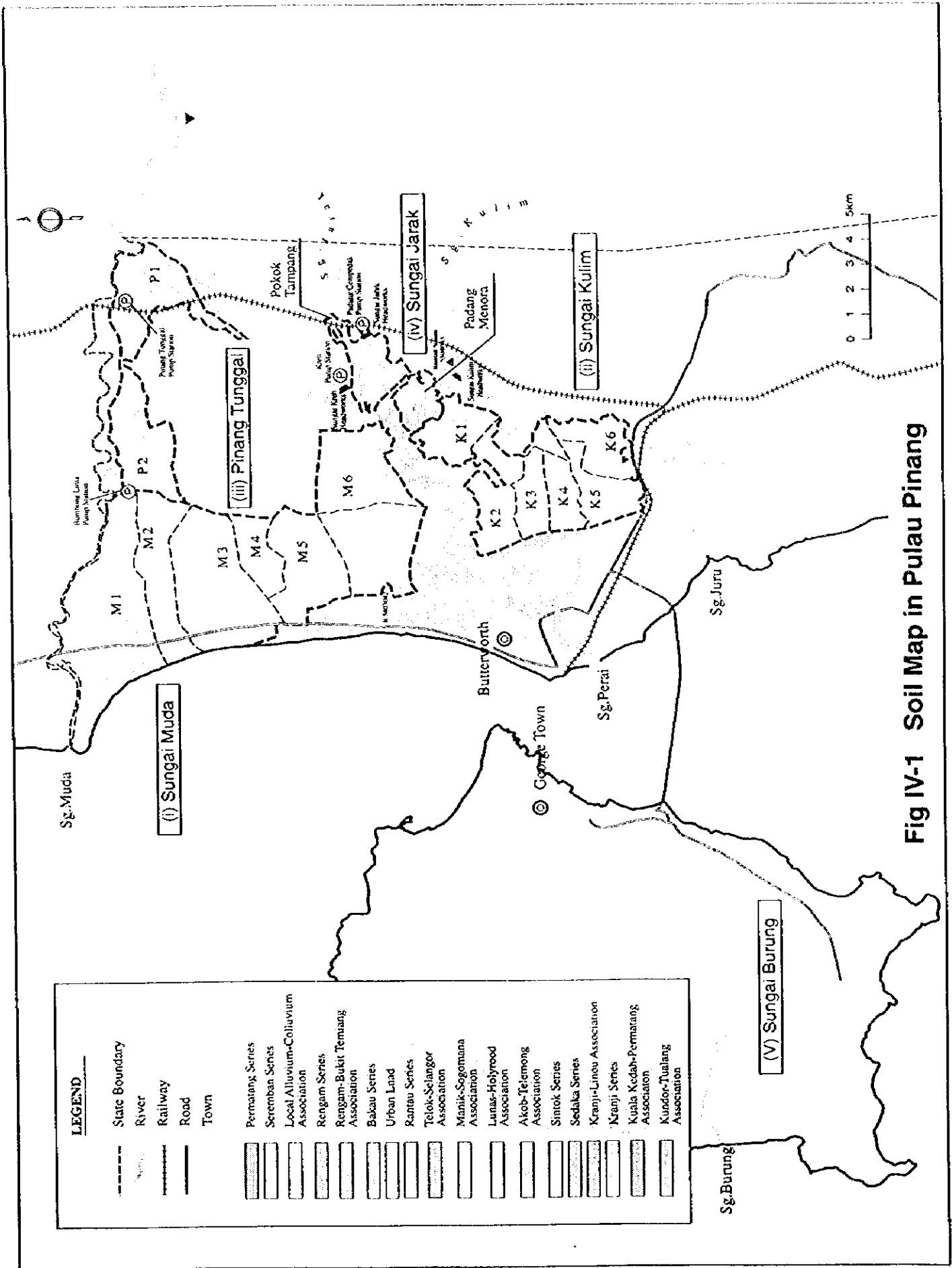


**FIGURES**



**Fig IV-1 Soil Map in Pulau Pinang**

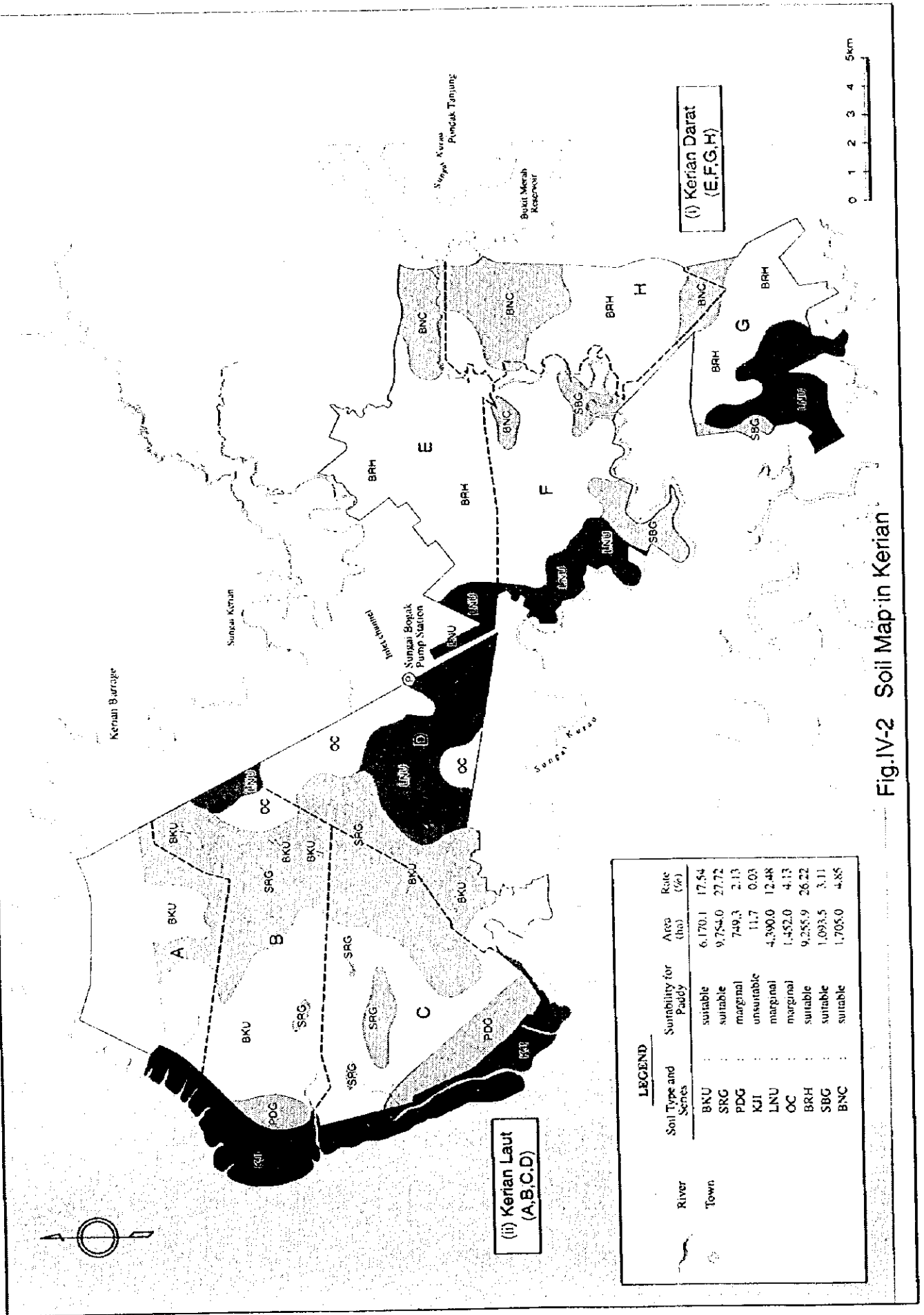
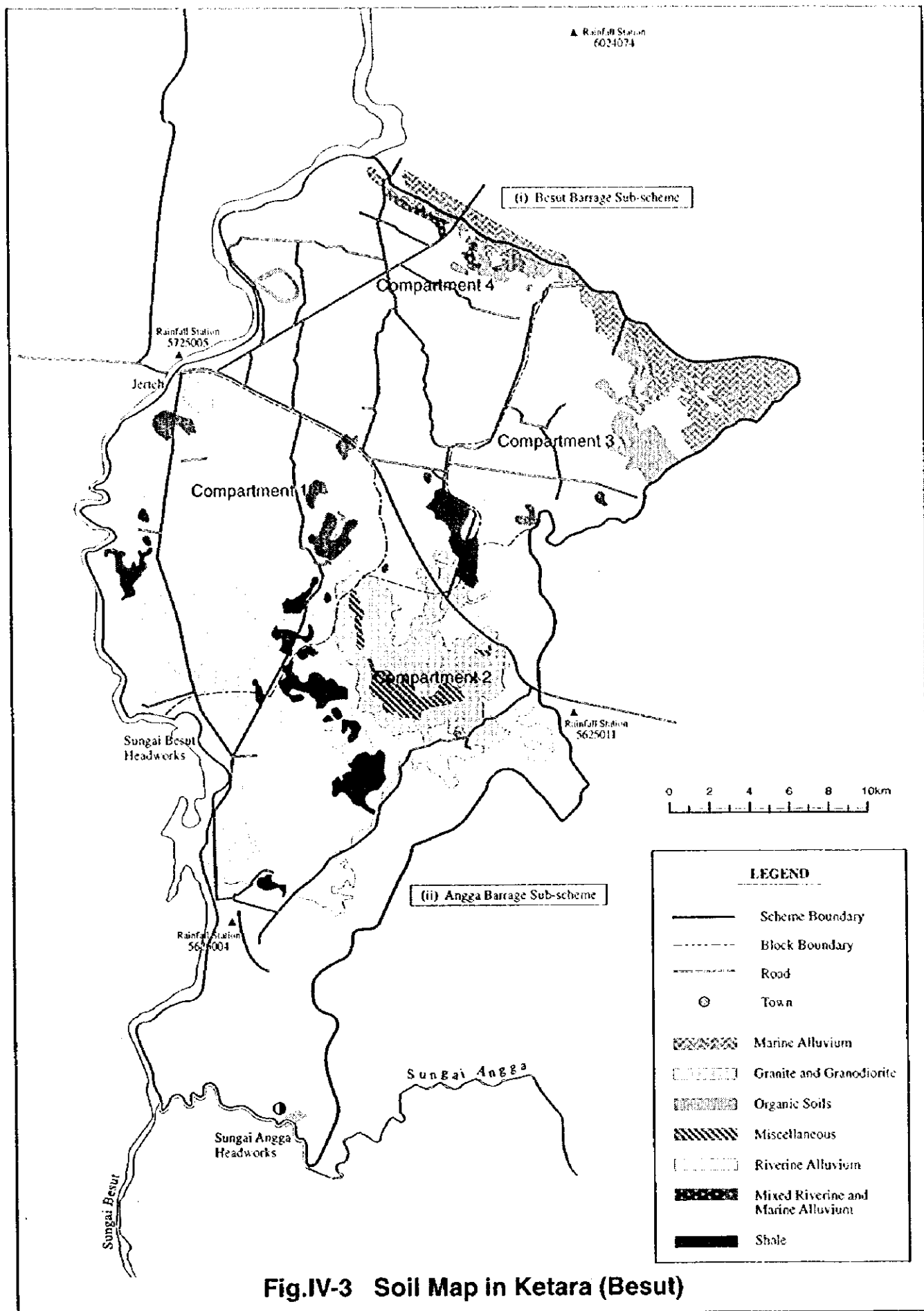


Fig. IV-2 Soil Map in Kerian

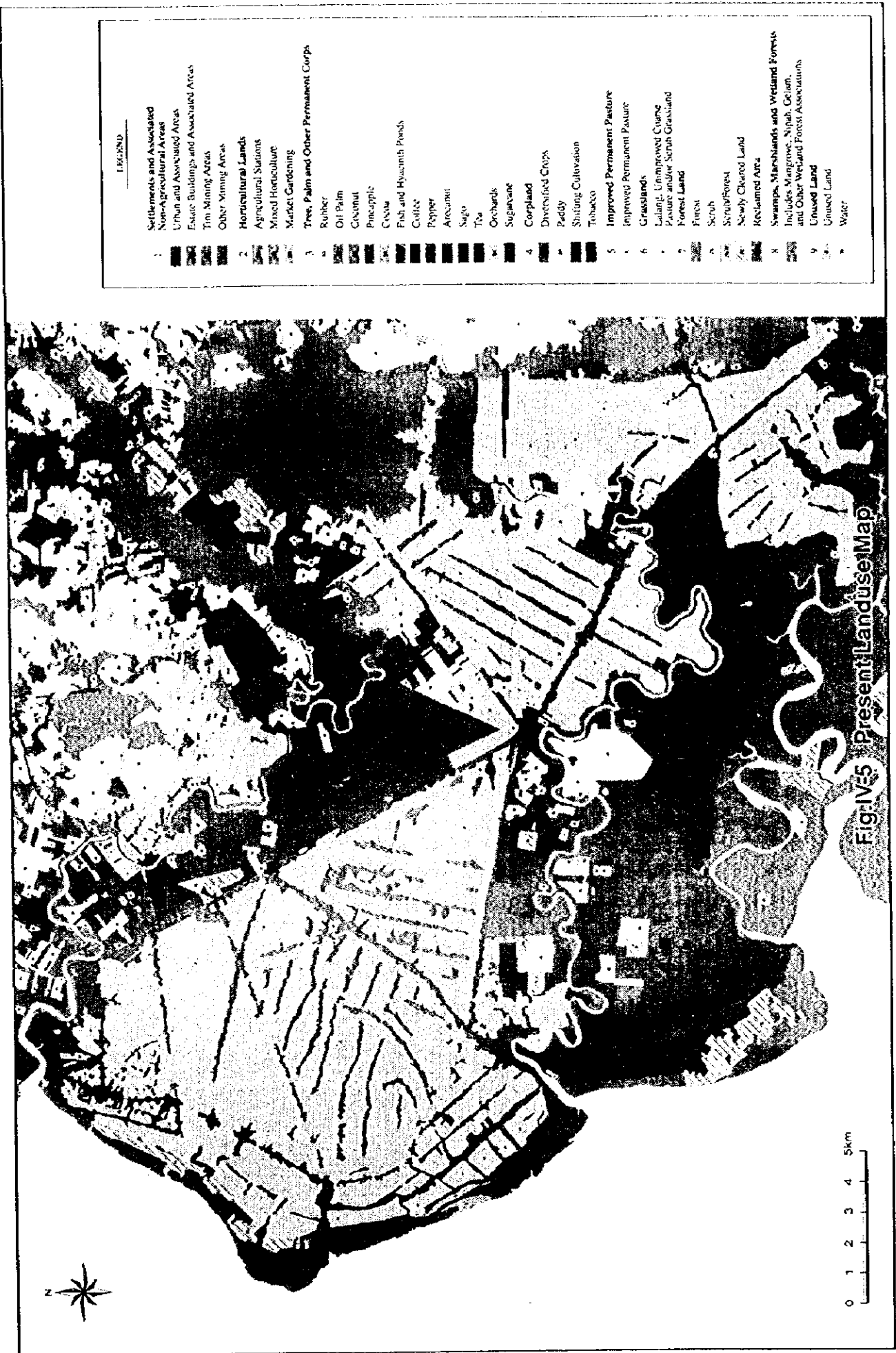




LEGEND

1	Settlements and Associated Non-Agricultural Areas
2	Urban and Associated Areas
3	Coastline
4	Residential Areas
5	Public
6	Esate Buildings and Associated Areas
7	Tin Mining Areas
8	Other Mining Areas
9	Power Line Right of Way
10	2. Horticultural Lands
11	Agricultural Areas
12	Mixed Horticulture
13	Mixed Gardening
14	3. Tree, Palm and Other Permanent Crops
15	Rubber
16	Oil Palm
17	Citrus
18	Peanut
19	Cocoa
20	Fish and Shellfish Ponds
21	Orchards
22	Sugarcane
23	4. Cropland
24	Diversified Crops
25	Paddy
26	5. Improved Permanent Pasture
27	Improved Permanent Pasture
28	6. Grasslands
29	7. Scrub Grassland and Lalang
30	Forest Land
31	Forest
32	Scrub
33	Newly Cleared Land
34	Reclaimed Areas
35	8. Swamps, Marshlands and Wetland Forests
36	Swamp and Wetland (non-vegetation)
37	9. Unused Land
38	Unused Land
39	Water

