540,576	(12.87)	1,152,753	(34.21)	1,147,539	(35.87)	630,798	(20.73)	3,471,666	(25.13)	8,484,687	(14.66)
(% to Indonesia Total)		*(6.4)*		*(13.6)*		*(13.5)*		*(7.4)*		*(40.9)*		*(100.0)*
Total Agricultural Land	4,201,705	(100.00)	3,369,958	(100.00)	3,198,775	(100.00)	3,043,101	(100.00)	13,813,539	(100.00)	57,861,429	(100.00)
(% to Indonesia Total)		*(7.3)*		*(5.8)*		*(5.5)*		*(5.3)*		*(23.9)*		*(100.0)*
% to Total Land Area	-	**(58.6)**	-	**(78.1)**	-	**(66.7)**	-	**(48.7)**	-	**(61.3)**	-	**(29.9)**

Source : Statistical Year Book of Indonesia, 1995 & 1996.

Table AT-4-3 Number of Horticulture Farm-Households in North Sumatra, 1983&1993

District / Municipality	1983		1993		Growth Ratio
	Total	(%)	Total	(%)	(1983=100)
1. Nias	19,504	(7.64)	41,665	(17.43)	113.62
2. Tapanuli Selatan	26,527	(10.39)	29,513	(12.34)	11.26
3. Tapanuli Tengah	3,303	(1.29)	5,424	(2.27)	64.21
4. Tapanuli Utara	41,059	(16.09)	31,126	(13.02)	-24.19
5. Labuan Batu	17,444	(6.84)	8,698	(3.64)	-50.14
6. Asahan	17,434	(6.83)	7,999	(3.35)	-54.12
7. Simalungun	35,448	(13.89)	16,110	(6.74)	-54.55
8. Dairi	6,681	(2.62)	11,409	(4.77)	70.77
9. Karo	14,693	(5.76)	22,988	(9.61)	56.46
10. Deli Serdang	45,207	(17.71)	36,804	(15.39)	-18.59
11. Langkat	21,142	(8.28)	22,737	(9.51)	7.54
12. Sibolga	80	(0.03)	41	(0.02)	-48.75
13. Tanjung Balai	182	(0.07)	345	(0.14)	89.56
14. Pematang Siantar	329	(0.13)	103	(0.04)	-68.69
15. Tebing Tinggi	868	(0.34)	1,118	(0.47)	28.80
16. Medan	4,668	(1.83)	1,778	(0.74)	-61.91
17. Binjai	638	(0.25)	1,231	(0.51)	92.95
Total	255,207	(100.00)	239,089	(100.00)	-6.32

Source : Biro Pusat Statistik Jakarta, Sensus Pertanian 1993, Seri H.2 North Sumatera, 1993.

Table AT-4-4 Number of Horticulture Farm-Households in West Java, 1983 & 1993

District / Municipality	1983		1993		Growth Ratio
	Total	(%)	Total	(%)	(1983=100)
1. Pandeglang	55,803	(3.92)	37,522	(4.44)	-32.76
2. Lebak	80,550	(5.66)	36,855	(4.36)	-54.25
3. Bogor	128,997	(9.07)	69,612	(8.23)	-46.04
4. Sukabumi	90,113	(6.34)	64,950	(7.68)	-27.92
5. Cianjur	107,593	(7.57)	50,197	(5.93)	-53.35
6. Bandung	99,861	(7.02)	63,876	(7.55)	-36.04
7. Garut	111,767	(7.86)	66,712	(7.89)	-40.31
8. Tasikmalaya	93,875	(6.60)	54,361	(6.43)	-42.09
9. Ciamis	133,385	(9.38)	57,866	(6.84)	-56.62
10. Kuningan	59,761	(4.20)	24,897	(2.94)	-58.34
11. Cirebon	28,170	(1.98)	21,347	(2.52)	-24.22
12. Majalengka	68,248	(4.80)	35,607	(4.21)	-47.83
13. Sumedang	66,817	(4.70)	40,090	(4.74)	-40.00
14. Indramayu	31,541	(2.22)	32,390	(3.83)	2.69
15. Subang	60,308	(4.24)	38,541	(4.56)	-36.09
16. Purwakarta	26,201	(1.84)	14,367	(1.70)	-45.17
17. Karawang	38,716	(2.72)	20,979	(2.48)	-45.81
18. Bekasi	55,663	(3.91)	34,931	(4.13)	-37.25
19. Tangerang	31,958	(2.25)	25,061	(2.96)	-21.58
20. Serang	48,130	(3.38)	52,202	(6.17)	8.46
21. Kodya Bogor	301	(0.02)	451	(0.05)	49.83
22. Kodya Sukabumi	571	(0.04)	161	(0.02)	-71.80
23. Kodya Bandung	2,234	(0.16)	2,405	(0.28)	7.65
24. Kodya Cirebon	1,369	(0.10)	559	(0.07)	-59.17
25. Kodya Tangerang	0	(0.00)	0	(0.00)	-
Total	1,421,932	(100.00)	845,939	(100.00)	-40.51

Source : Biro Pusat Statistik Jakarta, Sensus Pertanian 1993, West Java Province.

