

4. FEASIBILITY STUDY FOR SELECTED THREE GRANARY SCHEMES

4.1 Kerian Scheme

4.1.1 Agricultural Improvement Plan

(1) Cropping Schedule

The original cropping schedule in Kerian scheme is divided into 3 schedules (Fig. IV-10), which was set up on the basis of the transplanting cultivation method. However direct seeding methods are already being widely practiced in the scheme in order to overcome shortage of farm labor and save production cost and is increasing the rate. Therefore, the actual cropping schedule becomes different from the original one by changing the planting method.

In Kerian scheme, the irrigation schedule is adjusted for every crop season by Planting Schedule Committee which is composed of the representatives of concerned organizations like DID, DOA, MARDI and LPN. The farmers' request is also reflected in determining the irrigation schedule. Now, three different kinds of planting methods are practiced in Kerian scheme, namely transplanting, dry direct seeding and wet direct seeding. This makes the irrigation management more complicated. The unification of the planting method is desirable for the simplification of irrigation water management. From the viewpoint of cost saving, time and manpower, it is essential that manual transplanting should be replaced by direct seeding.

A land consolidation project is being carried out to improve drainage conditions in the Kerian scheme. After the completion of the project, the adoption of direct seeding methods will become possible in the whole Kerian scheme. The proposed cropping schedule is decided taking into account the water availability and rainfall condition during the harvesting period, etc. as shown in Fig. IV-10.

Considering the result of water balance study in the Kerian scheme, dry direct seeding methods will be introduced at 100% in off-season and wet direct seeding methods will be introduced in main-season except for organic soil areas, which occupy about 17% of the total area. The annual cropping intensity is proposed at 200% in the Kerian scheme. The areas demarcated for three schedules are summarized in the following table:

(Unit: ha)

Compartment	Area
Schedule 1 (Block 1) A, B, C	10,346
Schedule 2 (Block 2) D, E, F	8,403
Schedule 3 (Block 3) G, H	4,793

(2) Planting method and Mechanization

A major problem which the Kerian scheme faces is the non-adherence to cropping schedule. The majority of farmers in compartment F, G and H adhere the planting schedule, while it is difficult for many farmers in Kerian Laut especially compartment A, B and C to follow the planting schedule. The summary of the past planting schedule records are shown in Fig. IV-11. In those areas, land preparation is still done by manually, since mechanization is still limited due to low bearing capacity. Hence, the mechanization ratio in these areas still remains at low level. Farmers living in ill-drainage areas where are not accessible by machines, can not apply direct seeding method, since direct seeding requires a thorough land preparation and leveling by tractors. The non-adherence to the planting schedule is caused by the difficulty to carry out the manual land preparation and manual transplanting on time due to labor shortage. However, steps are being taken under the land conservation programme conducted by IADP Kerian/Sg. Manik to improve the load-carrying capacity of the soils in the whole Kerian and Sg. Manik Schemes by the construction of field bunds and drain ditches (Pembinaan Batas dan Parit Ladang). The programme which is fully funded by IADP Kerian-Sg. Manik, commenced in 1984 and will be completed by the year of 2000. These field bunds and drain ditches will improve in-field water management efficiency and effectiveness which helps in the formation of plough (hard) pan in the soil required for mechanization.

The full mechanized farming should be introduced into the whole Kerian scheme. Utilization of some small/medium size 4 W tractor (30 hp class) and harvester (3-4 ton class) will also be considered during the transition period by the time when the bearing capacity reaches the sufficient level in the organic soil areas. At present, the number of 4W tractors in the area is estimated at 189 units as shown in Table IV-31, which are hold by the Farmers Mechanization Center and contractors, and they are used for the contract farm work. After implementation of the project, it is estimated that 263 4W tractors will be necessary at a peak period during the cropping season. Assuming that the existing number of 4W tractors be kept in the future, the farmers' groups will own deficient numbers between peak requirement and availability. The harvesting work is being conducted with the contract basis and will also be done by the contract work with combine harvesters owned by contractors and FMC in future. The farmers' groups will own chopper spreader attached on the outlet of the combine harvester considering working efficiency of land preparation. The chopper spreader is used commonly for chopping and spreading the residue. The farmers' groups will also own some necessary managing implements for fertilizing and chemical application. The managing implements include light weight 4W tractor (10-20 hp class) for management and implements (attachments) such as broad caster, power blower, boom sprayer carpet duster, etc.

As mentioned above, small/medium size 4 W tractor (30hp class) and harvester (3-4 ton class) will be introduced in the organic soil areas which are characterized by low bearing capacity. These machinery will be own by the farmers' groups. The FMC will also own about one third of the necessary numbers of small/medium size 4 W tractor and harvester in accordance with the basic operation policy.

In order to estimate the number of the agriculture machinery and equipment, the estimated working efficiency as shown in the Table IV-32 is applied. The necessary number

of the machinery and equipments based on the mechanization plan is given in the Table IV-33 and summarized in the following table.

(Unit: Nos.)

Machinery/equipment	Necessary	Availability	Purchase
I. 4W tractor			
1. 60hp class	263	189*	74
2. Management tractor (10-20hp class)	145		145
II. Implements			
Lime sower	42		42
Rotavator	161	87	74
Paddy harrow	60		60
Rear bucket or Land roller	41		41
Granule applicator/Broadcaster	96		96
Boom sprayer	44		44
Carpet duster	28		28
III. Combine harvester (6t class)	45	45	
chopper spreader	45		45
Low bearing capacity area			
I. 4W tractor			
1. 30hp class	95	32	63
2. Management tractor (10-20hp class)	41		41
II. Implements			
Lime sower	18		18
Rotavator	68	5	63
Paddy harrow			
Rear bucket or Land roller	17		17
Granule applicator/Broadcaster	29		29
Boom sprayer	9		9
Carpet duster	9		9
III. Combine harvester (6t class)	19	6	13
chopper spreader	19	6	13

*: 20 by FMC Kerian, 169 by contractors (including farmer), source: FMC Kerian and IADP Kerian

The proposed mechanization farming system by integrated work is as shown below.

Mechanization system for Wet seeding

Two times of Land preparation (tractor + rotavator) → Paddling (tractor + paddy harrow) → Seeding (tractor + power blower/granule applicator or broadcaster) → Fertilizing and chemical application (tractor + granule applicator/carpet duster/boom sprayer) → Harvesting (combine harvester)

Mechanization system for Dry seeding

Land preparation (tractor + rotavator) → Seeding and pressing after seeding (tractor + power blower/granule applicator or broadcaster and rear bucket or land roller) → Fertilizing and chemical application (tractor + granule applicator/carpet duster/boom sprayer) → Harvesting (combine harvester)

Under the Wet direct seeding system, land preparation should be done two times and paddling should be done one time after land preparation. These operations are effective in weeds control and land leveling. Two times of land preparation and pressing after seeding should be adopted for dry direct seeding. The pressing after seeding under dry seeding system is not common farming practice now. However, it is reported by MADA that pressing after seeding under the dry seeding system is effective in germination and establishment of paddy.

The 4W tractor for management will run on the fixed way (tramline) which be set up in the paddy field in 10m interval. The tramline in low bearing capacity area like the organic soil areas shall improve soil conditions by using soil amendment input. The management tractor will be able to run on the tramline under the submerged paddy field. Application of fertilizer and chemicals will be done using the suitable implements like broadcaster, granule applicator, boom sprayer, etc. as the attachments with the management tractor.

(3) Paddy varieties and management practices

(a) Paddy varieties

MR84 and MR185 should be introduced as recommendable varieties. According to the result of the field test done by MADA, the most suitable number of paddy plants is estimated at 150-180 number per square meter. The seeding amount of paddy is decided between 60 - 80 kg/ha on the presumption that one thousand grain weight is 26g and the average germination rate is 60-65% based on the data of MADA experiments as shown below.

Estimated number of germination of paddy:

(Unit: Nos.)

Seed rate (kg/ha)	germination rate (%)	
	60	65
60	138	150
70	162	175
80	185	200

(b) Fertilizer application

Most of farmers in Kerian area depend on the subsidized fertilizer only. A majority of farmers apply fertilizer twice a season, and some farmers apply fertilizer only once a season. The significant of scheduled fertilizing activities should be stressed onto the farmers. The fertilizer application method according to the MARDI recommendation should be adopted in Kerian area.

The majority of soils in Kerian scheme are classified as suitable soil for paddy cultivation as shown Table IV-4. With the exception of the organic rich soils, most of the soils do not face fertility problems. In general, it can be said that the Kerian coastal plain where compartment A, B and C are located, is a fertile area and has the potential to support good plant growth with good yields. In the organic areas, strong acid conditions exist as

indicated by the low pH values. In these areas, the exchangeable aluminum in the soils is very high and is one of the causes of the acidity. The organic rich soils experience high acidity and high conductivity especially at depth. The aluminum content is also high and may exert toxic effects on plant growth. However, this can be easily corrected with proper lime application. The higher rate of fertilizer application amount with lime would be recommended in these areas. At the same time, the apply of not only NPK but also minor elements dressing should also be considered by introducing DRIS as mention in the Master Plan. The proposed fertilizer amount and apply timing is as follows:

- Amount and rate of fertilizer : N:P (P₂O₅):K (K₂O)= 100:40:30 (kg/ha)

- (i) N : 1st; 1/4, 2nd; 1/4 and 3rd; 1/2 on 15 - 21 day after sowing (HST),
45 - 50 HST and panicle initiation stage respectively
- (ii) P : 15 - 21 HST } together with N
- (iii) K : 15 - 21 HST } together with N

The additional elements (Ca) application is recommended for the organic soil area located in Kerian.

- Calcium fertilizer (GML) : 2.5 ton/ha
- (i) before first land preparation

(d) Pest and Weed Management

As for the weed control, two times of herbicide applications for wet direct seeding and three times of herbicide applications for dry direct seeding are recommended. Regarding the insect, the damage of Brown Hopper occurred sometimes in the past. It is important to pay attention to the occurrence of this harmful insect. Chemical application to control the weed, pest and decease should be carefully done with special attention to the environmental aspect. For the pest and weed control, proper measure should be made in line with DOA recommendations. IPM (Integrated Pest Management) method should be accelerated in the Kerian scheme.

The proposed farming practice for Kerian is shown in Table IV-34.

4.1.2 Agro-economy Improvement Plan

(1) Marketing

Improvement of marketing system basically consists of (i) improvement of harvesting methods, (ii) group arrangement of harvesting machinery and group purchase/sale, (iii) blanket purchase and sale through PPK. This procedure will also be followed in other two schemes. As peculiarities of the marketing condition in Kerian scheme, following 3 points should be considered.

- existence of middlemen in the marketing channel
- Guni-sack Handling is still applied in some area.
- Expected production will exceed present milling capacity of the Kerian area.

(a) Improvement of harvesting methods

Guni-sack handling is still applied in Kerian scheme. There are two reasons for farmers to use Guni-sack handling as their harvesting method. One reason is inadequate farm road that lorry cannot access the field. The other reason is farmers' conservativeness in applying new method. In this regard, improvement of farm road and dissemination of the knowledge regarding the advantages of bulk handling method should be promoted in order to shift the harvesting method to bulk handling.

(b) Integration/elimination of middlemen from the marketing channel

Because of involvement of middlemen in the process of farm input purchase and paddy sale, farmers often do not have choice in selecting sale destination or purchasing source. Besides, since arrangement of input and machinery is made according to the schedule of middlemen, it sometimes conflicts with the cropping schedule set by IADP staff. Therefore, it is necessary to establish direct relationship between farmers' groups and relating agencies (both for input supply and paddy sale). However, it should be considered that, in some cases, middlemen themselves are farmers and well functioning in the present situation. In this case, these middlemen should be integrated into the group system rather than just eliminating. And if these middlemen are not functioning well in the farmers' group, they would be replaced by the member farmers according to the frame-work of group system.

(c) Diversification of Sale Destination

In future, when the target yield (5.5t/ha) is achieved and cropping intensity is improved to 200%, it is estimated that the paddy production will exceed present milling capacity by 40,000 ton. Therefore, sale destination should be enhanced and diversified more to the outside of scheme, especially to the neighboring area such as Pulau Pinang.

By taking into account these points, following procedure should be taken for improvement of marketing system.

(i) Paddy Marketing

As to paddy marketing, it should be shifted into group marketing by following the procedure stated below. In the transition period, integration of middlemen should be carefully treated by governmental staff especially DOA. Improvement of infrastructure (farm road) is also important component for the improvement of harvesting system.

1st Stage

- In addition to the existing groups, Farmers' Group should be formed at the area where farmers are not organized yet.
- Middlemen should be integrated into the frame work of group system so that farmers are able to choose their sale destination.
- Harvesting system should be changed from guni-sack handling to bulk handling.

2nd Stage

- Arrangement of combine harvester should be done by group.
- Paddy should be sold by group, but return from paddy sale is paid to individual farmers.
- PPK's Information should be utilized by farmers' group in selecting mills.

3rd Stage

- Paddy should be sold by group and return from paddy sale is paid to group account rather than to individual farmers.

(ii) Input Marketing

Group purchasing is the basic principle for input marketing. It should be proceed with the following steps.

1st Stage

- In addition to the existing groups, Farmers' Group should be formed at the area where farmers are not organized yet.
- Dissemination of knowledge on group purchase should be done regarding the advantages of group purchase.
- Middlemen should be integrated into the frame work of group system so that farmers are able to choose their sale destination.

2nd Stage

- Bank Account should be prepared for farmers' groups. Fund for input purchase will be collected from member farmers.
- Bulk purchase should be started by group level with the assistance of PPK or DOA.

3rd Stage

- Bulk purchase should be done through PPK based on the report from each group.
- Input cost should be deducted from paddy sale.

For the establishment of group account, the Besut case can be referred, where the account is prepared under the name of multiple representatives of a group and the book is kept by IADP office. Group fund can be used only for group's expenditure and requires consultation with IADP staff.

(2) Rural Credit

The credit needs to be expected in the future would be (i) loan for establishment of farmers' group, (ii) loan for purchase of farm input, and (iii) loan for procurement of agricultural machinery. Basically, short term loan and paddy loan presently provided by PPK and BPM will be intensified by applying to farmers' group in addition to individual farmers. Besides, demand for agricultural machinery loan is expected to increase as the mechanization proceeds. In Kerian scheme, it is estimated that RM31.1 million will be necessary for the procurement of machinery. BPM or PPK should prepare to have enough fund to cover this

amount. As to the loan scheme, FOA's KPPP loan or BPM's agricultural machinery loan should be utilized for this purpose. Each farmers will pay rental fee of machinery and this fee will be collected by group basis and be allotted for the repayment of loan and O&M cost.

4.2 Ketara (Besut) Scheme

4.2.1 Agricultural Improvement Plan

(1) Cropping Schedule

The existing irrigation schedule and the original one of Besut scheme is summarized as shown in Fig. IV-12. The original irrigation schedule was sifted to the existing one in order to avoid the shortage of water supply in compartments 3 and 4. However, the existing schedule is risky for flood damage, if land preparation be delayed. Usually, flood happens in Besut scheme on November and December, and damages paddy plants. It results in postponing the cultivation schedule and missing the coming off- season cultivation. The original irrigation schedule is recommended in order to avoid the risk of flood. In the schedule, the first season crops is defined as off-season crop which lasts from March until September. The second season crop is called as main-season crop with a cultivation period between September and March. The proposed cropping schedule should be determined considering the water availability, flood effected period and harvesting period. The wet direct seeding method is presently common in the Besut scheme, and this method would be applied principally, however the partial introduction of the dry direct seeding (for approximately 20% of the planted area in off-season) will also be recommended in order to avoid high peak water demand during pre-saturation period in off season. The 175% of cropping intensity will be obtained by the improvement cropping pattern. The phase-wise planted areas are summarized as follows:

(Unit: ha)	
Compartment	Area
Phase 1 1, 4 and part of 2	3,439.9
Phase 2 3 and part of 2	1,723.4

(2) Planting Method and Mechanization

At present, the land preparation is generally done under submerged soil condition. The majority of the farmers conduct two times of land preparation. The first ploughing is done by the 4 wheels tractor on the contract basis. Second land preparation is done by the 2 wheels tractor owned by farmers. The utilization of 2 wheels tractor for land preparation is popular in the Besut scheme, however 2 wheels tractor is not suitable for effective mechanization in future, considering the work efficiency and the introduction of the large scale mechanized farming. Indeed, the existing 2 wheel tractors are used only for second ploughing. The utilization of the 4 wheel tractors should be recommended as the improvement plan for mechanization. 4 wheels tractors should gradually take place of existing 2 wheel tractors according to the renovation of them. At present, the peak 4 W tractor requirement for 1st land

preparation is estimated at around 110 numbers. The necessary 4W tractors are provided by IADP Ketara, the contractors and FMCs in and around the Besut, and 2nd land preparation depends on more than 600 numbers of 2 W tractors owned by individual farmers.

After the introduction of 4W tractor operation system, the tractor requirement for land preparation under the project condition is estimated at about 129 at the peak period. The farm mechanization will be partially supported by the private sector (contractors) in future. Farmers Mechanization Center (FMC) in Besut area will provide their own tractors and arrange the mobilization from other FMCs. The farmers' groups will own the deficient numbers between peak requirement and availability. The farmers' groups will also own some necessary managing implements for fertilizing and chemical application. The managing implements include light weight 4W tractor (10-20 hp class) for management and implements (attachments) such as broad easter, power blower, boom sprayer carpet duster, etc. Harvesting work will be done on the contract basis with combine harvesters owned by contractors and FMC in future. The farmers' groups will own chopper spreader attached on the outlet of the combine harvester considering working efficiency of land preparation. The chopper spreader is used commonly for chopping and spreading the residue.

Based on the formulated detailed plan for mechanization, the necessary numbers of machinery and implements are estimated as Table IV-35 and summarized as below.

(Unit: Nos.)			
Machinery/equipment	Necessary	Availability	Purchase
I. 4W tractor			
1. 60hp class	129	74*	55
2. Management tractor (10-20hp class)	42		42
II. Implements			
Lime sower	16		16
Rotavator	82	27	55
Paddy harrow	31		31
Rear bucket or Land roller	3		3
Granule applicator/Broadcaster	35		35
Boom sprayer	14		14
Carpet duster	14		14
III. Combine harvester (6t class)	23	23	
chopper spreader	23		23

*: 20 by FMC Besut, 14 by IADP Besut, 10 by contractors (including farmer) and 30 by FMC Kelantan, source: FMC Besut and IADP Besut

The proposed mechanization farming system by integrated work is as shown below.

Mechanization system for Wet seeding

Land preparation (tractor + rotavator) → Paddling (tractor + paddy harrow) → Seeding (tractor + power blower/granule applicator or broadcaster) → Fertilizing and chemical application (tractor + granule applicator/carpet duster/boom sprayer) → Harvesting (combine harvester)]

Mechanization system for Dry seeding

Land preparation (tractor + rotavator) → Seeding and pressing (tractor + power blower/granule applicator or broadcaster and rear bucket or land roller) → Fertilizing and chemical application (tractor + granule applicator/carpet duster/boom sprayer) → Harvesting (combine harvester)

Under the Wet direct seeding system, land preparation should be done two times and paddling should be done one time after land preparation. These operations are effective in weeds control and land leveling. Two times of land preparation and pressing after seeding should be adopted for dry direct seeding. The pressing after seeding is recommended, because it is reported by MADA that pressing after seeding under the dry seeding system is effective in germination and establishment of paddy.