Fig. IV-4 Present Landuse Map (Pulau Pinang)



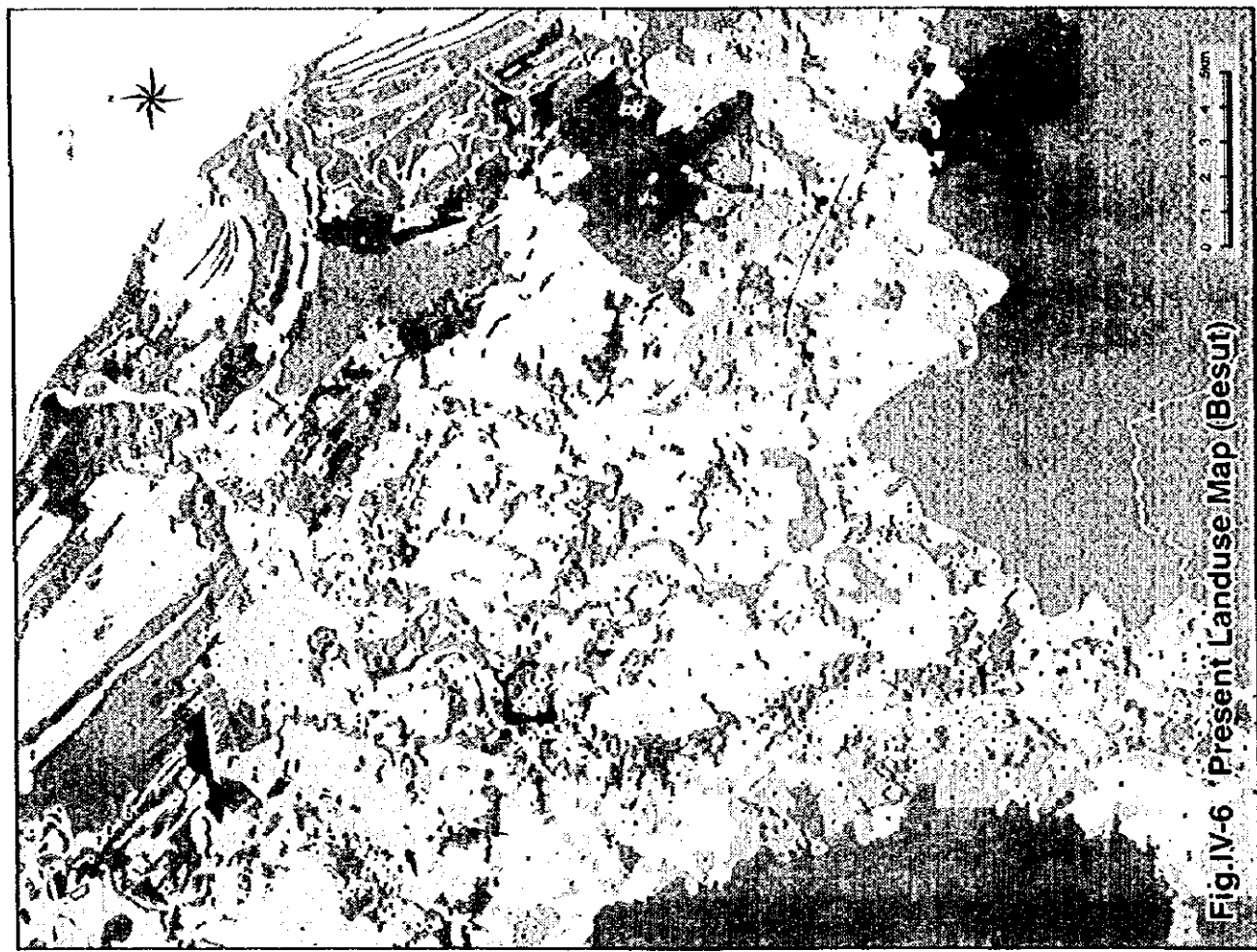
**LEGEND**

- 1 Settlements and Associated Non-Agricultural Areas
- 2 Horticultural Lands
- 3 Tree, Palm and Other Permanent Crops
- 4 Coprland
- 5 Improved Permanent Pasture
- 6 Grasslands
- 7 Forest Land
- 8 Swamps, Marshlands and Wetland Forests
- 9 Unused Land
- Water

**Fig: IV-5 Present Landuse Map**

**LEGEND**

1	Settlements and Associated Non-Agricultural Areas
2	Urban and Associated Areas
3	Elite Buildings and Associated Areas
4	Tim Mining Areas
5	Other Mining Areas
6	Horticultural Lands
7	Agricultural Stations
8	Mixed Horticulture
9	Market Gardening
10	Tree, Palm and Other Permanent Crops
11	Rubber
12	Oil Palm
13	Cocunut
14	Pineapple
15	Cassava
16	Fish and Hyacinth Ponds
17	Coffee
18	Pepper
19	Aracanut
20	Sago
21	Tea
22	Orchards
23	Sigatara
24	Corpland
25	Diversified Crops
26	Paddy
27	Shifting Cultivation
28	Tobacco
29	Improved Permanent Pasture
30	Improved Permanent Pasture
31	Grasslands
32	Lalang, Unimproved Grass Pasture and/or Scrub Grassland
33	Forest Land
34	Forest
35	Scrub
36	Scrub Forest
37	Newly Cleared Land
38	Reclaimed Area
39	Swamps, Marshlands and Wetland Forests (Includes Mangrove, Nipah, Cellan, and Other Wetland Forest Associations)
40	Unused Land
41	Unused Land
42	Water