Table AT-4-5 Number of Horticulture Farm-Households in East Java, 1993

District / Municipality	1993			% of Hort. Farmers to Total Farm Households
	Total Farm Households	No. of Horti-culture Farmers	(%)	
1. Pacitan	115,311	35,055	(4.29)	30.40
2. Ponorogo	152,556	26,896	(3.30)	17.63
3. Trenggalek	117,985	8,920	(1.09)	7.56
4. Tulung Agung	121,884	14,553	(1.78)	11.94
5. Blitar	154,511	33,637	(4.12)	21.77
6. Kediri	149,958	43,788	(5.36)	29.20
7. Malang	277,539	75,768	(9.28)	27.30
8. Lumajang	128,832	35,854	(4.39)	27.83
9. Jember	234,144	37,159	(4.55)	15.87
10. Banyuwangi	165,759	30,500	(3.74)	18.40
11. Bondowoso	121,252	19,667	(2.41)	16.22
12. Situbondo	89,463	17,365	(2.13)	19.41
13. Probolinggo	155,007	47,866	(5.86)	30.88
14. Pasuruan	157,823	39,992	(4.90)	25.34
15. Sidoarjo	55,102	8,447	(1.03)	15.33
16. Mojokerto	90,245	20,034	(2.45)	22.20
17. Jombang	98,431	12,294	(1.51)	12.49
18. Nganjuk	123,278	30,856	(3.78)	25.03
19. Madiun	94,114	13,656	(1.67)	14.51
20. Magetan	98,383	23,258	(2.85)	23.64
21. Ngawi	138,052	10,409	(1.28)	7.54
22. Bojonegoro	189,249	26,627	(3.26)	14.07
23. Tuban	157,087	45,744	(5.60)	29.12
24. Lamongan	178,579	20,287	(2.49)	11.36
25. Gresik	94,069	20,215	(2.48)	21.49
26. Bangkalan	120,740	32,141	(3.94)	26.62
27. Sampang	131,187	33,479	(4.10)	25.52
28. Pamekasan	109,813	19,195	(2.35)	17.48
29. Sumenep	221,349	32,538	(3.99)	14.70
Total	4,041,702	816,200	(100.00)	20.19

Source : Biro Pusat Statistik Jakarta, Sensus Pertanian 1993, Seri H.13, East Java, 1993.

Table AT-4-6 Number of Horticulture Farm-Households in South Sulawesi, 1993

District / Municipality	1993			% of Hort. Farmers to Total Farm Households
	Total Farm Households	No. of Horti-culture Farmers	(%)	
1. Selayar	16,443	3,496	(1.75)	21.26
2. Bulukumba	54,898	16,516	(8.26)	30.08
3. Bantaeng	22,095	8,130	(4.07)	36.80
4. Jeneponto	48,427	14,884	(7.45)	30.73
5. Takalar	25,657	7,429	(3.72)	28.96
6. Gowa	63,638	21,702	(10.86)	34.10
7. Sinjai	28,471	7,775	(3.89)	27.31
8. Maros	33,893	6,381	(3.19)	18.83
9. Pangkep	28,807	3,088	(1.54)	10.72
10. Barru	17,153	3,112	(1.56)	18.14
11. Bone	94,972	18,296	(9.15)	19.26
12. Soppeng	35,295	6,707	(3.36)	19.00
13. Wajo	53,889	13,932	(6.97)	25.85
14. Sidrap	30,366	6,833	(3.42)	22.50
15. Pinrang	38,531	7,194	(3.60)	18.67
16. Enrekang	23,169	8,719	(4.36)	37.63
17. Luwu	108,882	20,972	(10.49)	19.26
18. Tator	62,467	2,770	(1.39)	4.43
19. Polmas	58,237	10,378	(5.19)	17.82
20. Mjene	14,958	3,164	(1.58)	21.15
21. Mamuju	32,017	5,836	(2.92)	18.23
22. Ujung Pandang	7,120	1,812	(0.91)	25.45
23. Pare-Pare	2,532	757	(0.38)	29.90
Total	901,917	199,883	(100.00)	22.16

Source : Biro Pusat Statistik Jakarta, Sensus Pertanian 1993, South Sulawesi Province.

Table AT-4-7 Food Crops Production in the Study Area, 1995

(Unit : 1,000 ton)

Province / Area	Paddy	(%)	Maize	(%)	Cassava	(%)	Potato	(%)	Peanut	(%)	Soyabean	(%)	Total	(%)	Population (1,000)	Per Capita Food Crops Production	Land Area in 1995 (km2)	Ratio of Total Production/Area (ton / km2)
- North Sumatra	3,134.5	(6.3)	371.6	(4.5)	373.3	(2.4)	117.3	(5.4)	32.1	(4.2)	49.7	(3.0)	4,078.5	(5.2)	11,115	(0.37)	71,680	(56.90)
- West Java	10,722.7	(21.6)	332.2	(4.0)	1,700.3	(11.0)	489.3	(22.5)	117.4	(15.4)	95.7	(5.7)	13,457.6	(17.2)	39,207	(0.34)	43,177	(311.68)
- East Java	8,572.7	(17.2)	2,820.9	(34.2)	3,381.9	(21.9)	239.4	(11.0)	145.1	(19.1)	487.2	(29.0)	15,647.2	(20.0)	33,844	(0.46)	47,923	(326.51)
- South Sulawesi	3,727.1	(7.5)	738.9	(9.0)	604.7	(3.9)	89.4	(4.1)	86.3	(11.4)	77.2	(4.6)	5,323.6	(6.8)	7,558	(0.70)	62,483	(85.20)
Study Area	26,157.0	(52.6)	4,263.6	(51.7)	6,060.2	(39.2)	935.4	(43.1)	380.9	(50.1)	709.8	(42.3)	38,506.9	(49.3)	91,724	(0.42)	225,263	(170.94)
Indonesia	49,744.1	(100.0)	8,245.9	(100.0)	15,441.5	(100.0)	2,171.0	(100.0)	760.1	(100.0)	1,680.0	(100.0)	78,042.6	(100.0)	194,755	(0.40)	1,937,179	(40.29)

Source : Environmental Statistics of Indonesia 1996, Biro Pusat Statistik (BPS).