(3) Paddy varieties and management practices

(a) Paddy varieties

MR84 and MR185 should be introduced as recommendable varieties. According to the result of the field test done by MADA, the most suitable number of paddy plants is estimated at 150-180 number per square meter. The seeding amount of paddy is decided between 60 - 80 kg/ha on the presumption that one thousand grain weight is 26g and the average germination rate is 60-65% based on the data of MADA experiments.

(b) Fertilizer application

Majority of the farmers apply the subsidized fertilizer of about 80kgN/ha only. Most farmers apply fertilizer 2 times, but some farmers still apply all subsidized fertilizer one time. The MARDI fertilizer recommendation should be basically adopted to whole the scheme. The significant of scheduled fertilizing activities should be stressed onto the farmers.

The soils in Besut scheme are marginal for paddy cultivation because of the low pH, the low fertility and flood hazard as shown in Table IV-5. The danger of the flood can be avoided by the introduction of the proposed cropping schedule. Hence, the usage of additional fertilizer is effective in order to increase the paddy yield. More fertilizer application such as N:P (P₂O₅):K (K₂O)= 120:40:40 (kg/ha) will be recommended to lower fertility areas. Lime should be added to the low pH soil areas to prevent the ferrous poisoning effect and cure the soil acidity. Furthermore, as Magnesium (Mg) seems to be effective for paddy production based on the result of the DRIS pilot project in Besut scheme, application of Mg is recommended. Application of Ca and Mg will be adopted in the low pH areas which cover about 75% of the scheme. The area-wise optimum rate and amount of fertilizer will be obtained through the practice of DRIS.

The proposed fertilizer amount and apply timing is as follows:

- Amount and rate of fertilizer : N:P (P₂O₅):K (K₂O)= 100:40:30 (kg/ha)

(i) N : 1st; 1/4, 2nd; 1/4 and 3rd; 1/2 on 15 - 21 day after sowing (HST),
45 - 50 HST and panicle initiation stage respectively

(ii) P : 15 - 21 HST } together with N

(iii) K : 15 - 21 HST } together with N

The additional elements (Ca) application is recommended for the low pH area located in Ketara (Besut).

Calcium fertilizer (GML) : 2.5 ton/ha

(i) before first land preparation

Magnesium fertilizer : 130 kg/ha

(ii) before first land preparation

(4) Pest Management

As for the weed control, two times of herbicide applications for wet direct seeding and three times of herbicide applications for dry direct seeding are recommended. Chemical application to control the weed, pest and disease should be carefully done with special attention to the environmental aspect. For the pest and weed control, proper measure should be made in line with DOA recommendations. Regarding the rat damage, in Besut area, more rat damages occurred in the past in comparison with two other areas. It is important to pay attention to the occurrence of this problem. IPM (Integrated Pest Management) method should be accelerated in the area. The biological management system, especially the use of owls should be increased for biological rat control.

The proposed farming practice for Kerian is shown in Table IV-36.

4.2.2 Agro-economy Improvement Plan

(1) Marketing

As peculiarity of the marketing condition in KETARA (Besut) scheme, following 3 points should be considered.

- all the farmers belong to farmers' group
- group purchase is partly practiced by farmers with using groups' bank account
- expected production will exceed present milling capacity of Besut area.

(a) Enhancement of Group Purchase / Selling

In Besut area, farmers' groups are already rearranged based on the irrigation system and all the farmers belong to these groups. Besides, groups are promoted to open group account and to practice group purchase by using this account. Therefore, this promotion should be continued so that all the groups will practice group purchase. On the other hand, farmers' preference to the particular brand name of farm input prevents members from having consensus on group purchase. In this regard, dissemination of knowledge

regarding the farm inputs, especially their ingredients and effects, should be made so that farmers can reach consensus more easily.

(b) Diversification of Sale Destination

In future, when the target yield (5.5t/ha) is achieved and cropping intensity is improved to 175%, it is estimated that the paddy production will exceed present milling capacity by about 20,000 ton. Therefore, sale destination should be enhanced and diversified more to the neighboring area such as KADA and area where the milling capacity is large enough such as Pulau Pinang.

By taking into account these points, following procedure should be taken for improvement of marketing.

(i) Paddy Marketing

Since farmers' group is well established in Besut, group marketing should be promoted as early as possible by utilizing these groups.

1st Stage

- Group Arrangement of combine harvester should be enhanced.
- Group sale of paddy should be promoted, but return from paddy sale is paid to each farmer.
- Information provision system should be encouraged, especially on rice mills located outside of area.

2nd Stage

- Group sale of paddy should be promoted, and return from paddy sale should be paid to group account so that input cost can be deducted.

(ii) Input Marketing

The bases for the group purchase is already established in this area. Group purchasing presently done should be more encouraged. However, the difficulty in the collection of repayment for input cost is a main problem. Therefore, group selling integrated with loan collection, i.e. direct deduction from the sale, should be promoted in accordance with the promotion of group purchase.

1st Stage

- Enhancement of group purchase using group account.

2nd Stage

- Input cost should be deducted from paddy sale.
- Bulk purchase should be done through PPK based on the report from each group.

(2) Rural Credit

As in the case of other two areas, the credit needs to be expected in future would be (i) loan for purchase of farm input and (ii) loan for procurement of agricultural machinery. Short term loan and paddy loan presently provided by PPK and BPM will be intensified by applying to farmers' group in addition to individual farmers. As to the procurement of agricultural machinery, it is estimated that RM10.1 million will be necessary. BPM or PPK should prepare to have enough fund to cover this amount.

4.3 Pulau Pinang Scheme

4.3.1 Agricultural Improvement Plan

(1) Cropping Schedule

The present cropping schedule in the Pulau Pinang scheme is divided into 4 schedules as shown Table IV-37, however the area where is put in schedule 4, is being distributed among the other 3 schedules as shown in Fig. IV-13. The revised cropping pattern is recommendable judging from the water balance and rainfall condition during the harvesting time. The first season crops is defined as off-season crop which lasts from March until September. The second season crop is called as main-season crop with a cultivation period between September and February. The areas to be adopted the revised schedule are shown Table IV-38 and summarized below.

(Unit: ha)	
Schedule	Area
Schedule 1	3,312
Schedule 2	3,223
Schedule 3	3,066

(2) Planting method and Mechanization

The wet direct seeding method is common in Pulau Pinang scheme. The dry direct seeding method is done only in the small area in Sungai Muda. The wet direct seeding method is recommended in the Pulau Pinang scheme in both seasons. This wet direct seeding method is favorable for weed control. At present, the land preparation is normally done twice or 3 times before seeding. The first and second ploughing are done by the 4 wheels tractor on the contract basis. The utilization of 2 wheels tractor for land preparation is popular in the Pulau Pinang area. 2 wheels tractor is used for the last land preparation after first or second land preparation. The existing number of 4W tractor in the Pulau Pinang area is 43 which are owned by FMC and IADP Pulau Pinang. Additionally, the number of 4W tractors which are owned by private sector like contractors and farmers is estimated at about 80. It is estimated that 123 units can be used together.

After implementation of the project, full mechanized farming should be established in the Pulau Pinang scheme. It is estimated that 214 units of 4W tractors will be necessary at a

peak period during the cropping season. The farm mechanization will be partially supported by the private sector (contractors) in future. Assuming that the existing number of 4W tractors be kept in the future, the farmers' groups will own 91 units of tractors for the difference in number between peak requirement and availability. The farmers' groups will also own some necessary managing implements for fertilizing and chemical application. The managing implements include light weight 4W tractor (10-20 hp class) for management and implements (attachments) such as broad caster, power blower, boom sprayer carpet duster, etc. Harvesting work is being conducted on the contract basis and will also be done by the contract work with combine harvesters owned by contractors and FMC in future. The farmers' groups will own chopper spreader attached on the outlet of the combine harvester considering working efficiency of land preparation. The chopper spreader is used commonly for chopping and spreading the residue.

The proposed mechanization farming system by integrated work is as shown below, and given in the Table IV-39.

(Unit: Nos.)			
Machinery/equipment	Necessary	Availability	Purchase
I. 4W tractor			
1. 60hp class	214	123*	91
2. Management tractor (10-20hp class)	91		91
II. Implements			
Line sower	4		4
Rotavator	153	62	91
Paddy harrow	57		57
Rear bucket or Land roller			
Granule applicator/Broadcaster	78		78
Boom sprayer	26		26
Carpet duster	26		26
III. Combine harvester (6t class)	43	43	
chopper spreader	43		43

*: 33 by FMC Pulau Pinang, 10 by DOA, 80 by contractors (including farmer), source: Farm machinery services for farmers

The proposed mechanization farming system by integrated work is as shown below.

Mechanization system for Wet seeding

Land preparation (tractor + rotavator) → Paddling (tractor + paddy harrow) → Seeding (tractor + power blower/granule applicator or broadcaster) → Fertilizing and chemical application (tractor + granule applicator/carpet duster/boom sprayer) → Harvesting (combine harvester)}

Under the Wet direct seeding system, land preparation should be done two times and paddling should be done one time after land preparation. These operations are effective in weeds control and land leveling. The 4W tractor for management will run on the fixed way (tramline) which is set up in the paddy field in 10m interval.

(3) Paddy varieties and management practices

(a) Paddy varieties

MR84 and MR185 should be introduced as recommendable varieties. According to the result of the field test done by MADA, the most suitable number of paddy plants is estimated at 150-180 number per square meter. The seeding amount of paddy is decided between 60 - 80 kg/ha on the presumption that one thousand grain weight is 26g and the average germination rate is 60-65% based on the data of MADA experiments.

(b) Fertilizer application

Most of farmers in the Pulau Pinang area depend on the subsidized fertilizer of about 80kg/ha only. The significant of scheduled fertilizing activities should be stressed onto the farmers. The fertilizer application method according to the MARDI recommendation should be adopted in the Pulau Pinang scheme. The paddy cultivation management package recommended by MARDI and DOA is considered. The proposed fertilizer amount and apply timing are as follows:

- Amount and rate of fertilizer : N:P (P₂O₅):K (K₂O)= 100:40:30 (kg/ha)

- (i) N : 1st; 1/4, 2nd; 1/4 and 3rd; 1/2 on 15 - 21 day after sowing (HST),
45 - 50 HST and panicle initiation stage respectively
- (ii) P : 15 - 21 HST } together with N
- (iii) K : 15 - 21 HST } together with N

A detailed soil investigation survey has not been done in the Pulau Pinang scheme. According to the "Reconnaissance Soil Survey of Pinang and Province Wellesley", the majority of soils in Pulau Pinang scheme are classified as class I or II of soil suitability class for agriculture as shown Table IV-3. In general, it can be said that the Pulau Pinang scheme has the potential to support good plant growth with good yields. However, some cases of copper deficiency are reported. The apply of minor elements dressing should also be considered. The area-wise optimum rate and amount of fertilizer will be obtained through the practice of DRIS.

(4) Pest Management

As for the weed control, two times of herbicide application for wet direct seeding is recommended. Regarding the decease, the damage of Tungro virus sometimes occurred in the past. This decease is carried by Green Hopper. It is important to pay attention to the occurrence of this harmful insect. Chemical application to control the weed, pest and decease should be carefully done with special attention to the environmental aspect. For the pest and weed control, proper measure should be made in line with DOA recommendations. IPM (Integrated Pest Management) method should be accelerated in the Pulau Pinang scheme.

The proposed farming practice for Pulau Pinang is shown in Table IV-40.

4.3.2 Agro-economy Improvement Plan

(1) Marketing

Since labor shift to non-agriculture sector is significant in Pualu Pinang, it is important and urgent to reduce the burden of farming work from the individual farmers by promoting group work. For this purpose, PPK should be utilized as a coordinator between farmers' groups and relating agencies. The role of PPK, in this context, is to arrange contractor, farm input and sale destination according to the request from farmers' groups. In this system, what the farmers' groups have to do is just to request the arrangement to PPK. In addition, it is preferable for the farmers' groups to shift to bulk purchase and sale through PPK or mini estate in an early stage.

With the consideration on the points mentioned above, following procedure should be taken for improvement of marketing.

(a) Paddy Marketing

The steps to be followed would be as follows.

1st Stage

- In addition to the existing groups, Farmers' Group should be formed at the area where farmers are not organized yet.

2nd Stage

- Arrangement of combine harvester should be done by group through DOA or PPK.
- Paddy should be sold by group, but return from paddy sale is paid to each farmer.
- PPK's Information should be utilized by farmers' group in selecting mills.

3rd Stage

- Paddy should be sold by group and return from paddy sale is paid to group account rather than to each farmer.

In the future, the coordinating role of PPK or DOA should be operated under one agency, as the farmers' group be rearranged based on the irrigation system and integrated under PPK supervision.

(b) Input Marketing

As in the paddy marketing, input purchasing also should be done by utilizing coordinating agency. As far as farmers accepts, group purchase should immediately shift to the bulk purchase through PPK so that the burden of each farmers' group is reduced.

1st Stage

- Formation or rearrangement of Farmers' Group
- Dissemination of knowledge on group purchase should be done regarding the advantages of group purchase.

2nd Stage

- Bank Account should be prepared for farmers' groups. Fund for input purchase will be collected from member farmers.
- Bulk purchase should be started by utilizing coordinating agency (PPK or DOA).

3rd Stage

- Bulk purchase should be done through PPK based on the report from each group.
 - Input cost should be deducted from paddy sale.
- Input purchase as well as paddy marketing should be transformed group farming and mini-estate by following the example of mini-estate which exist within the area already.

(2) Rural Credit

As in the case of other two areas, the credit needs to be expected in future would be (i) loan for establishment of farmers' group, (ii) loan for purchase of farm input, and (ii) loan for procurement of agricultural machinery. Short term loan and paddy loan presently provided by PPK and BPM will be intensified by applying to farmers' group in addition to individual farmers. As to the procurement of agricultural machinery, it is estimated that RM18.1 million will be necessary. BPM or PPK should prepare to have enough fund to cover this amount. Besides, it is necessary to prepare a loan scheme which supports the upgrading of farming system into mini estate. Loan scheme such as BPM's Estate Development Loan should be utilized for this purpose by adjusting its qualification or eligibility.

TABLES

Table IV-1 Population by Ethnic Group and Sex

	Number of Household	Average Family Size	(Persons)					Total							
			Malay		Chinese		Indian		Other						
			Pop.	(%)	Pop.	(%)	Pop.	(%)	Pop.	(%)	Male (%)	Female (%)	Total		
IADP Pulau Pinang	34,544	5.01	129,969	75.0	33,601	19.4	8,544	4.9	1,079	0.6	85,180	49.2	88,013	50.8	173,193
Kerian/Sungai Manik	38,528	4.87	118,175	62.9	37,325	19.9	16,563	8.8	15,670	8.3	91,888	48.9	95,845	51.1	187,733
Kerian	34,103	4.91	104,646	62.5	37,316	22.3	16,546	9.9	8,931	5.3	81,933	48.9	85,506	51.1	167,439
Sungai Manik*	8,743	4.71	20,644	50.1	9,553	23.2	3,400	8.2	7,643	18.5	20,347	49.4	20,873	50.6	41,220
Seberang Perak	2,791	5.10	14,038	98.7	12	0.1	7	0.0	165	1.2	7,254	51.0	6,968	49.0	14,222
Kemasin Semerak	47,863	5.15	240,377	97.6	3,115	1.3	86	0.0	2,761	1.1	119,623	48.6	126,716	51.4	246,339
Besut	9,756	5.16	48,573	96.5	904	1.8	54	0.1	820	1.6	24,712	49.1	25,639	50.9	50,351

* Including Changkat Jong
Source: Population Census, 1991

Table IV-2 Population by Scheme and Occupation (Age15~64)

	(persons)										
	Professional, Technical		Admi., Service, etc.		Agriculture and related		Prod'n and transport, etc.		Others		Total
	Pop.	(%)	Pop.	(%)	Pop.	(%)	Pop.	(%)	Pop.	(%)	
IADP Pulau Pinang	5,117	8.2	13,988	22.5	6,706	10.8	32,652	52.5	3,721	6.0	62,184
Kerian/Sungai Manik	3,955	6.0	11,555	17.5	31,411	47.5	18,800	28.4	418	0.6	66,139
Kerian	3,351	6.1	9,710	17.8	24,862	45.6	16,226	29.7	394	0.7	54,543
Sungai Manik	604	5.2	1,845	15.9	6,549	56.5	2,574	22.2	24	0.2	11,596
Seberang Perak	271	7.2	463	12.3	2,653	70.4	371	9.9	8	0.2	3,766
Kemasin Semerak	5,626	8.7	14,080	21.7	28,860	44.5	15,839	24.4	409	0.6	64,814
Besut	1,243	9.8	2,699	21.3	5,681	44.9	2,873	22.7	165	1.3	12,661

Table IV-3 Soil Classification and Suitability for Paddy in Pulau Pinang

Soil Type and Series	Area (ha)	Rate (%)
Class I		
1 Rengam Series	13,740.0	5.37%
2 Selangor Series	2,800.0	1.09%
3 Selangor-Kangkong Association	800.0	0.31%
4 Sedak Series	3,140.0	1.23%
5 Bakau Series	6,040.0	2.36%
6 Serong Series	3,940.0	1.54%
7 Kundor-Tutang Association	15,040.0	5.88%
8 Briah Series	120.0	0.05%
9 Rantau Series	2,400.0	0.94%
Sub-total	48,020.0	18.76%
Class II		
1 Rengam-Bukit Temiang Association	13,220.0	5.16%
2 Akob-Telemong Association	7,380.0	2.88%
3 Manik-Sogomana Association	11,220.0	4.38%
4 Kuala Kedah-Pematang Association	6,480.0	2.53%
5 Sintok Series	5,100.0	1.99%
Sub-total	43,400.0	16.95%
Class III		
1 Seremban Series	1,360.0	0.53%
2 Lunas-Holyrood Association	14,720.0	5.75%
3 Minik-Lunas Association	12,560.0	4.91%
4 Holyrood-Colluvium Association	2,780.0	1.09%
5 Local Alluvium-Colluvium Association	16,080.0	6.28%
6 Telok-Selangor Association	20,920.0	8.17%
Sub-total	68,420.0	26.73%
Class IV		
1 Kranji Series	3,760.0	1.47%
2 Kranji-Linau Association	17,800.0	6.95%
3 Linau-Permatang Association	9,660.0	3.77%
4 Permatang Series	520.0	0.20%
Sub-total	31,740.0	12.40%
Class V		
1 Urban Land	15,080.0	5.89%
2 Steep Land	47,220.0	18.45%
Sub-total	62,300.0	24.34%
Others		
1 Rivers	2,120.0	0.83%
Sub-total	2,120.0	0.83%
Total	256,000.0	100.00%

Source: Reconnaissance Soil Survey of Penang and Province Wellesley, Soil Science Division Research Branch
Division of Agriculture

