

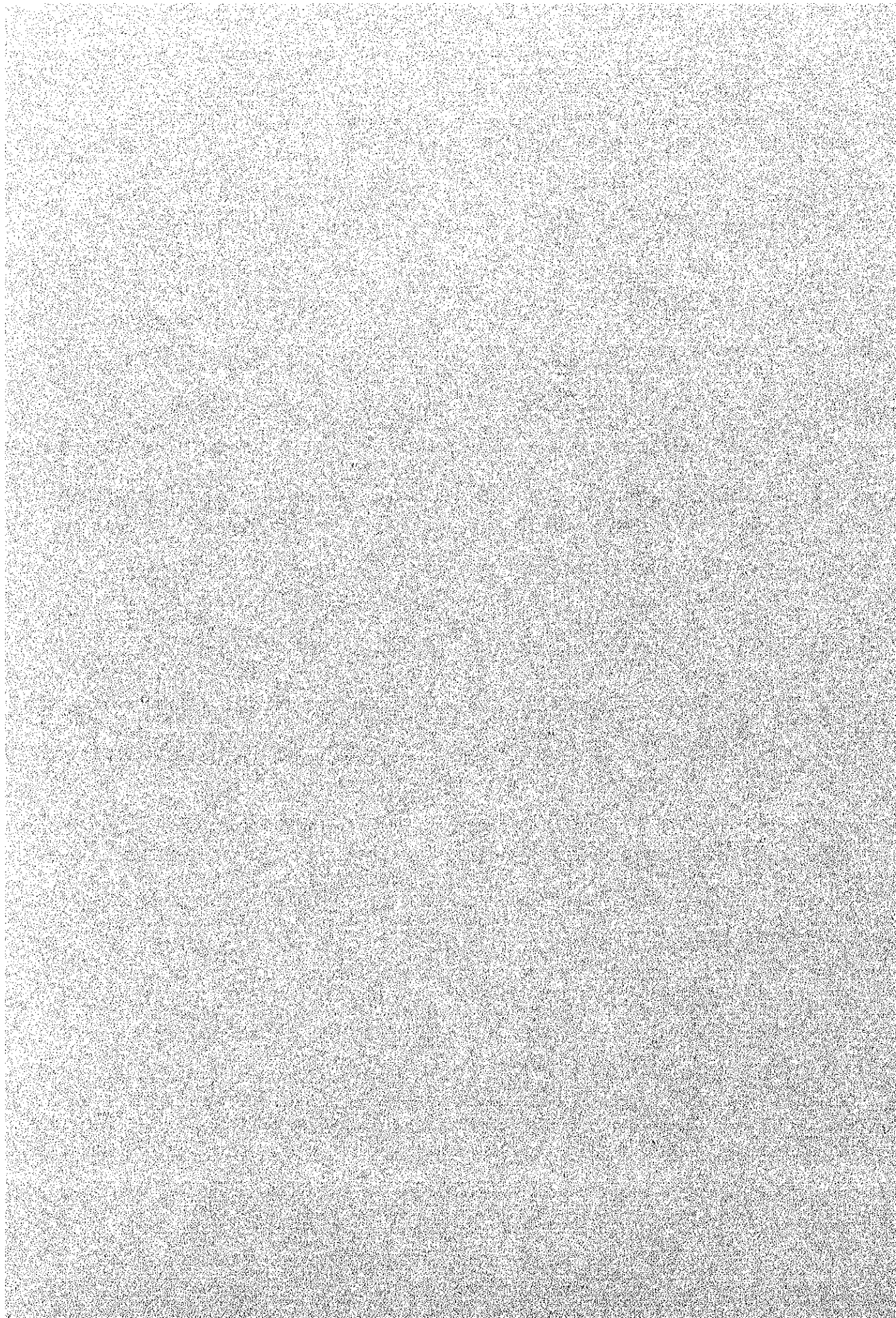
ANNEX V

AGRICULTURE

- V.1 RESULT OF SOIL SURVEY**
- V.2 RESULT OF FARMERS INTERVIEW SURVEY**
- V.3 COST AND PRODUCTION (BUDGET TABLES IN DETAIL)**

**Annex 6.2 List of Regulations under Environmental Quality Act, 1974
and other Environmentally Related Legislations**

Sl.No.	Legislations
1.	Environmental Quality Act, 1974
2.	Environmental Quality (Amendment) Act, 1985
3.	Environmental Quality (Prescribed Premises) (Crude Palm Oil) Order, 1977
4.	Environmental Quality (Prescribed Premises) (Crude Palm Oil) Regulations, 1977
5.	Environmental Quality (Licensing) Regulations, 1977
6.	Motor Vehicle (Control of Smoke and Gas Emission) Rules 1977
7.	Environmental Quality (Clean Air) Regulations, 1978 Regulations, 1977
8.	Environmental Quality (Prescribed Premises) (Raw Natural Rubber) Regulations, 1987
9.	Environmental Quality (Compounding of Offences) Regulations, 1978
10.	Environmental Quality (Sewage and Industrial Effluents) Regulations, 1978
11.	Environmental Quality (Control of Lead Concentration in Motor Gasoline) Regulations, 1985
12.	Environmental Quality (Prescribed Premises) (EIA) Order, 1987 Regulations, 1987
13.	Environmental Quality (Motor Vehicle Noise) Regulations, 1987
14.	Environmental Quality (Scheduled Waste) Regulations, 1989
15.	Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities) Order, 1989
16.	Environmental Quality (Prescribed Premises) (Scheduled Wastes Treatment and Disposal Facilities) Regulations
17.	Local Government Act, 1976
18.	Town and Country Planning Act, 1976
19.	Forest Enactment, 1934
20.	Fisheries Act, 1985
21.	The National Parks Act, 1980
22.	Protection of Wildlife Act, 1976
23.	Malaria Eradication Act, 1971
24.	Destruction of Disease Bearing Insects Act, 1975



ANNEX V.1 RESULT OF SOIL SURVEY

The soil assessment survey was carried out by a soil specialist of the local consultants.

At the five project sites, eleven soil pits were studied with checking on other soil layers using the auger. 22 soil samples were picked for testing on pH and some surveying in the laboratory. Actually, soil physical and chemical properties were mostly estimated based on expert knowledge of the soils by the consultants.

The executed schedule and the supervising staff in each site are listed below, and the assessment report by the consultants (Leng Consultants Co.) is attached after the table.

Soil Survey in Each Project Site

<u>Project Site</u>	<u>Executed Date</u>	<u>Soil Pits</u>	<u>Soil Samples</u>	<u>Supervising</u>
MA16	30 July, 94	2	4	FELCRA field staff JICA team(Agronomist)
JR10	31 July, 94	3	6	DOA area officer DOA extension worker JICA team(Agronomist)
TR44	03 Aug, 94	2	4	DOA area officer DOA extension worker JICA team(Agronomist)
PR1	09 Aug, 94	2	4	DID state co-ordinator DID technical assistant DOA extension worker JICA team(Agronomist)
KH4&5	10 Aug, 94	2	4	FOA general manager FOA staff JICA team(Agronomist)

1. PROJECT SITE AND SOIL PROFILE DESCRIPTION

1.1 Kelompok Kangkar Marlimaw, Batu Pahat JR10

(1) Project site characteristic.

The project site at Kangkar consists of very steep slopes with gradient exceeding 20°. The main area is a steep slope with gradient about 25°. Slope length exceeds 50m. The side slopes are also very steep but the slopes lengths are shorter (< 50m). The slopes terminate into a narrow valley where runoff from the slopes collects into a small stream passing through the valley. Although the slopes are steep, no current soil erosion is evident as a good cover of natural grasses provides protection against rain impact. Existing orchard fruit trees such as dukong, duku langsung, chempedak, durian, cocoa and coconut are planted on terrace with a contour ditch for each plant. Large sandstone boulders scatter on the main slopes.

Three soil profiles were examined at the Kangkar site each representing a major soil type found in the area. On the very steep and long slopes consisting of mainly sandstone with minor beds of shale, the dominating soil is Serdang series. Associated with the Serdang soil is the shallower Nami series where sandstone fragments are encountered between depths of 50-100cm. In the less steep slope where volcanic rock of dacitic composition occurs, Yong Peng series was found. In the narrow valley, shallow peat is overlain by a thin (0-30cm) mineral material.

(2) Soil profile characteristic

a. Serdang series

Serdang soil has a thin sandy loam Ap horizon overlaying a brownish yellow (10YR 6/8) sandy clay loam subsoil. Rock fragments may be observed within the profile. The soil has friable consistence and has moderate medium sub-angular blocky structure. Intense faunal activities are evident in the upper 30cm.

b. Yong Peng series

This soil is recognized by its striking dark brown color and very strong angular to sub-angular structures. It has a reddish brown clayey top soil overlaying a dark reddish brown subsoil. The soil develops very strong structures throughout the profile. It has a very firm consistence and numerous cracks and fissures are very much evident. On crack and pedestal surfaces, coatings are common. Rooting activities were observed to extend over 50cm depth. Durian trees (6-7 years old) grown under drip irrigation are performing very well in this soil.

c. Shallow peat

This soil locating in the narrow valley consists of shallow peat (<1.5m) overlain by mineral material of sandy loam to clay textures. The surface mineral material is generally stained by dark organic matter. The organic material which is saturated consists mainly of semi-decomposed roots, leaves and barks. These materials are remnants of former swamp vegetation. Water table is high ranging from 10 to 30cm from the surface. Although the valley has been drained, it is still susceptible to flash floods. However, judging from the performance of the crops grown in the valley, flooding is not serious enough to badly affect the crops.

1.2. Felcra Bukit Sedanan, Jasin MA16

(1) Project site characteristic.

The area where soil pits (2) are located is planted with cocoa under gliricidia and rubber inter cropped with a mixture of fruit species such as durian, star-fruit and chempedak. The crops are mostly under partial irrigation. The terrain in the area is mostly C₂ to C₃ classes. It consists of low level rounded hills with short slopes. Slope gradients are between 4-12°. The soils particularly at hill top were subjected to compaction by heavy machine during land clearing. Several years after land clearing, soil compaction is still very much evident. Two soil profiles about 200m apart located near a hill top were examined and they were found to be Bongor series.

(2) Soil profile characteristic.

The Bongor soil has a truncated profile. The original A₁ horizon had been removed during land clearing by heavy machinery. The exposed subsoil is very compact and dense. Soil structural elements deteriorated upon pore collapse. This gives rise to weak or massive structures. The soil dries out rapidly and because of low soil porosity, it is difficult to absorb water. This dense layer extends to about 30-50cm deep. The second soil profile has a thin (< 5cm) top soil which has been established by natural grasses. The compact layer is less thick.

The soil has a uniform brownish yellow (10YR 6/8) color and sandy clay subsoil. Below the compact layer, the soil is generally firm to friable. The profiles are deep, no stone or gravel is observed within 1.0m depth. Rooting activities in the upper 50cm are low.

1.3. Pasir Nering, Hulu Terengganu TR44

(1) Project site characteristic

Two soil profiles were examined and they are located on the upper part of a T₁ terrace which is about 3-5m above the river valley. The site consists of gentle planar slope with a gradient of 1-3°. The site is above the floodline. There was a change in crop grown in the area several years ago. The former crop was paddy and is now replaced by annual dry land crops. However, soil changes brought about by paddy cultivation are still very much evident. Two soil types were identified. These are Tok Yong and Chempaka series.

(2) Soil profile characteristic

a. Tok Yong series

The profile site is located 2-3m above the nearby stream channel. The top soil, about 20cm thick is a strong brown (10YR 5/3) clay with moderate sub-angular blocky structures. Immediately below the AP horizon, is a dense plough-pan formed during paddy cultivation. It is about 10-15cm thick with poor structures. The plough-pan has low permeability which impedes water percolation. This gives rise to oxidation reduction activities resulting in iron segregation which appear as mottles in the soil.

Below the plough-pan is a brownish yellow (10YR 6/8) clay to silty clay subsoil. The subsoil is friable and has moderate medium subangular blocky structures. Few isolated iron mottles appear in the Bwg horizon. At about 90 to 100cm depth, there is a lithological discontinuity. The texture changes abruptly from a cohesive clayey texture to a loose coarse sand. This indicates the alluvial nature of the soil. Textural stratification is a typical feature of T₁ soils. This soil has good internal drainage except at the ploughpan.

b. Chempaka series

Chempaka and Tok Yong soils form part of a toposequence in T₁ terrace.

Chempaka soil is normally located at lower elevation than the Tok Yong soil. It is a moderately well drained soil. Mottles are much more evident than the well drained Tok Yong soil. Although paddy was grown in this soil, plough-pan was absent, probably destroyed by subsequent deep ploughing operation.

The soil has a brown (10YR 5/3) clayey top soil followed by a reddish yellow (7.5YR 6/6) clay to silty clay subsoil. Shades of brownish yellow (10YR 6/6) mottles are present in the soil matrix. The amount of mottles increases from 5-10% in the upper part of the subsoil to 20-30% in the lower subsoil. Soil consistence is firm and structures are moderately developed. Water movement within the soil is slightly impeded as indicated by the presence of mottles in the soil.

1.4 Simpang Geti, Mata Ayer PR1

(1) Project site characteristic.

The Simpang Geti site is located on T₂ terrace with houses and roads on the highest part of the terrace. The terrace slopes gently towards the middle where a small stream passes. Cropping pattern is paddy-based with mainly tobacco in the off season. The elevation difference between the highest part of the terrace and the stream channel is estimated to be less than 2.0m. A bunding system maintains level ground for paddy growing although the land is sloping away at 1-3° gradient. During the wet season, floodings are common. During field visit, the land is being prepared for paddy cultivation and surface water was observed to be 'perched' above a dense slowly permeable plough-pan. As the land was under water, no attempt was made to examine soil profiles from soil pits. Soil were examined using an auger. The area was found to be mostly covered under Bukit Tuku series.

(2) Soil profile characteristic

Bukit Tuku series

The soil is typified by a grayish brown (10YR 5/2) sandy loam plough layer followed by a dense thin (< 10cm) plough-pan at 15-20cm depth. The subsoil is highly mottled and it is an olive brown (10YR 6/2) sandy clay interspersed with gleyed area. Gleying is an indication of the degree of iron segregation as a result of low redox potential induced by water submergence. Gleying increases from 10-20% at 30cm to over 50% at 75cm depth. The subsoil has a slightly plastic but non sticky consistence. At 70cm to 90cm depth, angular laterites are common. The laterites are more common in the upper parts of the T₂ terrace. At the lower parts of the terrace, soil drainage progressively worse and that textures are finer.

The coarse texture of the surface soil is mainly due to selective removal of clay and silt by moving water. During puddling process, the top soil is partly thrown into suspension. Surface water movement along the irregular surface preferentially removes fine soil particles along minor channels which lead to the edge of the bund and subsequently discharges into drains.

1.5. Bohor Masjid, Langkawi KH4

(1) Project site characteristic

The site is an alluvial T₂ terrace sandwiched between the coastal sand ridges and the hills in the center of Langkawi Island. Similar to the Simpang Geti site, the T₂ terrace has a gentle gradient (1-3°) and slopes toward a stream channel. The highest parts of the terrace are usually occupied by homesteads. The elevation difference in the terrace is confined to less than 3.0m. Padi is the main crop in the rainy season. The land is largely left fallow during the off-season. Floodings are common during wet season. The soil pit was located on the upper part of the T₂ terrace and the soil has been identified as Gong Chenak series.

(2) Soil profile characteristic.

Gong Chenak series

The soil is distinguished by its fine clayey texture and the highly mottled subsoil. It is imperfectly drained meaning that ground water fluctuates close to the surface. The plough layer, about 20cm thick is a light brown gray (10YR 6/2) sandy clay to clay. Although the soil is under paddy, plough-pan was not developed due to the absence of heavy machinery working on the land. The subsoil is greyish (10YR 6/6) with many (30-50%) strong brown (7.5YR 5/8) mottles which decrease with depth. At 75cm and deeper, gleying becomes more intense and iron mottles reduce to less than 30%. Semi-hardened plinthites developed from the reddish brown mottles are present and it increases with depth.

The subsoil texture is fine clayey and soil structures are moderately developed. Soil consistence is slightly plastic and non sticky. Rooting activities are mainly confined to the plough layer.

1.6 Ketapang, Langkawi KH5

(1) Project site characteristic

The area consists of a narrow strip of paddy land between the foothill and Kampong Ketapang where village houses are located. It is a T₂ terrace with a stream at the foot of the hill. Elevation difference in the terrace is about 2-4m. The terrace has a concave profile between the homesteads and the foothill. The slope gradient is about 1-3°. The soil pit is located 2-3m above the stream level and is at the higher part of the terrace. Therefore, soil drainage is better than those in the lower parts of the terrace. The soil is identified as Lubuk Kiat series which is a clayey soil with many prominent reddish mottles in the subsoil. The

soil drainage class is somewhat imperfectly drained with little gleying above 60cm depth.

(2) Soil profile characteristic

Lubuk Kiat series

The soil has a light brownish gray (2.5Y 6/2) sandy clay plough layer which is followed by a light yellowish brown (2.5Y 6/4) clayey subsoil. Plough-pan was not observed in the profile. Many prominent subrounded yellowish red iron mottles occur in the subsoil. Gleying is generally less than 10% indicating that although ground water does come up to within this depth, it does not stay long enough to induce low redox potential which produces intense gleyings. At depth of about 75cm, semi-hardened plinthites were observed. The soil develops very strong medium and fine sub-angular blocky structure. Soil consistence is friable. Rooting activities were observed to extend beyond 50cm depth which is a rare occurrence in paddy soil.