Table AT-4-8 Number and Percentage of Population below the Poverty Line, 1993 & 1996

Province	Urban Area				Rural Area				Urban and Rural Area		
	No. of Population Below Poverty Line		Poverty Line (Rp./Cap./Month)		No. of Population Below Poverty Line		Poverty Line (Rp./Cap./Month)		No. of Population Below Poverty Line		% to the Total
	1993 (%)	1996 (%)	1993	1996	1993 (%)	1996 (%)	1993	1996	1993 (%)	1996 (%)	Population ('96)
- North Sumatra	494,479 (5.7)	457,037 (6.3)	26,822	40,356	837,152 (4.9)	777,157 (5.1)	19,117	30,091	1,331,631 (5.1)	1,234,184 (5.5)	10.92
- West Java	2,327,139 (26.7)	1,879,653 (26.1)	30,559	41,688	2,285,213 (13.3)	2,082,458 (13.6)	20,497	30,356	4,612,352 (17.8)	3,962,111 (17.6)	9.88
- East Java	1,704,433 (19.6)	1,520,902 (21.1)	26,680	36,452	2,719,276 (15.8)	2,525,627 (16.5)	16,924	25,519	4,423,709 (17.1)	4,046,529 (18.0)	11.86
- South Sulawesi	257,162 (3.0)	241,230 (3.4)	25,024	36,281	401,990 (2.3)	375,901 (2.5)	16,033	21,614	659,152 (2.5)	617,131 (2.7)	8.02
Study Area	4,783,213 (55.0)	4,098,822 (56.9)	-	-	6,243,631 (36.3)	5,761,143 (37.7)	-	-	11,026,844 (42.6)	9,859,955 (43.8)	10.57
Indonesia	8,700,000 (100.0)	7,200,000 (100.0)	27,905	38,246	17,200,000 (100.0)	15,300,000 (100.0)	18,244	27,413	25,900,000 (100.0)	22,500,000 (100.0)	11.34

Source : Statisitical Year Book of Indonesia 1996.

Table AT-4-9 Annual Harvesting Area for Target Frutis by Province

Avocado (Unit : ha)

Province	Year					Average
	1991	1992	1993	1994	1995	
North Sumatra	691	760	323	461	426	532
West Java	11,804	8,218	6,285	3,552	4,694	6,911
East Java	7,013	6,594	5,524	3,248	4,881	5,452
South Sulawesi	1,207	3,541	2,188	2,676	2,019	2,326
Indonesia	26,871	27,744	19,185	14,856	19,377	21,607

Banana

Province	Year					Average
	1991	1992	1993	1994	1995	
North Sumatra	3,417	4,232	1,694	1,041	1,406	2,358
West Java	47,814	12,431	12,088	12,079	13,713	19,625
East Java	19,716	13,280	12,129	6,693	6,534	11,670
South Sulawesi	4,875	979	2,718	2,110	2,390	2,614
Indonesia	135,065	76,535	70,721	50,041	49,044	76,281

Durian

Province	Year					Average
	1991	1992	1993	1994	1995	
North Sumatra	2,701	5,303	2,246	3,507	3,181	3,388
West Java	8,707	4,653	4,038	6,657	4,126	5,636
East Java	4,057	3,271	3,143	2,049	3,096	3,123
South Sulawesi	2,272	1,853	2,710	2,209	2,811	2,371
Indonesia	42,742	36,024	31,383	56,318	46,341	42,562

Duku

Province	Year					Average
	1991	1992	1993	1994	1995	
North Sumatra	718	508	648	348	339	512
West Java	1,464	1,127	1,184	1,556	2,509	1,568
East Java	455	1,468	460	802	403	718
South Sulawesi	1,536	1,203	1,184	3,802	2,137	1,972
Indonesia	10,956	10,461	8,349	25,428	15,636	14,166

Mango

Province	Year					Average
	1991	1992	1993	1994	1995	
North Sumatra	1,708	761	382	5,063	953	1,773
West Java	26,625	23,250	24,648	20,079	24,921	23,905
East Java	58,436	56,889	47,015	48,942	83,295	58,915
South Sulawesi	15,065	9,514	5,768	13,182	7,831	10,272
Indonesia	159,031	139,623	126,184	133,454	196,604	150,979

Mangosteen

Province	Year					Average
	1991	1992	1993	1994	1995	
North Sumatra	-	-	-	-	755	755
West Java	-	-	-	-	1,454	1,454
East Java	-	-	-	-	478	478
South Sulawesi	-	-	-	-	83	83
Indonesia	-	-	-	-	5,162	5,162

Marquisa (in ton)

Province	Year					Average
	1991	1992	1993	1994	1995	
North Sumatra	-	-	-	-	939	939
West Java	-	-	-	-	-	-
East Java	-	-	-	-	-	-
South Sulawesi	-	-	-	-	33,881	33,881
Indonesia	-	-	-	-	34,820	34,820

Rambutan

Province	Year					Average
	1991	1992	1993	1994	1995	
North Sumatra	2,035	3,987	2,342	1,353	1,350	2,213
West Java	23,484	19,077	15,572	16,394	11,205	17,146
East Java	11,059	12,475	10,729	6,329	9,006	9,920
South Sulawesi	788	1,731	1,907	761	1,902	1,418
Indonesia	77,069	73,676	66,423	66,250	80,666	72,817

Salak

Province	Year					Average
	1991	1992	1993	1994	1995	
North Sumatra	98	109	370	3,113	3,676	1,473
West Java	4,924	2,478	2,387	2,262	7,073	3,825
East Java	659	696	5,245	388	494	1,496
South Sulawesi	444	314	831	281	268	428
Indonesia	15,309	8,599	14,626	16,752	18,775	14,812

Source : Direktorat Bina Program
Direktorat Jenderal Tanaman Pangan & Hortikultura
Tahun 1994,1995,1996 & 1997

Table AT-4-10 Average Yield for Target Fruits by Province

Avocado (Unit : ton/ha)

Province	Year					Average
	1991	1992	1993	1994	1995	
North Sumatra	4.3	3.2	7.9	7.5	6.6	5.3
West Java	4.0	4.6	6.5	12.4	16.2	7.1
East Java	3.5	3.6	3.7	6.9	7.2	4.6
South Sulawesi	2.6	3.2	2.8	2.3	2.8	2.8
Indonesia	3.4	3.4	4.9	6.9	8.4	5.0

Banana

Province	Year					Average
	1991	1992	1993	1994	1995	
North Sumatra	20.0	24.0	52.4	104.1	73.0	39.8
West Java	12.8	59.3	63.4	76.2	82.5	42.5
East Java	30.2	30.3	29.6	74.2	103.5	43.4
South Sulawesi	40.7	224.7	91.2	111.1	81.5	83.8
Indonesia	18.3	34.6	37.4	61.7	77.6	38.4