Class I: no limitations

Class II: few minor limitations

Class III: at least one serious limitation

Class IV: more than one serious limitation

Class V: at least one very serious limitation

Table IV-4 Soil Classification and Suitability for Paddy in Kerian

Soil Type and Series	Suitability for Paddy	Area (ha)	Rate (%)
I. Marine Alluvial Soils			
Soil Series			
1 Serong	suitable	9,754.0	27.72%
2 Bakau	suitable	6,170.1	17.54%
3 Sabrang	suitable	1,093.5	3.11%
4 Piandang	marginal	749.3	2.13%
5 Sedaka	-	245.8	0.70%
6 Chenan	-	123.1	0.35%
7 Keranji	unsuitable	11.7	0.03%
Sub-total		18,147.5	51.58%
II. Brackish Water Deposits			
Soil Series			
1 Beriah	suitable	9,225.9	26.22%
2 Brown Clay	suitable	1,705.0	4.85%
3 Sedu	-	180.2	0.51%
4 Jawa	-	64.8	0.18%
5 Udang	-	13.4	0.04%
Sub-total		11,189.3	31.80%
III. High Organic Matter Soils			
Soil Series			
1 Linau	marginal	4,390.0	12.48%
2 Organic Clay	marginal	1,452.0	4.13%
Sub-total		5,842.0	16.60%
IV. Others			
1 Residential	-	7.3	0.02%
		35,186.1	100.00%

Source: Semi-detailed Soil Survey of the Padi Growing Areas in the Krian District Perak, DOA

	Area (ha)	Rate (%)
Suitable	27,948.5	79.43
Marginal	6,591.3	18.73
Unsuitable	11.7	0.03
ND	634.6	1.80

Table IV-5 Soil Classification and Suitability for Paddy in Ketara (Besut)

Soil Type and Series	Suitability for Paddy	Area (ha)	Rate (%)
I. Riverine Alluvium			
Soil Series			
1 Tok Yong	2 marginal	3,998.2	33.75%
2 Kg Chempaka	2 marginal	2,143.2	18.09%
3 Holyrood	3 unsuitable	294.6	2.49%
4 Kg. Lating	2 marginal	661.7	5.59%
5 Sg. Jabil	2 marginal	349.2	2.95%
6 Batu Hitam	2 marginal	36.4	0.31%
7 Kg. Tepus	2 marginal	635.3	5.36%
8 Pasir Puteh	3 unsuitable	1,136.7	9.60%
9 Local Alluvium	3 unsuitable	28.7	0.24%
10 Kg. Binjai	3 unsuitable	437.9	3.70%
Sub-total		9,722.0	82.07%
II. Organic Soils			
Soil Series			
1 Brown Clay	3 unsuitable	76.5	0.65%
2 Peat	3 unsuitable	217.7	1.81%
Sub-total		294.2	2.48%
III. Mixed Riverline and Marine Alluvium			
1 Lubok Itac	3 unsuitable	63.5	0.22%
IV. Marine Alluvium			
Soil Series			
1 Rusila	3 unsuitable	44.5	0.38%
2 Rudua	3 unsuitable	230.7	1.95%
Sub-total		275.2	2.32%
V. Shale			
1 Malacca Munchong Ass.	3 unsuitable	407.5	3.44%
2 Durian-Malacca Ass.	3 unsuitable	157.8	1.33%
Sub-total		565.3	4.77%
VI. Granite and Granodiorite			
1 Jerangau	3 unsuitable	29.1	0.25%
2 Jerangau-Rangam Ass.	3 unsuitable	768.9	6.49%
Sub-total		798.0	6.74%
VII. Miscellaneous			
1 Steepland	3 unsuitable	128.3	1.08%
		11,846.6	100.00%

Source: Semi-detailed Soil Survey of the Padi Growing Areas in the Krian District Perak, DOA

	Area (ha)	Rate (%)
suitable	0	0.00
marginal	7,824.1	66.04
unsuitable	4,022.5	33.96

Table IV-6 Paddy Planted Area and Cropping Intensity

(Unit: ha)

	Pulau Pinang						Kerian						Sungai Manik						Seberang Perak						Kemasin Semarak						Ketara (Besut)					
	Annual			Off			Annual			Off			Annual			Off			Annual			Off			Annual			Off			Annual			Off		
	Main	%	Off	Main	%	Off	Main	%	Off	Main	%	Off	Main	%	Off	Main	%	Off	Main	%	Off	Main	%	Off	Main	%	Off	Main	%	Off	Main	%	Off			
1985 Planted area	13,866	56%	7,072	40,803	98%	17,536	7,966	96%	6,070	1,896	9,423	5,782	3,641	0	0%	0%	0%	6,048	117%	2,716	3,332	6,048	117%	2,716	3,332	6,048	117%	2,716	3,332	6,048	117%	2,716	3,332			
Cropping Intensity	11.3%	58%		172%	74%		126%	96%	30%		108%	66%	42%		0%	0%		117%	53%	65%		117%	53%	65%		117%	53%	65%		117%	53%	65%				
1986 Planted area	16,021	64%	8,162	35,976	92%	14,164	11,269	84%	5,313	5,956	7,627	5,610	2,017	0	0%	0%		5,591	108%	2,119	3,472	5,591	108%	2,119	3,472	5,591	108%	2,119	3,472	5,591	108%	2,119	3,472			
Cropping Intensity	13.1%	67%		152%	60%		178%	94%	94%		88%	64%	23%		0%	0%		108%	41%	67%		108%	41%	67%		108%	41%	67%		108%	41%	67%				
1987 Planted area	18,959	73%	9,978	44,013	99%	20,515	12,260	94%	5,954	6,306	9,105	3,508	5,597	13,654	4,561	9,093		6,671	129%	3,813	2,858	6,671	129%	3,813	2,858	6,671	129%	3,813	2,858	6,671	129%	3,813	2,858			
Cropping Intensity	15.5%	82%		186%	87%		194%	94%	100%		105%	40%	64%		128%	43%	85%		129%	74%	55%		129%	74%	55%		129%	74%	55%		129%	74%	55%			
1988 Planted area	20,216	83%	10,007	41,498	100%	17,916	12,059	97%	6,145	5,914	11,718	4,918	6,800	5,475	5,259	216		5,889	114%	4,184	1,705	5,889	114%	4,184	1,705	5,889	114%	4,184	1,705	5,889	114%	4,184	1,705			
Cropping Intensity	16.5%	82%		175%	76%		191%	94%	94%		135%	57%	78%		51%	49%	2%		114%	81%	33%		114%	81%	33%		114%	81%	33%		114%	81%	33%			
1989 Planted area	20,275	83%	10,107	36,395	91%	14,853	9,575	95%	3,480	6,095	15,078	7,465	7,613	5,794	4,968	826		7,756	150%	3,910	3,846	7,756	150%	3,910	3,846	7,756	150%	3,910	3,846	7,756	150%	3,910	3,846			
Cropping Intensity	16.6%	83%		154%	63%		152%	96%	96%		173%	86%	87%		54%	47%	8%		150%	76%	74%		150%	76%	74%		150%	76%	74%		150%	76%	74%			
1990 Planted area	21,805	84%	11,530	38,974	98%	15,681	12,086	95%	5,978	6,108	17,130	8,505	8,625	3,916	3,899	17		7,975	154%	4,199	3,776	7,975	154%	4,199	3,776	7,975	154%	4,199	3,776	7,975	154%	4,199	3,776			
Cropping Intensity	17.8%	94%		165%	66%		191%	97%	97%		197%	98%	99%		37%	37%	0%		154%	81%	73%		154%	81%	73%		154%	81%	73%		154%	81%	73%			
1991 Planted area	22,334	93%	10,907	39,259	96%	16,512	12,166	95%	6,104	6,062	17,094	8,531	8,563	4,379	4,191	188		7,975	157%	4,233	3,883	7,975	157%	4,233	3,883	7,975	157%	4,233	3,883	7,975	157%	4,233	3,883			
Cropping Intensity	18.2%	89%		166%	70%		193%	97%	96%		196%	98%	98%		41%	39%	2%		157%	82%	75%		157%	82%	75%		157%	82%	75%		157%	82%	75%			
1992 Planted area	23,918	96%	12,195	42,492	95%	22,980	11,929	94%	5,916	6,013	15,476	7,185	8,291	5,302	4,955	347		7,945	154%	4,221	3,724	7,945	154%	4,221	3,724	7,945	154%	4,221	3,724	7,945	154%	4,221	3,724			
Cropping Intensity	19.5%	100%		180%	97%		189%	94%	95%		178%	83%	95%		50%	46%	3%		154%	82%	72%		154%	82%	72%		154%	82%	72%		154%	82%	72%			
1993 Planted area	20,412	95%	10,921	40,219	96%	17,487	12,031	95%	5,975	6,056	16,610	7,972	8,638	7,520	6,413	1,107		9,263	179%	4,819	4,444	9,263	179%	4,819	4,444	9,263	179%	4,819	4,444	9,263	179%	4,819	4,444			
Cropping Intensity	18.4%	89%		170%	74%		190%	95%	96%		191%	92%	99%		71%	60%	10%		179%	93%	86%		179%	93%	86%		179%	93%	86%		179%	93%	86%			
1994 Planted area	18,864	92%	9,681	32,974	92%	15,844	12,085	96%	6,069	6,016	16,944	8,599	8,345	9,168	7,381	1,787		8,868	172%	4,894	3,974	8,868	172%	4,894	3,974	8,868	172%	4,894	3,974	8,868	172%	4,894	3,974			
Cropping Intensity	19.0%	97%		139%	67%		191%	96%	95%		195%	99%	96%		86%	69%	17%		172%	95%	77%		172%	95%	77%		172%	95%	77%		172%	95%	77%			
1995 Planted area	19,278	96%	9,726	36,503	93%	14,564	12,114	95%	6,027	6,087	17,134	8,591	8,543	7,481	6,447	1,034		9,522	184%	4,949	4,573	9,522	184%	4,949	4,573	9,522	184%	4,949	4,573	9,522	184%	4,949	4,573			
Cropping Intensity	19.4%	98%		154%	62%		192%	95%	96%		197%	99%	98%		70%	60%	10%		184%	96%	89%		184%	96%	89%		184%	96%	89%		184%	96%	89%			

Source: Paddy Statistics of Malaysia, 1995
IADP Kerian/Sungai Manik Office

Table IV-7 (1/3) Planting Method-wise Cropped area in Kerian

Irrigation	Cropping Calendar	Block	Irrigable Area (ha)	Planted Area	(Unit: ha)			
					Direct Seeding W.D=6.4	Land preparation by tractor	Machine Harvesting	Harvested Area Plant/Hary
94	Feb. '94 - Sept. '94	A	2,402	2,001 83.4%	78 3.2%	412 17.2%	670 27.9%	1,861 93.0%
		B	4,001	3,809 95.2%	137 3.4%	755 18.9%	1,321 33.0%	3,061 80.4%
		C	3,961	3,870 97.7%	260 6.6%	1,490 37.6%	1,058 26.7%	2,014 52.0%
		Sub-total	10,364	9,683 93.4%	475 4.6%	2,657 25.6%	3,049 29.4%	6,939 71.7%
94/95	Sep. '94 - Apr. '95	A	2,402	2,166 90.2%	122 5.1%	786 32.7%	1,540 64.1%	2,066 95.4%
		B	4,001	3,828 95.7%	376 9.4%	1,531 38.3%	2,470 61.7%	3,828 100.0%
		C	3,961	3,862 97.5%	476 12.0%	1,933 48.8%	2,523 63.7%	3,862 100.0%
		Sub-total	10,364	9,856 95.1%	974 9.4%	4,250 41.0%	6,533 63.0%	9,756 99.0%
95	1 April '95 - Sept. '95	A	2,402	2,305 96.0%	87 3.6%	1,981 82.5%	1,460 60.8%	2,253 97.7%
		B	4,001	3,773 94.3%	242 6.0%	1,616 40.4%	1,210 30.2%	3,773 100.0%
		C	3,961	3,894 98.3%	428 10.8%	2,060 52.0%	1,700 42.9%	3,894 100.0%
		Sub-total	10,364	9,972 96.2%	757 7.3%	5,657 54.6%	4,370 42.2%	9,920 99.5%
95/96	20 Nov. '95 - Jan. '96	A	1,389	1,345 96.8%	65 4.7%	1,066 76.7%	1,067 76.8%	1,195 88.8%
		B	4,001	3,699 92.5%	389 9.7%	1,869 46.7%	1,819 45.5%	3,699 100.0%
		C	3,961	3,920 99.0%	649 16.4%	2,401 60.6%	1,484 37.5%	3,919 100.0%
		Sub-total	9,351	8,964 95.9%	1,103 11.8%	5,336 57.1%	4,370 46.7%	8,813 98.3%
96	20 Nov. '96 - Jul. '95	A	1,389	1,345 96.8%	65 4.7%	1,068 76.9%	1,067 76.8%	1,195 88.8%
		B	4,001	3,699 92.5%	389 9.7%	1,869 46.7%	1,819 45.5%	3,699 100.0%
		C	3,961	3,894 98.3%	428 10.8%	2,060 52.0%	1,700 42.9%	3,894 100.0%
		Sub-total	9,351	8,938 95.6%	882 9.4%	4,997 53.4%	4,586 49.0%	8,768 98.3%
96/97	21 Jul. '96 - Jan. '97	A	1,389	1,360 97.9%	1,230 88.6%	1,325 95.4%	1,140 82.1%	1,185 87.1%
		B	4,001	3,715 92.9%	507 12.7%	2,005 50.1%	2,928 73.2%	3,715 100.0%
		C	3,960	3,925 99.1%	759 19.2%	2,465 62.2%	2,993 75.6%	3,624 92.3%
		Sub-total	9,350	9,000 96.3%	2,496 26.7%	5,795 62.0%	7,061 75.5%	8,524 94.7%
Average	A	7,266	4,050 56.2%	1,360 18.9%	3,179 44.1%	3,274 45.4%	3,575 88.3%	
	B	24,006	22,523 93.8%	2,040 8.5%	9,645 40.2%	11,567 48.2%	21,775 96.7%	
	C	23,765	23,365 98.3%	3,000 12.6%	12,409 52.2%	11,458 48.2%	21,207 90.8%	

Table IV-7 (2/3) Planting Method-wise Cropped area in Kerian

Irrigation	Cropping Calendar	Block	Irrigable Area (ha)	Planted Area	Direct Seeding	Land preparation by tractor	Machine Harvesting	(Unit: ha)
								Harvested Area Plant/Hary
94	Feb. '94 - Jul. '94	D	3,363	3,031	1,248	1,390	2,332	2,974
				90.1%	37.1%	41.3%	69.3%	98.1%
	E	2,344	2,344	1,010	1,309	1,911	2,344	
			100.0%	43.1%	55.8%	82.8%	100.0%	
	F	2,696	2,289	2,053	2,041	1,951	2,129	
			84.9%	76.1%	75.7%	72.4%	93.0%	
	Sub-total		8,403	7,664	4,311	4,740	6,224	7,447
				91.2%	51.3%	56.4%	74.1%	97.2%
94/95	Sep. '94 - Feb. '95	D	3,363	2,563	1,408	1,780	697	1,356
				76.2%	41.9%	52.9%	20.7%	52.9%
	E	2,344	2,226	1,217	1,835	1,715	2,078	
			95.0%	51.9%	78.3%	73.2%	93.4%	
	F	2,696	2,431	2,260	2,325	1,964	2,129	
			90.2%	83.8%	86.2%	72.8%	87.6%	
	Sub-total		8,403	7,220	4,885	5,940	4,376	5,563
				85.9%	58.1%	70.7%	52.1%	77.0%
95	1 Jan. '95 - 15 Jan. '95	D	3,363	2,972	1,406	1,956	1,989	2,821
				88.4%	41.8%	58.2%	59.1%	94.9%
	E	2,344	2,281	1,183	1,935	1,808	2,214	
			97.3%	50.5%	82.6%	77.1%	97.1%	
	F	2,696	2,037	1,812	2,003	1,952	2,037	
			75.6%	67.2%	74.3%	72.4%	100.0%	
	Sub-total		8,403	7,290	4,401	5,894	5,749	7,072
				86.8%	52.4%	70.1%	68.4%	97.0%
95/96	15 Aug. '95 - Jul. '96	D	3,363	2,702	1,527	2,702	2,253	2,552
				80.3%	45.4%	80.3%	67.0%	94.4%
	E	2,344	2,103	1,615	1,908	1,808	2,101	
			89.7%	68.9%	81.4%	77.1%	99.9%	
	F	2,696	2,563	2,452	2,515	2,512	2,561	
			95.1%	90.9%	93.3%	93.2%	99.9%	
	Sub-total		8,403	7,368	5,594	7,125	6,573	7,214
				87.7%	66.6%	84.8%	78.2%	97.9%
96	1 Mar. '96 - Sep. '96	D	3,363	2,702	1,728	1,825	2,253	2,702
				80.3%	51.4%	54.3%	67.0%	100.0%
	E	2,344	2,103	1,608	2,023	1,551	2,101	
			89.7%	68.6%	86.3%	66.2%	99.9%	
	F	2,696	2,563	2,492	2,513	2,521	2,561	
			95.1%	92.4%	93.2%	93.5%	99.9%	
	Sub-total		8,403	7,368	5,828	6,361	6,325	7,364
				87.7%	69.4%	75.7%	75.3%	99.9%
96/97	1 Sept. '96 - Feb. '97	D	3,363	2,555	1,945	2,135	1,530	1,774
				76.0%	57.8%	63.5%	45.5%	69.4%
	E	2,344	2,103	1,620	2,093	1,893	2,103	
			89.7%	69.1%	89.3%	80.8%	100.0%	
	F	2,696	2,561	2,482	2,561	2,342	2,561	
			95.0%	92.1%	95.0%	86.9%	100.0%	
	Sub-total		8,403	7,219	6,047	6,789	5,765	6,438
				85.9%	72.0%	80.8%	68.6%	89.2%
Average	D	D	20,178	16,525	9,262	11,788	11,054	14,179
				81.9%	45.9%	58.4%	54.8%	85.8%
		E	14,064	13,160	8,253	11,103	10,716	12,941
			93.6%	58.7%	78.9%	76.2%	98.3%	
	F	16,176	14,444	13,551	13,958	13,242	13,978	
				89.3%	83.8%	86.3%	81.9%	96.8%