2. SOIL PHYSICAL AND CHEMICAL PROPERTY

2.1. Evaluation Criteria

Selected soil physical and chemical properties of the soil at JICA study areas were estimated based on expert knowledge of the soils. Only P_H was directly measured. Soil drainage class described in soil profile characteristic is determined based on guidelines given by Department of Agriculture. A well drained soil has intermediate water holding capacity. It retains optimum amount of moisture. A moderately well drained soil is sufficiently wet close to the surface for a period that the planting or harvesting operations or yield of some field crops are affected unless it is drained. Moderately well drained soil has a layer with moderately slow permeability. Imperfectly drained soil implies that the soil is sufficiently wet to affect field operations significantly. The range of crop is restricted unless artificially drained. Ground water fluctuates close to the surface during wet season. Even in the dry season, ground water is rarely below 1.0m depth unless artificial drainage is provided. The soil commonly has a relatively slow permeable layer. The assessment standards for available water and water permeability are taken from guidelines of the United States Department of Agriculture. Available water is the amount of water that a soil can hold between 33 Kpa and 1500 Kpa within the root zone. Soil dries up rapidly if available water is less than 5% by volume. Drought sensitive plants will experience moisture stress on soils having low to very low available water. When available water is moderate to high, most perennials can cope under normal rainfall condition (about 100-120mm a month).

Water permeability refers to the vertical movement of water under saturated condition. A soil layer with the lowest value determines the water permeability of the soil. In the case of paddy soil, water permeability is usually impeded by the presence of a dense plough-pan. High water permeability transmits water rapidly and the soil remains wet for no more than a few hours after thorough wetting. It tends to have large connected pores. A moderate water permeability implies that water moves down the profile readily and that it remains wet for no more than a few days after wetting. Soils with moderate water permeability are favourable for rooting activities and supplying water to plants. A slow water permeability soil transmits water downward so slowly that it remains wet for a week or more after thorough wetting. Soils with slow water permeability have poor structure and fine, discontinuous pores. These soils with slow water permeability are difficult to work on especially after rain.

The inherent soil fertility is commonly represented by P_H , organic matter and CEC (Cation Exchange Capacity). Soil with low P_H of less than 4.5 will

require liming. When soil P_H reaches 5.0, liming is only required for sensitive crops. When P_H is at 5.5 or higher, most crops do not require liming. Soils with less than 1.5% organic carbon content in the top soil will definitely response to additional organic fertilizer input. It also implies that the soil physical and chemical conditions are less favourable for plant to grow. Soils having organic carbon content of between 3.5 to 4.5%, no additional organic fertilizer is necessary. The soil physical and chemical conditions are at optional level for rooting activities. Soils with CEC of less than $5.0 \text{ C mol kg}^{-1}$ soil suffers extensive leaching. Split fertilizer application are generally recommended from such soils. When the CEC exceeds is 15 C mol kg^{-1} , soil leaching potential is significant. However, split fertilizer applications may still be recommended depending on the crop nutrition demand.

2.2. Soil Series Properties

(1) Serdang series

The soil has a high sand content with low silt and clay. The available water is very low when coupled with the high water permeability renders the soil very drought. Crops grown on the soil frequently experience moisture stress. Soil P_H at 4.1 is low and most crops will require fairly heavy liming to perform satisfactorily. The moderate amount of 1.5 to 2.5% organic carbon in the top soil is satisfactory. The low clay content and the kaolinitic nature of the clay account for the low to very low CEC. Fertilizer loss is likely to be substantial if the amount and timing is not properly scheduled. Split fertilizer applications are highly recommended and that it should not be applied before the onset of heavy rains.

(2) Yong Peng series

The soil has a fine texture with very high clay content and low amount of fine sand. Clay of surface commonly ranges from 50-60% and increases to 60-70% in the subsoil. Available water is low and that moisture sensitive plants will experience moisture stress particularly in area with pronounced seasonal rainfall distribution. However, at the Kangkar site, dry season is irregular and not severe. Therefore, most tree crops will not experience severe moisture stress. However, during the early phase of crop establishment, some crops may experience moisture stress. The strong soil structures promote moderate to high water permeability. Water moves rapidly down the profile through the numerous cracks and channels. Soil pH at 4.2 to 4.4 is acidic. Liming in the order of 4 to 6 tons/ ha may be required for some of the sensitive annuals. Organic carbon is moderate and a moderate amount of organic input will

definitely help to improve the fertility of the soil. CEC is low to moderate suggesting that split fertilizer applications will be beneficial to crops.

(3) Shallow peat

It has a thin variable mineral soil material overlaying saturated organic material. Within the organic layer, sand, silt and clay are less than 10%. Available water tends to be low as organic material gives up water easily when it begins to dry out. Water movement in the soil is rapid as the organic material merely floats on water. Drainage in the area must be well controlled as over drainage leads to land subsidence. In addition, once the peat is drained, and allows to dry out, it is difficult to rewet the soil. pH of the soil is very acidic ranging from 3.8 to 4.1. Substantial liming is a pre-requisite for most annuals. Organic matter is adequate and CEC is very high. Therefore fertilizer loss due to leaching is minimal.

(4) Bongor soil

This is a medium textured soil with about 30-45% clay and 40-50% sand in the top 50cm. Frequently, clay content increases in the lower horizon. Silt content is fairly constant at between 10-20%. Available water is low and irrigation will definitely be beneficial to crops. Water permeability is very slow to slow due to soil compaction and soil structural degradation. The water permeability will hamper irrigation efficiency in that water moves along cracks and fissures without penetrating the soil matrix. Regeneration of soil structures and reducing soil compaction by deep ploughing will increase the soil responsiveness to management input. pH at 4.2 to 4.4 is acidic. A moderate amount of lime is sufficient for most fruit trees. CEC is low and split fertilizer applications are recommended.

(5) Tok Yong series

Tok Yong soil is a medium to fine texture soil having 40-50% clay and 20-35% silt in the upper 50cm. Available water is low and irrigation is essential for most annual crops. Water permeability is high due to moderate structures. However, the presence of a plough-pan inhibits water movement at 20-30cm depth. Water tends to stagnate above this layer. The soil becomes soggy and difficult to break-up making land preparation very difficult. In addition, temporary surface ponding may also occur. This presents a risk to low oxygen tolerant crops like tobacco and maize. pH at 4.6 to 4.7 is mildly acidic and a moderate amount of 2 to 3 tons per hectares of lime is adequate for most crops. Organic carbon content is moderate and crops will response to additional organic fertilizer input. The low to moderate CEC will necessitate split fertilizer applications. -

(6) Chempaka series

The physical-chemical properties of the soil are similar to Tok Yong soil except that the soil has slightly higher clay and silt content. This makes the soil even more difficult to work on. The risk of temporary surface water ponding is definitely higher than the Tok Yong soil. The slow water permeability induces a mild low redox condition where iron segregation begin to occur. This explains the slightly mottled appearance of the soil. However, the redox potential is not low enough to induce gleying.

(7) Bukit Toku series

This soil has low clay content (10-20%) in the plough layer and the clay increases to 25-40% in the subsoil. Silt is less than 20% and sand ranges from 40-80%. The available water is low to very low and will definitely require irrigation for crops grown in the off season. Water permeability is moderate to high resulting in high loss of surface water. However, the presence of a plough-pan below the Ap horizon minimizes loss of surface water and allows paddy to grow under submerged condition. Nevertheless, once the soil dries out, cracks and fissures develop in the slough-pan. Subsequent water loss will be substantial.

Soil pH at 6.1 to 6.6 is adequate for crops and no liming is necessary.

However, at the high end of pH at 6.6, some trace element deficiencies may occur for some dry land crops. Organic carbon content is low and the soil will respond positively to additional organic fertilizer input. To minimize nutrient loss due to low CEC, split fertilizer applications are required.

(8) Gong Chenak series

It is a clayey soil with clay content between 35-60%. Moderate amount of silt (10-30%) is present. Available water is low and irrigation in the off season is absolutely essential for crops to thrive. Water permeability is moderate to slow and is favourable for paddy cultivation. Soil pH of 4.8 in the plough layer and at 5.7 in the subsoil is adequate for most dry land crops. Little liming is required. Crops will response to additional organic fertilizer input and split fertilizer applications because of moderate organic carbon and low CEC.

(9) Lubok Kiat series

Texturally, Lubok Kiat soil is similar to Gong Chenak soil except that the subsoil has less clay (40-50%). Available water is low to very low. Irrigation is therefore essential for dry land crops in the off season. With its moderate water permeability, substantial loss of surface water is expected due to increased water movement down the profile. Therefore, for paddy cultivation, this soil is less favourable than the Gong Chenak soil. In terms of natural fertility, the soil will response similarly to the same input applied to Gong Chenak soil.

3. SOIL CROP SUITABILITY

3.1. Soil suitability assessment criteria

Soil suitability for crops is assessed based on the assumption that crops are to be managed by small holder farmers and that irrigation is available. Under small holder farming, the level of farm management is less intensive compared to commercial farmers. Nevertheless, it is expected that the proper crop variety is to be chosen for planting. Basic fertilizer practices, field operations such as weedings, crop protection measures and pruning where applicable are expected to be carried out.

The soil crop suitability is divided into 3 classes namely, suitable, moderate and marginal. The unsuitable class is intentionally omitted. Soils considered suitable for crops imply that there is a good chance of reasonable sustained yield under small holder management without incurring high risk of crop failures. The moderately suitable soil carries the connotations of lesser yield or additional input is required to increase yield comparable to those obtainable from the suitable soils. For example, Bukit Tuku, Gong Chenak and Lubok Kiat soils are moderately suitable for paddy. Paddy grown on these soils always yields lower than those grown on the more fertile coastal marine clays in the MUDA Area. In addition, consistent yield is more difficult to obtain. A marginal soil will require costly input to increase yield and that yield fluctuates widely. It may also mean increased crop failure risks due to unseasonable events such as flash floods.

3.2. Crop suitability

The sedentary soils such as Serdang series and Yong Peng series at Kangkar, Johor are moderately suitable for a wide range for fruit trees. The major limitations are the long steep slopes and low natural fertility such as low pH and CEC. Organic matter is also lacking. The steep slopes favour soil erosion and surface runoff. Soil conservation measures are necessary to mitigate the ill effects of runoff and soil erosion. Fruit trees grown in the middle and upper parts of the slope always perform poorer than those on the lower slopes. The steep terrain also makes on-farm access strenuous and difficult. There is a natural tendency for the farmers to apply less attention to those plants on the upper parts of a steep slope than those that are easily accessible on the lower slopes. In addition, during land clearing phase before a full ground cover and soil conservation measures are in place, the organic matter enriched surface soil is likely to be eroded which renders the soil less fertile. Therefore, early crop

establishment on such steep slopes are difficult. Field operations such as fertilizer application, weeding, spraying, pruning, bagging and harvesting are hampered by the steep terrain. The low available water and high water permeability of the soils can be mitigated by irrigation. Fruit trees that require a regular and consistent dry season of 1-3 months will perform less well in the area. The rainfall pattern in the area does not suggest the presence of a regular and consistent dry season. Therefore, fruit crops like duku, duku langsung and durian are at best considered moderately suitable although they appear to grow well. Healthy durian trees were observed to grow on Yong Peng series under irrigation. However, consistent good yield is difficult to obtain. In the valley, mostly annuals or biannuals such as vegetables, banana and pine apples are recommended. The high water table remains a threat to such crops. However, the risk of submergence can be mitigated by growing crops on raised beds. The Bongor soil at the Bukit Sedanan site is suitable for an extensive range of fruit trees. Other crops such as cashew, coffee (Robusta), cinnamon, pepper, pineapple, banana and papaya are also suitable. The major problem is the compact top soil and low organic matter content. Under such condition, rooting development is restricted. The compact top soil can be rehabilitated by organic matter input; breaking up the compact soil mechanically or growing a legume cover crop. As observed in the field, early crop establishment is poor even under irrigation. Water and nutrients tend to move along cracks rather than through the soil. Thus the supplies of water and plant nutrients to the roots are severely limited.

The Tok Yong and Chempaka soils are suitable for most tree crops and are moderately suitable for annuals such as vegetables, field crops and roselle. These crops perform better in medium textured to sandy soils. Fruit trees are widely grown on Tok Yong and Chempaka soils in the T₁ terraces at

Terengganu and Kelantan. The soils are difficult to work under wet condition and that crop damages may result from temporary surface ponding. However, this problem may be overcome by growing them on raised beds. The T₂ soils of Bukit Tuku, Gong Chenak and Lubuk Kiat are moderately suitable for paddy with Bukit Tuku the least productive for paddy. The low natural inherent infertility of the soils limits paddy yield to generally 2.5 to 3.5 tons per hectare. As the cropping pattern is determined by paddy, perennials are excluded. The available growing period after paddy is limited to about 6 months. The lighter textured Bukit Tuku soil is suitable for a range of annuals such as tobacco, vegetables and melon in the off-season under irrigation.

Tobacco grown in Simpang Geti and Tasik Melati areas commonly attains yield exceeding 1,000kg per hectare. However, a persistent risk in the area is the

occurrences of flash floods which cause widespread crop damages. Tobacco, vegetables and field crops are expected to perform reasonably well in Lubok Kiat soil. However, these crops are less desirable in the Gong Chenak soil. Fish rearing may be considered for Lubok Kiat and Gong Chenak soil. However, drainage must be adequate to prevent fish pond from being flooded during the wet season.

APPENDIX

A. Description of Soil Profile

B. Test and Estimates of Soil Properties

C. Soil and Crop Suitability

APPENDIX-A. DESCRIPTION OF SOIL PROFILE (1) MA16 FELCRA Bkt . Sedanan

PitNo	Horizon	Depth(cm)	ColorMatrix	Mottle	Texture	Structure	Consistence	DrainageClass	Slope	Gradient
Pit 1	Bt 1	0-30	10YR 6/8	NIL --	Sandy clay	weak very coarse	very hard	well drained	hill top	5 degree
	Bt 21	30-60	10YR 6/8	NIL --	Sandy clay	weak very coarse	firm			
	Bt 22	60-100	10YR 6/8	NIL --	Sandy clay	moderate medium	firm			
Pit 2	Ap	0-10	10YR 6/4	NIL --	Sandy clay loam	moderate medium	very hard	well drained	hill top	6 degree
	Bt 1	10-40	10YR 6/8	NIL --	Sandy clay	moderate medium	hard			
	Bt 2	40-100	10YR 6/8	NIL --	Sandy clay	moderate medium	firm			

SAB=Sub-angular blocky

APPENDIX-A. DESCRIPTION OF SOIL PROFILE (2) JR10 DOA Kangkar Marlimum

Pit No.	Horizon	Depth(cm)	Color Matrix	Mottle	Texture	Structure	Consistence	DrainageClass	Slope	Gradient
Pit 1	A1	0-10	10YR 4/3	NIL --	Sandy loam	moderate medi.&fine	loose	well drained	mid. slope	25 degree
	Bt 1	10-30	10YR 6/8	NIL --	Sa.cla.loam	mode/medi. SAB	friable			
	Bt 2	60-90	10YR 6/6	NIL --	Sa.cla.loam	mode/medi. SAB	friable			
	BC	90+	10YR 6/6	NIL --	Sa.cla.loam	weak/coarse SAB	friable			
Pit 2	A1	0-20	5 YR 4/4	NIL --	Fine sa.clay	strong med. SAB	firm	well drained	lower slope	22 degree
	Bt 1	20-60	5 YR 3/4	NIL --	Clay	strong med. AB	very firm			
	Bt 21	60-100	5 YR 3/4	NIL --	Clay	strong med. AB	very firm			
	Bt 22	100-150	5 YR 3/4	NIL --	Clay	strg. coarse AB	very firm			
Pit 3	Ap	0-20	10YR 3/3	NIL --	Clay loam	mode./medi. SAB	non-sticky	poorly drained	valley floor	0-1 degree
	Oe	20-40	7.5YR 3/2	NIL --	humid organic material		non-plastic			
	Oi 1	40-60	7.5YR 3/2	NIL --	h.o.m.					
	Oi 2	60-100	7.5YR 3/2	NIL --	h.o.m.					