Durian

Province	Year					Average
	1991	1992	1993	1994	1995	
North Sumatra	5.8	5.8	10.6	11.0	14.8	9.2
West Java	6.6	5.1	7.0	7.2	7.3	6.7
East Java	4.1	4.6	4.7	6.3	10.2	5.8
South Sulawesi	4.3	0.3	2.6	3.3	4.6	3.2
Indonesia	4.8	4.2	5.4	4.8	6.3	5.1

Duku

Province	Year					Average
	1991	1992	1993	1994	1995	
North Sumatra	7.8	8.2	4.3	6.7	11.5	7.4
West Java	9.6	12.9	13.8	7.9	5.9	9.2
East Java	6.7	6.1	9.3	5.6	20.8	8.1
South Sulawesi	8.3	12.2	7.7	4.2	9.1	7.3
Indonesia	7.3	7.7	7.1	3.5	9.1	6.4

Mango

Province	Year					Average
	1991	1992	1993	1994	1995	
North Sumatra	2.1	3.2	10.4	1.0	6.1	2.4
West Java	6.7	4.7	4.3	8.0	5.5	5.8
East Java	5.0	3.3	3.4	5.1	4.8	4.4
South Sulawesi	0.5	2.6	4.5	2.7	7.2	2.9
Indonesia	4.0	3.5	3.6	5.0	4.5	4.2

Mangosteen

Province	Year					Average
	1991	1992	1993	1994	1995	
North Sumatra	-	-	-	-	4.1	4.1
West Java	-	-	-	-	4.6	4.6
East Java	-	-	-	-	14.4	14.4
South Sulawesi	-	-	-	-	2.4	2.4
Indonesia	-	-	-	-	7.0	7.0

Marquisa

Province	Year					Average
	1991	1992	1993	1994	1995	
North Sumatra	-	-	-	-	-	-
West Java	-	-	-	-	-	-
East Java	-	-	-	-	-	-
South Sulawesi	-	-	-	-	-	-
Indonesia	-	-	-	-	-	-

Rambutan

Province	Year					Average
	1991	1992	1993	1994	1995	
North Sumatra	1.5	2.3	1.7	9.2	7.0	3.5
West Java	6.4	5.3	6.6	7.0	5.5	6.2
East Java	4.4	4.1	3.8	7.0	5.5	4.7
South Sulawesi	2.9	3.4	2.0	7.8	3.3	3.4
Indonesia	4.4	3.7	4.2	4.9	4.5	4.3

Salak

Province	Year					Average
	1991	1992	1993	1994	1995	
North Sumatra	15.7	22.4	13.5	35.4	32.8	32.5
West Java	13.9	39.4	95.3	30.6	53.6	44.0
East Java	48.8	21.8	7.0	22.5	48.3	15.6
South Sulawesi	13.0	26.8	19.3	32.8	68.1	27.0
Indonesia	12.2	23.0	23.8	17.4	35.3	22.8

Source : Direktorat Bina Program
Direktorat Jenderal Tanaman Pangan & Hortikultura
Tahun 1994,1995,1996 & 1997

Table AT-6-1 Provincial Profile for Orchard Development in the Study Area

Major Items (Indicators)	(year)	North Sumatra	West Java	East Java	South Sulawesi	Remarks
1. Horticultural Dev. Authority	(1997)	- North Sumatra Provincial *DIPERTA* (Diperta Propinsi or PRAS)	- West Java Provincial *DIPERTA* (Diperta Propinsi or PRAS)	- East Java Provincial *DIPERTA* (Diperta Propinsi or PRAS)	- South Sulawesi *DIPERTA* (Diperta Propinsi or PRAS)	- DGHCH at Central Government Level
2. Agro-Ecological Conditions	(1997)					- The climate of Indonesia is highly diverse
2.1 Climatic Factor		- Wet to very wet	- Wet to very wet	- Rather wet, wet to very wet	- Rather wet, wet to very wet	- Most of country enjoys a moist tropical climate
2.2 Edaphic Factor		- Low and high upland	- Low upland	- Low Upland	- Low and high upland	
2.3 Physiographic Factor		- Flat to steep slope	- Flat to undulating	- Flat to steep slope	- Flat to steep slope	
3. Horticultural Research Institution						- Center for Horticultural Crops Research & Dev. (Jakarta)
3.1 Assessment Institute for Agricultural Technology	(1997)	1 (Sei Putih)	1 (Lembang)	1 (Karang Ploso)	1 (Jeneponto)	- Fruit Research Institute (Solok, West Sumatra)
4. Seedling Production / Propagation						
4.1 Horticulture BBI Farms (ha)	(1997)	10.0	29.0	18.0	9.2	
4.2 BBI (no.)	(1997)	1 (Kota Gadang)	1 (Pasir Banteng)	1 (Pohjentrek)	1 (Bonto-Bonte)	
4.3 BBU (no.)	(1997)	2	3	5	2	
4.4 BBP (no.)	(1997)	12	31	8	10	
4.5 BPSB (no.)	(1997)	1	1	1	1	- Indonesia Total (27)
4.6 Nursery (no.)	(1997)	32	284	171	76	- Indonesia Total (1,460)
5. Farm Management						
5.1 Total Farm Households	(1993)	1,117,740	3,519,170	4,245,362	934,512	- Indonesia Total : 21,482,000
• National Weight (%)		*(5.20)*	*(16.38)*	*(19.76)*	*(4.35)*	
5.2 Horticulture Farm Households	(1993)	239,089	845,939	816,200	199,883	- Indonesia Total : 5,044,000
• National Weight (%)		*(4.74)*	*(16.77)*	*(16.18)*	*(3.96)*	
5.3 Average Land Size (ha)	(1993)	0.96	0.48	0.48	1.10	
5.4 Farming Method		- Traditional to semi-commercial	- Traditional to semi-commercial	- Traditional to semi-commercial	- Traditional to semi-commercial	
6. Extension						
6.1 BPP (Rural Agricultural Extension Center)	(1997)	96	236	244	120	- Indonesia Total : 1,884
6.2 BIPP (Rural Agricultural Information and Extension Center)	(1997)	11	20	29	21	- Indonesia Total : 243
6.3 PPS (no.)	(1997)	96	190	226	136	- Indonesia Total : 2,155
6.4 PPL (no.)	(1997)	1,669	3,408	3,191	1,966	- Indonesia Total : 31,255
6.5 No. of Farm Housseholds per PPS	(1997)	11,643	18,522	18,785	6,871	- Indonesia Average : 9,968
6.6 No. of Farm Households per PPL	(1997)	670	1,033	1,330	475	- Indonesia Average : 687
7. Farmers' Organizations& KUD						
7.1 No.of Desa where Kelompok Tani is established	(1993)	1,216	4,286	6,063	584	- Indonesia Total : 31,156
• National Weight (%)		*(3.90)*	*(13.76)*	*(19.46)*	*(1.87)*	*(100.00)*
7.2 KUD	(1995)	594	759	752	536	- Indonesia Total : 9,200
• National Weight (%)		*(6.46)*	*(8.25)*	*(8.17)*	*(5.83)*	*(100.00)*
8. Infrastructure						
8.1 Major Seaport	(1997)	- Belawan - Tg. Balai Asahan	- Tg. Priok *	- Tg. Perak	- Makassar (Ujung Pandang) - Pare-Pare	* Located in DKI Jakarta
8.2 Major Airport	(1997)	- Polonia (Medan)	- Soekarno-Hatta Int. Airport	- Juanda (Surabaya)	- (Ujung Pandang)	
9. Market / Trading						
9.1 Major Trading Centers	(1997)	- Medan	- Bandung (& Jakarta*)	- Surabaya	- Ujung Pandang	- Jakarta
9.2 Fruit Supply & Demand Situation	(1997)	- Demand and supply are well balanced	- Demand exceeds supply	- Supply just exceeds demand	- Supply fairly exceeds demand	
10. Agro-Industry & Post-harvest Processing Factories						
10.1 Fruit Juice	(1997)	4	6	10	34 **	** including home industry