Table IV-7 (3/3) Planting Method-wise Cropped area in Kerian

								(Unit: ha)
Irrigation	Cropping Calendar	Block	Irrigable Area (ha)	Planted Area	Direct Seeding	Land preparation by tractor	Machine Harvesting	Harvested Area Plant/Harv
94								
	Feb. '94 - Jul. '94	G	2,143	2,140 99.9%	1,445 67.4%	1,854 86.5%	1,253 58.5%	2,102 98.2%
		H	2,650	2,640 99.6%	1,999 75.4%	2,235 84.3%	1,793 67.7%	2,631 99.7%
		Sub-total	4,793	4,780 99.7%	3,444 71.9%	4,089 85.3%	3,046 63.6%	4,733 99.0%
94/95								
	Aug. '94 - Feb. '95	G	2,143	2,135 99.6%	1,243 58.0%	1,933 90.2%	1,187 55.4%	1,892 88.6%
		H	2,650	2,643 99.7%	2,215 83.6%	2,383 89.9%	2,195 82.8%	2,683 101.5%
		Sub-total	4,793	4,778 99.7%	3,458 72.1%	4,316 90.0%	3,382 70.6%	4,575 95.8%
95								
15 Feb. '95	Mar. '95 - Jul. '95	G	2,143	2,135 99.6%	1,243 58.0%	1,939 90.5%	1,187 55.4%	1,892 88.6%
		H	2,986	2,986 100.0%	2,215 74.2%	2,383 79.8%	2,195 73.5%	2,638 88.3%
		Sub-total	5,129	5,121 99.8%	3,458 67.4%	4,322 84.3%	3,382 65.9%	4,530 88.5%
95/96								
1 Oct. '95	Oct. '95 - Jul. '96	G	2,143	2,060 96.1%	1,232 57.5%	1,921 89.6%	1,794 83.7%	2,057 99.9%
		H	2,986	2,639 88.4%	2,397 80.3%	2,370 79.4%	2,415 80.9%	2,639 100.0%
		Sub-total	5,129	4,699 91.6%	3,629 70.8%	4,291 83.7%	4,209 82.1%	4,696 99.9%
96								
1 Apr. '96	Apr. '96 - Sep. '96	G	1,807	1,794 99.3%	1,460 80.8%	1,727 95.6%	1,530 84.7%	1,768 98.6%
		H	2,986	2,965 99.3%	2,873 96.2%	2,850 95.4%	2,811 94.1%	2,723 91.8%
		Sub-total	4,793	4,759 99.3%	4,333 90.4%	4,577 95.5%	4,341 90.6%	4,491 94.4%
96/97								
1 Oct. '96	Oct. '96 - Mar. '97	G	1,668	1,647 98.7%	1,498 89.8%	1,521 91.2%	1,582 94.8%	1,694 102.9%
		H	3,125	3,100 99.2%	2,972 95.1%	3,058 97.9%	2,805 89.8%	2,902 93.6%
		Sub-total	4,793	4,747 99.0%	4,470 93.3%	4,579 95.5%	4,387 91.5%	4,596 96.8%
Average								
		G	12,047	11,911 98.9%	8,121 67.4%	10,895 90.4%	8,533 70.8%	11,405 95.8%
		H	17,383	16,973 97.6%	14,671 84.4%	15,279 87.9%	14,214 81.8%	16,216 95.5%

Table IV-8 Detailed Paddy Planted Area in Ketara (Besut)

Farmers Group (Kumpulan Petani)	Net Area (ha)	Main season				Off season					
		95/96		96/97		95		96		97	
		Area (ha)	CI (%)	Area (ha)	CI (%)	Area (ha)	CI (%)	Area (ha)	CI (%)	Area (ha)	CI (%)
Compartment 1 (Phase I)											
1 TLK	408.1	346.7	85.0%	260.5	63.8%	346.0	84.8%	286.0	70.1%	332.4	81.5%
2 TLA	155.5	155.5	100.0%	155.5	100.0%	155.5	100.0%	155.5	100.0%	155.5	100.0%
3 TN/GL	144.2	144.2	100.0%	144.2	100.0%	144.0	99.9%	144.2	100.0%	144.2	100.0%
4 Gong Kulim	68.7	68.7	100.0%	68.7	100.0%	58.0	84.4%	68.7	100.0%	41.5	64.8%
5 TA Kubang Depu	99.2	98.4	99.2%	98.4	99.2%	99.0	99.8%	98.4	99.2%	98.4	99.2%
6 TA Kayu Kefat	78.7	78.7	100.0%	78.7	100.0%	78.0	99.1%	78.7	100.0%	78.7	100.0%
7 TA Pulau Ribu	96.8	96.8	100.0%	96.8	100.0%	96.0	99.2%	96.8	100.0%	96.8	100.0%
8 TA Pulau Panjang	183.6	183.6	100.0%	183.6	100.0%	183.0	99.7%	183.6	100.0%	183.6	100.0%
Sub-total	1,234.8	1,172.6	95.0%	1,086.4	88.0%	1,159.5	93.9%	1,111.9	90.0%	1,134.1	91.8%
Compartment 2 (Phase I and II)											
9 TPB	301.4	301.5	100.0%	301.5	100.0%	301.0	99.9%	301.5	100.0%	301.5	100.0%
10 TA Awak	270.7	270.8	100.0%	270.8	100.0%	100.0	36.9%	207.8	76.8%	208.0	76.8%
11 Sri Masin	50.6	50.6	100.0%	50.6	100.0%	0.0	0.0%	20.6	40.7%	50.6	100.0%
12 R-S	209.5	209.3	99.9%	209.3	99.9%	209.0	99.8%	189.5	90.5%	177.6	84.8%
13 S-T	297.4	297.2	99.9%	297.2	99.9%	297.0	99.9%	297.2	99.9%	297.2	99.9%
Sub-total	1,129.6	1,129.4	100.0%	1,129.4	100.0%	907.0	80.3%	1,016.6	90.0%	1,034.9	91.6%
Compartment 3 (Phase II)											
14 M-N	137.6	137.8	100.1%	137.8	100.1%	137.0	99.6%	137.8	100.1%	137.8	100.1%
15 N-O	152.9	153.0	100.1%	153.0	100.1%	140.0	91.6%	153.0	100.1%	153.0	100.1%
16 O-OI	278.3	278.4	100.0%	278.4	100.0%	271.0	97.4%	278.4	100.0%	278.4	100.0%
17 Q-QI	158.7	158.8	100.1%	158.8	100.1%	150.0	94.5%	0.0	0.0%	158.8	100.1%
18 Q2a	92.1	92.2	100.1%	92.2	100.1%	82.0	89.0%	0.0	0.0%	92.2	100.1%
19 Q2b	116.0	116.0	100.0%	116.0	100.0%	54.3	46.8%	0.0	0.0%	116.0	100.0%
20 Q2c	141.0	141.0	100.0%	100.0	70.9%	0.0	0.0%	0.0	0.0%	113.8	80.7%
21 PPI	229.8	229.8	100.0%	229.8	100.0%	229.0	99.7%	40.0	17.4%	229.8	100.0%
Sub-total	1,306.4	1,307.0	100.0%	1,266.0	96.9%	1,063.3	81.4%	609.2	46.6%	1,279.8	98.0%
Compartment 4 (Phase I)											
22 Mtb	150.3	150.3	100.0%	150.3	100.0%	150.0	99.8%	150.3	100.0%	150.3	100.0%
23 Mta	166.7	166.7	100.0%	166.7	100.0%	166.7	100.0%	166.7	100.0%	166.7	100.0%
24 M-MI	331.6	331.6	100.0%	171.1	51.6%	201.1	60.6%	171.1	51.6%	241.4	72.8%
25 GH	119.9	119.9	100.0%	119.9	100.0%	119.0	99.2%	119.8	99.9%	119.9	100.0%
26 III	218.6	218.6	100.0%	218.6	100.0%	0.0	0.0%	150.0	68.6%	218.7	100.0%
27 IJKL	286.3	286.3	100.0%	286.3	100.0%	286.0	99.9%	315.0	110.0%	253.8	88.6%
28 F-G	83.5	79.7	95.4%	79.7	95.4%	76.0	91.0%	76.2	91.3%	79.7	95.4%
29 Kuala Kenak	29.1	28.9	99.3%	0.0	0.0%	28.9	99.3%	0.0	0.0%	28.9	99.3%
30 TG	117.7	117.6	99.9%	117.6	99.9%	117.0	99.4%	117.6	99.9%	117.6	99.9%
Sub-total	1,503.7	1,499.6	99.7%	1,310.2	87.1%	1,144.7	76.1%	1,266.7	84.2%	1,377.0	91.6%
Besut Scheme	5,174.5	5,108.6	98.7%	4,792.0	92.6%	4,274.5	82.6%	4,004.4	77.4%	4,825.8	93.3%

Note:

i. This data prepared by Agriculture Component, IADP KETARA.

Table IV-9 Detailed Paddy Planted Area in Kemasin/Semerak

BLOCK	PADDY PLOT	EXTENT (HA)	INVOLVED VILLAGE	EXTENT OF CULTIVATED AREA		EXTENT OF NON CULTIVATED		REASON FOR NOT CULTIVATING
				LM 96 (ha)	MU 96/97 (man)	LM 96 (ha)	MU 96/97 (man)	
I. KEMASIN HILIR								
A	Krau	150	1. Krau Hulu 2. Tebing Roboh 3. Kelua 4. Keleroak 5. Pengkalan Cina	150	60	10	130	Main Season - Farmer's main focused on tobacco - 10% of the area (highland) will be cultivated with tobacco - 60ha are cultivated with first main season cultivation
B	Krau	12	Krau Hilir	10	-	2	12	Main Season / Off Season - Highland, vegetable cultivation & short term plants - Low-lying valley bottom - Tractors cannot go in - Uncomplete irrigation
C	Badak	25	Badak / Kemudi	16	16	9	9	- Animal / Enemy (livestock/Rat) Palm swamp land (original extent are 24 ha - after additional land leveling 1 ha)
D	Tek Behan	37	Tek Behan	35	33	2	2	2 ha of swampy area
E	Pengkalan Petah	60	1. Pengkalan Petah 2. Kelumpang 3. Kemasin	50	-	10	60	- Palm Swamp - 10 ha - MU - farmers focused on tobacco Tobacco also cultivated at highland and normally near to the gate
Sub-Total		324		291	111	33	213	
				Cropping Intensity	89.81%		34.26%	

BLOCK	PADDY PLOT	EXTENT (HA)	INVOLVED VILLAGE	EXTENT OF CULTIVATED AREA		EXTENT OF NON CULTIVATED		REASON FOR NOT CULTIVATING
				LM 96	MU 96/97	LM 96	MU 96/97	
I. Jelawat Rosa								
A	Rusa, Majur, Khg. Keladi, Nemon, Tek Ewa	384	1. Rusa 2. Majur 3. Kubang Keladi 4. Nemon 5. Tek Ewa	165	165	219	219	- Gelam (Melaleuca leucadendron) bun - 50 % - Low lying land - 40 % - Drainage - 10 %
B	Kok Lintang, Permatang Pasir, Telaga Ara	467	1. Kok Lintang 2. Permatang Pasir 3. Tek Ngah 4. G. Jelutong 5. Telaga Ara 6. Surau Batar 7. G. Teris	285	285	182	182	- Gelam (Melaleuca leucadendron) land - 50 % - Irrigation - 20 % - Animal / Enemy (Livestock/Rat) - 60%
C	Seneng, Alor Gana, Gong Chengal, Gelong Badak	533	1. Seneng 2. Alor Gana 3. Tempoyak 4. Tekel 5. Kok Kelik 6. Gelong Badak 7. Gelong Gelonggong 8. Gong Chengal	182	190	351	343	- Gelam (Melaleuca leucadendron) - 53 % - Drainage - 15 % - Livestock - 8 % - Vacant (plant with tanaman kantan) once a year

Source: IADP Kemasin/Semerak

Table IV-10 Paddy Production and Average Yields

(Unit: ton)

	JADP Pulau Pinang			Kerian			Sungai Manik			Seberang Perak			Kemasin Semerak			Ketara (Besut)		
	Annual	Main	Off	Annual	Main	Off	Annual	Main	Off	Annual	Main	Off	Annual	Main	Off	Annual	Main	Off
1985 Production	31,673	14,594	17,079	123,156	66,783	56,374	20,892	15,899	4,992	20,516	10,645	9,871	0	0	0	19,542	8,846	10,696
Average Yields	2.28	2.15	2.42	3.02	2.87	3.21	2.62	2.62	2.63	2.18	1.84	2.71				3.23	3.26	3.21
1986 Production	42,489	19,946	22,543	116,121	68,953	47,167	32,840	15,704	17,137	18,101	13,750	4,351	0	0	0	13,987	6,376	7,611
Average Yields	2.65	2.54	2.76	3.23	3.16	3.33	2.91	2.96	2.88	2.37	2.45	2.16				2.50	3.01	2.19
1987 Production	50,605	25,740	24,865	139,390	74,268	65,123	34,189	17,534	16,654	24,041	10,121	13,920	35,440	11,489	23,951	21,806	13,281	8,525
Average Yields	2.67	2.87	2.49	3.17	3.16	3.17	2.79	2.94	2.64	2.64	2.89	2.49	2.60	2.52	2.63	3.27	3.48	2.98
1988 Production	41,900	22,286	19,614	102,389	54,677	47,712	21,168	13,428	7,740	29,183	12,693	16,490	11,858	11,544	314	16,158	11,410	4,748
Average Yields	2.07	2.18	1.96	2.47	2.32	2.66	1.76	2.19	1.31	2.49	2.58	2.43	2.17	2.20	1.46	2.74	2.73	2.79
1989 Production	51,131	23,559	27,572	95,126	57,016	38,109	20,714	8,842	11,873	46,087	20,073	26,014	12,839	11,789	1,050	23,803	12,684	11,119
Average Yields	2.52	2.32	2.73	2.61	2.65	2.57	2.16	2.54	1.95	3.06	2.69	3.42	2.22	2.37	1.27	3.07	3.24	2.89
1990 Production	35,869	20,488	15,381	102,759	57,875	44,884	25,929	12,288	13,641	70,511	35,381	35,130	6,532	6,507	25	25,523	14,025	11,498
Average Yields	1.65	1.99	1.33	2.64	2.48	2.86	2.15	2.06	2.23	4.12	4.16	4.07	1.67	1.67	1.48	3.20	3.34	3.05
1991 Production	49,614	22,237	27,377	113,078	67,388	45,690	31,882	15,963	15,919	67,226	36,922	30,304	13,288	12,879	409	24,840	14,896	9,944
Average Yields	2.22	1.95	2.51	2.88	2.96	2.77	2.62	2.62	2.63	3.93	4.33	3.54	3.03	3.07	2.17	3.06	3.52	2.56
1992 Production	62,843	31,465	31,378	121,994	47,636	74,358	31,514	14,312	17,202	48,669	23,481	25,188	15,344	14,161	1,183	18,428	9,848	8,580
Average Yields	2.63	2.68	2.57	2.87	2.44	3.24	2.64	2.42	2.86	3.15	3.27	3.04	2.89	2.86	3.41	2.32	2.33	2.30
1993 Production	59,578	28,682	30,896	130,505	74,627	55,878	39,324	21,771	17,553	58,763	29,472	29,291	22,544	19,393	3,151	31,538	15,695	15,843
Average Yields	2.92	3.02	2.83	3.24	3.28	3.20	3.27	3.64	2.90	3.54	3.70	3.39	3.00	3.02	2.85	3.41	3.26	3.57
1994 Production	58,627	34,115	24,512	75,908	43,955	31,953	40,219	22,069	18,150	62,656	26,038	36,618	24,567	20,659	3,908	28,832	17,423	11,409
Average Yields	3.11	3.72	2.53	2.30	2.57	2.02	3.33	3.64	3.02	3.70	3.03	4.39	2.68	2.80	2.19	3.25	3.56	2.87
1995 Production	62,708	32,295	30,413	121,856	63,488	58,368	41,101	20,913	20,188	56,952	29,837	27,115	19,748	18,509	1,239	35,296	19,281	16,015
Average Yields	3.25	3.38	3.13	3.34	2.89	4.01	3.39	3.47	3.32	3.32	3.47	3.17	2.64	2.87	1.20	3.71	3.90	3.50

Source: Paddy Statistics of Malaysia, 1995
IADP Kerian/Sungai Manik Office

Table IV-11 Result of Paddy Production Survey in Kerian

Block Mukim	Comp.	(Unit: Clean kg/ha)										
		91/92	92/93	93/94	94/95	95/96	96/97	92	93	94	95	96
1 Semanggol	H	2,517	3,394	3,234	3,440	3,878	2,725	2,801	3,685		3,509	3,848
2 Semanggol	H	3,263	3,724	2,459	3,655	4,340	4,186	3,506	3,614		3,671	4,111
3 Semanggol	H	2,691	3,652	3,278	3,636	4,104	3,479	2,116	3,059		3,639	3,700
							<u>3,425</u>					<u>3,438</u>
4 Selinsing	G	3,119	2,969	3,813	2,739	3,404	3,300	3,656	3,608		3,244	2,693
5 Selinsing	G	2,593	3,680	2,978	2,129	3,183	3,417	4,108	3,586		2,737	3,437
6 Selinsing	G	2,944	3,741	3,293	3,042	3,436	3,160	2,996	2,686		3,187	4,200
							<u>3,163</u>					<u>3,345</u>
7 B. Serai	F	3,600	3,139	1,788	1,829	2,552	2,755	3,889	2,942	1,666		2,479
8 B. Serai	F	2,481	3,267	3,650	3,201	3,719	3,511	2,579	3,442	2,449		3,565
9 B. Serai	F	2,581	2,293	2,835	2,105	2,982	1,852	2,540	1,936	1,643		2,986
							<u>2,786</u>					<u>2,676</u>
10 Beriah	E	3,175	3,069	2,785	2,466	2,436	2,160	3,730	2,211	2,709		2,855
11 Beriah	E	2,778	3,757	2,039	2,818	2,811	2,213	3,997	2,459	2,348		3,244
12 B. Serai	E	2,089	3,131	3,098	3,557	3,167	2,849	4,053	2,563	1,239		2,768
							<u>2,800</u>					<u>2,848</u>
13 B. Serai	D	1,158	2,731	2,278	2,624	2,899	2,911	3,342	2,444	307		3,041
14 K. Kurau	D	1,012	2,299	1,890		2,662	2,211	2,312	1,809			2,287
15 K. Kurau	D		3,550			4,382	4,851	4,662	2,716			
16 BT/PB	D	921	2,009	1,795	759	2,291	3,106	2,376	1,536		1,296	1,947
							<u>2,417</u>					<u>2,313</u>
17 K. Kurau	C		2,341		2,840	3,500	2,567	2,728	3,703	1,240	4,139	
18 K. Kurau	C		3,275		2,693	4,315	4,293	3,223	4,054	3,026	5,463	
19 T. Piandang	C		3,997		4,720	5,160	4,869	4,555	4,467	3,997	4,929	
20 T. Piandang	C		3,788		4,155	4,070	5,464	4,431	4,100	3,757	4,079	
							<u>3,878</u>					<u>3,868</u>
21 T. Piandang	B		4,331		4,267		2,938	4,565	5,039	3,512	3,932	
22 BT/PB	B	2,737	3,756		3,841	3,663	4,074	2,998	4,352	4,032	5,005	
23 BT/PB	B	2,394	3,479		3,074	2,926	3,799	3,924	4,005	2,900	4,205	
24 BT/PB	B	1,949	2,852		2,722	3,098	2,984	3,471	3,467	1,913	3,113	
25 BT/PB	B	2,750	3,832		3,030	3,300	4,534	3,708	3,441	2,205	4,301	
26 BT/PB	B	2,371	3,084		3,240	2,995	2,702	2,407	3,099	1,659	3,002	
							<u>3,240</u>					<u>3,511</u>
27 Sg. Aceh	A	1,733	4,499		4,079	3,137	2,568	1,929	4,197	4,236	4,216	
28 Sg. Aceh	A	1,766	3,517		4,169		3,671	1,583	4,487		3,882	
							<u>3,238</u>					<u>3,504</u>
Kerian		2,392	3,327	2,748	3,109	3,400	3,282	3,292	3,311	2,491	3,766	3,144