AB=Angular blocky

APPENDIX A. DESCRIPTION OF SOIL PROFILE (3) TR44 DOA Pasir Nering

Pit No.	Horizon	Depth(cm)	Color Matrix	Mottle	Texture	Structure	Consistence	DrainageClass	Slope	Gradient
Pit 1	Ap 1	0-20	10YR 5/3	NIL	Clay	mod./med. SAB	friable	well drained	foot slope	2-3 degree
	Ap 2	20-32	10YR 5/3	<5%10YR 6/4	Clay	massive	firm			
	Bw	32-50	10YR 6/6	<5%10YR 6/4	Clay	mod./med. SAB	friable			
	BC	50-80	10YR 6/8	NIL	Clay	weak coarse	friable			
	IIC	80-120+	10YR 5/8	NIL	Coarse san.	SAB	loose			
Pit 2	Ap	0-15	10YR 5/3	NIL	Clay	mod./med. SAB	firm	moderately drained	upper slope	2-3 degree
	Bw1	15-40	7.5YR 6/6	5-10%10YR6/6	Clay	moderate med. to fine	friable			
	Bw2	40-80	7.5YR 5/6	10-20%10YR6/6	Clay	SAB mod./med.	friable			
	BC	80-125+	7.5YR 5/6	10-20%10YR6/6	Clay	SAB weak coarse	friable			

SAB=Sub-angular blocky

APPENDIX-A. DESCRIPTION OF SOIL PROFILE (4) PR 1 DID/FOA Simpang Geti

Pit No.	Horizon	Depth(cm)	Color Matrix	Mottle	Texture	Structure	Consistence	DrainageClass	Slope	Gradient
Pit 1	--	0-15	10 YR 5/2	NIL	Sandy loam	--	--	imperfectly	mid. terrace	1-2 degree
	--	15-30	10 YR 5/2	NIL	Sandy loam	--	--	drained		
	--	30-45	10 YR 6/2	40-50% 2.5Y5/6	Sa.cla.loam	--	--			
	--	45-60	10 YR 6/2	30-40% 2.5Y6/6	Sandy clay	--	--			
	--	60-75	10 YR 6/2	20-30% 2.5Y6/6	Sandy clay	--	--			
	--	75-90	10 YR 6/2	20-30% 2.5Y6/6 & 10YR6/6	Sandy clay	--	--			
Pit 2	--	0-15	10 YR 5/2	<5% 7.5YR4/4	Sa.cla.loam	--	--	somewhat	upper	1-2 degree
	--	15-30	10 YR 6/6	5-10% 7.5YR5/6	Sandy clay	--	--	imperfectly	terrace	
	--	30-45	10 YR 6/6	10-20% 7.5YR5/6 <5% 10YR6/2	Sandy clay	--	--	drained		
	--	45-60	10 YR 6/6	20-30% 7.5YR6/8 10-20% 10YR6/2	Clay	--	--			
	--	60-75	10 YR 6/4	40-50% 7.5YR6/8 20-30% 10YR6/2	Clay	--	--			
	--	75-90	10 YR 6/2	30-40% 7.5YR6/8	Sa.cla.loam	--	--			

Lateritic stones at 85 cm

APPENDIX-A. DESCRIPTION OF SOIL PROFILE (5) KH 4&5 DID/FOA/DOA Kedawang

Pit No.	Horizon	Depth(cm)	Color Matrix	Mottle	Texture	Structure	Consistence	DrainageClass	Slope	Gradient
Pit 1 (Boh- Masj.)	Ap	0-20	10 YR 6/2	<5% 7.5YR4/4	Clay	weak coarse SAB	firm	imperfectly drained	upper terrace	1-2 degree
	BwgG1	20-40	10 YR 6/8	30-40%10YR6/2	Clay	mod./med. SAB	non-sticky slightly			
	BwgG2	40-75	10 YR 6/2	40-50%7.5YR5/8	Clay	mod./med. SAB	non-sticky slightly			
	BwGg	75-105	10 YR 6/2	30-40%7.5YR5/8	Clay & <5% lateri- tic stones	weak coarse SAB	non-sticky slightly			
Pit 2 (Keta- pang)	Ap	0-20	2.5 YR 6/2	<5% 7.5YR5/8	Sandy clay	mod./med. SAB	firm	somewhat imperfectly drained	upper terrace	1-2 degree
	Bwg1	20-36	2.5 YR 6/4	40-50% 5YR5/6 <10%2.5Y 6/2	Clay	strong med. & fine SAB	friable			
	Bwg2	36-60+	10 YR 6/4	40-50% 5YR5/6 <10%2.5YR 6/2	Clay	strong med. & fine SAB	friable			

APPENDIX-B. TEST AND ESTIMATES OF SOIL PROPERTIES(3) TR44 DOA Pasir Nering

Pit No.	Depth (cm)	Soil series	Soil Component			pH (water)	Available Water	Water Permeability	Organic Carbon(%)	CEC C mol/kg
			Sand(%)	Silt(%)	Clay(%)					
Pit 1	0-20	Tok Yong	15-25	25-35	40-50	4.6	low	high	moderate	moderate
	30-50		10-20	20-30	50-60	4.7	low	moderate	low	low
Pit 2	0-20	Chempaka	20-30	30-40	40-50	4.5	low	high	moderate	moderate
	30-50		15-25	30-40	45-55	4.7	low	moderately slow	low	low

TEST AND ESTIMATES OF SOIL PROPERTIES(1) MA 16 FELCRA Bkt. Sedanan

Pit 1	0-20	Bungor	45-55	10-20	30-40	4.3	low	very slow	low	low
	30-50		40-50	10-20	35-45	4.4	low	slow	low	low
Pit 2	0-20	Bungor	50-60	10-20	25-35	4.2	low	moderate slow	moderate	moderate
	30-50		40-50	10-20	35-45	4.4	low	moderate	low	low

APPENDIX-B. TEST AND ESTIMATES OF SOIL PROPERTIES(2) JR 10 DOA Kangkar Marlímaw

Pit No.	Depth (cm)	Soil series	Soil Component			pH (water)	Available Water	Water Permeability	Organic Carbon(%)	CEC C mol/kg
			Sand(%)	Silt(%)	Clay(%)					
Pit 1	0-20	Serdang	65-75	10-15	15-20	4.1	very low	very high	moderate	low
	30-50		55-70	10-15	20-30	4.3	low	high	low	very low
Pit 2	0-20	Yong Peng	15-25	25-35	50-60	4.2	low	high	moderate	moderate
	30-50		5-10	25-35	60-70	4.4	low	moderate	moderate	low
Pit 3	0-20	Shallow peat	30-40	25-40	30-40	4.1	low	very high	adequate	moderate
	30-50		<5	<5	<5	3.8	low	high	high	high

APPENDIX-B. TEST AND ESTIMATES OF SOIL PROPERTIES(4) PR 1 DID/FOA Simpang Geti

Pit No.	Depth (cm)	Soil series	Soil Component			pH (water)	Available Water	Water Permeability	Organic Carbon(%)	CEC C mol/kg
			Sand(%)	Silt(%)	Clay(%)					
Pit 1	0-20	Bukit Tuku	70-80	< 10	10-20	6.3	very low	high	low	low
	30-50		60-70	< 10	25-35	6.1	low	moderate	low	low
Pit 2	0-20	Bukit Tuku	50-60	10-20	20-35	6.5	very low	high	low	low
	30-50		40-50	10-20	30-40	6.6	low	moderate	low	low

TEST AND ESTIMATES OF SOIL PROPERTIES(5) KH 4&5 DID/FOA/DOA Kedawang

Pit 1 (B.M.)	0-20	Gong Chenak	40-50	10-20	35-45	4.8	low	moderate	moderate	low
	30-50		20-30	20-30	50-60	5.7	low	moderately slow	low	low
Pit 2 (K.p.)	0-20	Lubok Kiat	40-50	10-20	30-40	5	low	moderate	moderate	low
	30-50		20-30	20-30	40-50	4.8	very low	moderate	low	low

Assessment specifications on soil property

1.. Available Water class (water content: 33kpa-1500kpa)

<u>Rating class</u>	<u>Water volume(%)</u>
very low	< 5%
low	5 -10%
moderate	10 -15%
high	15 -20%
very high	> 20%

Those 1..and 2..are modified after "Soil Conservation Service, USDA(1981)", Examination and description of soils in the field Revision of Soil Survey Manual, Chapter 4, USDA, Washington, D.C.

3.. Organic Carbon Content

<u>Rating class</u>	<u>Weight content(%)</u>
low	< 1.5%
moderate	1.5 -3.0%
adequate	3.0 -4.5%
high	> 4.5%

3.. Adapted after Wong, I.F.I.(1986), "Soil-Crop Suitability Classification for Peninsular Malaysia (Revised)".
Soil and Analytical Services Bulletin No.1, Department of Agriculture, Ministry of Agriculture, Malaysia.

2.. Saturated Water Permeability

<u>Rating class</u>	<u>cm / hr.</u>
very slow	< 3.6 / 1000
slow	3.6/100--3.6/1000
moderately slow	3.6/10 --3.6/100
moderate	3.6 --3.6/10
high	36 --3.6
very high	> 36

4.. Cation Exchange Capacity

<u>Rating class</u>	<u>C mol / kg soil</u>
very low	< 5
low	5 - 10
moderate	10 -15
adequate	15 -24
high	> 24

4.. Adapted from Malaysian Agriculture Research and Development Institute (unpublished).

SOIL CROP SUITABILITY ASSESSMENT AT JICA SMALL RESERVOIR STUDY SITES.

SITE/ SOILNESS	SUITABILITY CLASS	CROPS	REMARKS
TERENGGANU Tok Yong	Suitable	Cempedak, mangosteens, nangka, duku, star-fruit, lemon, limau langkat, guava, ciku, sour-sap, pineapple, dukong, tamarind, sukun, cashew, coffee, cinnamon banana.	The soil is suitable for a wide range of fruit trees. Occasional floodings may occur.
Chempaka	Moderately suitable	Rossele, rambutan, duku langsat, durian.	Rossele performs better in medium texture soils. Rambutan is very sensitive to moisture stress. Lack of consistent dry weather causes irregular fruiting behaviour by duku langsat and durian.
PERLIS Bukit Tuku	Suitable Moderately suitable Marginally suitable	Similar crops as for Tok Yong series Rossele Vegetables, root crops, maize	Heavy texture in the subsoil may cause temporary ponding at the surface. Surface ponding due to heavy texture causes crop damage. Tillage operation is difficult either in the wet or dry condition.
PERLIS Bukit Tuku	Moderately suitable Suitable	Padi, melon, vegetables Tobacco	A padi based cropping system. Other crops are planted in the off-season. Periodic crop damage by occasional floods.

SOIL CROP SUITABILITY ASSESSMENT AT JICA SMALL RESERVOIR STUDY SITES.

SITE/ SOILNESS	SUITABILITY CLASS	CROPS	REMARKS
JOHOR Serdang	Moderately Suitable	Nangka, cempedak, manggis, rambutan, petai.	The steep gradient is the major constraint. The present plantings are restricted to the lower slope, erosion is checked by a combination of ground cover and terraces.
	Moderately suitable	Duku, duku langsung, durian.	Growth is expected to be satisfactory, however, fruiting behaviour is affected by lack of consistent dry season.
	Suitable	Nangka, cempedak, manggis, rambutan, petai, mangosteen, star-fruit Duku, duku langsung, durian.	The steep gradient is mitigated by the rather short slope ($\leq 100m$). As per Serdang soil.
Shallow Peat	Moderately suitable Suitable	Banana, pineapple, melon, vegetable.	The high water table poses a risk. Flooding may occur during wet season.
MELAKA Bongor	Suitable	Nangka, cempedak, manggis, petai duku, duku langsung, durian, pomelo, star fruit, guava, ciku, sour sap, dukong, tamarind, sukun, cashew, coffee (Rubusta) cinnamon, pineapple, banana, papaya and pepper.	Compaction structure deterioration due to surface exposure and low organic matter content cause difficulties in early crop establishment.
	Moderately suitable	Rambutan	Very sensitive to moisture stress.

SOIL CROP SUITABILITY ASSESSMENT AT JICA SMALL RESERVOIR STUDY SITES.

SITE/ SOILNESS	SUITABILITY CLASS	CROPS	REMARKS
LANGKAWI Gong Chenak	Moderately suitable Suitable	Padi, vegetables, tobacco, melon. Tobacco.	A paddy based cropping system. Vegetables on raised bed. Planted during dry season. Occasional crop damage due to heavy unseasonal rain. Fish rearing is possible if sufficient drainage is provided.
Lubuk Kiat	Moderately suitable Suitable	Padi, vegetables, melon. Tobacco.	A paddy based cropping system. Vegetables on raised bed during off-season. Floodings due to unseasonal rains is the main hazard.

NOTE: The crop suitability assessment assumes that crops will be managed by small holders.

ANNEX V.2 RESULT OF FARMERS INTERVIEW SURVEY

The farmers interview survey was conducted on around 300 farmers, and resulted 261 of effective answer-sheets. The executed date and the interviewers in each site are listed as follows, and the results of enumerated answers are attached after the table.

Farm Code	Interviewed Families	Effective Families	% of Answers	Executed Samples	Date	Interviewers
MA16	96	107	96	100%	13-17 June	High sch.students
JR10	36	36	36	100%	20-30 June	DOA ex. workers
TR44	79	41	34	43%	26-30 June	College students
PR1	75*	70	60	80%	18-30 Aug.	FOA social officer
KH4&5	130	40	35	27%	19-30 Aug.	FOA social officer

Note : * Tasik Melati (Aloh Baroh) was not surveyed.

Summary of Farm Survey Result (PR1 & 4)

PR1 & 4 Lot no.	TOTAL	AVE.
A. LABOUR SURVEY		
1.Nos.of family members/in	221	3.7
2.Age of house- owner	3277	54.6
3.Nos. of children / in	76	1.3
4.Age of the eldest child / in	1587	26.5
5.Age of the youngest child	1469	24.5
6.Workable nos. in family	182	3
7.Sick name		
8.Sick days		
9.Home farming days / yr.	36744	612
10.Outside Worked days/yr.	9656	161
11.Husband main work		
12.Commuting time(minutes)		
13.Feeling on working		
14.Income satisfaction		
15.Farm land acreage(ha)	50.2	0.8
16.Farming difficulty		
17.Crop knowledge source		
18.Will for irrigation		
19.Will for group farming		
20.Farmer's successor		
B. Paddy Cultivation		
1.Paddy cropped area (ha)	50.47	0.84
2.Machinery cost (RM)	36286	605
3.Agro-chemical cost (RM)	4380	73
4.Seeds paddy		
5.Hired labours cost (RM)	3100	51.7
6.Family working days	3071	51.2
7.Total yield (kg)	210820	3514
Tobacco Cultivation		
8.Nos. of plants	96000	2600
9.Machinery cost	6530	176.5
10.Total work days	3296	89
11.Distance to barn(munites)	875	23.7
12.Total cost of production	20155	545
13.Total income by Tobacco	64415	1741
Non-Tabacco Farmers		
14.Cropping in dry season	no=23	
15.Desire for Tobacco crop	no=5, uncert=17	
16.Problem in Tobacco	Labour=23	
17.Membership of PPK	yes=23	

ANNEX V.2 RESULT OF FARMERS' INTERVIEW SURVEY (PR1&4)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
PR 1 & 4 / Farmer's No.	85	84	14	213	35	333	54	5	61	71	319	219	58	12	73	69	331	218	336	307	
Lot No.																					
ABOUT SURVEY																					
1. Nos of family members/in	3	4	3	5	2	5	5	2	3	4	4	3	3	4	5	4	3	3	3	3	3
2. Age of house- owner	58	65	52	35	70	45	50	55	73	58	63	48	60	58	57	50	53	55	62	50	50
3. Nos. of children / in	1	1	1	2	0	3	3	1	1	1	1	1	1	2	2	1	1	1	1	1	1
4. Age of the eldest child / in	22	38	32	5	15	30	28	53	53	25	38	33	38	32	35	38	15	35	34	25	25
5. Age of the youngest child	22	38	32	3	10	10	10	28	53	25	38	33	38	30	33	38	15	35	34	25	25
6. Workable nos. in family	3	3	2	1	1	1	2	3	3	4	4	3	3	3	4	4	2	4	4	2	3
7. Sick name										fever											
8. Sick days	600	600	360	120	240	120	216	320	540	300	400	750	750	750	1000	768	490	1000	300	750	750
9. Home farming days / yr.	0	240	180	240	0	240	500	432	264	500	0	0	0	0	0	690	0	0	250	0	0
10. Outside Worked days/yr.	p.&t.	paddy	paddy	paddy	paddy	paddy	paddy	p.&t.	p.&t.	p.&t.	p.&t.	p.&t.	p.&t.	p.&t.	p.&t.	p.&t.	p.&t.	p.&t.	p.&t.	paddy	p.&t.
11. Husband main work	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu
12. Commuting time (minutes)	60	30	60	30	30	5	45	20	20	20	20	20	20	20	20	30	30	30	30	30	30
13. Feeling on working	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
14. Income satisfaction	0.8	0.4	1.2	0.4	0.8	0.3	1.2	0.5	0.8	2	0.4	0.8	0.4	0.4	0.8	2.4	0.8	0.4	1	0.8	0.8
15. Farm land acreage (ha)	L&C	L&C	L	L&C	L	L	L	L	L	L	L	L	L	L&C	L&C	L	L&C	L&C	L	L&C	L&C
16. Farming difficulty	Ne&A	A	A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A
17. Crop knowledge source	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
18. Will for irrigation	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
19. Will for group farming	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
20. Farmer's successor	uncert	yes	yes	yes	uncert	yes	uncert	uncert	yes	uncert	yes	yes	yes	yes	yes	yes	yes	uncert	yes	uncert	uncert
addy Cultivation	0.8	0.4	1.2	0.4	0.8	0.3	1.2	0.5	0.8	2	0.4	0.8	0.4	0.4	0.8	2.4	0.8	0.4	0.8	0.8	0.8
1. Paddy cropped area (ha)	550	275	825	275	550	195	870	440	860	680	275	550	275	275	550	1740	595	298	595	595	595
2. Machinery cost (RM)	78	75	140	75	85	40	90	70	160	95	50	100	75	75	75	320	57	50	50	55	55
3. Agro-chemical cost (RM)	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	bought	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.
4. Seeds paddy	60	60	200	100	100	0	100	100	100	100	200	100	100	200	0	200	30	20	30	30	30
5. Hired labours cost (RM)	50	50	30	10	20	10	18	105	45	100	120	65	65	30	35	46	45	62	25	67	67
6. Family working days	3510	1820	5525	1820	3640	1170	3510	2340	3770	4600	1690	3575	1820	1820	3640	9360	3580	1830	3510	3575	3575
7. Total yield (kg)	Tobacco Cultivation																				
8. Nos. of plants	3000							2000	2000	3000	2000	2000	2000	2000	2000	6000	2000	4000		2000	2000
9. Machinery cost	185							165	165	165	165	165	165	165	165	495	165	250		120	120
10. Total work days	92							139	100	72	81	95	99	66	88	94	86	91		94	94
11. Distance to barn (munites)	25							20	20	20	20	20	20	20	20	20	25	25		25	25
12. Total cost of production	580							545	545	420	545	545	545	545	545	1635	325	650		485	485
13. Total income by Tobacco	1850							1200	1200	1800	1200	1300	1250	1300	1255	3600	1450	2400		1400	1400
Non-Tobacco Farmers																					
14. Cropping in dry season	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
15. Desire for Tobacco crop	L.	L.	L.	L.	L.	L.	L.	L.	L.	L.	L.	L.	L.	L.	L.	L.	L.	L.	L.	L.	L.
16. Problem in Tobacco	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
17. Membership of PPK																					