Note : For abbreviations, refer to the "Abbreviations and Glossary" in the Text
Source: JICA Study Team

Table AT-6-2 Basic Development Plan by Target Fruit in North Sumatra

Major Development Menus (Components)	Target Fruits				
	Durian	Mangosteen	Marquisa	Rambutan	Salak
1. Land Resources					
1.1 Intensified land use	◎	◎	◎	◎	◎
1.2 Preparation of cadastral map	◎	◎	◎	◎	◎
2. Social Acceptability					
2.1 Confirmation of farmers' participation	◎	◎	◎	◎	◎
3. Planting Materials					
3.1 Strengthening of the Institutes Concerned	◎	◎	◇	◎	◎
3.2 Upgrading and modernization of propagation of high quality seedlings	◎	◎	◇	◎	◎
3.3 Improvement of certification system	◎	◎	△	◎	◎
3.4 Development of well-managed commercial nurseries	◎	◎	△	○	◎
3.5 Strengthening of farm input selection	◇	◇	○	○	◎
4. Farming System and Technology					
4.1 Structural improvement of traditional cultivation system	◇	◇	○	○	◇
4.2 Shift of the prevailing farming practice to the market-oriented one	◎	◎	○	○	◎
4.3 Leveling-up of farmers' knowledge and capabilities on farming practices	◎	◎	○	○	◎
5. Post-harvest Handling					
5.1 Higher value-added production of fruits	◎	◎	○	◎	◎
5.2 Dissemination of the post-harvest handling technologies	◎	◎	○	○	◎
6. Extension System					
6.1 Overcoming of the limited personnel and lack of facilities for dissemination of know-how and technologies	◎	◎	◎	◎	◎
7. Infrastructure and Facilities					
7.1 Reinforcement of inadequate infra-structure and limited facilities	◇	◇	◎	◇	◇
8. Investment and Credit					
8.1 Introduction of long-term credit system	◎	◎	△	◎	○
8.2 Enhancement of the supporting services by public sector	◎	◎	◎	◎	◎
9. Marketing					
9.1 Structural reformation of the marketing system	◇	◇	○	○	◇
9.2 Grouping of the fruit growers	◎	◎	◎	◎	◎
9.3 Promotion of institutional linkages between producers and middlemen	◇	◇	○	○	◇
9.4 Increase of women participation in fruit cultivation, post-harvest handling and marketing	○	○	△	△	○
9.5 Establishment of reliable and timely market information system	○	○	○	○	○
9.6 Arrangements of the policy issues relating to export promotion programs, licensing or deregulation in trade, etc.	△	△	○	◎	△
9.7 Accommodation to globalization and intensification of international competitiveness in world trade (GATT, WTO, etc.)	△	△	○	◇	△

Remarks : ◎ = Highly required
○ = Required to expand to some extent
◇ = Required to start newly
△ = Better to be considered

Source: JICA Study Team

Table AT-6-3 Proposed Project Areas for Orchard Development in North Sumatra

No.	Target Fruits	Location			
		Districts	Area (ha)	Sub-Districts	Area (ha)
1.	**Durian**	- Dairi	300	• Siempat Nempu	50
				• Silima Pungga-Punngga	100
				• Siempat Nempu Hilir	100
				• Tiga Lingga	50
		- Tapanuli Tengah	750	• Sorkam	250
				• Lumut	250
				• Sibabangun	250
		- Tapanuli Utara	500	• Garoga	300
				• Pahae Julu	100
				• Pahae Jae	100
2.	**Mangosteen**	- Tapanuli Selatan	800	• Batang Natal	800
		- Tapanuli Utara	500	• Garoga	500
3.	**Marquisa**	- Karo	1,000	• Simpang Empat	1,000
4.	**Rambutan**	- Langkat	500	• Binjai	500
5.	**Salak**	- Tapanuli Selatan	1,500	• Siais	800
				• Padang Sidempuan Barat	500
				• Padang Sidempuan Timur	200
	Total	6 Districts (8 Potential Areas)	5,850	-	5,850

Source : JICA Study Team and Diperta Propinsi Sumatera Utara.