Source: IADP Kerian

Table IV-12 Results of Paddy Production Survey in Ketara (Besut)

ISU	(Unit: Wet kg/ha)				
	Main season			Off season	
	94/95	95/96	96/97	95	96
Compartment 1	<u>4,118</u>	<u>5,508</u>	<u>4,003</u>	<u>4,134</u>	<u>5,108</u>
1 Pulau Panjang	4,730	5,175	4,569	4,410	4,900
2 Telaga Nibong	4,312	5,680	3,430	4,275	5,250
3 Kayu Kelat	4,060	5,550		3,890	5,300
4 Pulau Ribu	4,420		2,573	3,210	
5 Lubuk Agu	3,060	4,900		3,810	4,700
6 Lubuk Kawah	4,115	5,900	5,734	4,170	5,200
7 Kubang Depu	3,940	5,845	6,025	4,380	5,300
8 Gong Kulim	4,310		1,688	4,930	
Compartment 2	<u>4,204</u>	<u>5,457</u>	<u>5,126</u>	<u>3,808</u>	<u>4,981</u>
9 Padang Baloh	4,266	5,483	4,297	4,005	5,200
10 Awek	4,210	4,890	4,961	3,560	4,700
11 RS	3,945	5,860	6,756	3,845	5,050
12 ST	4,393	5,595	4,490	3,823	4,975
13 Sri Masin					
Compartment 3	<u>4,447</u>	<u>5,209</u>	<u>5,035</u>	<u>4,125</u>	<u>5,027</u>
14 MN	4,097	5,425	6,163	4,235	5,100
15 NO	4,955	5,630	4,744	4,200	
16 OOI	4,745	4,733	5,670	4,010	4,900
17 PPI	4,151	5,547		3,710	5,057
18 QQ1	4,275	5,575	3,565	4,215	5,050
19 Q2a	4,580		5,174	4,380	
20 Q2b	4,580	4,410	4,893		
21 Q2c	4,195	5,140			
Compartment 4	<u>4,336</u>	<u>5,472</u>	<u>4,539</u>	<u>4,098</u>	<u>5,108</u>
22 MMI	4,195	5,810		4,390	5,050
23 M1a	4,183	5,410	3,822	3,790	5,450
24 M1b	4,340	5,610	4,758	4,360	4,900
25 GH	4,365		5,381	4,420	
26 III	4,493	5,740	5,376	4,253	4,916
27 Kuala Kenak		4,560		3,560	
28 IJKL	4,244	5,465	3,356	4,070	4,882
29 FG	4,330			4,420	
30 TG	4,535	5,710		3,620	5,450
Besut Scheme	4,287	5,402	4,639	4,072	5,067

Note:

1. The source of the data from crop cutting survey carried out by the DOA.
2. Vacants indicate that paddy was not planted on the plot chosen
3. This data prepared by Agriculture Component, IADP KETARA.
4. Average Yield of Wet Paddy

Table IV-13 Results of Paddy Production Survey in Pulau Pinang

No.	Block	(Unit: Wet kg/ha)							
		Main season				Off season			
		94/95	95/96	96/97	Ave.	94	95	96	Ave.
Sungai Muda									
	1 M1	3,245	5,389	5,396	4,677	3,499	4,533		4,016
	2 M2	3,337	4,540	2,580	3,486	3,893	2,416		3,154
	3 M3	3,715	5,106	2,536	3,786	4,404			4,404
	4 M4		4,151	5,094	4,623	2,913	4,774		3,844
	5 M5	3,368	4,550	4,451	4,123	2,212	3,515		2,863
	6 M6	2,363	3,949	2,596	2,969	1,913			1,913
Pinang Tunggal									
	1 P1	3,612	6,089	4,183	4,628		4,287		4,287
	2 P2	3,612	2,791	3,259	3,221		3,660		3,660
Sungai Kulim									
	1 K1		3,497		3,497	2,500			2,500
	2 K2	4,044	3,083	3,917	3,681	3,500	3,892		3,696
	3 K3	4,685	5,439	3,900	4,675	4,000	4,676		4,338
	4 K4	4,170	4,662	4,017	4,283	3,000	3,067		3,033
Sungai Jarak									
	1 Potok Tampang	2,016			2,016		3,742		3,742
	2 Padang Menora	2,016			2,016		3,475		3,475
Pulau Pinang		3,615	4,437	3,812		3,183	3,869		

Source: IADP Pulau Pinang, DOA Pulau Pinang

Yield of Wet Paddy

Table IV-14 Summary of Farm Inputs in the Study Area

Scheme	IADP Pulau Pinang	Kerian	Sungai Manik	Seberang Perak	FELCRA	Kemasin Semarak	Besut	Chui Chak (sample)
1. Average Yield*1								
Annual	2.80t/ha	2.94t/ha	3.05t/ha	3.53t/ha		2.82t/ha	3.18t/ha	6 - 7t/ha
Main season	2.90t/ha	2.86t/ha	3.16t/ha	3.57t/ha		2.91t/ha	3.34t/ha	
Off season	2.71t/ha	3.05t/ha	2.94t/ha	3.50t/ha		2.22t/ha	3.00t/ha	
2. Seed rate								
	75 - 80kg/ha (WDS)	40-100kg/ha (WDS, app. 40%)	40-100kg/ha (DDW and WDS)	80-100kg/ha (WDS)	80-100kg/ha (WDS)	40-60kg/ha (WDS)	50kg/ha (WDS)	80-100kg/ha (WDS)
		100-150kg/ha (DDS, app. 60%)						
		25kg/ha (TP, app. 70 - 80%)						
3. Fertilizer Application								
	1) 17.5:15.5:10 200kg/ha 15DAS 2) Urea 40kg/ha 45DAS 3) Urea 60kg/ha 55DAS 4) 16:16:16 150kg/ha 75DAS	1) Mixture 35:31:20 80kg/ha 20DAS 2) Urea 40kg/ha 45DAS 3) 15:15:15 125kg 80DAS	1) 17.5:15.5:10 200kg/ha 20DAS 2) Urea 100kg/ha 40DAS 3) 15:15:15 50kg 75DAS	1) 17.5:15.5:10 200kg/ha 15DAS 2) Urea 100kg/ha 35DAS 3) Urea after 100kg/ha flowering 4) 12:9:22.3 150kg/ha PAT	1) 17.5:15.5:10 200kg/ha 15DAS 2) Urea 100kg/ha 25DAS 3) Urea 100kg/ha 65DAS 4) Urea 100kg/ha 80-90DAS	1) 17.5:15.5:10 100kg/ha 15DAS 2) 17.5:15.5:10 100kg/ha Urea 40kg/ha 45DAS 3) Urea 80kg/ha 65DAS 4) Baja makmur 125kg/ha 65DAS	1) 17.5:15.5:10 200kg/ha 20DAS 2) Urea 75kg/ha 45DAS 3) 12:12:17 125kg/ha 55DAS 4) Urea 75kg/ha 65DAS	1) 17.5:15.5:10 150kg/ha 24DAS 2) 17.5:15.5:10 50kg/ha 31DAS 3) Urea 100kg/ha 46DAS 4) Urea 84kg/ha 56DAS 5) Urea 84kg/ha 72DAS 6) 15:15:15 125kg/ha 56DAS
	Total N (Nkg/ha) (Recommendation)	84 Total N (Nkg/ha)	89 Total N (Nkg/ha)	145 Total N (Nkg/ha) (Recommendation)	Total N 150-170 (Nkg/ha)	Total N 109 (Nkg/ha) (Recommendation)	Total N 119 (Nkg/ha) (Recommendation)	Total N
	Actual*2	Actual	Actual	Actual	Actual	Actual	Actual	177
	Total N (Nkg/ha)	80 Total N (Nkg/ha)	80 Total N (Nkg/ha)	80 Total N (Nkg/ha)	80 Total N (Nkg/ha)	80 Total N (Nkg/ha)	80 Total N (Nkg/ha)	80 (Nkg/ha)

DAS: Days after seeding

*1: 5 years average (1991-1995)

PAT: Particle Initiation

*2: Government Subsidy fertilizer

Table IV-15 Estimated Farm Inputs and Labour Requirements

(Unit: per ha)

Items	Unit	Direct Seeding						
		Ploa Pajang	Kerian		Sungai Manik	Seberang Perak exc. HUCRA	Besut	Kemasin Semerak
			DS	TP				
1. Seed Material	(kg)	80	80	25	100	100	80	50
Fertilizer								
1. Subsidy								
NPK	(kg)	200	200	200	200	200	200	200
Urea	(kg)	100	100	100	100	100	100	100
NPK								
2. Additional								
NPK	(kg)							
Urea								
Compost	(kg)							
2. Agrochemicals								
Insecticide	(kg/ha)		0.75	0.5				
	(lit./ha)		1	0.85	0.63		2.47	10
	(lit./ha)				1.25		0.12	
Fungicides	(kg/ha)						19.77	
	(lit./ha)	0.1						
Herbicides	(kg/ha)		0.75	1.65		0.04	2.47	2.5
	(lit./ha)	6	8.7	6.6	7.5	1.65	4.9	
Rat control	(lit./ha)				0.63	0.80	0.6	
	(kg/ha)	1						1
3. Machinery (Contract)								
Tractor	(times)	3	2		3	3	2	3
Combine	(times)	1	1		1	1	1	1
Transport		1	1	1	1	1	1	1
4. Labour								
Land Prepn.	(md)			10.3			0.4 *	
Nursery	(md)			2.7				
Planting	(md)							
Direct Seeding	(md)	2.7	0.6		0.8	3.2	0.5	3.0
Transplanting	(md)			14.5				
Replanting	(md)		3.7	1.3	2.1		2.5	
Fertilizer Application	(md)	2.3	1.6	2.3	2.1	6.5	4.6	5.0
Chemical Application	(md)	5.4	1.8	2.0	2.3	6.9	2.4	5.4
Manual Weeding	(md)		1.0	1.2				
Water Management	(md)	2.6	2.2	2.2	2.9	2.2	2.5	12.0
Crop Watching	(md)							
Harvesting	(md)			21.5				
Processing	(md)							
Total	(md)	13.0	10.9	58.0	10.3	18.8	12.9	25.4
	(mh)	104.0	86.8	464.3	82.3	150.4	103.6	203.2

Remarks: Figures were revised and up-dated by the Consultancy Team, based on the collected data and result of field survey.

1 man-day = 8 man-hrs

*: 2W tractor

Table IV-16 Capacity of Rice Mills and Paddy Production by Scheme

Scheme	No.	Ownership	Unit	Daily	Yearly	Paddy
			Capacity (mt/hr)	Capacity*1 (mt/day)	Capacity*2 (mt/year)	Production in Scheme*3 (mt/year)
Pulau Pinang	1	BERNAS	4.8	77	19,200	
	2	SWASTA*4	3.2	51	12,800	
	3	SWASTA	6.0	96	24,000	
	4	SWASTA	3.5	56	14,000	
	5	SWASTA	6.4	102	25,600	
	6	SWASTA	6.0	96	24,000	
	7	SWASTA	6.0	96	24,000	
	8	SWASTA	3.5	56	14,000	
	9	SWASTA	8.0	128	32,000	
	10	SWASTA	3.0	48	12,000	
	11	SWASTA	2.1	34	8,400	
	12	SWASTA	8.0	128	32,000	
	13	SWASTA	8.0	128	32,000	
	14	SWASTA	5.0	80	20,000	
	Sub-total			1,176	294,000	58,674
Kerian	1	BERNAS	4.5	72	18,000	
	2	SWASTA	4.5	72	18,000	
	3	SWASTA	4.7	75	18,800	
	4	SWASTA	6.0	96	24,000	
	5	SWASTA	10.0	160	40,000	
	6	SWASTA	10.0	160	40,000	
	7	SWASTA	5.0	80	20,000	
	8	SWASTA	5.0	80	20,000	
	9	SWASTA	2.0	32	8,000	
	10	SWASTA	3.3	53	13,200	
	Sub-total			880	220,000	112,668
Sungai Manik	1	BERNAS	5.0	80	20,000	36,808
Seberang Perak	1	BERNAS	10.0	160	40,000	58,853
Kemasin Semerak	1	BERNAS	5.0	80	20,000	19,098
Besut	1	BERNAS	5.0	80	20,000	
	2	SWASTA	1.3	21	5,250	
	3	SWASTA	1.0	16	4,000	
	Sub-total			117	29,250	27,787
Total				2,493	623,250	313,888

*1: Daily working hour is assumed to be 16 hours.

*2: Annual working days is assumed to be 250 days.

*3: Paddy production in granary of 5 years average from 1991-95.

*4: SWASTA; Non-BERNAS private rice millers.

Source: MOA, BERNAS

Table IV-17 Types and Conditions of Loan by BPM

1. Type of Loan

- Term Loan (for paddy, machinery & other loan)
- Revolving Credit (for other loan only)
- Trade Financing (for other loan only)
- Islamic Financing (for other loan only)

2. Interest Rate

Varies from types of project and source of fund;

- Service Charge: RM 5.00 / RM 100 loan (only for paddy loan)
- Flat Rate: 6.50% per annum (for new machinery loan)
8.00% per annum (for 2nd hand machinery loan)
- Special Rate: 4.00% per annum calculated on yearly loan balances (for other loan)
6.50% per annum calculated on yearly loan balances (for other loan)
- Commercial Rate 0% to 4.00% per annum above Base Lending Rate (BLR is 10.25% as of December 1997) (for other loan)

3. Conditions for Application

- Loan Amount: 100% financing or RM 350.00 per acre and the maximum loan per borrower is RM 5,000.00 (for paddy loan only)
80% financing from the project cost (for machinery and others loan)
- Loan Period: 6 months (for paddy loan only) to 5 years (for machinery & others loan)
Above 5 years (for other loan)
- Loan Repayment: *Mode*;
cash, cheque, standing instruction etc.
Installment;
lump sum (for paddy loan only)
monthly, quarterly, half yearly, yearly etc.
- Collateral fixed deposit, land, listed shares, 2 guarantors (for paddy loan) etc.

Table IV-18 Total Disbursement and Recovery of BPM's Credit by Loan Type

	Pulau Pinang		Kerian		Sungai Manik		Seberang Perak		Kemasin Semarak		Besut	
	Disburse (RM mil)	Recovery (RM mil)	Disburse (RM mil)	Recovery (RM mil)	Disburse (RM mil)	Recovery (RM mil)	Disburse (RM mil)	Recovery (RM mil)	Disburse (RM mil)	Recovery (RM mil)	Disburse (RM mil)	Recovery (RM mil)
	Rate (%)	Rate (%)	Rate (%)	Rate (%)	Rate (%)	Rate (%)	Rate (%)	Rate (%)	Rate (%)	Rate (%)	Rate (%)	Rate (%)
Short-term												
1992	2.17	2.15	8.22	6.46	3.93	2.97	0.00	0.00	2.53	1.91	0.92	0.60
1993	2.40	2.30	4.48	6.20	4.28	4.22	0.29	0.17	0.96	1.12	0.95	0.84
1994	2.35	2.49	5.36	3.40	3.51	4.27	0.98	0.57	0.73	0.84	0.94	0.95
1995	2.47	2.43	7.63	7.25	3.96	3.01	1.61	1.13	0.66	0.73	1.01	1.02
1996	2.53	2.51	6.93	6.59	3.36	3.27	2.02	1.74	0.43	0.54	0.67	0.70
Medium-term												
1992	0.23	0.02	0.04	0.03	0.45	0.13	1.01	0.03	0.21	0.57	0.52	0.26
1993	0.57	0.06	0.16	0.04	0.13	0.21	0.36	0.27	0.37	0.41	0.13	0.42
1994	0.04	0.12	0.13	0.04	0.04	0.27	0.05	0.24	0.05	0.45	0.08	0.34
1995	0.22	0.13	0.03	0.05	0.44	0.21	0.00	0.20	0.24	3.14	0.26	0.32
1996	0.51	0.17	0.08	0.08	0.04	0.38	0.00	0.16	0.36	0.52	0.16	0.39
Others												
1992	7.96	2.24	4.62	2.93	5.78	3.80	0.93	0.28	43.94	44.61	33.82	29.82
1993	5.18	3.63	5.16	3.03	3.72	5.80	1.18	0.64	36.87	37.48	28.41	29.43
1994	7.48	4.49	2.16	2.93	3.18	4.98	0.46	0.79	23.11	24.62	27.94	28.23
1995	20.91	6.23	6.09	3.81	4.40	4.30	0.86	0.89	41.54	42.28	39.88	40.10
1996	18.10	9.98	6.40	5.60	6.16	5.54	3.33	2.79	48.35	49.42	40.94	44.74
Total												
1992	10.36	4.41	12.88	9.42	10.16	6.90	1.94	0.31	46.68	47.09	35.26	30.68
1993	8.15	5.99	9.80	9.27	8.13	10.23	1.83	1.08	38.20	39.01	29.49	30.69
1994	9.88	7.10	7.65	6.37	6.73	9.52	1.49	1.60	23.89	25.91	28.96	29.52
1995	23.60	8.79	13.75	11.11	8.80	7.52	2.47	2.22	42.44	46.15	41.15	41.44
1996	21.14	12.66	13.41	12.27	9.56	9.19	5.35	4.69	49.14	50.28	41.77	45.83

1. Short term refers to Paddy Loan.

2. Medium term refers to Agricultural Machinery Loan.

3. Others refer to other types of loan.

4. Recovery Rate is calculated by BPM based on their formula.

Source: Agricultural Bank of Malaysia.