ANNEX V.2 RESULT OF FARMERS' INTERVIEW SURVEY (PRI&4)

PR 1 & 4 / Farmer's No.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	
Lot No.	226	83	23	59	25	212	43	80	34	2	334	68	2	62	236	54	242	35	60	
ABOUT SURVEY																				
1. Nos. of family members/in	5	4	4	4	4	2	4	4	4	4	4	4	4	4	3	4	3	5	4	4
2. Age of house- owner	49	45	50	58	60	60	60	58	58	57	50	45	65	58	45	55	55	50	56	56
3. Nos. of children / in	2	2	2	1	1	0	1	1	1	1	1	2	1	0	2	1	1	2	1	1
4. Age of the eldest child / in	20	25	25	38	38	38	38	35	35	32	28	25	40	40	20	35	25	38	35	35
5. Age of the youngest child	18	20	16	38	38	38	38	35	35	32	28	20	40	40	10	35	25	25	25	35
6. Workable nos. in family	3	4	3	4	3	2	3	3	3	3	4	4	4	2	3	4	3	4	3	3
7. Sick name																				
8. Sick days																				
9. Home farming days / yr.	500	870	500	620	620	500	620	620	620	620	870	870	680	500	750	800	620	790	750	750
10. Outside Worked days/yr.	0	250	250	500	250	0	250	250	250	250	0	250	250	0	0	0	250	0	0	0
11. Husband main work	p.&t.	p.&t.	p.&t.	p.&t.	paddy	paddy	paddy	p.&t.	paddy	paddy	p.&t.	p.&t.	p.&t.	paddy	p.&t.	p.&t.	paddy	p.&t.	p.&t.	p.&t.
12. Commuting time (minutes)																	45			
13. Feeling on working	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu
14. Income satisfaction	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
15. Farm land acreage (ha)	1	0.8	0.8	0.8	0.8	0.4	0.8	0.8	0.8	0.8	0.4	0.8	1.4	0.4	0.4	0.6	0.4	0.8	1.1	1.1
16. Farming difficulty	L&C	L&C	L&C	L&C	L&C	L&C	L&C	L&C	L&C	L&C	L&C	L&C	L&C	L&C	L&C	L&C	L&C	L&C	L&C	L
17. Crop knowledge source	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A
18. Will for irrigation	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
19. Will for group farming	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
20. Farmer's successor	uncert	uncert	uncert	uncert	uncert	uncert	uncert	uncert	yes	uncert	yes	uncert	uncert	uncert	uncert	yes	uncert	uncert	yes	yes
addy Cultivation																				
1. Paddy cropped area (ha)	1	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.4	0.8	1.4	0.4	0.4	0.6	0.4	0.8	1.1	1.1
2. Machinery cost (RM)	745	595	595	595	595	595	595	595	595	595	298	595	1030	298	298	430	298	595	800	800
3. Agro-chemical cost (RM)	100	50	50	50	50	50	50	50	50	50	35	50	100	70	50	50	50	60	70	70
4. Seeds paddy	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.
5. Hired labours cost (RM)	40	30	30	30	30	30	30	30	30	30	30	30	100	40	60	20	20	30	80	80
6. Family working days	51	65	42	50	52	40	50	50	50	50	67	67	50	50	61	61	60	67	70	70
7. Total yield (kg)	4420	3600	3600	3600	3600	3600	3600	3500	3600	3500	1760	3600	5850	1755	1755	2080	1700	3510	4680	4680
Tobacco Cultivation																				
8. Nos. of plants	4000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	4000	4000	3000	3000	3000	3000
9. Machinery cost	250	120	120	120	120	120	120	120	185	185	120	120	185	250	250	250	185	185	185	185
10. Total work days	81	92	73	81	81	81	81	81	99	99	86	90	99	89	89	89	92	99	99	99
11. Distance to barn (minutes)	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
12. Total cost of production	650	485	485	485	485	485	485	485	580	580	485	485	580	650	650	650	580	580	580	580
13. Total income by Tobacco	3200	1400	1400	1400	1400	1400	1400	1400	1850	1850	1400	1400	1850	2800	2800	2800	1850	1850	1850	1850
Non-Tobacco Farmers																				
14. Cropping in dry season																				
15. Desire for Tobacco crop																				
16. Problem in Tobacco																				
17. Membership of PPK																				

ANNEX V.2 RESULT OF FARMERS' INTERVIEW SURVEY (PRI&4)

	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
PR 1 & 4 / Farmer's No.	211	335	71	140	64	1	760	36	68	88	43	41	84	82	626	335	87	312	296	229	142
Lot No.																					
ABOUT SURVEY																					
1. Nos. of family members/in	3	4	4	5	4	2	2	2	2	4	4	4	4	4	3	4	4	4	6	5	4
2. Age of house- owner	60	50	50	48	58	60	56	61	60	45	45	50	52	55	56	50	55	55	48	48	64
3. Nos. of children / in	1	2	1	2	2	0	0	0	0	2	2	2	2	2	1	1	1	1	2	2	1
4. Age of the eldest child / in	32	38	35	16	22					20	20	26	32	25	21	30	38	35	30	29	35
5. Age of the youngest child	32	35	35	10	18					16	10	24	25	20	21	30	38	35	28	29	35
6. Workable nos. in family	3	4	3	2	4	2	2	2	2	3	3	4	4	4	1	4	3	3	4	4	4
7. Sick name																					
8. Sick days	480	360	750	310	1000	500	370	370	500	600	750	870	870	500	180	870	750	750	1000	1000	870
9. Home farming days / yr.	0	750	0	250	0	0	250	500	0	250	0	250	250	500	120	0	0	0	0	0	0
10. Outside Worked days/yr.	paddy	paddy	p.&t.	paddy	p.&t.	paddy	paddy	paddy	paddy	p.&t.	p.&t.	p.&t.	p.&t.	p.&t.	p.&t.	p.&t.	p.&t.	p.&t.	paddy	p.&t.	paddy
11. Husband main work	90	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	paddy
12. Commuting time(minutes)	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu
13. Feeding on working	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
14. Income satisfaction	0.3	0.8	0.4	0.4	0.4	1	0.2	0.8	0.8	0.8	0.4	0.4	0.8	0.8	2.2	0.2	1.8	2.4	2.4	1.8	0.4
15. Farm land acreage(ha)	L&C	L&C	L	L	L&C	L&C	L	L	L&C	L&C	L	L&C	L&C	L&C	L	L&C	L	L	L	L&C	L&C
16. Farming difficulty	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A	Ne&A
17. Crop knowledge source	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
18. Will for irrigation	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
19. Will for group farming	uncert	uncert	uncert	uncert	uncert	uncert	uncert	uncert	uncert	uncert	uncert	yes	uncert	uncert	uncert	uncert	uncert	uncert	uncert	uncert	yes
20. Farmer's successor	addy	Cultivation																			
1. Paddy cropped area (ha)	0.3	0.8	0.4	0.4	0.4	1	0.2	0.8	0.8	0.8	0.4	0.4	0.87	0.8	2.2	0.2	1.8	2.4	2.4	1.8	0.4
2. Machinery cost (RM)	145	595	298	298	298	733	148	595	595	595	293	298	595	595	1617	147	1327	1740	1740	1327	297
3. Agro-chemical cost (RM)	25	60	50	50	70	50	20	70	70	50	50	50	55	70	120	25	130	130	130	130	60
4. Seeds paddy	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.	self-p.
5. Hired labours cost (RM)	0	30	20	20	0	20	0	30	50	30	30	30	30	30	40	0	40	40	40	40	30
6. Family working days	35	30	62	31	65	40	35	10	45	51	66	62	70	45	15	65	62	63	63	63	42
7. Total yield (kg)	650	3510	1760	1750	1755	4090	780	3510	3510	3575	1755	1820	3600	3600	9165	845	7605	9360	9400	7605	1760
Tobacco Cultivation																					
8. Nos. of plants	1000	4000			3000					2000	4000	4000	2000	2000		2000	2000	2000	2000	2000	2000
9. Machinery cost	65	250	89	89	98					165	250	250	165	120		120	120	120	120	120	160
10. Total work days	68	89	89	89	98					91	86	91	100	74		89	83	89	89	85	85
11. Distance to barn(minutes)	25	25	25	20	20					25	25	25	25	25		25	25	25	25	25	25
12. Total cost of production	200	550			580					325	650	650	325	485		485	485	485	485	485	325
13. Total income by Tobacco	600	2900			1850					1400	2800	2500	1400	1400		1400	1400	1400	1400	1400	1400
Non-Tobacco Farmers																					
14. Cropping in dry season	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no
15. Desire for Tobacco crop	uncert	uncert	uncert	uncert	uncert	uncert	uncert	uncert	uncert	uncert	uncert	uncert	uncert	uncert	uncert	uncert	uncert	uncert	uncert	uncert	uncert
16. Problem in Tobacco	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
17. Membership of PPK	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

ANNEX V.2 RESULT OF FARMERS' INTERVIEW SURVEY (KH4&5)

KH4&5/ Farmer's No.	Lot No.																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A. LABOUR SURVEY																				
1.Nos. of family members/in	2	3	6	4	2	10	4	10	8	5	5	2	5	6	3	3	2	4	5	3
2.Age of house- owner	60	67	75	51	65	48	49	50	45	63	57	50	58	46	56	68	63	60	51	80
3.Nos. of children / all			4	2	8	8	2	10	6					4					3	
4.Age of the eldest child / in			7	13		16			20	40	19		35	20	20				23	
5.Age of the youngest child			3	6		12			10	23	10			4					10	
6.Out-living children / out								2	1											
7.Workable nos. in family	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	1	2	1
8.Unhealthy family member																				
9.Sick name																				
10.Sick days																				
11.Home farming days / yr.																				
12.Outside Worked days/yr.																				
13.Husband main work																				
14.Commuting time(minutes)	20	30	20	30	30	30	5	10	5	10	10	30	20	20	20	20	30	10	10	10
15.Feeling on working	usu	easy	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu
16.Income satisfaction	no	yes	no	no	yes	yes	yes	no	no	no	no	no	no	no	no	yes	yes	no	no	no
17.Farm land acreage(ha)	1.4	1.4	0.5	1	0.8	1	5.6	0.6	1.2	0.6	0.9	0.4	0.6	2.4	2	0.6	1.6	1.2	0.8	0.8
18.Farming difficulty	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
19.Crop knowledge source	A.F	A.F	A.F	A.F	A.F	A.F	N.A	A.F	A.F	A.F	A.F	A.F	A.F	A	A.F	F	A.F	A.F	A.F	A.F
20.Will for irrigation	yes	yes	yes	yes	yes	no	no	yes	yes	yes	yes	uncert	uncert	yes	yes	yes	yes	yes	yes	yes
21.Will for group farming	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
22.Farmer's successor											no									
B. Paddy Cultivation																				
1.Paddy cropped area (ha)																				2.4
2.Machinery cost (RM)																				1550
3.Agro-chemical cost (RM)																				30
4.Fertilizer (kg) subsidized																				720
5.Seeds paddy																				self-p.
6.Hired labours cost (RM)																				9600
7.Family working days																				6960
8.Total yield (kg)																				
9.Paddy income																				

ANNEX V.2 RESULT OF FARMERS' INTERVIEW SURVEY (KH4&5)

KH4&5/ Farmer's No.	Lot No.																				TOTAL	AV.	Remarks	
	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35									
A. LABOUR SURVEY																								
1.Nos. of family members/in	6	2	3	4	2	6	6	5	5	4	2	3	4	2	2	148	4.2	old-man-family<3=40% over50=80%						
2.Age of house- owner	45	74	61	75	60	46	52	37	37	50	70	55	60	51	60	1958	55.9	mostly no answers						
3.Nos. of children / all	4					4	4	3								54	4.5	mostly no answers						
4.Age of the eldest child / in	22					24	27	16	16	27		30	20			379	22	mostly no answers						
5.Age of the youngest child	18					11	10	9	9	16		25	10			177	12	mostly no answers						
6.Out-living children / out																3		mostly no answers						
7.Workable nos. in family	1	1	2	1	1	1	4	1	1	2	1	2	2	1	2	46	1.3							
8.Unhealthy family member																								
9.Sick name																								
10.Sick days																								
11.Home farming days / yr.																								
12.Outside Worked days/yr.																								
13.Husband main work																								
14.Commuting time(minutes)	15	15				10	10	5	5	10	5	10	5	5	5	445	16	to paddy field						
15.Feeing on working	usu					usu	no	usu	usu	no	usu	usu	usu	usu	usu									
16.Income satisfaction	no			yes		no	no	yes	yes	no	no	no	no	yes	yes	yes10.no19								
17.Farm land acreage(ha)	0.4	0.6	0.2	0.9	1.5	1.2	0.4	1	0.6	2.6	1	0.8	0.6	1	0.6	38.4	1.1							
18.Farming difficulty	W	W	W	W	T	W	L	L	W	L,W	W	W	L,W	W	W		W 27							
19.Crop knowledge source	A,F	A,F	A		F	A	A,F	A,F		A,F	A	A	A,F	A	A	A 30, F 24								
20.Will for irrigation	yes	yes	uncert	uncert	yes	yes	yes	yes	uncert	yes	yes	yes	yes	yes	uncert									
21.Will for group farming	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes									
22.Farmer's successor	no		no	no	no	no	no	no	no	no	no	no	no	no	no									
B. Paddy Cultivation																								
1.Paddy cropped area (ha)	0.6				1.5	0.6	0.4		0.6	2.6		0.7	0.6	1	0.6	11	1.1							
2.Machinery cost (RM)	250				880	160			200	1250		520	200	370	250	5630	563	Av.RM512/ha						
3.Agro-chemical cost (RM)	10				20					40		20		20	20	160	16							
4.Fertilizer (kg) subsidized	160				400	120			160	850		240	100	240	180	3170	317	Av.288kg/ha						
5.Seeds paddy	bought				bought	self-p.			bought	self-p.		bought	self-p.	bought	self-p.									
6.Hired labours cost (RM)																								
7.Family working days																								
8.Total yield (kg)	2160				5200	1440			2200	9600		2800	1760	3200	2160	40120	4012	Av.3.7t /ha						
9.Paddy income	1566				3770	1040			1560	6960		2030	1276	2300	1560	29022	2902							

Summary of Farm Survey Result (MA 16)

MA 16	TOTAL	AVERAGE
House No.	96	
A. LABOUR SURVEY		
1.Nos. of family members	586	6.1
2.Age of house- owner	3952	41
3.Nos. of children	388	4
4.Age of the eldest child	1225	13
5.Age of the youngest child	481	5
6.Workable nos. in family	152	1.6
7.Unhealthy family member	14	0.1
8.Sick name		
9.Sick days		
10.Felcra Worked days / yr.	16659 (40%)	170
11.Outside Worked days/yr.	22653 (60%)	240
12.Husband main work	F52	54%
13.Commuting time(minutes)	3340	35
14.Feeling on working	easy 20,usu 57, hard 19	
15.Income satisfaction	yes 61, no 35	
16.Farm land acreage		
17.Farming difficulty		
18.Crop knowledge source		
19.Will for irrigation	yes 79, uncert 15, no 2	
20.Will for group farming	yes 60, uncert 19, no 17	
21.Farmer's successor	yes 44, uncert 14, no 38	

ANNEX V.2 RESULT OF FARMERS' INTERVIEW SURVEY (MA16)

MA16/Farmer's No. House No.	B101 1498	B102 1500	B103 1501	B104 1502	B105 1503	B106 1504	B107 1505	B108 1506	B109 1507	B110 1508	B111 1510	B113 1511	B114 1513	B116 1514	B117 1516	B119 1518	B121 1518	B1 TOTAL	B1 AVE.
A. LABOUR SURVEY																			
1. Nos. of family members	8	7	5	9	4	3	5	8	5	8	5	3	7	5	4	10	9	105	6.2
2. Age of house- owner	57	45	46	47	33	55	40	40	47	37	36	42	42	32	36	44	59	738	43
3. Nos. of children	6	5	3	7	2	1	3	7	3	6	3	1	5	3	3	8	7	73	4.3
4. Age of the eldest child	36	12	9	24	11	14	7	17	17	11	11	12	12	3	6	18	29	249	15
5. Age of the youngest child	22	2	0	10	7	14	2	7	8	3	6	12	2	0	2	3	16	116	6.8
6. Workable nos. in family	6	1	1	1	1	1	1	1	2	2	2	1	1	1	1	2	1	26	1.5
7. Unhealthy family member	0	0	0	1	0	0	0	1	0	1	1	0	0	0	0	0	0	4	0.23
8. Sick name																			
9. Sick days																			
10. Felera Worked days / yr.	140	240	130	280	0	300	0	312	0	140	0	20	0	140	0	0	300	2002	120
11. Outside Worked days/yr.	1500	0	120	0	280	0	300	0	390	250	390	200	312	120	300	470	0	4632	270
12. Husband main work	F.,fac	F.	F.	F.	outL	F.	outL	F.	outL	F.,out	fac	estate	MaL	F.	MaL	outL	F.	F9, Out	7
13. Commuting time(rainutes)	15	15	60	15	20	30	60	30	60	30	30	60	60	5	60	20	10	550	32
14. Feeling on working	hard	easy	usual	usual	hard	usual	hard	easy	usual	usual	yes	hard	usual	easy	hard	usual	hard	easy	usual
15. Income satisfaction	yes	no	no	no	yes	yes	yes	yes	yes	yes	no	no	yes	yes	no	yes	yes	yes	yes
16. Farm land acreage																			
17. Farming difficulty																			
18. Crop knowledge source																			
19. Will for irrigation	yes	uncert	yes	uncert	yes	uncert	yes	yes	no	yes	uncert	yes	uncert	yes	uncert	yes	yes	yes	yes
20. Will for group farming	no	uncert	yes	uncert	uncert	yes	uncert	yes	no	yes	uncert	no	uncert	uncert	uncert	uncert	yes	yes	yes
21. Farmer's successor	no	uncert	yes	uncert	no	no	no	no	no	uncert	no	uncert	no	uncert	no	no	uncert	yes	yes