Table AT-6-4 Basic Development Plan by Target Fruit in West Java

Major Development Menus (Components)	Target Fruits					
	Avocado	Duku	Durian	Mango	Mangosteen	Salak
1. Land Resources						
1.1 Intensified land use	◎	◎	◎	◎	◎	◎
1.2 Preparation of cadastral map	◎	◎	◎	◎	◎	◎
2. Social Acceptability						
2.1 Confirmation of farmers' participation	◎	◎	◎	◎	◎	◎
3. Planting Materials						
3.1 Strengthening of the Institutes Concerned	◎	◎	○	◎	◎	◎
3.2 Upgrading and modernization of propagation of high quality seedlings	◎	◎	○	◎	◎	◎
3.3 Improvement of certification system	◎	◎	◎	◎	◎	◎
3.4 Development of well-managed commercial nurseries	○	○	○	○	○	○
3.5 Strenthening of farm input selection	○	○	○	○	○	○
4. Farming System and Technology						
4.1 Structural improvement of traditional cultivation system	◎	◎	◎	◎	◎	◎
4.2 Shift of the prevailing farming practice to the market-oriented one	◎	◎	◎	◎	◎	◎
4.3 Leveling-up of farmers' knowledge and capabilities on farming practices	◎	◎	◎	◎	◎	◎
5. Post-harvest Handling						
5.1 Higher value-added production of fruits	◇	◇	◇	◇	◇	◇
5.2 Dissemination of the post-harvest handling technologies	◎	◎	◎	◎	◎	◎
6. Extension System						
6.1 Overcoming of the limited personnel and lack of facilities for dissemination of know-how and technologies	◎	◎	◎	◎	◎	◎
7. Infrastructure and Facilities						
7.1 Reinforcement of inadequate infra-structure and limited facilities	◇	◇	◇	◇	◇	◇
8. Investment and Credit						
8.1 Introduction of long-term credit system	◇	◇	◎	◎	◎	◇
8.2 Enhancement of the supporting services by public sector	◎	◎	◎	◎	◎	◎
9. Marketing						
9.1 Structural reformation of the marketing system	○	○	○	○	○	○
9.2 Grouping of the fruit growers	◎	◎	◎	◎	◎	◎
9.3 Promotion of institutional linkages between producers and middlemen	◎	◎	◎	◎	◎	◎
9.4 Increase of women participation in fruit cultivation, post-harvest handling and marketing	△	○	○	△	○	○
9.5 Establishment of reliable and timely market information system	○	○	○	○	○	○
9.6 Arrangements of the policy issues relating to export promotion programs, licensing or deregulation in trade, etc.	△	△	△	△	△	△
9.7 Accommodation to globalization and intensification of international competi-tiveness in world trade (GATT, WTO, etc.)	△	△	△	△	△	△

Remarks: ◎ = Highly required
○ = Required to expand to some extent
◇ = Required to start newly
△ = Better to be considered

Source: JICA Study Team

Table AT-6-5 *Proposed Project Areas for Orchard Development in West Java*

No.	Target Fruits	Location			
		Districts	Area (ha)	Sub-Districts	Area (ha)
1.	**Avocado**	- Bandung	500	• Cicalengka	500
2.	**Duku**	- Ciamis	500	• Sukadana	500
3.	**Durian**	- Bogor	500	• Cigudeg	500
4.	**Mango**	- Sumedang	1,000	• Tomo • Ujungjaya	530 470
5.	**Mangosteen**	- Purwakarta	500	• Wanayasa	500
6.	**Salak**	- Tasikmalaya	1,000	• Cibeureum • Kawalu • Manonjaya	500 200 300
	Total	6 Districts (6 Potential Areas)	4,000	-	4,000

Source : JICA Study Team and Diperta Propinsi Jawa Barat.

Table AT-6-6 Basic Development Plan by Target Fruit in East Java

Major Development Menus (Components)	Target Fruits					
	Avocado	Banana	Duku	Durian	Mango	Salak
1. Land Resources						
1.1 Intensified land use	◎	◎	◎	◎	◎	◎
1.2 Preparation of cadastral map	◎	◎	◎	◎	◎	◎
2. Social Acceptability						
2.1 Confirmation of farmers' participation	◎	◎	◎	◎	◎	◎
3. Planting Materials						
3.1 Strengthening of the Institutes Concerned	○	◇	○	○	◇	◇
3.2 Upgrading and modernization of propagation of high quality seedlings	○	◇	○	○	◇	◇
3.3 Improvement of certification system	◎	◎	◎	◎	◎	◎
3.4 Development of well-managed commercial nurseries	○	◇	○	○	◇	◇
3.5 Strenthening of farm input selection	○	○	○	○	○	○
4. Farming System and Technology						
4.1 Structural improvement of traditional cultivation system	◇	◇	◎	◎	◇	◇
4.2 Shift of the prevailing farming practice to the market-oriented one	○	○	◎	◎	○	○
4.3 Leveling-up of farmers' knowledge and capabilities on farming practices	◎	◎	◎	◎	◎	◎
5. Post-harvest Handling						
5.1 Higher value-added production of fruits	◎	◎	◎	◎	◎	◎
5.2 Dissemination of the post-harvest handling technologies	◎	◎	◎	◎	◎	◎
6. Extension System						
6.1 Overcoming of the limited personnel and lack of facilities for dissemination of know-how and technologies	◎	◎	◎	◎	◎	◎
7. Infrastructure and Facilities						
7.1 Reinforcement of inadequate infra-structure and limited facilities	◇	◇	◇	◇	◇	◇
8. Investment and Credit						
8.1 Introduction of long-term credit system	◇	△	◇	◎	◎	◇
8.2 Enhancement of the supporting services by public sector	◎	◎	◎	◎	◎	◎
9. Marketing						
9.1 Structural reformation of the marketing system	○	○	○	○	○	○
9.2 Grouping of the fruit growers	◎	◎	◎	◎	◎	◎
9.3 Promotion of institutional linkages between producers and middlemen	◎	◎	◎	◎	◎	◎
9.4 Increase of women participation in fruit cultivation, post-harvest handling and marketing	△	△	○	○	△	○
9.5 Establishment of reliable and timely market information system	○	○	○	○	○	○
9.6 Arrangements of the policy issues relating to export promotion programs, licensing or deregulation in trade, etc.	△	△	△	△	◎	△
9.7 Accommodation to globalization and intensification of international competi-tiveness in world trade (GATT, WTO, etc.)	△	△	△	△	◇	△