Table IV-19 Financing System in Malaysia relating to Paddy Production

Financing System	Purposes	Procedure	Eligible Applicant	Terms & Condition	Advantages	Disadvantages
1. BPM-SPKP Credit Scheme (SPKP - Special Credit Scheme for Agriculture)	<ul style="list-style-type: none"> development of farmers, livestock rearers and fishermen who venture into agricultural industries 	SPKP Special Committee (MOA) → BPM → Credit Coordination Com. → Relevant Dept/Agency → AFO or AFA	1) <RM10,000 • Farmers, fishermen & livestock rearer whose gross household income is <RM5000/month 2) >RM10,000 • Farmers, fishermen & livestock rearer whose income is >RM500 but <RM1,000/month • Agricultural Cooperatives • Farmers' Organization • other Agro-based cooperatives	1) <RM10,000 • 6% interest • max - 5 yrs 2) >RM10,000 • <6% interest • max - 12 yrs	<ul style="list-style-type: none"> 0% interest on <RM10,000 <6% interest on >RM10,000 Open to individual and institutions Credit policy is spelled out 	<ul style="list-style-type: none"> guarantee or collateral needed long process of application high risk on bad-debt very thorough and strict scrutiny of applications, especially for the 0% interest loan
2. FOA-KPPP Loan Fund (KPPP - Farmers' Organizations Loan Fund)	<ul style="list-style-type: none"> to provide extension services & training facilities to expand agricultural production projects to provide farm supplies, farm machinery and services to provide marketing services to provide transport for milk to provide social services 	Board → FOA/H/O Financing Com. → NAFAS → State FOA Fin Com → AFO → SFO → Farmers' Unit → Member Unit	<ul style="list-style-type: none"> Any FO that involves in viable marketing/agribusiness/agro-based industries, and having a constraints in working capital/cash flow including high gearing ratio 	<ul style="list-style-type: none"> interest rate is 4% or 0% in certain cases no collateral or collateral is needed on case by case 	<ul style="list-style-type: none"> negotiable on certain cases, especially on emergency need low interest, 4% or 0% in certain cases no collateral or collateral is needed on a case by case basis credit policy is spelled out clearly 	<ul style="list-style-type: none"> limited fund available confines to FOs and agro-based cooperatives only taking high risk on bad-debt project cannot be implemented on schedule long process of application for non-emergency loan legal action against debtors is very costly, difficult and might damage FOA's image
3. FOA-SSPTE Leasing Scheme (SSPTE - Zero Interest Leasing Scheme)	<ul style="list-style-type: none"> to help FOs in acquiring commercial goods vehicles for beefing up its capacity and increase competitiveness 	FOA Management → Agri. Industries Dept. Div. → State FOA → Application from FOs	<ul style="list-style-type: none"> opened to any FO only commercial goods vehicles which is less than 5.5 mt usually max is RM50,000 no guarantee or collateral is needed, but need RM500 deposit 	<ul style="list-style-type: none"> 0% interest flexible payment (1/4, 1/2, 1 year) option to purchase on settlement of last payment purchase price of vehicle is lower than the dealer's vehicle is registered in the borrower's name ownership claim is lodged 	<ul style="list-style-type: none"> weight of vans or trucks limited to 5.5 metric ton only limited fund available confines to FOs faced with cash flow problems legal action against debtors is too costly, difficult and might damage FOA's image 	<ul style="list-style-type: none"> weight of vans or trucks limited to 5.5 metric ton only limited fund available confines to FOs faced with cash flow problems legal action against debtors is too costly, difficult and might damage FOA's image
4. AFO Loan	<ul style="list-style-type: none"> to provide small amount mainly for small project to provide credit based purchase service for farm supplies and grocery 	Board of Director → Credit & Saving Committee → Indiv./Group Application (AFO projects, farmers, etc.)	<ul style="list-style-type: none"> Individual farmers Farmers Group 	<ul style="list-style-type: none"> Interest rate is <6%, usually 4% No interest for credit base purchase of farm supplies & grocery Large amount is referred to BPM, SPKP or FOA, KPPP 	<ul style="list-style-type: none"> limited fund available confines to member farmers only taking high risk on bad-debt affordable only small amount of credit no fixed credit policy spelled out legal action against debtors would damage AFO's image 	<ul style="list-style-type: none"> limited fund available confines to member farmers only taking high risk on bad-debt affordable only small amount of credit no fixed credit policy spelled out legal action against debtors would damage AFO's image
5. Tanjung Karang AFO-SKLT Scheme for Paddy (SKLT - Supervised Farm Credit Scheme)	<ul style="list-style-type: none"> to provide farm supplies to member farmers 	Board of Director → Credit & Saving Committee → Paddy Mgmt-Exclate Division → Group of Farmers	<ul style="list-style-type: none"> Farmers who fulfill all the requirements laid out by AFO 	<ul style="list-style-type: none"> farmers enjoy better yield farmers' average annual income increased generates other business activities such as grocery supplies, marketing, transportation, advanced technology in harvesting and ploughing applied the system provides guaranteed market for farmers' produce provides advances such as cash and grocery supplies farmers who are in need before harvesting 	<ul style="list-style-type: none"> farmers enjoy better yield farmers' average annual income increased generates other business activities such as grocery supplies, marketing, transportation, advanced technology in harvesting and ploughing applied the system provides guaranteed market for farmers' produce provides advances such as cash and grocery supplies farmers who are in need before harvesting 	<ul style="list-style-type: none"> certain farmers still sell their paddy to private millers without the knowledge of AFO undercutting of prices for services provided by private cooperatives AFO is obligated not to collect or it would delay in collection whenever there is crop failure or disaster. Thus the AFO cash flow will be affected. AFO has to depend entirely on cooperation of all farmers to handlower their land for implementation

Table IV-20 Results of the Farm Survey on Rural Credit

	(1) Utilization of Credit					
	Yes		No		Total	
	No.	%	No.	%	No.	%
Kemasin Semerak	6	9.4	58	90.6	64	100.0
Ketara (Besut)	9	15.0	51	85.0	60	100.0
Pulau Pinang	37	49.3	38	50.7	75	100.0
Seberang Perak	29	35.4	53	64.6	82	100.0
Kerian / Sungai Manik	78	39.0	122	61.0	200	100.0
Sb. Perak (share system)	1	5.6	17	94.4	18	100.0
Overall	160	32.1	339	67.9	499	100.0

	(2) Source of Credit															
	BPM		PPK		Coop		Middlemen		Friend		Relatives		Others		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Kemasin Semerak	5	83.3	0	0.0	0	0.0	0	0.0	0	0.0	1	16.7	0	0.0	6	100.0
Ketara (Besut)	4	44.4	4	44.4	0	0.0	0	0.0	0	0.0	0	0.0	1	11.1	9	100.0
Pulau Pinang	35	94.6	2	5.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	37	100.0
Seberang Perak	23	79.3	1	3.4	1	3.4	0	0.0	0	0.0	0	0.0	4	13.8	29	100.0
Kerian / Sungai Manik	61	75.3	13	16.0	1	1.2	2	2.5	1	1.2	2	2.5	1	1.2	81	100.0
Sb. Perak (share system)	1	100.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	1	100.0
Overall	129	79.1	20	12.3	2	1.2	2	1.2	1	0.6	3	1.8	6	3.7	163	100.0

	(3) Problems in Obtaining Institutional Credit											
	Complicated Procedure		Long Time for Realization		High Interest Rate		Others		Total			
	No.	%	No.	%	No.	%	No.	%	No.	%		
Kemasin Semerak	2	11.1	2	11.1	1	5.6	13	72.2	18	100.0		
Ketara (Besut)	11	37.9	10	34.5	1	3.4	7	24.1	29	100.0		
Pulau Pinang	2	15.4	1	7.7	2	15.4	8	61.5	13	100.0		
Seberang Perak	2	22.2	4	44.4	2	22.2	1	11.1	9	100.0		
Kerian / Sungai Manik	19	30.2	19	30.2	13	20.6	12	19.0	63	100.0		
Sb. Perak (share system)	1	50.0	0	0.0	1	50.0	0	0.0	2	100.0		
Overall	37	27.6	36	26.9	20	14.9	41	30.6	134	100.0		

Table IV-21 Crop Budget for Each Granary Area

	Pulau Pinang			Kerian			Sungei Manik			Seberang Perak			Kemuning Semarak			Bavit			Changkat Jong				
	Unit	Qty	Price	Cost	Qty	Price	Cost	Qty	Price	Cost	Qty	Price	Cost	Qty	Price	Cost	Qty	Price	Cost	Qty	Price	Cost	
Gross Income																							
I. Paddy production	kg	3,090	0.7442	2299.6	2,990	0.7442	2,225	2,990	0.7442	2,225	3,520	0.7442	2619.6	2,770	0.7442	2,061	3,460	0.7442	2574.9	7,952	0.7442	5918	
Production Cost																							
I. Material Cost	kg	80	1.0	80	100	1.0	100	100	1.0	100	100	1.0	100	60	1.0	60	50	1.0	50	100	1.0	100	
1) Seed																							
2-1) Fertilizer (Subsidised)	kg	200	0.48	96	80	0.48	38.4	200	0.48	96	200	0.48	96	200	0.48	96	200	0.48	96	200	0.48	96	
17.5:15.5:10	kg		0.48			0.48			0.48			0.48			0.48			0.48			0.48		
35:31:20	kg		0.48		80	0.48	38.4		0.48			0.48			0.48			0.48			0.48		
12:12:17	kg		0.48			0.48			0.48			0.48			0.48			0.48			0.48		
15:15:15	kg		0.48		125	0.48	60		0.48			0.48			0.48			0.48			0.48		
Urea	kg	100	0.54	54	40	0.54	21.6	100	0.54	54	100	0.54	54	120	0.54	64.8	75	0.54	40.5	100	0.54	54	
2-2) Fertilizer (Non-Subsidised)	kg																						
16:16:16	kg	150	0.48	72		0.48			0.48			0.48			0.48			0.48			0.48		
15:15:15	kg		0.48			0.48		50	0.48	24		0.48			0.48			0.48		125	0.48	60	
12:9:22.3	kg		0.48			0.48			0.48		150	0.48	72		0.48			0.48			0.48		
Urea	kg		0.54			0.54			0.54		100	0.54	54		0.54		75	0.54	40.5	168	0.54	90.72	
Baja Makmur	kg		0.48			0.48			0.48			0.48			0.48			0.48			0.48		
3) Agro-chemical	lit																						
Pesticide	lit																						
Weedicide	lit																						
II. Labor Cost																							
Land preparation	md	2.5	20	50		20.0			20.0			20.0			20.0			20.0			20.0		
Sowing	md	0.1	20	2	0.6	20.0	12	0.6	20.0	12	0.6	20.0	12	3	12.0	36	3.3	12.0	39.6	0.6	20.0	12	
Replacing	md	2.5	20	50	3.7	20.0	74		20.0			20.0			20.0			20.0		2	20.0	40	
Fertilizer Application	md	3.7	20	74	1.6	20.0	32	1.9	20.0	38	1.9	20.0	38	5	12.0	60	8	12.0	96	3.55	20.0	71	
Chemical Application	md	2.4	20	48	2.8	20.0	56	2.5	20.0	50	2.5	20.0	50	1.4	12.0	168	7.5	12.0	90	4.25	20.0	85	
Irrigation	md	2.2	20	44	2.2	20.0	44	2.2	20.0	44	2.2	20.0	44		12.0			12.0			20.0		
III. Machinery																							
Tractor	times	2																					
Sprayer	hrs																						
Combine	times	1																					
Transport	times	1																					
IV. Miscellaneous																							
Net Return																							
With Subsidized Fertilizer																							
Without Subsidized Fertilizer																							

Table IV-22 Estimated Fixed Cost and the Disbursement Schedule

(1) Estimated Fixed Cost				(RM)
Definition	Quantity	Unit Cost	Total	
Infrastructure	(ha)			
1. Surveying	1,000	504	504,146	
2. Designing of all infrastructure	1,000	336	336,098	
3. Machine mobilization	1,000	157	157,413	
4. Const'n of drain. & irrig. canal	1,000	1,578	1,578,382	
5. Const'n of culv. & water cont'l struc.	1,000	631	630,715	
6. Cutting and clearing	1,000	2,155	2,154,854	
7. Leveling of land	1,000	2,103	2,102,737	
8. Road construction	1,000	1,787	1,786,848	
9. Infrastructure maintenance	1,000	1,261	1,261,430	10,512,622
Machinery and Equipment	(Unit)			
1. Tractors	6	85,088	510,528	
2. Trailer	2	10,636	21,272	
3. Harvesting machine	1	106,360	106,360	
4. Office building	1	127,632	127,632	
5. Store	1	21,272	21,272	
6. Pump house	1	300,000	300,000	1,087,064
Total			11,599,686	11,599,686

(2) Disbursement Schedule					(RM)	
Definition	Disbursement Schedule				Replacement Cost	
	Year 0	Year 1	Year 2	Total	Useful Life	Cost (RM)
Infrastructure*1						
1. Surveying	504,146			504,146		
2. Designing of all infrastructure	336,098			336,098		
3. Machine mobilization	59,030	59,030	39,353	157,413		
4. Const'n of drain. & irrig. canal	591,893	591,893	394,596	1,578,382		
5. Const'n of culv. & water cont'l str	236,518	236,518	157,679	630,715		
6. Cutting and clearing	808,070	808,070	538,713	2,154,854		
7. Leveling of land	788,526	788,526	525,684	2,102,737		
8. Road construction	670,068	670,068	446,712	1,786,848		
9. Infrastructure maintenance	473,036	473,036	315,357	1,261,430		
Machinery and Equipment*2	4,467,386	3,627,142	2,418,095	10,512,622		
1. Tractors	510,528			510,528	8 years	510,528
2. Trailer	21,272			21,272	5 years	21,272
3. Harvesting machine	106,360			106,360	8 years	106,360
4. Office building	127,632			127,632		
5. Store	21,272			21,272		
6. Pump house	112,500	112,500	75,000	300,000	15 years	240,000
Total	899,564	112,500	75,000	1,087,064		

Table IV-23 Crop Budget of Rompin Paddy Estate

Item	Unit	Unit Price	Quantity	Cost/ha
1) Land Preparation				313
Pre planting Spraying				
Material	RM/lit	8.25	1.6	13
Labor	RM/ha	14.8	1.0	15
Ploughing				
Round 1	RM/ha	115	1.0	115
Round 2	RM/ha	85	1.0	85
Round 3	RM/ha	85	1.0	85
2) Planting				106
Seed preparation	RM/ha	0.55	1.0	1
Seed	RM/kg	1.3	70.8	91
Labour	RM/ha	14.8	1.0	15
3) Weeding				99
Round 1	RM/ha	95	1	95
Round 2	RM/ha	35	0.1	4
4) Pest and Diseases				370
Pest control - round1&2 (Granular)				
Material	RM/kg	4.5	70	318
Labour	RM/ha	3.8	2	8
Pesticide - round 3				
Material	RM/ha	5.7	0.2	1.1
Labour	RM/ha	3.8	0.2	0.8
Pesticide - round 4				
Material	RM/ha	5.7	1	6
Labour	RM/ha	3.8	1	4
Fungicide - round 1				
Fuel	RM/ha	4.2	1	4
Material	RM/ha	15.8	1	16
Labour	RM/ha	1.25	1	1
Fungicide - round 2				
Fuel	RM/ha	4.2	0.1	0.4
Material	RM/ha	15.8	0.1	1.6
Labour	RM/ha	1.25	0.1	0.1
Rat Control				
Round 1				
Material	RM/ha	0.1	2	0.2
Labour	RM/ha	0.8	2	1.6
Round 2				
Paddy Grain	RM/ha	0.1	2	0.2
Material	RM/ha	2.7	2	5.4
Labour	RM/ha	0.8	2	1.6
5) Manuring				362
Round 1 (NPK : 40:30:30)				
Material	RM/kg	0.8	350	280.0
Labour	RM/ha	20	1	20.0
Round 2 (Urea)				
Material	RM/kg	0.7	30	21.0
Labour	RM/ha	4.7	1	4.7
Round 3 (Urea)				
Material	RM/kg	0.7	45	31.5
Labour	RM/ha	4.7	1	4.7
6) Irrigation (Irrigation)	RM/ha	32	1	32.0
7) Harvesting	RM/ha	224	1	224.0
8) Machinery Maintenance	RM/ha	15	1	15.0
9) Land Rent	RM/ha	24.71	1	24.7
Total				1,545

Table IV-25 Inflow and Outflow Statements (Case 2)

General Assumptions		0 Year	1 Year	2 Year	3 Year	4 Year	5 Year
1. Inflow Rate (m³/hr)							
Area I	0	30	30	30	30	30	30
Area II	0	30	30	30	30	30	30
Area III	0	0	0	0	0	0	0
2. Outflow Rate (m³/hr)							
Area I	0	0	0	0	0	0	0
Area II	0	0	0	0	0	0	0
Area III	0	0	0	0	0	0	0
3. Net Inflow Rate (m³/hr)							
Area I	0	30	30	30	30	30	30
Area II	0	30	30	30	30	30	30
Area III	0	0	0	0	0	0	0
4. Total Inflow Rate (m³/hr)							
Area I	0	30	30	30	30	30	30
Area II	0	30	30	30	30	30	30
Area III	0	0	0	0	0	0	0
5. Total Inflow Rate (m³/hr)							
Area I	0	30	30	30	30	30	30
Area II	0	30	30	30	30	30	30
Area III	0	0	0	0	0	0	0
6. Total Inflow Rate (m³/hr)							
Area I	0	30	30	30	30	30	30
Area II	0	30	30	30	30	30	30
Area III	0	0	0	0	0	0	0

Costs, Flow, and Financial Analysis

Item	0 Year	1 Year	2 Year	3 Year	4 Year	5 Year
CAMP INFLOW						
1. Area I	0	0	0	0	0	0
2. Area II	0	0	0	0	0	0
3. Area III	0	0	0	0	0	0
4. All Areas	0	0	0	0	0	0
CAMP OUTFLOW						
1. Area I	0	0	0	0	0	0
2. Area II	0	0	0	0	0	0
3. Area III	0	0	0	0	0	0
4. All Areas	0	0	0	0	0	0
NET INFLOW						
1. Area I	0	0	0	0	0	0
2. Area II	0	0	0	0	0	0
3. Area III	0	0	0	0	0	0
4. All Areas	0	0	0	0	0	0
Net Inflow	0	0	0	0	0	0
Net Outflow	0	0	0	0	0	0

Item	Years					Total
	0 Year	1 Year	2 Year	3 Year	4 Year	
Manufacture	0	0	0	0	0	0
Maintenance	0	0	0	0	0	0
Repair	0	0	0	0	0	0
Replacement	0	0	0	0	0	0
Other	0	0	0	0	0	0
Total	0	0	0	0	0	0

Notes:

- 1. Net Inflow = Total Inflow - Total Outflow
- 2. Net Outflow = Total Inflow - Total Outflow
- 3. Net Inflow = Total Inflow - Total Outflow
- 4. Net Outflow = Total Inflow - Total Outflow
- 5. Net Inflow = Total Inflow - Total Outflow
- 6. Net Outflow = Total Inflow - Total Outflow

Item	0 Year	1 Year	2 Year	3 Year	4 Year	5 Year
1. Net Inflow	0	0	0	0	0	0
2. Net Outflow	0	0	0	0	0	0
3. Net Inflow	0	0	0	0	0	0
4. Net Outflow	0	0	0	0	0	0
5. Net Inflow	0	0	0	0	0	0
6. Net Outflow	0	0	0	0	0	0

Item	Years					Total
	0 Year	1 Year	2 Year	3 Year	4 Year	
1. Net Inflow	0	0	0	0	0	0
2. Net Outflow	0	0	0	0	0	0
3. Net Inflow	0	0	0	0	0	0
4. Net Outflow	0	0	0	0	0	0
5. Net Inflow	0	0	0	0	0	0
6. Net Outflow	0	0	0	0	0	0

Table IV-26 Inflow and Outflow Statements (Case 3)

0 Year	1 Year	2 Year	3 Year	4 Year	5 Year	6 Year	7 Year	8 Year	9 Year	10 Year	11 Year	12 Year	13 Year	14 Year	15 Year	16 Year	17 Year	18 Year	19 Year	20 Year	21 Year	22 Year	23 Year	24 Year	25 Year
0	500	500	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	4200	4400	4600	4800	5000
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

1. Infrastructure Cost - 100% Government	2. GMP - 10%	3. Price Subsidy - 5.5%	4. Yield per bushel - 3.5
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* Yield shows weight of grain bushel.