ANNEX V.2 RESULT OF FARMERS' INTERVIEW SURVEY (MA16)

MA16/Farmer's No. House No.	B201	B202	B203	B204	B205	B206	B207	B208	B209	B210	B211	B212	B213	B214	B215	B216	B217	B218	B219	B220	B221	B2	B2
	1519	1520	1521	1522	1523	1524	1525	1526	1527	1528	1529	1530	1531	1532	1533	1534	1535	1536	1537	1538	1539	TOTAL	AVE.
A. LABOUR SURVEY																							
1. Nos. of family members	6	4	7	5	11	7	6	5	9	4	5	4	8	8	5	8	8	8	7	3	5	133	6.3
2. Age of house-owner	48	33	41	33	39	49	43	29	40	43	33	44	41	48	40	53	45	40	35	32	32	841	40
3. Nos. of children	4	2	5	3	9	5	4	3	7	2	3	2	6	6	3	6	6	6	5	1	3	91	4.3
4. Age of the eldest child	18	3	15	7	18	28	11	7	18	8	16	19	19	15	9	28	22	12	9	4	13	299	14
5. Age of the youngest child	10	1	4	1	2	19	0	3	7	0	6	13	9	2	4	10	8	0	1	4	8	112	5.3
6. Workable nos. in family	2	1	2	1	1	2	2	1	1	2	1	2	3	2	1	2	3	1	1	1	1	33	1.6
7. Unhealthy family member	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
8. Sick name	otak berair																						
9. Sick days	4months																						
10. Felera Worked days / yr.	0	0	516	156	0	576	0	288	288	288	0	700	0	0	300	576	653	0	0	0	288	4341	210
11. Outside Worked days/yr.	576	300	0	120	300	0	588	288	0	288	288	0	662	576	0	0	300	300	182	300	0	5068	240
12. Husband main work	out fa	outL	F.	F.	comM	F.	bis fac	contL	E.	F.	fac L	Fbuitik	outL	coco pl	F.	F.	Fbuitik	fishery	sales	fishery	F.	F(0: Out 11	
13. Commuting time (minutes)	10	10	30	25	90	15	30	60	5	5	60	5	60	5	30	30	10	45	60	80	30	695	33
14. Feeling on working	usual	hard	easy	usual	easy	usual	usual	hard	hard	hard	usual	usual	usual	usual	usual	usual	easy	usual	usual	hard	usual	easy	usual
15. Income satisfaction	yes	yes	yes	yes	yes	no	yes	yes	no	no	yes	yes	yes	no	yes	yes	no	yes	yes	yes	yes	yes	yes
16. Farm land acreage.																							
17. Farming difficulty																							
18. Crop knowledge source	yes	no	yes	yes	yes	uncert	yes	uncert	yes	yes	uncert	yes	yes	yes	yes	uncert	yes	yes	yes	yes	yes	y 16.u.4.n.1	
19. Will for irrigation	yes	yes	yes	yes	yes	yes	yes	uncert	yes	yes	uncert	yes	yes	yes	uncert	uncert	yes	yes	no	yes	yes	y 16.u.4.n.1	
20. Will for group farming	yes	yes	uncert	yes	yes	no	no	uncert	yes	yes	uncert	no	yes	yes	yes	yes	yes	yes	yes	uncert	uncert	y 13.u.5.n.3	
21. Farmer's successor																							

ANNEX V.2 RESULT OF FARMERS' INTERVIEW SURVEY (MA16)

MA16/Farmer's No. House No.	B301 1540	B302 1541	B303 1542	B304 1543	B305 1544	B306 1545	B307 1546	B308 1547	B309 1548	B310 1549	B311 1550	B313 1552	B314 1553	B315 1554	B317 1556	B318 1557	B319 1558	B320 1559	B321 1560	B322 1561	B3 TOTAL	B3 AVE.
A. LABOUR SURVEY																						
1. Nos. of family members	6	4	5	5	7	6	3	8	8	5	7	5	6	5	3	6	5	4	7	3	108	5.4
2. Age of house-owner	41	30	49	36	45	35	48	43	46	33	37	38	36	35	38	33	35	35	56	54	803	40
3. Nos. of children	4	2	3	3	5	4	1	6	6	3	5	3	4	3	1	4	3	2	5	1	68	3.4
4. Age of the eldest child	16	5	17	9	13	6	22	15	19	5	8	10	10	11	0	10	9	6	24	9	224	11
5. Age of the youngest child	6	2	12	2	2	0	22	0	2	2	1	6	5	9	0	0	1	3	10	9	94	4.7
6. Workable nos. in family	1	1	3	1	2	1	1	1	3	1	1	1	1	1	2	1	1	1	3	1	28	1.4
7. Unhealthy family member	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8. Sick name																						
9. Sick days																						
10. Feltra Worked days / yr.	0	0	300	226	550	300	300	0	300	0	300	288	0	0	288	300	300	0	300	300	4052	200
11. Outside Worked days/yr.	256	220	0	0	0	0	0	300	0	226	0	0	300	300	288	0	0	300	0	0	2190	110
12. Husband main work	driver	out fa	F.	F.	F.	F.	F.	guard	F.	parents	F.	F.	out fa	out fa	F., fac	F.	F.	out fa	F.	F.	F13; Out 7	
13. Commuting time (minutes)	20	60	30	5	25	25	25	45	25	25	25	25	60	60	25	30	25	30	30	30	625	31
14. Feeling on working	usual	usual	usual	easy	usual	usual	usual	usual	easy	usual	usual	usual	easy	usual	easy	usual	easy	usual	easy	usual	usual	cas 6, usu 14
15. Income satisfaction	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes 20, no 0
16. Farm land acreage																						
17. Farming difficulty																						
18. Crop knowledge source																						
19. Will for irrigation	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	all yes 20
20. Will for group farming	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	all yes 20
21. Farmer's successor	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	uncert	yes	yes	yes	yes	yes	yes 19

ANNEX V.2 RESULT OF FARMERS' INTERVIEW SURVEY (MA16)

MA16/Farmer's No. House No.	B401 1562	B402 1563	B403 1564	B404 1565	B405 1566	B406 1567	B407 1568	B408 1569	B409 1570	B410 1571	B411 1572	B413 1574	B414 1575	B415 1576	B416 1577	B417 1578	B418 1579	B419 1580	B421 1682	B422 1583	B4 TOTAL	B4 AVE.
A. LABOUR SURVEY																						
1.Nos. of family members	6	8	12	5	5	11	5	7	2	6	4	9	9	5	6	6	8	2	6	4	126	6.3
2.Age of house- owner	51	38	44	28	30	35	38	36	52	46	38	43	50	40	38	39	36	51	32	36	801	40
3.Nos. of children	4	6	10	2	3	9	3	4	0	4	2	7	7	3	4	3	6	0	4	2	83	4.2
4.Age of the eldest child	23	17	19	4	5	13	17	10	0	16	13	19	15	6	10	13	14	0	6	6	226	11
5.Age of the youngest child	13	1	1	1	0	0	3	4	0	7	12	8	0	1	5	6	3	0	2	3	70	3.5
6.Workable nos. in family	4	3	2	2	2	1	2	2	1	2	1	2	5	2	1	1	2	1	1	1	38	1.9
7.Unhealthy family member	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	2	1	0	0	6	0.3
8.Sick name							heart attack	block out								xblood	heart.a	xblood				
9.Sick days						13yrs										4yrs	2yrs	3yrs				
10.Felera Worked days / yr.	220	0	0	300	0	0	0	0	300	600	0	0	224	300	300	288	0	300	300	0	3132	160
11.Outside Worked days/yr.	700	900	600	200	600	300	500	500	0	0	300	510	0	300	0	0	600	0	0	300	6310	320
12.Husband main work	F.	outL.fac	outL.	F.fac	rubber	outL.	constr	outL.	F.	F.	fishery	Ma.L.	F.	F.fac	F.	F.	fishery	F.	F.	outL.	F10: Out 10	
13.Commuting time(minutes)	5	120	35	5	30	30	15	30	15	10	15	60	30	30	30	10	150	30	30	30	710	35
14.Feeling on working	hard	hard	usual	usual	easy	hard	usual	hard	usual	usual	hard	hard	hard	hard	usual	usual	hard	usual	hard	hard	easy	6. usu 14 hard 0
15.Income satisfaction	yes.	yes	yes	no	no	no	no	no	no	no	no	yes	no	no	no	no	no	no	no	no	yes 4.	no 16
16.Farm land acreage																						
17.Farming difficulty																						
18.Crop knowledge source																						
19.Will for irrigation	uncert	yes	yes	yes	uncert	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	uncert	yes	yes	y 17.u 3.n 0	
20.Will for group farming	uncert	no	yes	yes	yes	no	no	no	no	no	no	no	yes	yes	no	yes	no	uncert	no	yes	y 7.u 2.n 1	
21.Farmer's successor	no.	no	yes	yes	no	no	yes	no	no	no	uncert	no	yes	yes	no	no	no	no	no	no	y 5.u 1.n 14	

ANNEX V.2 RESULT OF FARMERS' INTERVIEW SURVEY (MA16)

MA16/Farmer's No. House No.	B502 1585	B503 1586	B504 1587	B505 1588	B506 1589	B507 1590	B508 1591	B509 1592	B510 1593	B511 1594	B512 1595	B514 1597	B516 1599	B517 1600	B518 1601	B519 1602	B521 1604	B522 1605	B5 TOTAL	B5 AVE.	
A. LABOUR SURVEY																					
1. Nos. of family members	8	4	4	5	8	7	5	8	6	6	6	6	6	9	5	6	5	7	9	114	6.3
2. Age of house- owner	49	32	40	42	48	48	36	42	36	40	34	58	54	48	36	35	38	53	769	43	
3. Nos. of children	6	2	2	3	6	4	3	6	4	3	4	3	7	3	4	3	5	5	73	4.1	
4. Age of the eldest child	17	5	12	6	20	15	6	15	12	12	7	15	28	22	6	5	12	12	227	13	
5. Age of the youngest child	6	0	6	1	8	9	2	2	5	2	0	12	16	11	0	0	6	3	89	4.9	
6. Workable nos. in family	2	1	1	1	3	1	1	1	1	2	1	2	3	2	1	1	2	1	27	1.5	
7. Unhealthy family member	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	3	0.2	
8. Sick name					h.blood					u.berdarah		u.maws									
9. Sick days										3yrs		6									
10. Felera Worked days / yr.	0	0	300	300	576	300	240	0	0	0	300	240	288	0	288	0	0	300	3132	174	
11. Outside Worked days/yr.	600	300	0	0	288	0	0	300	300	397	0	300	600	888	0	288	192	0	4453	250	
12. Husband main work	constr	outL	F.	F.	F.out	F.	F.	fishery constr	Ma L.	F.	F.	fac	F.outL	guard	F.	outL	boardr	F.	F10: OUT 8		
13. Commuting time(minutes)	180	60	15	15	30	15	15	30	30	90	30	30	30	60	5	20	90	15	760	42	
14. Feeling on working	hard	usual	hard	usual	usual	usual	hard	hard	hard	hard	easy	usual	usual	usual	usual	usual	hard	hard	easy	easy 1, usu 9, hard 8	
15. Income satisfaction	no	no	no	yes	yes	no	no	yes	no	yes	yes	no	yes	yes	yes	yes	yes	no	yes	no 8	
16. Farm land acreage																					
17. Farming difficulty																					
18. Crop knowledge source																					
19. Will for irrigation	yes	yes	uncert	yes	yes	yes	yes	yes	uncert	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	y 16.u.2.n 0	
20. Will for group farming	yes	uncert	uncert	yes	yes	no	yes	yes	yes	no	yes	yes	uncert	yes	yes	yes	yes	uncert	y 12.u.4.n 0		
21. Farmer's successor	no	no	no	no	no	no	no	no	no	no	yes	no	yes	yes	yes	yes	yes	no	y 6.u.1.n		

Summary of Farm Survey Result (JR10)

JR10	TOTAL	AVERAGE
1.Nos. of family members/in	191	5.3
2.Age of house- owner	1902	52.8
3.Nos. of children / all	194	5.4
4.Age of the eldest child / in	595	16.5
5.Age of the youngest child	329	9.1
6.Out-living children / out	77	2.1
7.Workable nos. in family	61	1.7
8.Unhealthy family member	8	0.2
9.Sick name		
10.Sick days		
11.Home farming days / yr.	6192	170
12.Outside Worked days/yr.	11833	330
13.Husband main work		
14.Commuting time(minutes)	870	24
15.Feeing on working	easy16, usu15, hard5	
16.Income satisfaction	yes 6, no 30	
17.Farm land acreage(ha)	111.1	3
18.Farming difficulty	water28,cost20,labor13	
19.Crop knowledge source	Ag.ex34,Neighbour11	
20.Will for irrigation	yes 35	
21.Will for group farming	yes 36	
22.Farmer's successor	yes 34	
B. CROP SURVEY (3)TREE CROPS	E CROP	
1.Total Nos of Fruits trees	3160	88
(1)Nos of Durian	2084	58
(2)Nos of Duku Langsat	405	11
(3)Nos of Dukong	293	8
(4)Nos of Manggis	50	1
(5)Nos of Rambutan	189	5
(6)Nos of Cempedak	70	2
(7)Nos of Manggosteen	49	1
(8)Nos of Banana	0	0
(9)Nos of other Fruits tree	30	1
2.Total Nos of Estate trees	15377	427
(1)Nos of Rubber	9380	261
(2)Nos of Oil-palm	4207	117
(3)Nos of Coffee	1790	50
3.Holding total tree Nos.	18537	515
4.Harvesting tree Nos. in all	11799	328
5.Yearly income by harvest	119610	3323
6.Expected income in future	488700	13575
7.Cash cost/ yr. at present	36203	1006
8.Fertilization cost	19942	554
9.Net income (5.-7.)	83407	2317
10.Family total work days/yr	6738	187
11.Net income RM/day(9/10)	12.4	12.4

ANNEX V.2 RESULT OF FARMERS' INTERVIEW SURVEY (JR10)

JR10 / Farmer's No. Lot No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
	6311	6310	6308	5864	6566	6309	4602	5865	6312	5866	4592	4601	4591	4603	4592	4593	5863	6066	6065	
A. LABOUR SURVEY																				
1. Nos. of family members/in	11	7	5	6	7	7	4	4	3	3	5	8	5	11	3	7	9	4	3	
2. Age of house-owner	40	60	53	55	53	43	62	58	50	58	42	48	54	52	69	40	42	69	62	
3. Nos. of children / all	9	6	3	4	5	5	7	4	4	7	3	6	4	9	5	4	7	5	5	
4. Age of the eldest child / in	17	25	29	19	22	9	11	14	15	19	16	22	20	21	23	8	18	37	22	
5. Age of the youngest child	2	9	16	11	14	2	9	14	15	19	8	5	4	4	23	2	3	35	22	
6. Out-living children / out	0	1	0	0	0	0	5	3	3	6	0	0	1	0	4	0	0	3	4	
7. Workable nos. in family	2	3	3	1	1	2	1	1	1	1	2	2	1	2	2	1	2	2	2	
8. Unhealthy family member	1	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	0	1	0	
9. Sick name	semput																			
10. Sick days	48										60	60	35		48			84		
11. Home farming days / yr.	550	120	120	250	240	160	160	52	0	240	90	200	125	135	180	330	320	70	320	
12. Outside Worked days/yr.	0	865	976	220	0	470	0	250	270	0	452	216	572	584	284	0	300	280	383	
13. Husband main work	rub/ovr	ouL	ouL	op/fru	farmer	teacher	farmer	contra	lowyer	farmer	teacher	farmer	ouL	pensio	fruit	farmer	pensio	farmer		
14. Commuting time (minutes)	0	60	15	0	0	20	0	60	15	0	30	120	20	0	0	0	0	0	0	
15. Feeling on working	easy	usual	usual	usual	easy	usual	usual	usual	hard	easy	usual	usual	usual	usual	usual	usual	usual	easy	easy	
16. Income satisfaction	no	no	no	no	no	no	no	no	yes	no	no	yes	no	no	yes	no	no	no	yes	
17. Farm land acreage (ha)	13.5	1	3.2	8.8	8	6.8	1.1	4.8	0.9	2.4	2.8	6.4	3.8	1.5	1.6	3.1	6.4	1.1	0.7	
18. Farming difficulty	W.T.C	W,T	W,C	L,W,C	WTMC	L,W	W,C	W,T,M	L,W	L,W,C	L,C	W,C	W,C	C	W,T	W,T,C	W	L,W,C	W	
19. Crop knowledge source	R.A	A	N.A	A	all	N.A	N.A	A	N	A	A	N.A,F	N	A	N.A	A	R.A	A	A	
20. Will for irrigation	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	uncert	yes	yes	yes	yes	yes	
21. Will for group farming	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	
22. Farmer's successor	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	
B. CROP SURVEY (3) TREE CROPS																				
1. Total Nos of Fruits trees	120	76	135	230	125	207	90	20	130	178	60	129	50	90	36	220	100	100	157	
(1) Nos of Durian	20	50	90	150	100	180	70	20	70	120	30	98	30	50	36	135	60	100	65	
(2) Nos of Duku Langsat	50	10	0	30	15	10	20	0	0	0	0	10	20	20	0	20	0	0	50	
(3) Nos of Dukung	30	10	15	0	10	10	0	0	60	20	30	10	0	0	0	0	20	0	20	
(4) Nos of Manggis	20	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
(5) Nos of Rambuan	0	6	0	0	0	0	0	0	0	8	0	11	0	10	0	50	0	0	14	
(6) Nos of Cempedak	0	0	0	0	0	7	0	0	0	30	0	0	0	0	0	15	0	0	8	
(7) Nos of Manggosteen	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	
(8) Nos of Banana	0	0	0	0.3ha	0.4ha	0	0	0	0	0	30trs	0	0	150trs	0	0.6ha	0	0	0	
(9) Nos of other Fruits tree	0	0	30	Sukun	0.1ha	Lemon grass	0	0	0	0	0	0	0	0	0	0	0	0	0	
2. Total Nos of Estate trees	1800	0	300	540	2100	780	0	250	0	0	192	385	100	0	1360	1190	0	0	0	
(1) Nos of Rubber	1800	0	0	0	1200	360	0	0	0	0	0	0	0	0	360	0	0	0	0	
(2) Nos of Oil-palm	0	0	300	540	900	420	0	250	0	0	192	385	0	0	0	0	550	0	0	
(3) Nos of Coffee	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	1000	640	0		
3. Holding total tree Nos.	1920	76	435	770	2225	987	90	270	130	178	60	321	435	190	36	1580	1290	100	157	
4. Harvesting tree Nos. in all	1807	7	300	620	1815	560	0	255	0	13	0	218	220	0	0	162	1190	30	40	
5. Yearly income by harvest	13100	300	3600	13000	18400	5250	0	2000	0	500	0	5800	3750	0	0	1100	21600	750	2700	
6. Expected income in future	44000	3000	13000	44000	65000	28000	10000	5000	12000	10000	9500	22000	10000	8000	4000	25500	29600	15000	15000	
7. Cash cost/yr. at present	915	250	1380	3440	2820	2682	274	1000	1030	780	410	1800	1550	204	316	2140	5580	1035	1100	
8. Fertilization cost	495	150	882	1800	2000	1512	126	400	220	480	170	500	950	84	176	1600	2800	620	820	
9. Net income (5-7.)	12185	50	2220	9560	15580	2568	-274	1000	-1030	-280	-410	4000	2200	-204	-316	-1040	16020	-285	1600	
10. Family total work days/yr	550	60	135	250	1092	340	160	48	60	240	90	260	125	135	180	330	368	120	320	
11. Net income RM/day(9/10)	22.155	0.8333	16.444	38.24	14.267	7.5529	-1.713	20.833	-17.17	-1.167	-4.556	15.385	17.6	-1.511	-1.756	-3.152	43.533	-2.375	5	