**Fig. IV-6 Present Landuse Map (Besut)**

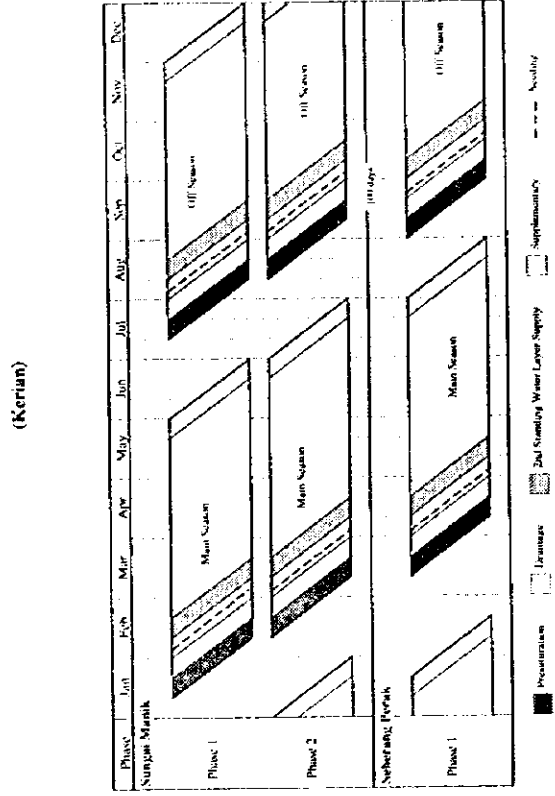
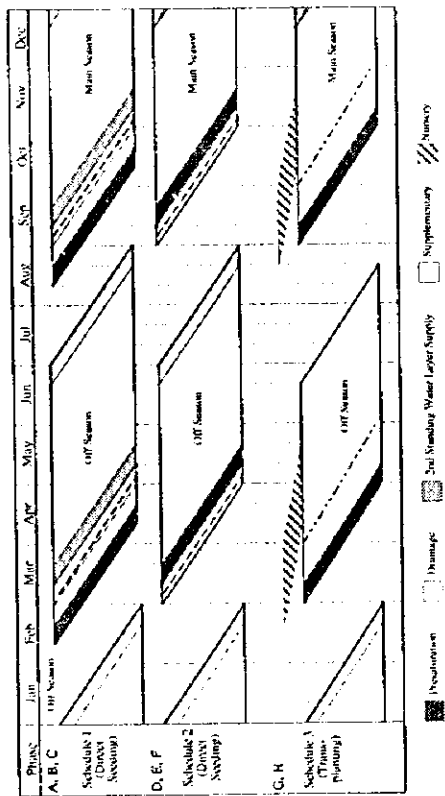
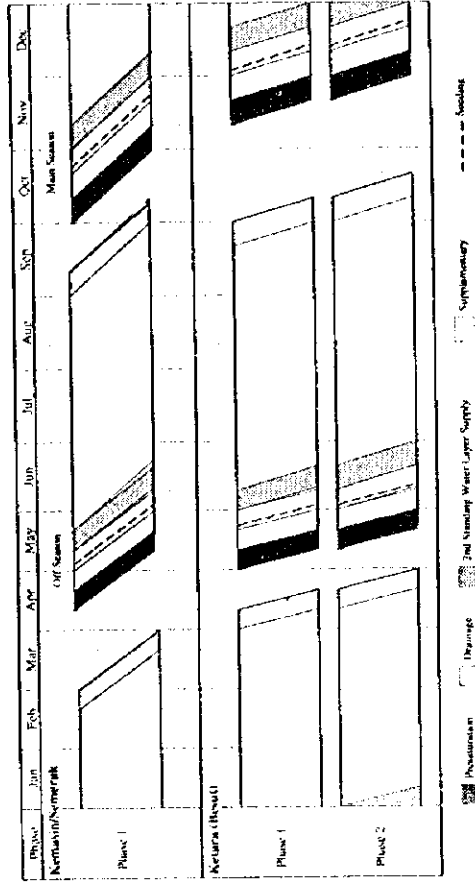
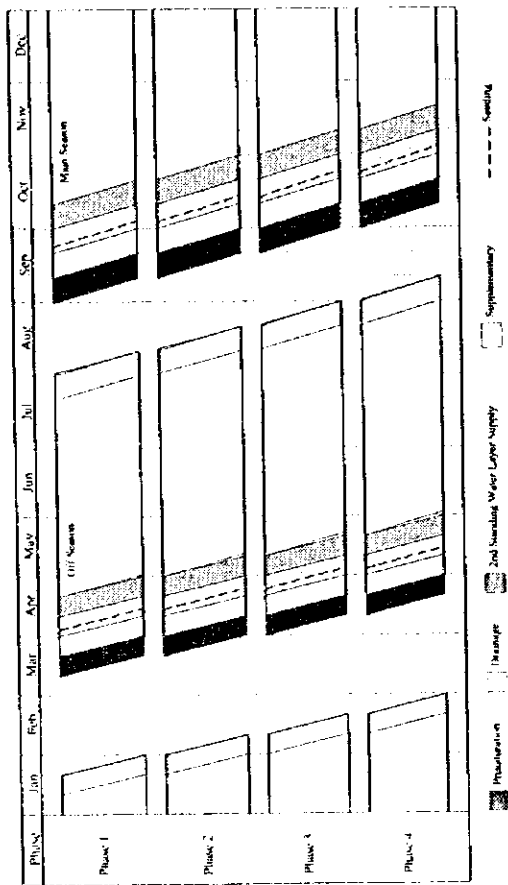