Remarks : ◎ = Highly required
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Source: JICA Study Team

Table AT-6-7 Proposed Project Areas for Orchard Development in East Java

No.	Target Fruits	Location			
		Districts	Area (ha)	Sub-Districts	Area (ha)
1.	**Avocado**	- Lumajang	1,000	• Klakah • Ranuyoso • Randuagung • Kudungjajang	200 600 100 100
2.	**Banana**	- Jombang	500	• Kesamben • Sumobito • Diwek • Tembelang	150 100 100 150
		- Lumajang	500	• Yosowilangun • Tekung • Kunir • Senduro	100 150 100 150
3.	**Duku**	- Tulungagung	1,000	• Ngantru • Kedungwaru	600 400
4.	**Durian**	- Jombang	1,150	• Wonosalam • Bareng	1,000 150
		- Trenggalek	1,000	• Bendungan	1,000
5.	**Mango**	- Pasuruan	750	• Grati • Nguling	375 375
6.	**Salak**	- Malang	1,700	• Gondanglegi • Bululawang • Tajinan	700 600 400
	Total	6 Districts (8 Potential Areas)	7,600	-	7,600

Source : JICA Study Team and Diperta Propinsi Jawa Timur.

Table AT-6-8 Basic Development Plan by Target Fruit in South Sulawesi

Major Development Menus (Components)	Target Fruits				
	Avocado	Mango	Mangosteen	Marquisa	Rambutan
1. Land Resources					
1.1 Intensified land use	◎	◎	◎	◎	◎
1.2 Preparation of cadastral map	◎	◎	◎	◎	◎
2. Social Acceptability					
2.1 Confirmation of farmers' participation	◎	◎	◎	◎	◎
3. Planting Materials					
3.1 Strengthening of the Institutes Concerned	◎	◎	◎	◇	◎
3.2 Upgrading and modernization of propagation of high quality seedlings	◎	◎	◎	◇	◎
3.3 Improvement of certification system	◎	◎	◎	△	◎
3.4 Development of well-managed commercial nurseries	◎	◎	◎	△	◎
3.5 Strengthening of farm input selection	◎	◎	◎	○	◎
4. Farming System and Technology					
4.1 Structural improvement of traditional cultivation system	◇	◎	◇	◇	◎
4.2 Shift of the prevailing farming practice to the market-oriented one	△	◇	△	○	△
4.3 Leveling-up of farmers' knowledge and capabilities on farming practices	◎	◎	◎	◎	◎
5. Post-harvest Handling					
5.1 Higher value-added production of fruits	◎	◎	◎	◎	◎
5.2 Dissemination of the post-harvest handling technologies	◎	◎	◎	◎	◎
6. Extension System					
6.1 Overcoming of the limited personnel and lack of facilities for dissemination of know-how and technologies	◎	◎	◎	◎	◎
7. Infrastructure and Facilities					
7.1 Reinforcement of inadequate infra-structure and limited facilities	◇	◇	◇	◎	◇
8. Investment and Credit					
8.1 Introduction of long-term credit system	◎	◎	◎	◎	◎
8.2 Enhancement of the supporting services by public sector	◎	◎	◎	◎	◎
9. Marketing					
9.1 Structural reformation of the marketing system	△	△	△	○	△
9.2 Grouping of the fruit growers	◎	◎	◎	◎	◎
9.3 Promotion of institutional linkages between producers and middlemen	◎	◎	◎	◎	◎
9.4 Increase of women participation in fruit cultivation, post-harvest handling and marketing	△	△	○	△	△
9.5 Establishment of reliable and timely market information system	○	○	○	○	○
9.6 Arrangements of the policy issues relating to export promotion programs, licensing or deregulation in trade, etc.	△	○	△	○	△
9.7 Accommodation to globalization and intensification of international competitiveness in world trade (GATT, WTO, etc.)	△	△	△	△	△

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◇ = Required to start newly
△ = Better to be considered

Source: JICA Study Team

Table AT-6-9 Proposed Project Areas for Orchard Development in South Sulawesi

No.	Target Fruits	Location			
		Districts	Area (ha)	Sub-Districts	Area (ha)
1.	Avocado	**2 Districts**	**1,000**		
		- Gowa	500	• Tinggi Moncong • Parangloe • Tompobulu	200 150 150
		- Soppeng	500	• Marioiwawo • Marioriawa	250 250
2.	Mango	**5 Districts**	**2,500**		
		- Sidenreng Rappang	500	• Panca Rijang	500
		- Majene	500	• Sendana	500
		- Bone	500	• Patinpeng	500
		- Maros	500	• Tanralili	500
		- Wajo	500	• Pammana/ S. Paru	500
3.	Mangosteen	**2 Disricts**	**1,000**		
		- Tana Toraja	500	• Mengkendek	500
		- Polewali Mamasa	500	• Mambi	500
4.	Marquisa (Passion Fruit)	**2 Districts**	**4,000**		
		- Gowa	1,000	• Tompobulu	1,000
		- Tana Toraja	3,000	• Saluputti • Rindingallo	2,000 1,000
5.	Rambutan	**4 Districts**	**4,050**		
		- Mamuju	2,350	• Kalukku • Budong-Budong	1,000 1,350
		- Enrekang	500	• Meiwa	500
		- Pinrang	500	• Patampanua • Duampanua	300 200
		- Barru	700	• Tanete Rilau • Tanete Riaja	200 500
	Total	**13 Districts** * (15 Potential Areas)	**12,550**	-	**12,550**

Note : * Two potential sites are proposed in Kabupaten Gowa and Kabupaten Tana Toraja.
Source : JICA Study Team and Diperta Propinsi Sulawesi Selatan.