ANNEX V.2 RESULT OF FARMERS' INTERVIEW SURVEY (JR10)

JR10 / Farmer's No.	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Lot No.	1161	2515	1160	1189	1159	8177	8178	4572	8177	1159	4570	4578	6307	3991	4598	4573	4590
A. LABOUR SURVEY																	
1. Nos. of family members/in	4	5	9	1	6	3	6	2	3	5	5	5	9	2	3	4	7
2. Age of house- owner	70	62	32	64	46	36	42	105	63	40	51	40	41	62	43	54	41
3. Nos. of children / all	8	8	6	4	5	0	4	21	8	3	4	3	7	1	1	4	5
4. Age of the eldest child / in	14	33	8	xx	21	xx	18	xx	27	14	15	17	14	xx	5	25	17
5. Age of the youngest child	13	10	1	xx	4	xx	11	xx	9	8	7	12	3	xx	5	22	7
6. Out-living children / out	6	5	0	4	1	0	0	21	6	0	1	0	0	1	0	2	0
7. Workable nos. in family	2	1	1	1	2	2	3	2	2	1	2	2	2	1	1	3	1
8. Unhealthy family member	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9. Sick name	handicap																
10. Sick days	36	365															
11. Home farming days / yr.	575	55	100	320	90	120	300	350	120	80	150	80	70	45	0	35	40
12. Outside Worked days/yr.	0	578	320	0	550	250	600	0	280	220	300	400	564	300	285	782	282
13. Husband main work	rubber factory telecom farmer attend farmL farmer farmer techni attend teacher attend salesm factory outL techni																
14. Commuting time (minutes)	0	120	60	0	60	30	0	0	0	30	30	60	10	0	20	90	20
15. Feeling on working	easy	hard	easy	easy	usual	easy	easy	hard	easy	easy	easy	easy	usual	usual	easy	hard	usual
16. Income satisfaction	yes	no	no	no	yes	no	no	no	no	no	no	no	no	no	no	no	no
17. Farm land acreage(ha)	5.2	3	1.4	0.8	2.4	1.2	3.2	3.2	3.4	0.3	0.6	1.6	3.1	1.4	0.8	0.8	0.8
18. Farming difficulty	W	L	L	L,W,C	W,C	W	W	L	L,C	W	W	L,W	W,C	C	W,C	W,C	W
19. Crop knowledge source	A	A	A	A	A	R	N,A	R,A	N,A	A	N,A	A	N,A	A	A	A	A
20. Will for irrigation	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
21. Will for group farming	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
22. Farmer's successor	yes	yes	yes	uncert	yes	no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
B. CROP SURVEY (3)TREE CROPS																	
1. Total Nos of Fruits trees	310	19	14	64	90	30	18	40	20	20	50	70	0	43	0	54	65
(1)Nos of Durian	150	10	14	60	70	20	5	40	12	20	50	40	0	30	0	49	40
(2)Nos of Duku Langsat	80	0	0	0	15	0	0	0	0	0	0	30	0	0	0	0	25
(3)Nos of Dukong	30	0	0	0	15	5	0	0	8	0	0	0	0	0	0	0	0
(4)Nos of Manggis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(5)Nos of Rambutan	30	9	0	0	0	5	8	0	0	0	0	0	0	13	0	5	0
(6)Nos of Cempedak	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(7)Nos of Mangosteem	20	0	0	4	0	0	5	0	0	0	0	0	0	0	0	0	0
(8)Nos of Banana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
(9)Nos of other Fruits tree	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0-ha Pucuk manis																	
2. Total Nos of Estate trees	1200	860	100	50	540	260	720	1000	300	0	0	0	990	360	0	0	0
(1)Nos of Rubber	1080	710	0	0	540	260	720	1000	0	0	0	0	990	360	0	0	0
(2)Nos of Oil-palm	120	150	100	0	0	0	0	0	300	0	0	0	0	0	0	0	0
(3)Nos of Coffee	0	0	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0
3. Holding total tree Nos.	1510	879	114	114	630	290	738	1040	320	20	50	70	990	403	0	54	65
4. Harvesting tree Nos. in all	1300	19	4	40	550	260	733	1040	312	0	0	0	270	20	0	14	0
5. Yearly income by harvest	8780	850	0	780	1280	2400	2700	3900	5000	0	0	0	1200	550	0	320	0
6. Expected income in future	26000	1400	0	4500	10000	2400	6000	5000	8000	2000	4000	4000	19000	4300	6000	6500	7000
7. Cash cost/ yr. at present	1925	323	100	120	850	150	200	560	800	100	140	300	590	306	0	338	695
8. Fertilization cost	1050	168	60	60	620	70	100	500	400	50	40	150	250	216	0	168	255
9. Net income (5-7.)	6855	527	-100	660	430	2250	2500	3340	4200	-100	-140	-300	610	244	0	-18	-695
10. Family total work days/yr	575	55	30	200	90	250	300	70	120	0	0	70	40	0	0	35	40
11. Net income RM/day(9/10)	11.922	9.5818	-3.333	3.3	4.7778	9	8.3333	47.714	35	#####	#####	#####	8.7143	6.1	-0.514	-17.38	

ANNEX V.2 RESULT OF FARMERS' INTERVIEW SURVEY (TR44)

TR44 / Farmer's No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Lot No.																				
A. LABOUR SURVEY																				
1.Nos. of family members/in	5	4	5	5	4	4	6	8	8	3	6	6	6	9	6	6	9	9	6	9
2.Age of house- owner	50	53	56	40	60	36	70	49	42	90	47	60	70	50	50	51	27	47	47	56
3.Nos. of children / all	5	4	5	1	2	2	6	7	5	1	4	6	5	7	4	4	4	6	6	7
4.Age of the eldest child / in	29	32	20	4	23	17	50	30	20	28	18	23	45	33	32	28	7	18	18	32
5.Age of the youngest child	21	15	9	4	21	9	30	12	5	28	9	13	30	13	27	21	2	11	12	12
6.Out-living children / out	2	1	2	0	0	0	2	1	0	0	1	0	1	0	1	0	0	2	0	0
7.Workable nos. in family	5	2	3	2	4	2	6	5	2	3	2	4	5	6	4	6	4	2	5	5
8.Unhealthy family member	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
9.Sick name																				
10.Sick days	280	300	300	400	0	360	500	300	50	400	290	350	500	400	500	500	540	300	300	250
11.Home farming days / yr.	900	200	400	300	900	0	1100	1100	550	300	200	450	1100	1100	600	800	600	300	300	1036
12.Outside Worked days/yr.	rubtap	rubtap	rubtap	crptr	rubtap	roselle	rubtap	rubtap	rubtap	H.Frm	rubtap	rubtap	rubtap	rubtap	rubtap	rubtap	firewood.s.	cook	bsines	
13.Husband main work	90	30	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	usu	30	15		
14.Commuting time(minutes)	hard	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	usu	easy	usu	
15.Feeing on working	2	0.8	1	0.8	0.4	0.4	0.8	1.2	0.2	0.4	0.1	1.2	1.2	0.8	1.2	1.2	0.4	0.2	1.6	
16.Income satisfaction	all	all	all	all	all	T	all	all	all	C		all	all	all	all	all	all	all	W.C	
17.Farm land acreage(ha)	A	N	R	N	N	N	N	N	R	R	N.A	A	A	N	N	A	N	N.A	N	N.A
18.Farming difficulty	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
19.Crop knowledge source	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
20.Will for irrigation	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
21.Will for group farming	no	yes	no	no	uncert	yes	no	no	no	uncert	yes	no	no	no	no	no	unc	no	no	yes
22.Farmer's successor	0.2	0	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B. FARMING																				
1.Rozelle crop area (ha)	70	0	0	0	0	80	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.Roz.production cost(RM)	700	0	0	0	0	480	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.Roz. income (RM)	0.4	0	0	0	0	0	0	0	0	0.4	0	0	0	0	0.8	0	0	0	0	0.4
4.Other crop area (ha)	180	0	0	0	0	0	0	0	0	120	0	0	0	0	220	0	0	0	0	0
5.Cost for other crops(RM)	600	0	0	0	0	0	0	0	0	400	0	0	0	0	1000	0	0	0	0	100
6.Other crops income(RM)	52	51	306	92	21	23	14	35	31	0	620	531	367	235	329	8	0	4	110	
7.Nos. of tree crops	150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8.Cost for tree crops	300	130	300	270	100	100	0	400	20	0	80	1750	520	350	200	0	0	0	0	150
9.Tree crops income (RM)	1.1	0.5	3	0.9	0.2	0.3	0.1	0.4	0.3	0.4	2.2	2.3	3.7	0.8	3.3	0.1	0	0	0	1.5
10.Total crop area (ha)	400	0	0	0	0	80	0	0	0	120	0	0	0	0	220	0	0	0	0	0
11.Total product. cost(RM)	1600	130	300	270	100	580	0	400	20	400	80	1750	520	350	1200	0	0	0	0	250
12.Total farm income (RM)	4000	230	2000	2000	500	700	500	600	1500	500	150	2150	5200	800	8100	500	0	500	500	350
13.Future expected income()																				

ANNEX V.2 RESULT OF FARMERS' INTERVIEW SURVEY (TR44)

TR44 / Farmer's No.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	40	41	TOTAL	AV.
LABOUR SURVEY																				
1.Nos. of family members/in	3	5	8	4	4	7	4	6	9	6	10	6	9	9	6	10	6	9	218	6.2
2.Age of house- owner	55	39	39	50	60	41	38	46	49	37	49	39	45	45	37	49	39	45	1711	50.3
3.Nos. of children / all	1	3	4	2	2	4	2	4	5	3	8	4	8	8	3	8	4	8	151	4.4
4.Age of the eldest child / in	12	9	11	34	18	17	4	19	29	12	28	11	21	21	12	28	11	21	769	22.6
5.Age of the youngest child	12	1	1	32	8	7	2	3	17	6	9	3	3	3	6	9	3	3	413	12.1
6.Out-living children / out	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0.4
7.Workable nos. in family	2	1	3	4	2	1	1	2	4	3	5	1	1	1	3	5	1	1	108	3.2
8.Unhealthy family member	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0.12
9.Sick name	h.b.p. heart a																			
10.Sick days	40	20																		
11.Home farming days / yr.	0	0	300	300	800	300	410	50	0	350	600	200	0	50	600	200	0	50	9880	290
12.Outside Worked days/yr.	480	290	600	900	0	500	180	250	300	830	300	800	290	250	300	800	290	250	18266	537
13.Husband main work	rubtap	rubtap	rubtap	rubtap	H.Frm	rubtap	rubtap	rubtap	rubtap	guard	guard	retired	rubtap	teach	rubber=23/34					
14.Commuting time(minutes)	60	30	30	30	30	10	90	30	30	30	20	30	30	20	20	30	30	20	565	17
15.Feeling on working	usu	hard	usu	usu	hard	usu	usu	usu	usu	usu	usu	easy	usu	usu	usu	usu	usu	usu	usu24. easy2. hard3	
16.Income satisfaction	no	no	no	no	no	no	no	no	no	yes	yes	yes	no	no	yes	yes	no	no	yes2. no27	
17.Farm land acreage(ha)	0.4	0.2	0.4	1.2	0.8	4	0.1	0.1	0.4	0.4	0.8	2.8	0.1	0.1	0.8	2.8	0.1	0.1	28	0.8
18.Farming difficulty	all	all	all	all	C	R	C	all	all	C	C	C	all	all	C	C	all	all		
19.Crop knowledge source	N	N	N	N	R	R	N.A	N	N	N	A	N.R	N	N	A	N.R	N	N	A neighbor18.Ag.ext & relat 6	
20.Will for irrigation	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes yes34. no0. uncertain0	
21.Will for group farming	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes yes34. no0. uncertain0	
22.Farmer's successor	no	no	no	no	yes	yes	yes	no	no	uncert	yes	yes	no	uncert	yes	yes	no	uncert	yes12. no17. uncertain5	
FARMING																				
1.Rozelle crop area (ha)	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.2
2.Roz.production cost(RM)	0	0	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	190	76
3.Roz. income (RM)	0	0	160	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1340	536
4.Other crop area (ha)	0	0	0	0	0.3	1.2	0	0	0	1	0.8	0	0	0	0.8	0	0	0	5.4	0.6
5.Cost for other crops(RM)	0	0	0	0	0	492	0	700	0	230	122	0	0	0	122	0	0	0	2064	229
6.Other crops income(RM)	0	0	0	0	50	950	0	900	0	750	1000	0	0	0	1000	0	0	0	5750	639
7.Nos. of tree crops	0	14	5	66	34	815	35	50	2	104	1620	370	0	65	1620	370	0	65	5959	205
8.Cost for tree crops	0	0	0	460	120	250	50	0	0	600	1734	500	0	0	1734	500	0	0	3864	133
9.Tree crops income (RM)	0	0	0	0	0	500	900	0	0	400	700	600	0	100	700	600	0	100	8670	299
10.Total crop area (ha)	0	0	0.3	0	0	1.5	3.5	0.5	2	2	10.4	3.7	0	0.7	10.4	3.7	0	0.7	43.7	1.3
11.Total product. cost(RM)	0	0	0	0	0	612	250	750	0	830	1856	500	0	0	1856	500	0	0	5618	165
12.Total farm income (RM)	0	0	160	-460	50	1450	800	1800	0	1150	1700	600	0	100	1700	600	0	100	15300	450
13.Future expected income()	0	100	700	500	2000	1200	2000	0	500	1500	4000	1000	0	200	4000	1000	0	200	44030	1295

ANNEX V.3 COST AND PRODUCTION (BUDGET TABLES IN DETAIL)

The crop budgets were studied on several books published by MARDI and DOA. Those books are listed up as follows:

- (1) Anggaran kos pengeluaran dan pendapatan untuk tanaman dan ternakan, 1992, MARDI. (published in 1993).
- (2) Panduan Analisis Produktiviti Tanaman Buah-buahan Terpilih, 1993, DOA.(3)A Report on the Techno-economic Survey of the Malaysian Fruit Industry, 1980, MARDI-UPM.(published in 1981).
- (4) Potensi dan kajian kemungkinan penanaman orkid secara komersial, 1991, MARDI.
- (5) Technology for commercial production of durian, 1992, MARDI.
- (6) Acidity amendments and crop responses to liming of Malaysian soils, 1990, MARDI.
- (7) Teknologi Tembakau, Mey 1985/Mey 1987, MARDI.

The tables of crop budgets here were modified from these books except V.3.1., and those tables are shown only for the reference. Hence, it is recommended to discuss and review before the implementation with farmers and the project owner Agencies.

The attached tables here are as follows:

- V.3.1. Orchid Budget by MARDI (0.4 ha)
- V.3.2. Proposed Durian Budget at MA16(ha) (RM)
- V.3.3. Proposed Orchid Budget at MA16 (0.4 ha)
- V.3.4. Plan of Compost Factory Budget at MA16
- V.3.5. Plan of Resin Handicraft Production at MA16
- V.3.6. Durian Maintenance Budget at JR10
- V.3.7. Compost Making Budget at JR10
- V.3.8. Compost Making Budget at KH1
- V.3.9. Proposed Orchid Budget at KH1
- V.3.10. Proposed Crop Budget of Melon at KH1
- V.3.11. Proposed Crop Budget of Cauliflower at KH1

ANNEX V. 3. Cost and Production (Budget Tables in Detail)

V. 3. 1 Orchid Budget by MARDI (0.4 ha)*

(1) Facility Investment	RM33,639/yr.	Average in 6 yrs.
(2) Fertilizer	RM 2,011/yr.	
(3) Chemicals	RM 3,830/yr.	
(4) Wrapping	RM 2,340/yr.	
(5) Labour cost	RM25,000/yr.	
(6) Other cost	RM 5,460/yr.	
<u>Total cost / year</u>	<u>RM72,280/yr.</u>	
Gross Return	RM123,156/yr.	Average in 6 yrs.
Net Return	RM50,876/yr.	