Fig. IV-7 Present Cropping Schedule in the Study Area



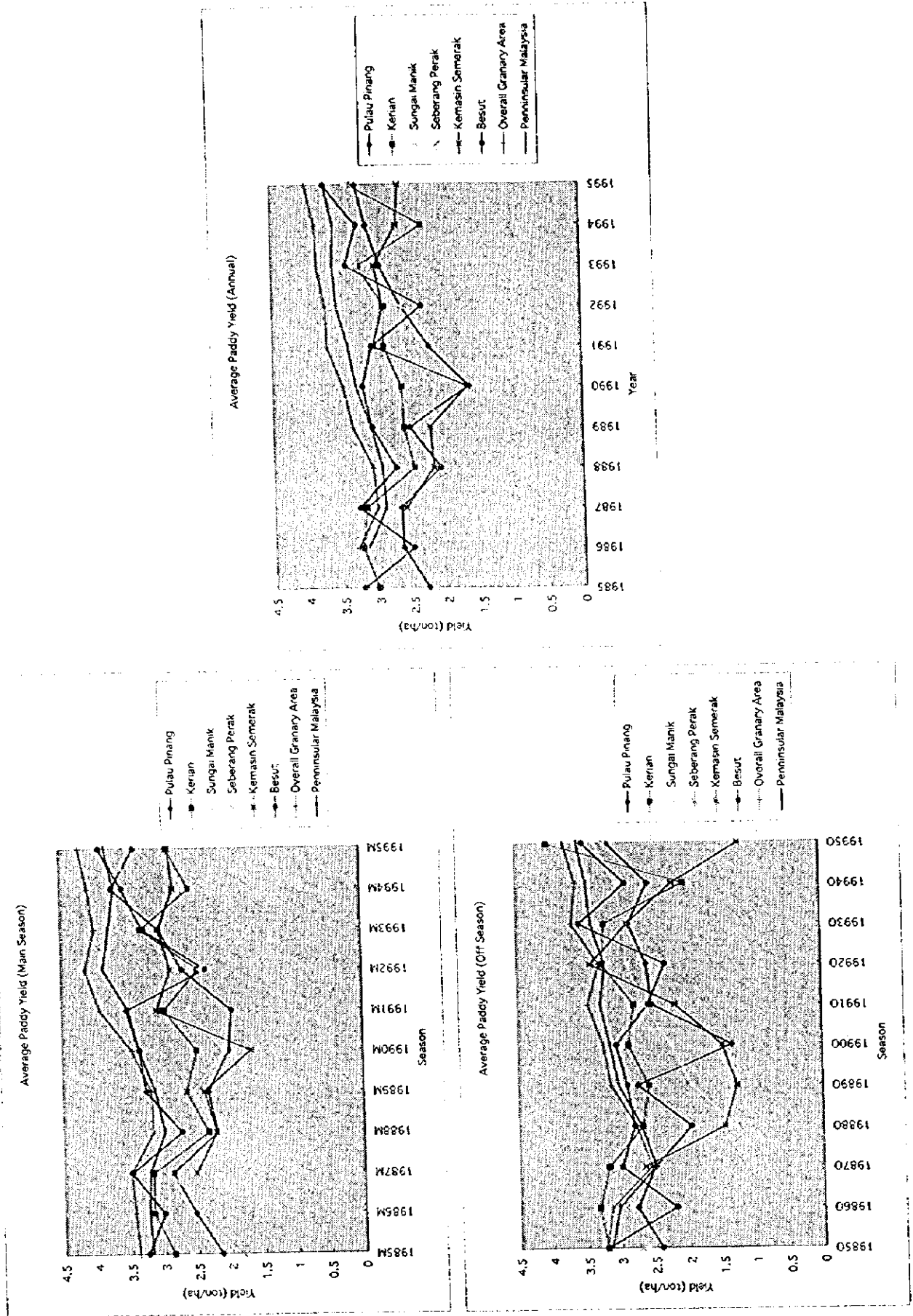


Fig. IV-8 Average Paddy Yields of the Study Area

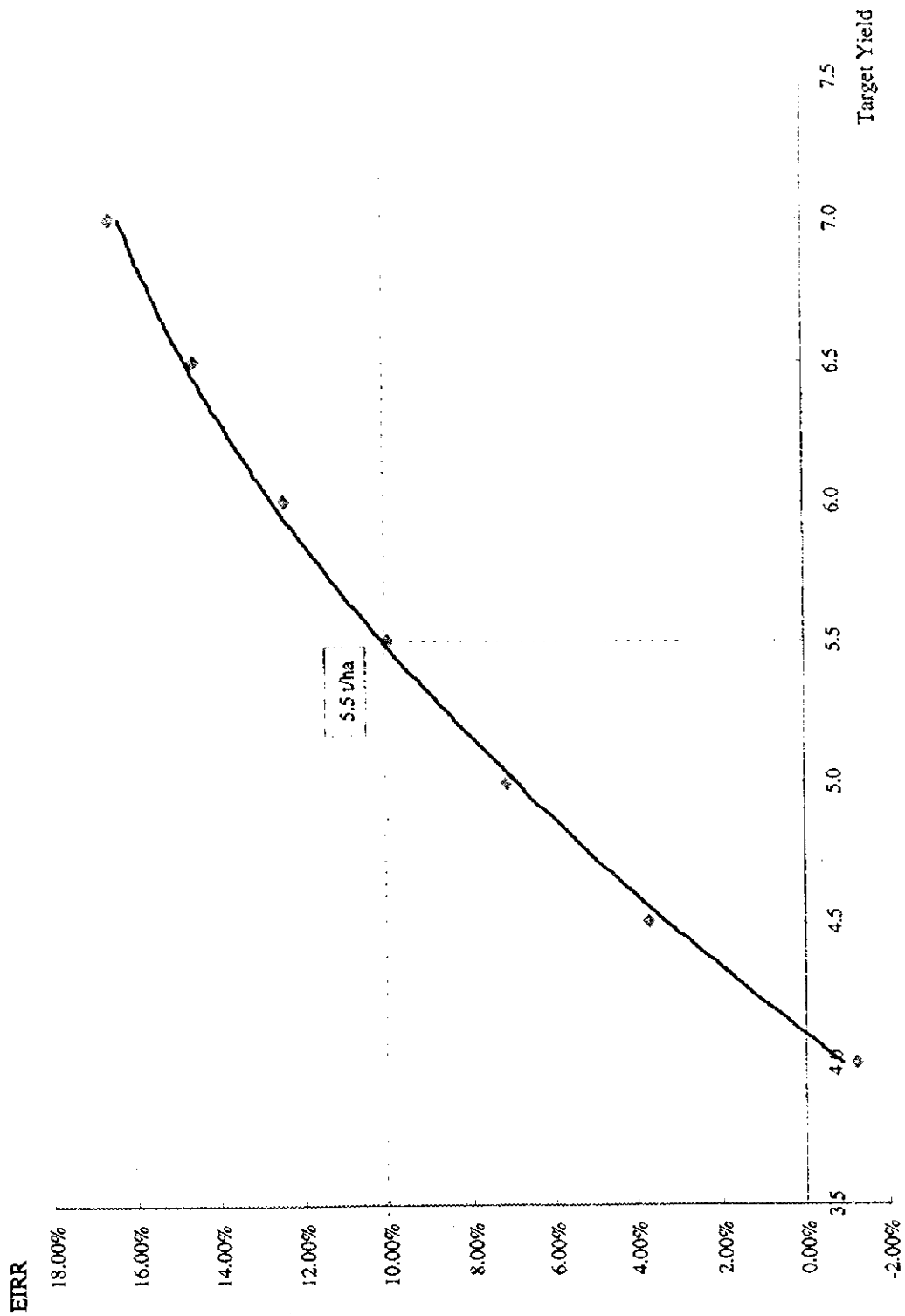