Items	0 Year	1 Year	2 Year	3 Year	4 Year	5 Year	6 Year	7 Year	8 Year	9 Year	10 Year	11 Year	12 Year	13 Year	14 Year	15 Year	16 Year	17 Year	18 Year	19 Year	20 Year	21 Year	22 Year	23 Year	24 Year	25 Year
CASH INFLOW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Estimated production volume	0	225	600	1125	1800	2625	3600	4725	6000	7425	9000	10725	12600	14625	16800	19125	21600	24225	27000	30000	33225	36750	40500	44500	48750	53250
Unit Yield (mt/ha)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Planted Area (ha)	0	600	1200	1800	2400	3000	3600	4200	4800	5400	6000	6600	7200	7800	8400	9000	9600	10200	10800	11400	12000	12600	13200	13800	14400	15000
Total Production	0	1,800	3,600	5,400	7,200	9,000	10,800	12,600	14,400	16,200	18,000	19,800	21,600	23,400	25,200	27,000	28,800	30,600	32,400	34,200	36,000	37,800	39,600	41,400	43,200	45,000
CASH OUTFLOW	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1. Land preparation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2. Planting	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3. Weeding	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4. Penicillin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5. Fertilizer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6. Irrigation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7. Harvesting	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8. Machine maintenance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9. Land rental	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Expenses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1. Infrastructure	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2. Insurance Premium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3. Management*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4. Housing Allowance*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5. KWSP (repayment fund)**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Cash Flow	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

* Infrastructure cost increases by 6000/000/year.
 ** KWSP cost increases by 6000/000/year.
 *** KWSP cost increases by 6000/000/year.
 **** KWSP cost increases by 6000/000/year.
 Source: LAPP Feas. Study.

Table IV-29 Proposed Cropping Intensity based on the Proposed Cropping Pattern

IADP	Irr. area (ha)	PI/Seed		Main		PI/Seed		Off		PI/Seed		Total	
		Method	Area	Area	%	Method	Area	%	Method	Area	%	Method	Area
Pulau Pinang	9,601	WD	9,601	100.0%	WD	9,601	100.0%	WD	9,601	100.0%	WD	19,202	200.0%
		DD			DD			DD			DD	0	0
		Sub-Total	9,601	100.0%	Sub-Total	9,601	100.0%	Sub-Total	9,601	100.0%	Sub-Total	19,202	200.0%
Kerian	23,560	WD	19,555	83.0%	WD	0	0.0%	WD	0	0.0%	WD	19,555	83.0%
		DD	4,005	17.0%	DD	23,560	100.0%	DD	23,560	100.0%	DD	27,565	117.0%
		Sub-Total	23,560	100.0%	Sub-Total	23,560	100.0%	Sub-Total	23,560	100.0%	Sub-Total	47,120	200.0%
Sungai Manik	6,318	WD	6,318	100.0%	WD	6,318	100.0%	WD	6,318	100.0%	WD	12,636	200.0%
		DD			DD			DD			DD		
		Sub-Total	6,318	100.0%	Sub-Total	6,318	100.0%	Sub-Total	6,318	100.0%	Sub-Total	12,636	200.0%
Seberang Perak	8,708	WD	8,708	100.0%	WD	8,708	100.0%	WD	8,708	100.0%	WD	17,416	200.0%
		DD			DD			DD			DD		
		Sub-Total	8,708	100.0%	Sub-Total	8,708	100.0%	Sub-Total	8,708	100.0%	Sub-Total	17,416	200.0%
Kemasin/ Semerak	6,895	WD	6,895	100.0%	WD	6,895	100.0%	WD	6,895	100.0%	WD	13,790	200.0%
		DD			DD			DD			DD		
		Sub-Total	6,895	100.0%	Sub-Total	6,895	100.0%	Sub-Total	6,895	100.0%	Sub-Total	13,790	200.0%
Ketara (Besut)	5,164	WD	5,164	100.0%	WD	3,098	60.0%	WD	3,098	60.0%	WD	8,262	160.0%
		DD			DD	775	15.0%	DD	775	15.0%	DD	775	15.0%
		Sub-Total	5,164	100.0%	Sub-Total	3,873	75.0%	Sub-Total	3,873	75.0%	Sub-Total	8,262	175.0%
5 Granaries (Study Area)	60,246	WD	56,241	93.4%	WD	34,620	57.5%	WD	34,620	57.5%	WD	90,861	150.8%
		DD	4,005	6.6%	DD	24,335	40.4%	DD	24,335	40.4%	DD	28,340	47.0%
		Sub-Total	60,246	100.0%	Sub-Total	58,955	97.9%	Sub-Total	58,955	97.9%	Sub-Total	119,201	197.9%

WD: Wet Direct Seeding

DD: Dry Direct Seeding (germination depend on irrigation waer)

Table IV-30 Proposed Farming Practices

Activities		Kind and Amount of Inputs Machinery and Implements		(Unit: ha)	
				Man-hr	
		Wet	Dry		
I. Land preparation					
Wet direct seeding					
1	1st Rotavation	Tractor + Rotary	1 round	2.0	
2	2nd Rotavation	Tractor + Rotary	1 round	1.8	
3	Podding	Tractor + Paddy Harrow	1 round	1.4	
Dry direct seeding					
1	1st Rotavation	Tractor + Rotary	1 round		1.9
2	2nd Rotavation	Tractor + Rotary	1 round		1.7
II. Seeding					
Wet	Seeding	Seed rate	60 - 80kg/ha		
		Tractor + Power Blower/Granule applicator or Broadcaster		1.0	
Dry	Seeding	Tractor + Power Blower/Granule applicator or Broadcaster			1.0
	Pressing	Tractor + Roter bucket/Land Roller			1.0
III. Fertilizing					
	Lime or MgO Application (if necessary)	Tractor + Lime sower		2.0	2.0
	Lime	2.5ton/ha			
	MgO	130kg/ha			
1	1st Top dressing	Tractor + Granule applicator/Power		1.2	1.2
2	2nd Top dressing	Brower or Broadcaster		1.2	1.2
3	3rd Top dressing			1.2	1.2
	Fertilizer	N P2O5:K2O=100 - 120:30-50:30-40 Subsidy: Mixture 200kg, Urea 100kg Additional: Mix: 100kg Urea 40kg			
IV. Pest and Weed control					
1 Weed control					
Wet direct seeding	2 times	Tractor + Granule Applicator, Carpet Duster, Boom Sprayer		2.4	
		Dimepiperate/Bensulfuron-methyl (Yukamate/Push)	30-40kg/ha		
		2,4PA (2,4-D amine)	30-45kg/ha		
Dry direct seeding	3 times	Tractor + Granule Applicator, Carpet Duster, Boom Sprayer			3.1
		Thiobencarb (Saturn)	6000-12000ml/ha		
		Thiobencarb (Saturn)	30-40kg/ha		
		2,4PA (2,4-D amine)	30-45kg/ha		
2	Pest Control	Tractor + Granule Applicator, Carpet Duster, Boom Sprayer			
	2 times				
		BPMC (fenobucarb)	30kg/ha	1.9	1.9
		Buprofezin	600cc/ha		
3	Rat control	Tractor			
	2 times	Drat	250ml/ha	1.3	1.3
V. Harvesting					
1	Harvesting	Combinharvester with chopper		1.0	1.0
2	Transportation	Lorry			
VI. Preparatory Work					
				2.0	2.0
VII. Others					
				10.0	10.0
Total				30.4	30.3

Table IV-31 Number of Machineries in Kerian

Block	Ownership	(Unit: numbrs)		
		Harvester	4W Tractor	2W Tractor
A	PPK/FMC			
	Private			
	Ahli	1	1	
B	PPK/FMC			
	Private			
	Ahli	4	4	5
C	PPK/FMC			
	Private	3	10	
	Ahli		3	
D	PPK/FMC			
	Private			
	Ahli	2	9	1
E	PPK/FMC			
	Private	3	14	5
	Ahli			
F	PPK/FMC			
	Private	47	38	
	Ahli		22	
G	PPK/FMC		12	
	Private	3	68	
	Ahli			
H	PPK/FMC	4	8	
	Private			
	Ahli			
Total		67	189	11

Source: PPK Kerian

Ahli: Contractor

Table IV-32 Estimated Working Efficiency of Mechanization Farm Works

Working Efficiency of Land Preparation

Dry Direct Seeding

Operation	Implement *1	Working width (m)	Working rate (ha/hour)	Working rate (ha/day)
First tillage	Rotary tiller	1.6	0.54	4.32
Second tillage	Rotary tiller	1.6	0.58	4.64
Seeding	Drillseeder	2.0	1.00	8.00
Pressing	Rear bucket	2.0	1.04	8.32

*1: All implements are mounted on tractor

Recent advances in Malaysian Rice Production

Wet Direct Seeding

Machine	Operation	Implement *1	Working width (m)	Working rate (ha/hour)	Working rate (ha/day)
Tractor	First tillage *1	Rotary tiller	1.6	0.50	4.00
	Second tillage *1	Rotary tiller	1.6	0.55	4.40
	Puddling *2	Paddy Harrow	2.5	0.70	5.60
Power tiller *3	First tillage	Rotary tiller	1.6	0.15	1.20
	Second tillage	Rotary tiller	1.6	0.18	1.44
	Puddling	Rotary tiller	2.0	0.28	2.24

*1: Using rotary tiller, Howard AR60

*2: Using wide rotary tiller, Nipro HB2500B

*3: Result by field work survey of 10 cases

Recent advances in Malaysian Rice Production

Working Efficiency of Management Work

Machine	Implement *1	Working width (m)	Inputs	Working rate (ha/hour)	(Working rate) ha/day
Light Weight Tractor for Management					
1.	MGA *1	10.0	fertilizer, seed and Chemical	1.54	12.31
2.	Boom sprayer	10.0	fertilizer and Chemical (liquid)	1.54	12.31
3.	Carpet Duster	100.0	fertilizer, seed and Chemical	3.03	24.24
4.	Jet Broad caster on Turn Table *2	50.0	fertilizer and seed	3.33	26.67
		25.0	chemical	1.54	12.31

*1 MGA: Multipurpose Granule Applicator

*2: reference data

Combine harvester

7.5 - 8.0 ha/day

Table IV-33 (1/11) Estimation of the Necessary Number of Tractors and Implements for Kerian (Compartment A, B and C) (under Wet Direct Seeding)

10. (a) (9)	11	12	Jan		Feb		Mar		Apr		May		June		July		Aug		Sept		Oct		Nov		Dec								
			1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3							
16.114.00	100.0%	0.0%																															
16.114.00	100.0%	0.0%																															
Farm Works																																	
Land preparation																																	
B 1st Application	60hp	LS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
B 1st Rebound	60hp	RT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
B 2nd Rebound	60hp	RT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
W Puddling	60hp	PH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
W Seeding	20hp	GA/BC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
D Pressing																																	
Fertilizer Application																																	
1st Top Dressing	20hp	GA/BC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2nd Top Dressing	20hp	GA/BC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
3rd Top Dressing	20hp	GA/BC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Weed control																																	
1st Application	20hp	RS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2nd Application	20hp	CD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
3rd Application	20hp	GA/BC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Pest control																																	
1st Application	20hp	CD	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2nd Application	20hp	RS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Harvesting																																	
Harvesting		CH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Lorry																																	
Miscellaneous																																	
Lime Sower (LS)																																	
Rice harrow (RH)																																	
Paddy harrow (PH)																																	
Rear Bucker (RB)																																	
Grain's Application/Broadcaster (GA/BC)																																	
Beam Spreader (BS)																																	
Carpenter (CD)																																	
Wp																																	
Sp																																	
Pt																																	
Max																																	

Table IV-33 (4/11) Estimation of the Necessary Number of Tractors and Implements for Kerian (Compartment D, E and F) (under Dry Direct Seeding)

Area (ha)	Main	Off	Month												Max					
			Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec						
5,203.00	0.0%	100.0%																		
3,200																				
60hp	LS			10.44	21.68	27.68	10.04													
60hp	RT			21.68	43.36	43.36	21.68													
60hp	RT			39.52	39.52	39.52														
60hp	PH																			
20hp	GA/B/C																			
20hp	GA/B/C																			
20hp	GA/B/C																			
60hp	RB																			
Fertilizer Application																				
20hp	GA/B/C																			
20hp	GA/B/C																			
20hp	GA/B/C																			
Weed control																				
20hp	BS																			
20hp	CD																			
20hp	GA/B/C																			
Pest control																				
20hp	CD																			
20hp	BS																			
Harvesting																				
Harvester																				
Lorry																				
60hp																				
20hp																				
4																				
Line Sower (LS)																				
Rotavator (RO)																				
Paddy Harrow (PH)																				
Rear Booter (RB)																				
Granule Applicator/Broadcaster (GA/B/C)																				
Boom Sprayer (BS)																				
Cotton Duster (CD)																				

Table IV-33 (S11) Estimation of the Necessary Number of Tractors and Implements for Kerian (Compartment G and H) (under Wet Seeding)

Main	Off	Machine	Machine	Machine	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Max.
4,143.00	119,574	0.0%													
4,143.00	119,574	0.0%													
Farm Works															
Landpreparation															
B Line Application	60hp	LS			0.00	0.00	0.00	0.00	0.00	0.00	12.95	25.89	12.95		
B 1st Re-tiling	60hp	RT			0.00	0.00	0.00	0.00	0.00	0.00	25.89	51.79	25.89		
B 2nd Re-tiling	60hp	PH			0.00	0.00	0.00	0.00	0.00	0.00	47.08	94.08	47.08		
W Puddling	60hp	PH			0.00	0.00	0.00	0.00	0.00	0.00	36.99	73.99	36.99		
W Seeding	20hp	GABC			0.00	0.00	0.00	0.00	0.00	0.00	8.42	16.83	8.42		
D Seeding															
D Pressing															
Fertilizer Application															
1st Top Dressing	20hp	GABC			0.00	0.00	0.00	0.00	0.00	0.00	16.83	33.65	16.83		
2nd Top Dressing	20hp	GABC			0.00	0.00	0.00	0.00	0.00	0.00	16.83	33.65	16.83		
3rd Top Dressing	20hp	GABC			0.00	0.00	0.00	0.00	0.00	0.00	16.83	33.65	16.83		
Weed control															
1st Application	20hp	BS			0.00	0.00	0.00	0.00	0.00	0.00	4.27	8.54	4.27		
2nd Application	20hp	CD			0.00	0.00	0.00	0.00	0.00	0.00	8.54	17.07	8.54		
3rd Application	20hp	GABC			0.00	0.00	0.00	0.00	0.00	0.00	4.27	8.54	4.27		
Pest control															
1st Application	20hp	CD			0.00	0.00	0.00	0.00	0.00	0.00	8.54	17.07	8.54		
2nd Application	20hp	BS			0.00	0.00	0.00	0.00	0.00	0.00	8.54	17.07	8.54		
Harvesting															
Harvester		CH			27,67	27,67									
Grain															
Summary															
60hp	(hr-Unit)		0	0	0	0	0	0	0	0	0	39	78	39	0
20hp	(hr-Unit)		0	0	0	0	0	0	0	0	0	12	25	12	0
H	(hr-Unit)		0	0	0	0	0	0	0	0	0	0	0	0	0
Lime Sower (LS)															
Rotavator (RO)			0	0	0	0	0	0	0	0	0	13	26	13	0
Paddy Harrow (PH)			0	0	0	0	0	0	0	0	0	26	52	26	0
Rear Bucket (RB)			0	0	0	0	0	0	0	0	0	37	73	37	0
Grainle Applicator/Broadcaster (GABC)			0	0	0	0	0	0	0	0	0	0	0	0	0
Broadcaster (BS)			0	0	0	0	0	0	0	0	0	0	0	0	0
Carrier (CD)			0	0	0	0	0	0	0	0	0	0	0	0	0

Table IV-33 (6/11) Estimation of the Necessary Number of Tractors and Implements for Kerian (Compartment G and H) (under Dry Seeding)

Area (ha) Main Off	Machine	Machinal	Working Efficiency	Jan		Feb		Mar		Apr		May		June		July		Aug		Sept		Oct		Nov		Dec		Max.	
				1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2		1
4,143.00 0.0%	650																												
Farm Works																													
Landpreparation																													
B Line application	60hp LS	X						12,95	24,89	12,95																			
B 1st Rotation	60hp RT	4						25,89	51,79	25,89																			
B 2nd Rotation	60hp RT	4									47,08	47,08																	
W Puddling	60hp PH	6																											
D Seeding	30hp GA/BC	12						8,42	16,83	8,42																			
D Seeding	30hp GA/BC	12						12,45	24,90	12,45																			
D Pressing	60hp RB	X																											
Fertilizer Application																													
1st Top Dressing	30hp GA/BC	12						16,83	16,83																				
2nd Top Dressing	30hp GA/BC	12						16,83	16,83																				
3rd Top Dressing	30hp GA/BC	12																											
Weed control																													
1st Application	20hp BS	12						8,42	16,83	8,42																			
2nd Application	20hp CD	24						8,54	8,54																				
3rd Application	20hp GA/BC	12						8,42	16,83	8,42																			
Pest control																													
1st Application	20hp CD	24						4,27	8,54	4,27																			
2nd Application	20hp BS	12						8,42	16,83	8,42																			
Harvesting																													
Harvester	CH	7																											
Loody																													
Total																													
60hp																													
30hp																													
H																													
Lime Sower (LS)																													
Rotavator (RO)																													
Paddy Harrow (PH)																													
Rear Bucker (RB)																													
Granule Applicator/Broadcaster (GA/BC)																													
Bromo Sprayer (BS)																													
Canepl. Ductor (CD)																													

Table IV-33 (9/11) Estimation of the Necessary Number of Tractors and Implements for Kerian (Organic Soil Area in Compartment D, E and F) (under Dry Direct Seeding)

Area (ha) Main Off	Machine	Make/model	Material	Working Efficiency	Jan		Feb		Mar		Apr		May		June		July		Aug		Sept		Oct		Nov		Dec			
					1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2
3,200.00 100.0%																														
3,200																														
Farm Works																														
Land preparation																														
B Line application	30hp	LS		6				8,89	17,78	8,89																				
B 1st Rotation	30hp	RT		3				17,78	35,56	17,78																				
B 2nd Rotation	30hp	RT		3				32,32	32,32	32,32																				
W Puddling	30hp	PH		4																										
D Seeding	20hp	GA/BC		12				4,33	8,67	4,33																				
D Dressing	30hp	GA/BC		6				8,55	17,09	8,55																				
Fertilizer Application																														
1st Top Dressing	20hp	GA/BC		12				8,67	8,67	8,67																				
2nd Top Dressing	20hp	GA/BC		12				8,67	8,67	8,67																				
3rd Top Dressing	20hp	GA/BC		12																										
Weed control																														
1st Application	20hp	BS		12				4,33	8,67	4,33																				
2nd Application	20hp	CD		24				4,40	4,40	4,40																				
3rd Application	20hp	GA/BC		12				4,33	8,67	4,33																				
Post control																														
1st Application	20hp	CD		24				2,20	4,40	2,20																				
2nd Application	20hp	BS		12				4,33	8,67	4,33																				
Harvesting																														
Harvester		CH		6				19,00	19,00	19,00																				
Cultury																														
Max																														
30hp				(m-d/day)	0	0	0	27	53	94	76	49	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
20hp				(m-d/day)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H				(m-d/day)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lime Sower (LS)					0	0	0	9	18	18	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Rotavator (RO)					0	0	0	18	36	68	50	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Paddy Harrow (PH)					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Rear Bucket (RB)					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Granule Applicator/Broadcasters (GA/BC)					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Boom Sprayer (BS)					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Crop Duster (CD)					0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Table IV-34 Proposed Farming Practices for Kerian