* Potensi dan kajian Kemungkinan penanaman orkid secara komersia MARDI,1991

V.3.2. Proposed Durian Budget at MA (ha) (RM) *

Production cost

	1st yr.	2nd yr.	3rd yr.	4th yr.	5th yr.	6th yr.	7th yr.	8th yr.
(1) Preparation	450	0	0	0	0	0	0	0
(2) Planting	387	0	0	0	0	0	0	0
(3) Seedling	290	0	0	0	0	0	0	0
(4) Fertilizer	317	388	460	531	707	800	876	1,103
(5) Chemicals	173	295	417	431	530	530	530	530
(6) Labour **	461	519	576	576	740	764	975	1,304
<u>Annual cost/ ha</u>	<u>2,048</u>	<u>1,202</u>	<u>1,435</u>	<u>1,538</u>	<u>1,977</u>	<u>2,094</u>	<u>2,381</u>	<u>2,937</u>

Yield; production

	7th yr.	8th yr.	9th yr.	10th yr.	11th yr.	12th yr.	13th yr.	14th yr.
(1) Yield (t/ha)	0.9	2.3	3.7	5.0	6.5	7.4	8.3	9.2
(2) Gross return	1,800	4,600	7,400	10,000	13,000	14,800	16,600	18,400
(3) Net return	(-10775)	(-8675)	(-4075)	2,925	9,700	11,300	112,900	14,500

*Panduan analisis produktiviti tanaman buah-baahan, DOA,1993

**Labour cost: RM15/ man-day

V.3.3. Proposed Orchid Budget at MA16 (0.4 ha)

Initial Investment

(1) Net house	RM20,000	Net: RM7,000(FT610) *
(2) Sprayer	RM 2,000	
(3) Seedling cost	RM10,000	
(4) Materials	RM28,000	40,000pots; RM0.7/pot
<u>Total</u>	<u>RM60,000</u>	<u>Bank loan by 10 farmers(group)</u>

<u>Annual cost</u>	(1) Maintenance	RM3,000	Repairing of facilities and sprayers
	(2) Materials	RM4,000	40,000pots; RM0.1/pot
	(3) Labour cost	RM15,000	RM5 /day(4hrs.): 10 women.
	(4) Loan payment	RM8,740	9% interest; 10yrs. repayment
	<u>Total</u>	<u>RM30,740</u>	
<u>Gross production</u>	50,000 stalks/yr	RM40,000	Sale price: @RM0.8
<u>Net production</u>		RM 9,260	dividing among 10 participants.

V.3.4. Plan of Compost Factory Budget at MA16

Materials (In the case of 2 tons of daily production)			cost
(1) Palm-oil waste*	1,000kg	Labour cost	
(2) Saw-dust*	1,000kg	Labour cost	
(3) Molasses*	2,000cc(2.5kg)		RM10
(4) water	200Liter(200kg)	Labour cost	
(5) Cow-dung	400kg(dry)	Labour cost	
(6) Labour cost(unload/mixing)	5 hired labourer		RM50
	per day running cost:		RM60/ day

Production

(3) and (4) will be mixed at first, and then (1), (2), and (5) will be added and mixed. After mixing, it has to be kept in airless condition for one week. After one week, the compost should be dry up.

When the dried compost is put in plastic bags, it can be used for a few months. The compost can mix with any kind of organic matter, such as cow-dung, dry leaves, etc.

*All of the materials will be prepared by FELCRA.

Manufacturing Facility

For the purpose of mixing and drying, approx.1000 sq. feet of concrete yard will be necessary.

As for keeping the mixed compost for one week with airless condition at least seven partition of concrete enclosures should be constructed.

For the covering, plastic sheets is available.

V.3.5. Plan of Resin Handicraft Production at MA16

Initial cost

(1) Workroom facility (12ft & 18ft	RM30,000	(FELCRA)
(2) Resin process machine 1 set	RM20,000	(Bank loan)
(3) Electronic range 1unit	RM 2,500	(Bank loan)
(4) Furnitures (table,chair, locker)	RM 5,000	(FELCRA)

Running cost (Monthly)

(1) Material	RM2,500	(Key-holder; 12,500 pieces)
(2) Labour cost	RM1,250	(5 women; RM10/ day)
(3) Loan payment	RM280	(Monthly; RM3,280/ yr.)
(3) Managing cost	RM1,000	(Handicraft company *)

Production

(1) Items: Key-holder; 10,000 pieces/ month; Sale price @RM1.00	
(2) Gross return	RM10,000
(3) Net return (to be divided by 5 participants)	RM 4,970

Instruction or Managing cooperation

There are two companies of resin handicraft manufacturing, which are famous for the accessory and the souvenir.

Both of them are situated at Batu Caves in K.L. suburbs.

When starting the project, FELCRA staff and some women should go and see the manager and discuss on the possibility of the project.

*Syarikat Papillon; 55 Jalan Sesama, Batu Caves, Selangor

V.3.6. Durian Maintenance Budget at JR10

Recommendation by DOA

Fertilization Design in 8th -25th yr.

(1) Compound fertilizer : 9kg / tree / year	RM774 / ha
(2) Organic fertilizer : 40kg / tree / year	RM480 /ha

Proposed Fertilization Design (8th -25th yr.)

(1) Compost : 5,000kg/ ha : 50kg / tree /yr.	RM500 / ha
(2) Lime : 1,000kg/ ha : 10kg /tree /yr	RM200 / ha
(3) Compound fertilizer:1,000kg : 10kg / tree / yr.	RM900 / ha

V.3.7. Compost Making Budget at JR10

Materials (In the case of 4 tons of weekly production)

			<u>cost</u>
(1) Palm-oil waste*	2,000kg	Transportation	RM100
(2) Saw-dust*	2,000kg	Transportation	RM100
(3) Molasses*	4,000cc(5kg)		RM20
(4) water	400Liter(400kg)		
(5) Chicken-dung	800kg(dry)	Labour cost	
(6) Labour cost(unload/mixing)	Family labour & Group Farming		
per day running cost:			RM220/ week

Production

(3) and (4) will be mixed at first, and then (1), (2), and (5) will be added and mixed. After mixing, it has to be kept in airless condition for one week. After one week, the compost should be dry up.

When the dried compost is put in plastic bags, it can be used for a few months. The compost can mix with any kind of organic matter, such as chicken-dung, kitchen garbage, dry leaves, etc.

*All of the materials will be arranged by DOA extension service.

Manufacturing Facility

In case of JR10, DOA extension worker has learned to use microbes for compost making, and farmers also have exercised to make compost by the group working.

Therefore, in some farm houses, they can start to make compost with help of DOA extension worker.

Instruction and Supervising

Professor Dr. Sharifuddin Hj. Abdul Hamid, a lecturer in the soil science faculty, UPM, will help them with adequate instruction and supervising.

V.3.8. Compost Making Budget at KH1

<u>Materials</u> (In the case of 1 ton of weekly production)			<u>cost</u>
(1) Rice bran*	500kg	Transportation	FOA service
(2) paddy husk*	500kg	Transportation	FOA service
(3) Molasses*	1,000cc(1.25kg)		RM 5
(4) water	100Liter(100kg)		
(5) Chicken-dung	200kg(dry)		RM30
(6) Labour cost(unload/mixing)	Group Farming labour		
	per day running cost:		RM35/ week

Production

(3) and (4) will be mixed at first, and then (1), (2), and (5) will be added and mixed. After mixing, it has to be kept in airless condition for one week. After one week, the compost should be dry up.

When the dried compost is put in plastic bags, it can be used for a few months. The compost can mix with any kind of organic matter, such as chicken-dung, kitchen garbage, dry leaves, etc.

*All of the materials will be arranged by FOA service.

V.3.9. Proposed Orchid Budget at KH1 (0.4 ha)

Initial Investment

(1) Net house	RM20,000	Net: RM7,000(FT610) *
(2) Sprayer	RM 2,000	
(3) Seedling cost	RM10,000	
(4) Materials	RM28,000	40,000pots; RM0.7/pot
Total	RM60,000	Bank loan by 10 farmers(group)

Annual cost

(1) Maintenance	RM3,000	Repairing of facilities and sprayers
(2) Materials	RM4,000	40,000pots; RM0.1/pot
(3) Labour cost	RM15,000	RM25 /day(8hrs.): 2 families.
(4) Loan payment	RM8,740	9% interest; 10yrs. repayment
Total	RM30,740	

Gross production

50,000 stalks/yr	RM40,000	Sale price: @RM0.8
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Net production

RM 9,260	dividing by two families.
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V.3.10. Proposed Crop Budget of Melon at KH1*

Production Cost (ha)

(1) Seeds		RM 250
(2) Land preparation		RM 650
(3) Lime		RM 200
(4) Compost	10 t	RM 350
(5) Fertilizer	1 t	RM 960
(6) Labour	100 man-days	RM2,500
Total cost		RM4,930

Yield and Production

(1) Yield per ha	12,000kg	
(2) Gross return	RM1.2 / kg	RM14,400
(3) Net return		RM 9,470

V.3.11. Proposed Crop Budget of Cauliflower at KH1*

Production Cost (ha)

(1) Seeds	250g	RM 350
(2) Land preparation		RM 650
(3) Lime		RM 200
(4) Compost	10 t	RM 350
(5) Fertilizer	1 t	RM 960
(6) Labour	150 man-days	RM3,750
Total cost		RM6,280

Yield and Production

(1) Yield per ha	10,000kg	
(2) Gross return	RM2 / kg	RM20,000
(3) Net return		RM13,720

*Anggaran kos pengeluaran dan pendapatan untuk tanaman dan ternakan, 1992, MARDI

ANNEX VI
ENVIRONMENT

**ANNEX VI
ENVIRONMENT**

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ANNEX 6.1 ENVIRONMENTAL QUALITY ACT 1974

ENVIRONMENTAL QUALITY (PRESCRIBED ACTIVITIES) (ENVIRONMENTAL IMPACT ASSESSMENT) ORDER 1987

In exercise of the powers conferred by section 34A of the Environmental Quality Act 1974, the Minister, after consultation with the Environmental Quality Council, makes the following order:

1. This Order may be cited as the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987 and shall come into force on the 1st April 1988.
2. The activities specified in the Schedule are prescribed to be prescribed activities.

SCHEDULE

1. AGRICULTURE

- (a) Land development schemes covering an area of 500 hectares or more to bring forest land into agricultural production.
- (b) Agricultural programmes necessitating the resettlement of 100 families or more.
- (c) Development of agricultural estates covering an area of 500 hectares of more involving changes in type of agricultural use.

2. AIRPORT

- (a) Construction of airports (having an airstrip of 2,500 meters or longer).
- (b) Airstrip development in state and national parks.

3. DRAINAGE AND IRRIGATION

- (a) Construction of dams and man-made lakes and artificial enlargement of lakes with surface areas of 200 hectares or more
- (b) Drainage of wetland, wildlife habitat or virgin forest covering an area of 100 hectares or more
- (c) Irrigation schemes covering an area of 5,000 hectares or more

4. LAND RECLAMATION

Coastal reclamation involving an area of 50 hectares or more.

5. FISHERIES

- (a) Construction of fishing harbors.
- (b) Harbor expansion involving an increase of 50 percent or more in fish landing capacity per annum.
- (c) Land based aquaculture projects accompanied by clearing of mangrove swamp forests covering an area of 50 hectares or more.

6. FORESTRY

- (a) Conversion of hill forest land to other land use covering an area of 50 hectares or more.
- (b) Logging or conversion of forest land to other land use with the catchment area of reservoirs used for municipal water supply, irrigation or hydro power generation or in areas adjacent to state and national parks and national marine parks.
- (c) Logging covering an area of 500 hectares or more.
- (d) Conversion of mangrove swamps for industrial, housing or agricultural use covering an area of 50 hectares or more.
- (e) Clearing of mangrove swamps on islands adjacent to national marine parks.

7. HOUSING

Housing development covering an area of 50 hectares or more.

8. INDUSTRY

- (a) Chemical : Where the production capacity of each product or of combined products is greater than 100 tonnes/day.
- (b) Petrochemicals : All sizes
- (c) Non-ferrous : Primary smelting : Aluminium - All sizes, Copper - All sizes,
Others : Producing 50 tonnes/day and above of product.
- (d) Non metallic : Cement - for clinker throughput of 30 tonnes/hour and above.
Lime : 100 tonnes/day and above burnt lime rotary kiln or 50 tonnes/day and above vertical kiln.
- (e) Iron and steel : Require iron ore as raw materials for production greater than 100 tonnes/day. Or Using scrap iron as raw materials for production greater than 200 tonnes/day.
- (f) Shipyards : Dead weight tonnage greater than 5000 tonnes.

- (g) Pulp and paper industry - Production capacity greater than 50 tonnes/day.

9. INFRASTRUCTURE

- (a) Construction of hospitals with outfall into beachfronts used for recreational purposes.
- (b) Industrial estate development for medium or heavy industries covering an area of 50 hectares or more.
- (c) Construction of expressways.
- (d) Construction of national highways.
- (e) Construction of new townships.

10. PORTS

- (a) Construction of ports.
- (b) Port expansion involving an increase of 50% or more in handling capacity per annum.

11. MINING

- (a) Mining of minerals in new areas where the mining lease covers a total area in excess of 250 hectares.
- (b) Ore processing including concentrating for aluminium, copper, gold or tantalum.
- (c) Sand dredging involving an area of 50 hectares or more.

12. PETROLEUM

- (a) Oil and gas fields development
- (b) Construction of off-shore and on-shore pipelines in excess of 50 kilometers in length.
- (c) Construction of oil and gas separation, processing, handling, and storage facilities.
- (d) Construction of oil refineries.
- (e) Construction of product depots for the storage of petrol, gas or diesel (excluding service stations) which are located within 3 kilometers or any commercial, industrial or residential areas and which have a combined storage capacity of 60,000 barrels or more.

13. POWER GENERATION AND TRANSMISSION

Dams and hydroelectric power schemes with either or both of the following :

- (a) Dams over 15 meters high and ancillary structures covering a total area in excess of 40 meters.
 - (b) Reservoirs with a surface area in excess of 400 hectares.
14. **QUARRIES**
Proposed quarrying of aggregate, limestone, silica, quartzite, sandstone, marble and cooperative building stone within 3 kilometers of any existing residential, commercial, or industrial or any area for which a license permit or approval has been granted for residential, commercial or industrial development.
15. **RAILWAYS**
- (a) Construction of new routes
 - (b) Construction of branch lines
16. **TRANSPORTATION**
Construction of Mass Rapid Transport projects
17. **RESORT AND RECREATIONAL DEVELOPMENT**
- (a) Construction of coastal resort facilities or hotels with more than 80 rooms.
 - (b) Hill station resort or hotel development covering an area of 50 hectares or more
 - (c) Development of tourist or recreational facilities in national parks.
 - (d) Development of tourist or recreational facilities on islands in surrounding waters which are gazetted as national marine parks.
18. **WASTE TREATMENT AND DISPOSAL**
- (a) Toxic and Hazardous Waste
 - (i) Construction of incineration plant
 - (ii) Construction of recovery plant (Off-site)
 - (iii) Construction of wastewater treatment plant (Off-site)
 - (iv) Construction of secure and landfill facility
 - (v) Construction of storage facility(Off-site).
 - (b) Municipal Solid Waste
 - (i) Construction of incineration plant
 - (ii) Construction of composting plant
 - (iii) Construction of recovery recycling plant
 - (iv) Construction of incineration plant
 - (v) Construction of municipal solid waste landfill facility

(c) **Municipal Sewage**

- (i) **Construction of wastewater treatment plant**
- (ii) **Construction of marine outfall.**

19. **Water Supply**

- (i) **Construction of dams or impounding reservoirs covering an area of 200ha or more.**
- (ii) **Groundwater development for industrial, agricultural or urban water supply of greater than 4,500 cubic meters per day.**

**Annex 6.2 List of Regulations under Environmental Quality Act, 1974
and other Environmentally Related Legislations**

Sl.No.	Legislations
25.	Sale of Food and Drug Ordinance, 1952
26.	Antiquities Act, 1976
27.	The Aboriginal Peoples Act, 1954
28.	Federal Territory Act, 1952
29.	Urban Development Authority Act, 1971
30.	Dangerous Drug Ordinance, 1952
31.	Sarawak Land Code, 1958
32.	Sabah Land Ordinance, 1958
33.	Employment Act, 1955
34.	Employees' Social Security Act, 1969
35.	Children and Young Person (Employment) Act, 1966
36.	Children and Young Person Act, 1947
37.	National Land Code, 1965
38.	Municipal and Town Boards (Amendment) Act, 1975
39.	City of Kuala Lumpur (Planning) Act, 1975
40.	Housing Developers (Control and Licensing) Act, 1974
41.	Streets, Drainage and Building Act, 1974
42.	Mining Enactment, 1929
43.	The Waters Enactment, 1920
44.	Drainage Works Ordinance, 1954
45.	Petroleum Development Act, 1974
46.	Land Conservation Act, 1960
47.	Factories and Machinery Act, 1967
48.	The Road Traffic Ordinance, 1958
49.	Pesticides Act, 1974
50.	Radioactive Substances Act, 1968
51.	Poisons Ordinance, 1951
52.	Explosive Drug Ordinance, 1952
53.	Medicine (Advertisement & Sale) Ordinance, 1956
54.	Trade Description Act, 1972
55.	Continental Shelf Act, 1966
56.	The Merchant Shipping Ordinance, 1952
57.	Federation Port Rules, 1953

Annex 6.3 Environmental Study in Phase - I

(1) Environmental Problems of the Short-listed Projects

The environmental problems of the 134 short-listed projects were surveyed using questionnaire and the summary is shown in Table A.6.3.1.