Fig IV-9 Relationship between Target Yield and EIRR

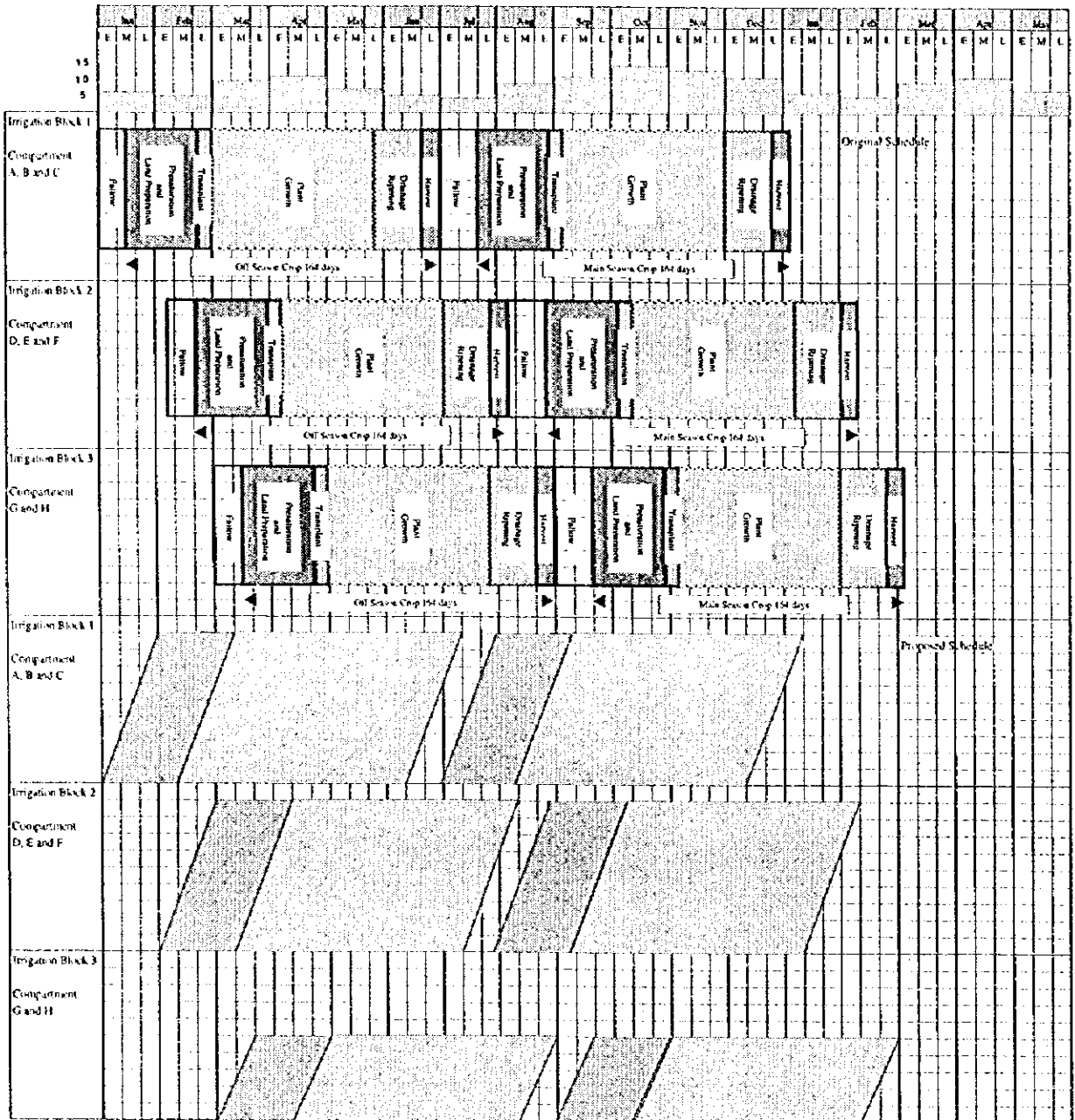
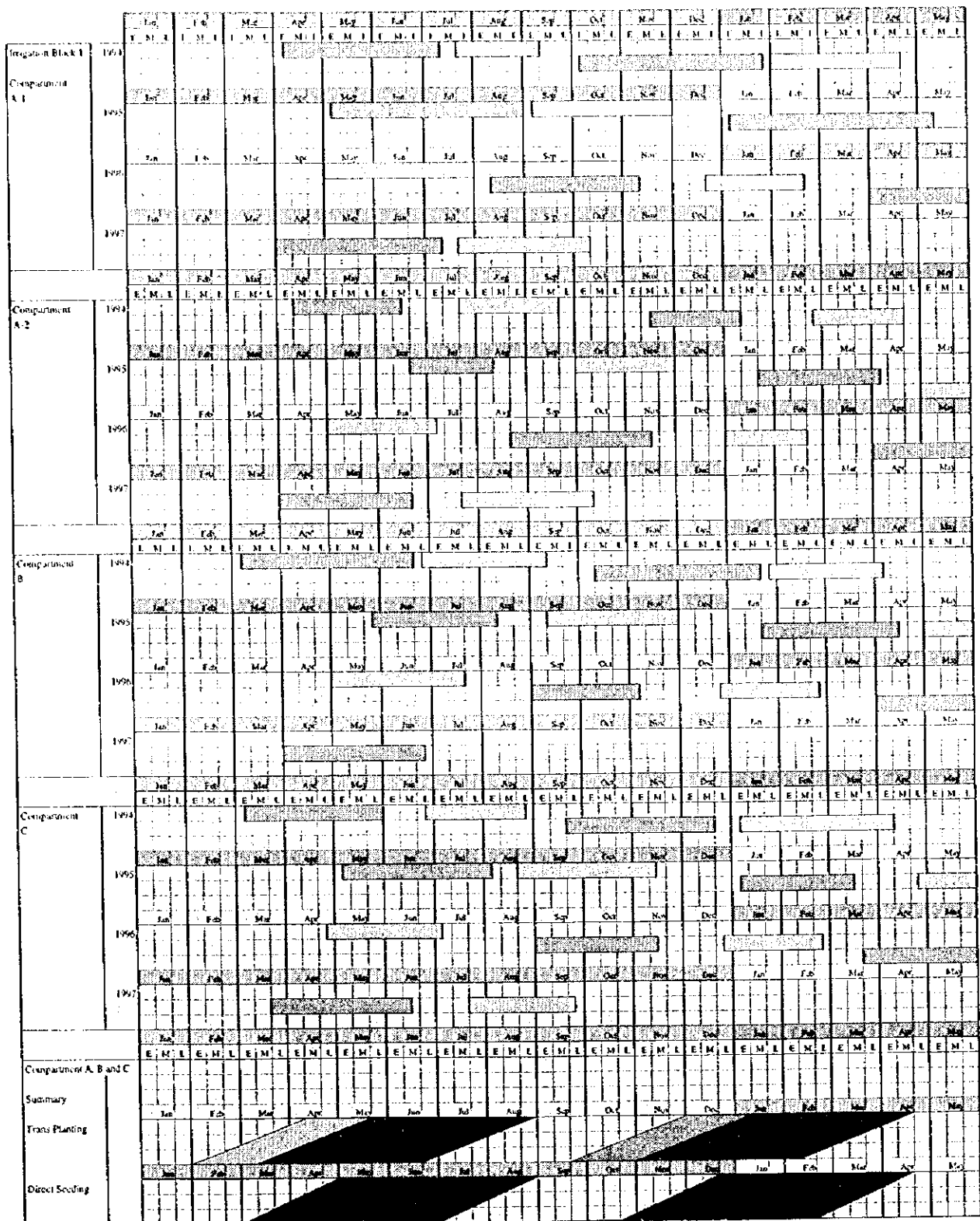


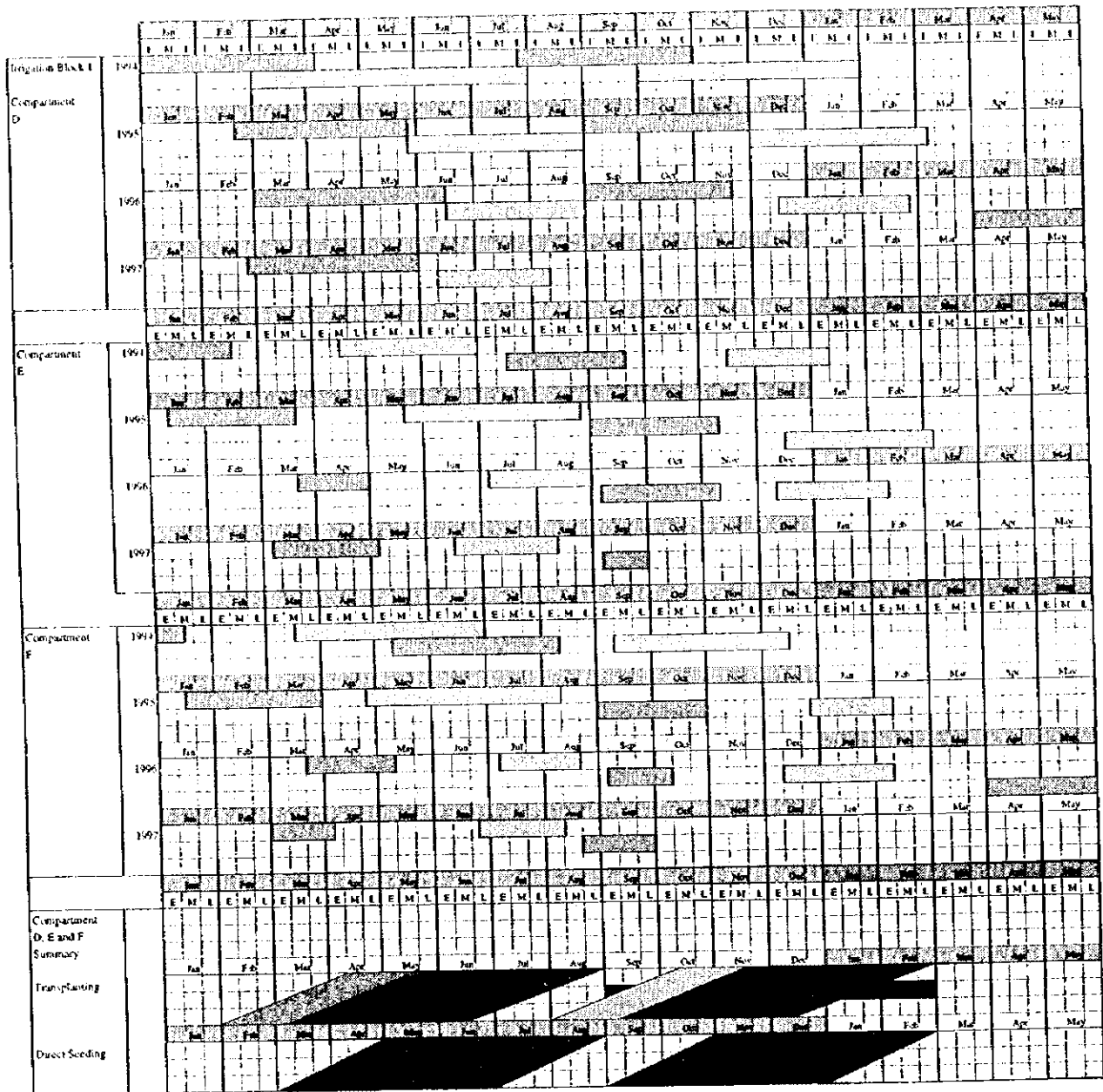
Fig. IV-10 Original and Proposed Schedule for Kerian