Table AT-6-10 Criteria for Prioritization of the Orchard Development Potential Areas (1/3)

Key Assessment Factors and Evaluation Indicators	Scoring Standard	Weight Ratio
(1) Natural Conditions		0.20
(1) - 1 Agro climatic suitability	Conformity with agro-ecological requirements 3 Highly suitable 2 Suitable 1 Suitable with water supply	
(1) - 2 Physiography	Topographic condition 3 Plain & undulating 2 Rolling 1 Swamps, mountanous & hilly	
(1) - 3 Soils	Soil conditions 3 Alluvial, laterite & andosol 2 Association of all types of soils (points 3 and 1) 1 Peat soil, podzolic, grumsol, lithosol, regosol & mediterranean	
(1) - 4 Land availability and development potentials	Total farmland comprising wet land, dry field, shifting cultivation, grass land, temporary fallow land and estates 3 More than 20,000 ha 2 1,000 ha to 20,000 ha 1 Less than 1,000 ha	
(1) - 5 Present land use condition and land preparation	Land development requirement 3 Land dev.work not required (presently cropped area) 2 Land clearing required (temprorary fallow land) 1 Land development required (presently not used as farmland)	
(1) - 6 Available farmland for fruit orchard development	Average size of farmland per farm household 3 More than 2 ha 2 1 to 2 ha 1 Less than 1 ha	
(1) - 7 Availability of water resources	Type of possible water sources 3 Sufficient water sources and good distribution of precipitation 2 Perennial water sources exploitable by gravity 1 Perennial water sources exploitable by pumping-up or seasonal water sources exploitable with storage facilities 0 Water source not needed (enough with rainfalls)	
(2) Seedling Production		0.05
(2) - 1 Availability of recommended variety	No. of reccommended varieties 3 3 and more varieties 2 2 varieties 1 1 variety 0 None	
(2) - 2 Reliability of recommended mother plant variety	Maintenance condition of the mother plants 3 Maintained at BBI/BBU and seed growers' fields 2 Maintained by BBI, but care taken by farmers 1 Not maintained by BBI	
(2) - 3 Seedling quality	No. of seedling per hectare 3 Less than 100 2 100 to 400 1 More than 400	

Table AT-6-10 Criteria for Prioritization of the Orchard Development Potential Areas (2/3)

Key Assessment Factors and Evaluation Indicators	Scoring Standard	Weight Ratio
(3) Institutional Capability		
(3) - 1 Extension service system	Establishment status of extension service system (No. of horticulture farm households per BPP) 3 Very good (below 1,000) 2 Good ((1,000 to 4,000) 1 Not Good (More than 4,000) 0 None (Zero)	0.10
(3) - 2 Service capacity of extension workers	No. of PPLs assigned for food crops production per BPP 3 10 PPLs and more 2 5 to 9 PPLs 1 1 to 4 PPLs	
(3) - 3 Possibility of organizing fruit growers	No. of Kelompok Tani in District 3 More than 1,000 2 400 to 1,000 1 Less than 400	
(4) Development Needs		
(4) - 1 Alleviation of poverty	Proportion of the less developed villages to the District total 3 Above 25% 2 10% to 25% 1 Below 10%	0.18
(4) - 2 Opportunity of employment generation	Possibility of job creation through orchard development (hired labor requirement per hecare) 3 More than 140 M/D 2 90 to 140 M/D 1 Less than 90 M/D	
(4) - 3 Contribution to reduction of the regional disparities	Proportion of the beneficiary horticulture farm-households to the District total 3 Above 50% 2 10% to 50% 1 Below 10%	
(4) - 4 Enhancement of agro-industry	Possibility of agro-processing development 3 Processing required (marquisa) 2 Processing possible (banana, durian, mango & salak) 1 Processing not required (avocado, duku, mangosteen & rambutan)	
(4) - 5 Environmentally friendly development	Positive impacts (+) and no negative impact (±) 3 Above 90 2 80 to 90 1 Below 80 (For details, refer to Tables J-4-2 to J-4-5 of Appendix J)	
(5) Social Acceptability		
(5) - 1 Famers' intention to promote orchard development	Farmers' willingness to grow fruit trees or expand fruit cultivation 3 Very high 2 High 1 Not so high	0.15
(5) - 2 Farmers' familiarity with fruit growing	No. of productive target fruit trees per horticulture farm-household 3 More than 5 2 1 to 5 1 Less than 1	
(5) - 3 Contribution to improvement of the gender issue	Women's contribution to the household financial management 3 More than 40% 2 20% to 40% 1 Less than 20%	

Table AT-6-10 Criteria for Prioritization of the Orchard Development Potential Areas (3/3)

Key Assessment Factors and Evaluation Indicators	Scoring Standard	Weight Ratio
(6) Crop Marketability		
(6) - 1 Transportation and quality conservation	Damages and losses during transportation 3 Ordinary packaging needed to transport crops 2 Specific package and night transportation required to avoid physical damages and losses 1 Temperature-controlled vehicle and special package needed to keep the quality of crops	0.17
(6) - 2 Local market size	Proportion of urban population to the District total 3 Above 25% 2 10% to 25% 1 Below 10%	
(6) - 3 Accessibility to regional markets	Existence of municipality (Kotamadya) with population of more than 100,000 3 Within 100 km by road or ship 2 100 to 200 km 1 More than 200 km	
(6) - 4 Supply and demand situation	Future demand in 2010 vis-a-vis present supply 3 Deficit 2 Even or balaned 1 Surplus	
(6) - 5 Relationship between production and price	Trends of relationships between yearly production and price 3 Significantly positive trend 2 Positive trend 1 Negative trend	
(7) Crop Profitability		
(7) - 1 Crop budget analysis indicated by Net Production Value for the first 11 years	Net production value per ha at discount rate of 10% 3 Above Rp. 30,000 2 Rp. 10,000 to Rp. 30,000 1 Below Rp. 10,000	0.15
(7) - 2 Initial working capital requirement indicated by the duration needed to settle the accumulated deficit	No. of deficit years at the initial stage 3 Less than 3 years 2 3 to 6 years 1 More than 6 years	
(7) - 3 Average net income from target fruit production for 11 years	Annual average net income during 11 years 3 Above Rp. 5,000 2 Rp. 5,000 to Rp. 25,000 1 Below Rp. 2,500	
	Weight Total	1.00