As shown in Table A.6.3.1, 76 of the 134 projects surveyed have no major environmental problem in the area. The major environmental problem is water quality caused by domestic effluent, industrial effluent, farm effluent, salinity, brackish water, sediment, mineral and weeds. Water quality is the major problem in 4 of the 5 short listed projects in Melaka State. Other major environmental problems in the short-listed projects are flooding, soil erosion and water logging. Especially in the Pahang state, flooding and water logging are the major problems in 9 of the inundation schemes. Small reservoir development is expected to have a significant effect in mitigating the flood problem. Soil erosion because of land clearing and logging is an important problem in 8 projects in Perak State. In Kelantan river erosion and flooding are the major problems in 3 of the projects.

(2) Remedial Measures and Monitoring Facilities

Since there are no major environmental problems caused by the small reservoir development projects, there are almost no remedial measures were followed in the projects surveyed except for desilting basin and bunding which were reported for two projects.

Regarding the monitoring facilities for environmental protection, DID carries out water quality sampling in the major rivers. DID has 43 principal water quality stations and 28 secondary water quality stations for monitoring the water quality in the major rivers. Besides suspended sediment sampling is carried out at 43 principal stations and 37 secondary stations. DOE is also monitoring the 87 major rivers and the water quality samples were carried out in 555 sites in 1991.

(3) Prescribed Activities of the Short-listed Projects

The Environmental Impact Assessment (EIA) which was made a mandatory requirement under section 34A of the Environmental Quality Act, 1974 requires anyone who intends to carry out a prescribed activity to first conduct a study to assess the environmental impact that will arise from the prescribed activity as well as the mitigating measures to overcome them. The Environmental Quality (Prescribed

Activities) (Environmental Impact Assessment) Order 1987 specifies 19 broad categories of activities requiring EIA prior to project approval or implementation.

The proposed project activities in the project area were verified against the prescribed activities through the questionnaire survey. Based on the analysis of the results, it was found out that the proposed project areas for most of the projects are small compared to the limits of the Prescribed activities. Therefore in most of the cases, EIA shall not be necessary. Among the short listed projects, the following projects which are bound by the limits of the prescribed activities need a detailed EIA and approval from DOE before their implementation. The projects and the prescribed activities which bound the respective projects are given below :

1. KH 3 - Ampangan Pdg Saga - Conversion of forest land to other land use covering an area of 50 ha or more.
2. PP6 - Sg Jarak Irrigation Area - Construction of dams or impounding reservoirs of 200 ha or more.
3. PP9 - Sg Burung - Conversion of forest land to other land use covering an area of 50 ha or more.
4. PP 13 - Skim Pengairan Tasek Selatan - Development of tourist facilities in national parks.
5. PK 3 - Industri Buah-Buahan - Conversion of forest land to other land use covering an area of 50 ha or more.
6. SG 8 - Kuang - Land development of agricultural estates covering an area of 500 ha or more involving changes in type of agriculture use.
7. NS 7 - Kg Bk Tembok & Sg Raya - Construction of dams or impounding reservoirs of 200 ha or more.
8. KN 5 - Lubok Selehong - Agriculture programs necessitating the resettlement of 100 families or more
9. KN 24 - Ranc Taliair Enggong - Construction of dams or impounding reservoirs of 200 ha or more.
10. TR1 - Telabak Irrigation Scheme - Conversion of forest land to other land use covering an area of 50 ha or more.
11. TR 3 - Skim Tanaman Padi Maras - Conversion of forest land to other land use covering an area of 50 ha or more.
12. TR 50 - Kolam Abang - Construction of dams or impounding reservoirs of 200 ha or more.

In most of the projects where there is a potential for small reservoir development, the area of the proposed reservoir is not clear at present. Therefore, it is not possible to decide on the necessity of EIA for those projects. Once a complete and suitable plan is

made for those projects, the necessity of EIA can be verified against the prescribed activities.

(4) Environmental Impacts of the Short-listed Projects

The environmental impacts of the short-listed projects were studied using a preliminary assessment matrix through questionnaire survey. The summary of the environmental impacts of the short-listed projects based on the Questionnaire survey is shown in Table A.6.3.2. The environmental impacts of the projects in each of the 11 states of Peninsular Malaysia is shown in Table A.6.3.3.

Among the 114 projects, around 100 projects have no impact with regard to most of the environmental components. Since the size of the project considered in most of the cases for the small reservoir development is less than 200 ha, the environmental impacts are relatively small.

The main environmental component which has a significant effect on 10-15 small reservoir development projects is surface water, which includes flooding, water quality, drainage and water balance etc. The socio economic conditions of the area is also expected to have a significant impact. The other environmental components like groundwater, land, species and populations and aesthetic and cultural aspects also have significant impact on some of the projects.

The environmental enhancement is also significant for around 20 projects. Especially the surface water conditions, socio economic conditions and impacts on the community is expected to improve by these small reservoir development projects. Water balance of 5 projects in Perlis State and 17 projects in Kedah State is expected to improve by small reservoir development. The community shall also be benefited from these 22 projects. In Pahang state small reservoir development is expected to have a significant effect in improving the flooding and drainage problem of the projects.

(5) Environmental Criteria for the Selection of Projects

With regard to environmental aspect, the selection of the projects for small reservoir development shall be made considering the following three factors :

- 1) The projects which may cause no or less environmental problems which can be solved by suitable remedial measures shall be selected.
- 2) The project areas which do not include environmentally sensitive areas shall be selected. The environmentally sensitive areas are as follows ;
 - i) Historic, religious, cultural or archeological sites
 - ii) Existing Reserves and Parks

- iii) Any area gazetted as a forest reserve or protective forest reserve (including mangrove areas)
- iv) Existing Hydro-project and irrigation schemes
- v) Water Supply Intakes
- vi) Coral reefs and major fishing grounds
- vii) Any area with tourism potential

3) Areas which include the prescribed activities shall be avoided. However if necessary, some highly potential areas which also include prescribed activities shall be selected. If development need to be carried in these areas, a detailed Environmental Impact Assessment and approval from the Department of Environment will be necessary.

Tables

TABLE A.6.3.1 MAJOR ENVIRONMENTAL PROBLEMS OF THE SHORT LISTED PROJECTS

State	No. of Project Areas	Major Environmental Problems														No Prob. Data							
		Water Quality							Soil Erosion			Flood ing	River Erosion	Water Short	Water Logging		Draught						
		DE	IE	FE	SA	BW	SE	MN	WE	GE	LG							LC					
Perlis	6		2																	3			
Kedah	19												1						3	14			
Paula Pinang	13			5										1						6			
Perak	19		1							1					2	7	1			6	3		
Selangor	17											1					1			11	3		
N. Sembilan	8													1						6			
Melaka	5	1			1																1		
Johor	6																				6		
Kelantan	14																	3			9		
Trengganu	15															1						12	2
Pahang	12										2							7				2	
Total	134	1	3	5	1	1	1	1	1	4	1	1	1	6	4	7	15	3	1	9	3	76	8

DE - Domestic Effluent, IE - Industrial Effluent, FE - Farm Effluent, SA - Salinity, BW - Brackish Water, SE - Sediments, MN - Minerals, WE - Weeds,

GE - General Water Quality, LG - Logging, LC - Land Clearing

TABLE A.6.3.2 SUMMARY OF ENVIRONMENTAL IMPACTS BASED ON THE PRELIMINARY ASSESSMENT MATRIX

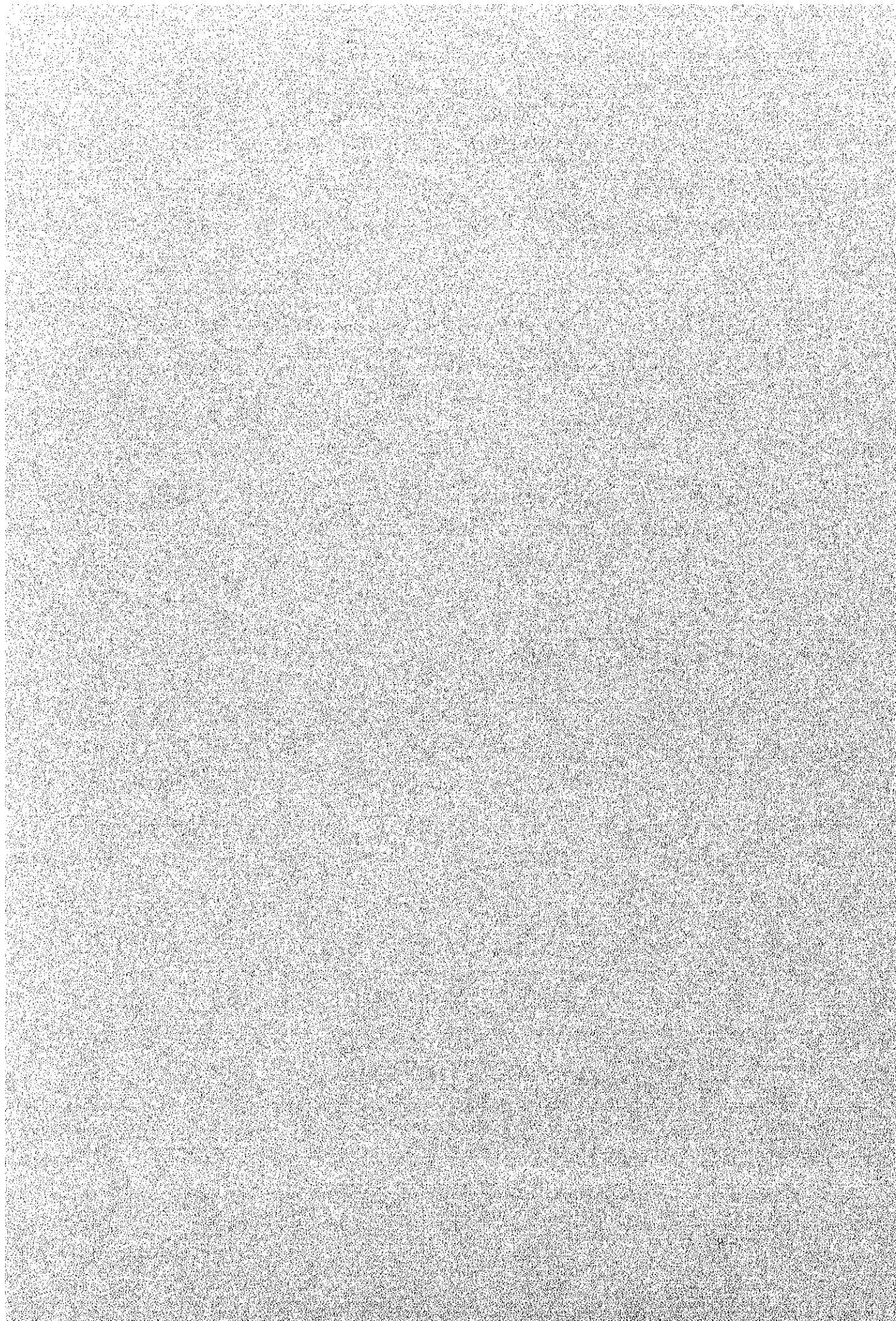
ENVIRONMENTAL COMPONENTS	NUMBER OF PROJECTS				
	No Impact	Significant and Solvable	Significant but Unknown	Significant and Unsolviable	Environmental Enhancement
I. PHYSICOCHEMICAL					
1. LAND					
(i) Change of Land use (Devastation or desertification)	100	4	4	0	6
(ii) Soil Erosion	108	5	1	0	0
(iii) Soil Salinization	110	2	2	0	0
(iv) Deterioration of soil fertility	106	5	3	0	0
(v) Others	114	0	0	0	0
2. SURFACE WATER					
(i) Water Balance	85	5	2	0	22
(ii) Flooding	84	13	3	1	13
(iii) Soil sedimentation	98	9	3	1	3
(iv) Water Quality	97	7	5	1	3
(v) Drainage Pattern	85	11	4	0	14
(vi) Change in Existing Use	101	7	2	1	3
(vii) Others	112	2	0	0	0
3. GROUNDWATER					
(i) Change in groundwater hydrology	96	12	2	0	4
(ii) Water Quality	109	1	4	0	0
(iii) Change in Existing Use	108	2	4	0	0
(iv) Others	114	0	0	0	0
4. ATMOSPHERE					
(i) Atmospheric pollution	109	2	2	0	1
(ii) Others	114	0	0	0	0
5. NOISE					
(i) Noise Pollution	114	0	0	0	0
(ii) Others	114	0	0	0	0
II. BIOLOGICAL					
6. SPECIES AND POPULATIONS					
(i) Terrestrial Vegetation	109	4	0	0	1
(ii) Terrestrial Wildlife	111	2	1	0	0
(iii) Other Terrestrial Fauna	110	4	0	0	0
(iv) Aquatic/Marine Flora	110	3	1	0	0
(v) Fish	105	4	1	0	4
(vi) Other Aquatic/Marine Fauna	113	1	0	0	0
7. HABITATS AND COMMUNITIES					
(i) Terrestrial Habitats	113	1	0	0	0
(ii) Terrestrial Communities	111	2	1	0	0
(iii) Aquatic, Estuarine, Marine Habitats	111	2	1	0	0
(iv) Aquatic, Estuarine, Marine Communities	111	2	1	0	0
(v) Others	114	0	0	0	0
III. HUMAN					
8. HEALTH AND SAFETY					
(i) Physical Safety	114	0	0	0	0
(ii) Psychological Well-Being	110	2	0	0	2
(iii) Outbreak of Diseases	110	3	1	0	0
(iv) Others	114	0	0	0	0
9. SOCIAL AND ECONOMIC					
(i) Employment	84	3	5	1	21
(ii) Housing	94	6	0	1	13
(iii) Change in Way of Life	84	4	5	0	21
(iv) Involuntary Settlement	105	5	1	0	3
(v) Population Increase	99	6	3	0	6
(vi) Others	114	0	0	0	0
10. AESTHETIC AND CULTURAL					
(i) Impacts on the Community	80	4	4	0	26
(ii) Conflicts among communities	107	7	0	0	0
(iii) Historic and Cultural Assets	114	0	0	0	0
(iv) Others	111	1	0	0	2

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ANNEX VII
PROJECT ECONOMY



ANNEX VII
PROJECT ECONOMY

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7.1 The History of Small Reservoir Development in Japan

As a reference, here is a sketch of small reservoir development in Japan.

Japan has a long history of small reservoirs. Before the Imperial Court set its capital in *Nara* basin in 710, some reservoirs had been made in Northern *Izumi* area where the precipitation is relatively less than other areas. *Sayama* pond (Surface area (SA) = 51ha; Irrigated area (IA) = 1800 ha, re-built in 731 AC) is one of them. In the *Nara* period, *Kumeda* pond (SA = 45.6ha; Effective volume (EV) = 1.6mil. m³, built in 734 AC) was constructed in the southern *Izumi* area. They are the two biggest reservoirs in the region even now. They have survived all the vicissitude of the history up to the present. (Of course material and technology of the time could not withstand the storms, of which scale were above around one upon tenth probability, dams had been re-constructed again and again until some decades ago.)

It was a national project those days to build a dam of this size. The emperor *Shomu*, Empress *Komyo* and a state councillor *Tachibana* were the major promoters of the *Kumeda* reservoir project, for example. Abbot *Gyouki* of *Asuka* temple of *Kegon* sect was the chief engineer of major repair works of *Sayama* pond and new construction works of *Kumeda* pond.

Those days some of the priests were notable civil engineers. *Man-noh* pond (L=155m, H=32m, Area=1.4km², EV= 1.5mil. m³, IA = 3400ha for 7900 farming households as of 1969 after renovation works were carried out), the biggest in Japan of this sort was repaired by Abbot *Kohboh*, the founder of *Singon* Sect in 821. It is located in *Marugame* plain of *Shikoku* Island, his native place, that belongs to the same climatic zone as *Izumi* plain. The plain has been irrigated by more than 20 thousand ponds. *Osaka* prefecture where *Izumi* plain is situated has about 12,000 ponds as of now. This number suggests almost all the water available in basins is collected by reservoirs at different altitudes and used again and again till it reaches the sea. The lower the reservoirs are situated, the nearer to the one the ratio of the surface area of reservoir to its irrigation area becomes.

Networks of irrigation cum drainage channels with diversification weirs have been made, and complex water rights have been established. Farmers associations were then formed accordingly. Yet water shortages at the period of paddy transplantation were so acute in some years that quarrels on the water use have often been developed into a big fight among and within the farmers settlements. And they have settled their psychological accounts on the accumulated antipathy at the time of communal festivities. This communal attitude still reflects the behaviour of the participants in the present annual *Sintoh* festivals.

Only the levelling of surface of the paddy field which is to reduce the number of pieces of paddy fields in recent consolidating program have succeeded in saving the volume of irrigating water. (Water stays in a piece of paddy field for some time.)

Many reservoirs in the plains have recently faced drastic changes in land use of surrounding areas mainly due to urbanisation. Their functional changes have been taken place. Surface water space and adjacent areas of reservoirs have become public parks to enhance amenities of the area. To suit the purpose, representatives of surrounding residential areas of a reservoir joined the farmers association to form a committee to look after the reservoir and to make a long-term plan for future development. Women's association and different age-groups perform their parts in planning and maintenance of the reservoir. The local government helps to implement the plan, and to support their maintenance and operation works.