Source: IADP Kerian

 : Planting Period  
 : Harvesting Period

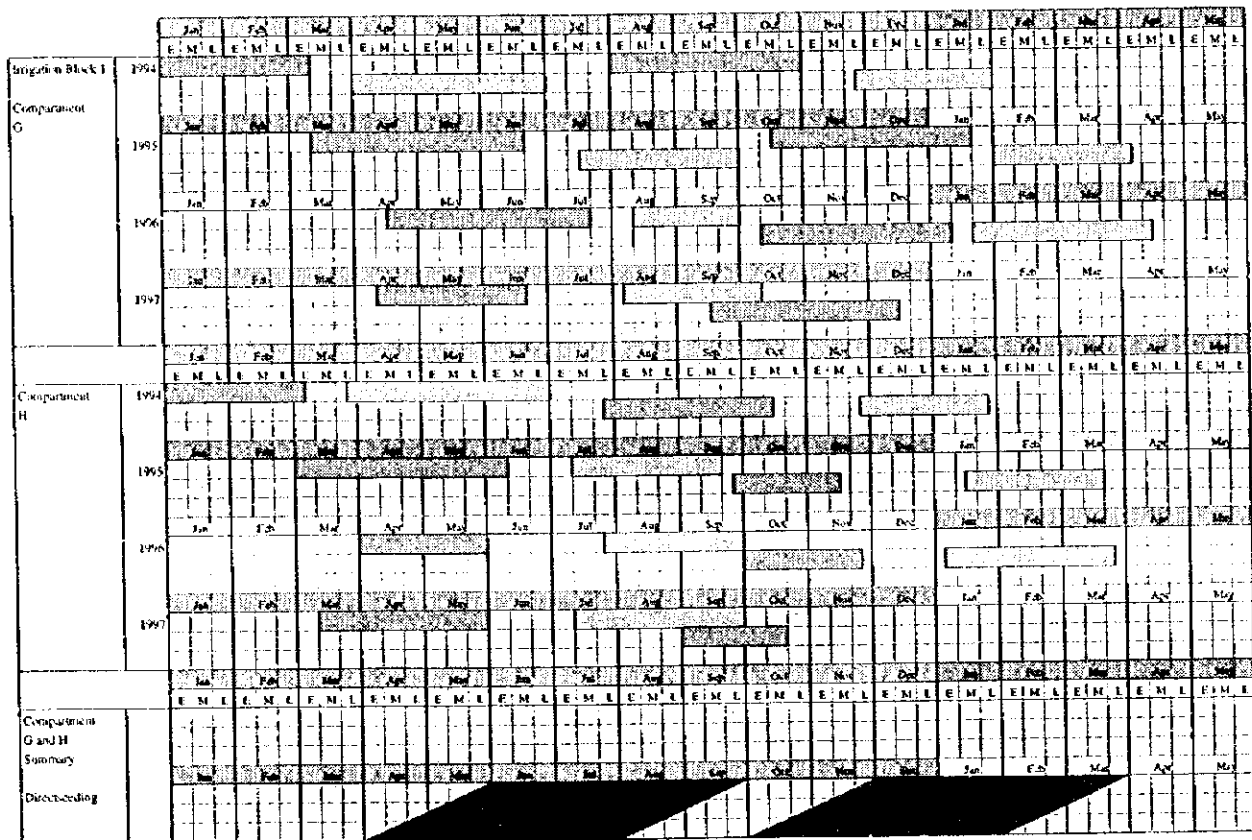
Fig. IV-11 (1/3) Actual Planting Progress Records in Kerian



Source: IADP Kerian

■ : Planting Period  
 ▨ : Harvesting Period

Fig. IV-11 (2/3) Actual Planting Progress Records in Kerian



Source: IADP Kerian  
 [Shaded Box] : Planting Period  
 [Shaded Box] : Harvesting Period