Dry Direct Seeding				Wet Direct Seeding			
Days after Seeding	Activities	Input	Remark	Days after Seeding	Activities	Input	Remark
-23	Lime Application Fused magnesium phosphate	GSM Lime 4W Tractor + Lime Sower	2.5ton/ha depend on the soil condition (Organic Soil and low pH soil) approximately 4.100ha or 17%	-23	Lime Application Fused magnesium phosphate	GSM Lime 4W Tractor + Lime Sower	2.5ton/ha depend on the soil condition (Organic Soil and low pH soil) approximately 4.100ha or 17%
-18	1st Land Preparation	4W Tractor + Rotavator		-18	1st Land Preparation	4W Tractor + Rotavator	15 - 10cm
-7	Rodent/Rat Control	Check or Dett 125 ml	depend on location, either there are rat attack happen or not	-15	Water Supply		5 - 8cm
-5	2nd Land Preparation and Eand Levelling	4W Tractor + Rotavator		-7	Rodent/Rat Control	Check or Dett 125 ml	depend on location, either there are rat attack happen or not
-2	Selecting Seeds			-4	Plucking and levelling	4W Tractor + Rotavator Paddy Harrow	
0	Seed Sowing and pressing Seeding	4W Tractor + Power Blower/Granule Applicator or Broadcast	Seed rate 60-80kg/ha	0	Sowing Sprouting Seeds	4W Tractor + Power Blower/Granule Applicator or Broadcast	Seed rate 60-80kg/ha
	Pressing	4W Tractor + Rear Bucket and Roller		0-4	Hericide application before sprouting (1)	Dusospicrate/Benfluruthion methyl +Yukamate/Pasha 30-40kg/ha Tractor + Carpet Duster or Granule Applicator	
0-4	Hericide application before sprouting (1)	Thiofenacarb (Saturn)	600-1200ml/ha	15	1st Fertilizer Application	N:P:K2O= 40:30:20kg/ha Tractor + Granule Applicator/Broadcast	4 times fertilizer application for low fertility area 2nd N:40kg/ha 3rd N:20kg/ha 4th N:20kg/ha
5	Water supply		(5 - 8cm)		Pest control (1)	BPMC (fenitrothion) 30kg/ha Tractor + Carpet Duster or Granule Applicator	as required
15-20	Hericide application after sprouting (2) Water Control	Thiofenacarb (Saturn)	30-45kg/ha Tractor + Carpet Duster or Granule Applicator (5 - 10 cm)	25-30	Hericide application after sprouting (2) Water Control	2-APA (2,4-D amine) Tractor + Carpet Duster or Granule Applicator (5 - 10 cm)	30-45kg/ha
15-21	1st Fertilizer Application	N:P:K2O= 40:30:20kg/ha Tractor + Granule Applicator/Broadcast	4 times fertilizer application for low fertility area 2nd N:40kg/ha 3rd N:20kg/ha 4th N:20kg/ha	45-50	2nd Fertilizer Application	N:40kg/ha Tractor + Granule Applicator/Broadcast	
	Pest control (1)	BPMC (fenitrothion) Tractor + Carpet Duster or Granule Applicator	30kg/ha as required	75 (PIS)	3rd Fertilizer Application	N:20kg/ha Tractor + Granule Applicator/Broadcast	
30-35	Hericide application after sprouting (3) Water Control	2-APA (2,4-D amine) Tractor + Carpet Duster or Granule Applicator (5 - 10 cm)	30-45kg/ha		Pest control (2)	Bupirfezin Tractor + Boom Sprayer	600ml/ha as required
45-50	2nd Fertilizer Application	N:40kg/ha Tractor + Granule Applicator/Broadcast			Rodent/Rat Control	Check or Dett 125 ml	depend on location, either there are rat attack happen or not
75 (PIS)	3rd Fertilizer Application	N:20kg/ha Tractor + Granule Applicator/Broadcast		110	Drainage		
	Pest control (2)	Bupirfezin Tractor + Boom Sprayer	600ml/ha as required	125	Harvesting	Harvester + Lorry	
	Rodent/Rat Control	Check or Dett 125 ml	depend on location, either there are rat attack happen or not				
110	Drainage						
125	Harvesting	Harvester + Lorry					

Source: TADP Kerian, MARDI and DOA Recommendation

Table IV-35 (1/2) Estimation of the Necessary Number of Tractors and Implements for Beut (under Dry Direct Seeding)

Mach. works	Jan		Feb		Mar		Apr		May		June		July		Aug		Sept		Oct		Nov		Dec		
	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	
	0		0		0		0		0		0		0		0		0		0		0		0		0
Area (ha)	5,165.30																								
Main oil	15.0%																								
Tractor	LS, RT, PH, GAWRC, BS, CD, CI																								
Implement	LS, RT, PH, GAWRC, BS, CD, CI																								
Working days	1000, 1000																								
Tractor	1000, 1000																								
Implement	1000, 1000																								
Working days	1000, 1000																								
Tractor	1000, 1000																								
Implement	1000, 1000																								
Working days	1000, 1000																								
Tractor	1000, 1000																								
Implement	1000, 1000																								
Working days	1000, 1000																								

Table IV-35 (22) Estimation of the Necessary Number of Tractors and Implements for Kest (under Wet Direct Seeding)

Mach. No.	Mach. Type	Mach. Model	Area (Ha)										Total
			1	2	3	4	5	6	7	8	9	10	
Land Works													
Preparation			<p>1. Ploughing (1000) 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p> <p>2. Sowing (1000) 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p> <p>3. Weeding (1000) 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p> <p>4. Harvesting (1000) 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p> <p>5. Transport (1000) 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p>										
Fertilizer Application			<p>1. Top Dressing (1000) 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p> <p>2. Top Dressing (1000) 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p> <p>3. Top Dressing (1000) 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p>										
Weed Control			<p>1. Application (1000) 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p> <p>2. Application (1000) 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p> <p>3. Application (1000) 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p>										
Harvesting			<p>1. Harvesting (1000) 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p> <p>2. Harvesting (1000) 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p> <p>3. Harvesting (1000) 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p>										
Total			<p>1. 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p> <p>2. 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p> <p>3. 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p> <p>4. 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p> <p>5. 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p>										
Yield			<p>1. 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p> <p>2. 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p> <p>3. 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p>										
Mach. No.			<p>1. 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p> <p>2. 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p> <p>3. 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p>										
Mach. Type			<p>1. 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p> <p>2. 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p> <p>3. 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p>										
Mach. Model			<p>1. 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p> <p>2. 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p> <p>3. 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00</p>										

Table IV-36 Proposed Farming Practices for Ketara (Besut)

Dry Direct Seeding				Wet Direct Seeding			
Days after Seeding	Activities	Input	Remark	Days after Seeding	Activities	Input	Remark
-23-24	Lime Application MgO Application	GML Lime 2.5ton/ha 130kg/ha 4W Tractor + Lime Sower	depend on the soil condition (Organic Soil and low pH soil)	-23-24	Lime Application MgO Application	GML Lime 2.5ton/ha 130kg/ha	depend on the soil condition (Organic Soil and low pH soil)
-12-18	1st Land Preparation	4W Tractor + Rotavator		-19-18	1st Land Preparation	4W Tractor + Rotavator	15 - 15cm
-7	Rodent/Rat Control (1)	Check or Dett 125 ml	depend on location, either there are rat attack happen or not	-15	Water Supply		5 - 8cm
-5	2nd Land Preparation and Land Leveling	4W Tractor + Rotavator		-7	Rodent/Rat Control	Check or Dett 125 ml	depend on location, either there are rat attack happen or not
-1	Selecting Seeds			-4-2	Puddling and levelling	4W Tractor + Rotavator Paddy Harrow	
0	Seed Sowing and pre-sowing Seeding	4W Tractor + Power Blower/Granule Applicator or Broadcast	Seed rate 60-80kg/ha	-3-2	Selecting and Soaking Seeds		
	Pressing	4W Tractor + Rear Bucket/and Roller		0	Sowing Sprouting Seeds	4W Tractor + Power Blower/Granule Applicator or Broadcast	Seed rate 60-80kg/ha
0-4	Herbicide application before sprouting (1)	Thiobencarb (Salam) 4W Tractor + Boom Sprayer	6000-12000ml/ha	0-4	Herbicide application before sprouting (1)	Diminiporate/Bensulfuron-methyl (Yukamate/Push) Tractor + Carpet Duster or Granule Applicator	30-40kg/ha
5	Water supply		(5 - 8 cm)	15	1st Fertilizer Application	N:P2O5:K2O= 40:30:20 kg/ha Tractor + Granule Applicator/Broadcast	4 times fertilizer application for 2nd N:40kg/ha 3rd N:20kg/ha 4th N:20kg/ha low fertility area
15-20	Herbicide application after sprouting (2) Water Control	Thiobencarb (Salam) Tractor + Carpet Duster or Granule Applicator	30-45kg/ha (5 - 10 cm)		Post control (1)	BPMC (fen-bucarb) Tractor + Carpet Duster or Granule Applicator	30kg/ha as required
15-24	1st Fertilizer Application	N:P2O5:K2O= 40:40:30 kg/ha Tractor + Granule Applicator/Broadcast	4 times fertilizer application for 2nd N:40kg/ha 3rd N:20kg/ha 4th N:20kg/ha low fertility area	25-30	Herbicide application after sprouting (2) Water Control	2,4PA (2,4-D amine) Tractor + Carpet Duster or Granule Applicator	30-45kg/ha (5 - 10 cm)
	Post control (1)	BPMC (fen-bucarb) Tractor + Carpet Duster or Granule Applicator	30kg/ha as required	45-50	2nd Fertilizer Application	N:40kg/ha Tractor + Granule Applicator/Broadcast	
30-35	Herbicide application after sprouting (3) Water Control	2,4PA (2,4-D amine) Tractor + Carpet Duster or Granule Applicator	30-45kg/ha (5 - 10 cm)	75 (PIS)	3rd Fertilizer Application	N: 20kg/ha Tractor + Granule Applicator/Broadcast	
45-50	2nd Fertilizer Application	N:40kg/ha Tractor + Granule Applicator/Broadcast			Post control (2)	Buprofezin Tractor + Boom Sprayer	600ml/ha as required
75 (PIS)	3rd Fertilizer Application	N: 20kg/ha Tractor + Granule Applicator/Broadcast			Rodent/Rat Control (2)	Check or Dett 125 ml	depend on location, either there are rat attack happen or not
	Post control (2)	Buprofezin Tractor + Boom Sprayer	600ml/ha as required	110-115	Drainage		
	Rodent/Rat Control (2)	Check or Dett 125 ml	depend on location, either there are rat attack happen or not	125-130	Harvesting	Harvester + Lorry	
110-115	Drainage						
125-130	Harvesting	Harvester + Lorry					

Source: IADP Ketara (Besut), MARDI and DOA Recommendation

Table IV-37 Present Cropping Schedule in Pulau Pinang

Off Season												
Number of Date												
	0	5	10	13	15	20	30	50	70	105	120	Harvest
Schedule												
I	15/3	20/3	25/3	28/3	30/3	5/4	20/4	5/5	25/5	30/6	15/7	5/8
II	25/3	30/3	5/4	8/4	10/4	15/4	30/4	15/5	5/6	10/7	25/7	15/8
III	5/4	10/4	15/4	18/4	20/4	25/4	10/5	25/5	15/6	20/7	5/8	25/8
IV	15/4	20/4	25/4	28/4	30/4	5/5	20/5	5/6	25/6	30/7	15/8	5/9

Main Season												
Number of Date												
	0	5	10	13	15	20	35	50	70	95	110	Harvest
Schedule												
I	1/9	5/9	10/9	13/9	15/9	20/9	5/10	20/10	10/11	5/12	20/12	10/1
II	10/9	15/9	20/9	23/9	25/9	30/9	15/10	30/10	20/11	15/12	30/12	20/1
III	20/9	25/9	30/9	3/10	5/10	10/10	25/10	10/11	30/11	25/12	10/1	30/1
IV	30/9	5/10	10/10	13/10	15/10	20/10	5/11	20/11	10/12	5/1	20/1	10/2

0 Start Pre saturation Supply
 5
 10 Stop Presaturation Supply
 13 Field Dry up
 15 Start Sowing
 20 Finish Sowing
 20-50 1st Critical Supply
 Main 70-95 2nd Critical Supply
 Off 70-105 2nd Critical Supply
 Main 95 Stop Supply
 Off 105 Stop Supply
 Main 95-110 Dry up
 Off 105-120 Dry up

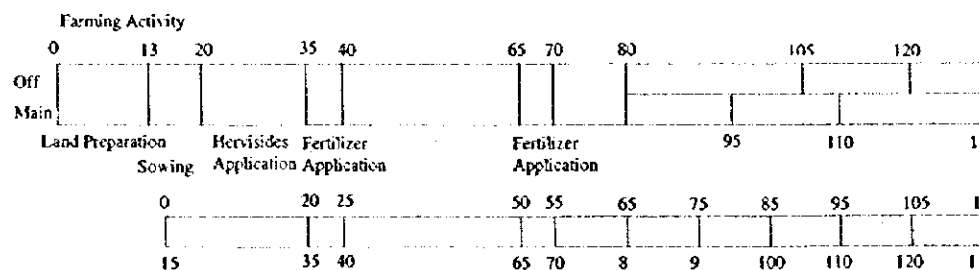
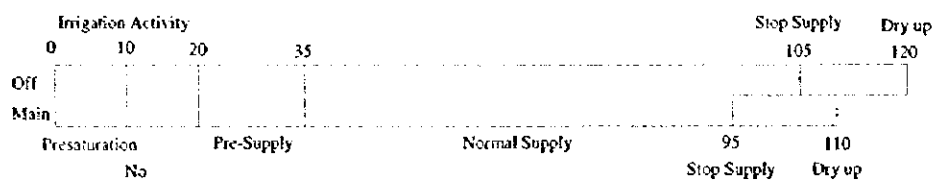


Table IV-38 Distribution of Irrigation Areas under Present and Revised Schedule

(Unit: ha)

Block		Irrigation Schedule (Present)				Total
Sungai Muda	Net Irrigation area	1	2	3	4	
1. M1	1,490.00	577.14	252.40	660.46		1,490.00
2. M2	752.00	210.24	310.93	230.83		752.00
3. M3	1,390.00	422.22	440.45	527.33		1,390.00
4. M4	360.00		206.00	50.00	104.00	360.00
5. M5	1,978.00		680.56	544.64	752.80	1,978.00
6. M6	918.00		237.92	294.24	385.84	918.00
sub total	6,888.00	1,209.60	2,128.26	2,307.50	1,242.64	6,888.00

Block		Irrigation Schedule (Present)				Total
Pinang Tunggal	Net Irrigation area	1	2	3	4	
7. P1A	206.00			206.00		206.00
8. P2	732.00	329.00	267.86	135.14		732.00
sub total	938.00	329.00	267.86	341.14	0.00	938.00

Block		Irrigation Schedule (Present)				Total
Sungai Kulim	Net Irrigation area	1	2	3	4	
9. K1B	348.00	348.00				348.00
10. K2B	347.00	112.10	110.70	124.20		347.00
11. K3	397.00	113.00	147.00	137.00		397.00
12. K4	295.00	86.95	134.55	73.50		295.00
sub total	1,387.00	660.05	392.25	334.70	0.00	1,387.00

Block		Irrigation Schedule (Present)				Total
Sungai Jarak	Net Irrigation area	1	2	3	4	
13. Pokok Tampang	173.00		131.00	42.00		173.00
14. Padang Menora	215.00		124.00	91.00		215.00
sub total	388.00	0.00	255.00	133.00	0.00	388.00

Ground Total 9,601.00 2,198.65 3,043.37 3,116.34 1,242.64 9,601.00
(peninsular)

Block		Revised Irrigation Schedule (Estimation)				Total
Sungai Muda	Net Irrigation area	1	2	3	4	
1. M1	1,490.00	577.14	252.40	660.46		1,490.00
2. M2	752.00	210.24	310.93	230.83		752.00
3. M3	1,390.00	422.22	440.45	527.33		1,390.00
4. M4	360.00	360.00				360.00
5. M5	1,978.00	752.80	680.56	544.64		1,978.00
6. M6	918.00		623.76	294.24		918.00
sub total	6,888.00	2,322.40	2,308.10	2,257.50	0.00	6,888.00

Ground Total 9,601.00 3,311.45 3,223.21 3,066.34 0.00 9,601.00

Source: IADP Pulau Pinang

Figures are estimated by the JICA Study Team based on the data from IADP Pulau Pinang.

Table IV-40 Proposed Farming Practices for Pulau Pinang

Days after Seeding	Activities	Input	Wet Direct Seeding Remark
-18	1st Land Preparation	4W Tractor + Rotavator	15 - 10cm
-15	Water Supply		5 - 8cm
-7	Rodent/Rat Control	Check or Dlat 125 ml	depend on location, either there are rat attack happen or not.
-4	Puddling and levelling	4W Tractor + Rotavator Paddy Harrow	
-2	Selecting and Soaking Seeds		
0	Sowing Sprouting Seeds	4W Tractor + Power Blower/Granule Applicator or Broadcaster	Seed rate 60-80kg/ha
0 - 4	Herbicide application before sprouting (1)	Dimepiperate/Bensulfuron-methyl (Yukamate/Push) Tractor + Carpet Duster or Granule Applicator	30-40kg/ha
15	1st Fertilizer Application	N:P2O5:K2O= 40:30:20 kg/ha Tractor + Granule Applicator/Broadcaster	4 times fertilizer application for 2nd N:40kg/ha 3rd N:20kg/ha 4th N:20kg/ha low fertility area
	Pest control (1)	BPMC (fenobucarb) Tractor + Carpet Duster or Granule Applicator	30kg/ha as required
25 - 30	Herbicide application after sprouting (2) Water Control	2,4PA (2,4-D amine) Tractor + Carpet Duster or Granule Applicator	30-45kg/ha (5 - 10 cm)
45-50	2nd Fertilizer Application	N:40kg/ha Tractor + Granule Applicator/Broadcaster	
75 (PIS)	3rd Fertilizer Application	N: 20kg/ha Tractor + Granule Applicator/Broadcaster	
	Pest control (2)	Buprofezin Tractor + Boom Sprayer	600ml/ha as required
	Rodent/Rat Control	Check or Dlat 125 ml	depend on location, either there are rat attack happen or not.
95-100	Drainage		
120-125	Harvesting	Harvester + Lorry	

Source: IADP Pulau Pinang, Agricultural Component, MADRI and DOA recommendation