Fig. IV-11 (3/3) Actual Planting Progress Records in Kerian

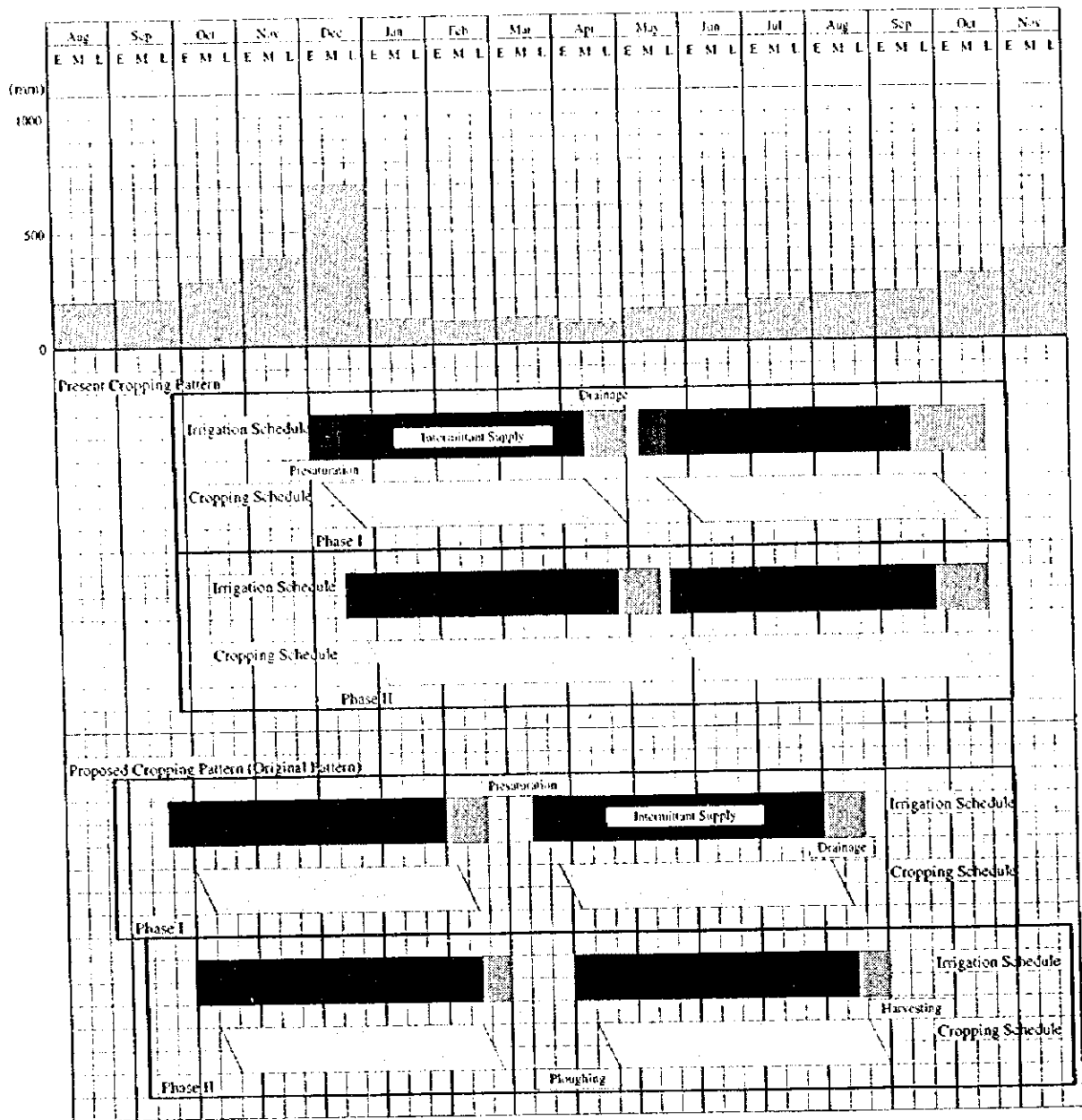
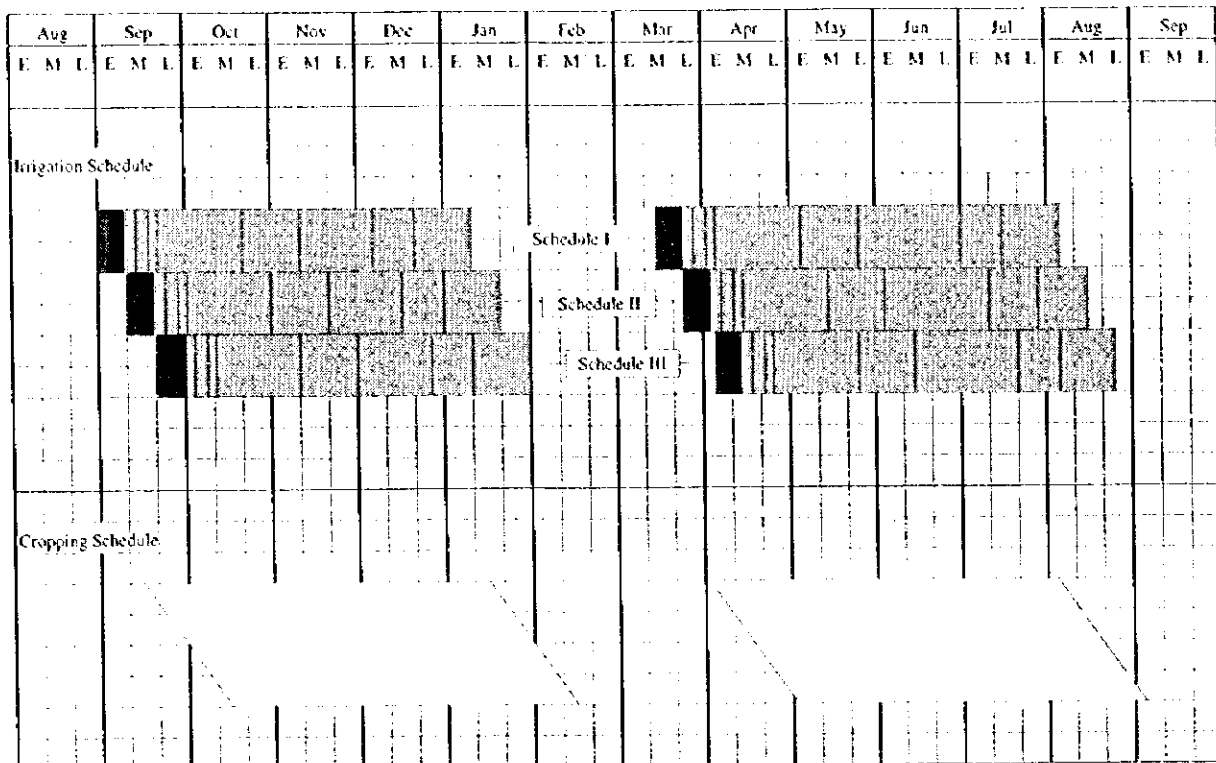


Fig. IV-12 Present and Proposed Cropping Schedule for Ketara (Besut)



Source: IADP Pulau Pinang

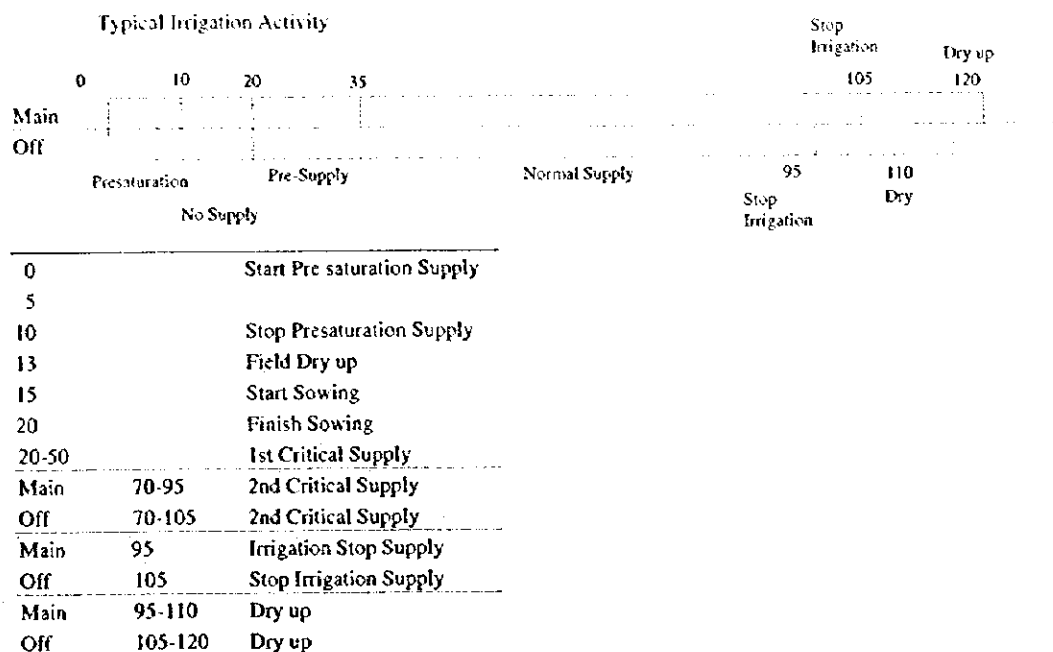


Fig.IV-13 Proposed Cropping Schedules for Pulau Pinang



***ATTACHMENT***

Table IV-A-1 Sample of Actual Farming Practice (Sungai Manik-1)

Days after Seeding	Activities	Input	Amount	Unit cost	(Unit: 1.6ha)	
					Cost	
					Material	Work
-10	Ploughing I rotavation	Tractor				280
-1	Ploughing II rotavation	Tractor				
0	Seeding	Seed manpower	160kg 1 manday	1.0/kg 12	160	12
1	Ploughing IV rotavation					
12	Weed control	Satnil manpower	4 lit 2 manday	31/lit 12	124	24
23	Irrigation					
30	Fertilizer application	Compound manpower	16bagx20kg 2 manday	0.48/kg 12	153.6	24
35	Weed control	Amine manpower	4 lit 1 manday	33.00/lit 12	132	12
45	Fertilizer application	Urea manpower	4bagx20kg 0.5 manday	0.54/kg 12	43.2	6
50	Weed control	Heramine manpower	4 lit 1 manday	35/lit 12	140	12
60	Drain off the field Fertilizer application	Urea manpower	4bagx20kg 0.5 manday	0.54/kg 12	43.2	6
70	Fertilizer application	NPK (green) manpower	4bagx50kg 1 manday	39.80/bag 12	159.2	12
72	Insect control	Fastec manpower	1 lit 1 manday	28.50/lit 12	28.5	12
78	Rat control	Drat manpower	1 lit 0.5 manday	42.00/lit 12	42	6
120	Harvesting		7.52ton	50/ton		376
	Transportation		7.52ton	25/ton		188

Table IV-A-2 Sample of Actual Farming Practice (Sungai Manik-2)

Days after Seeding	Activities	Input	Amount	Unit cost	(Unit: 1.6ha)	
					Cost	
					Material	Work
-10	Ploughing I rotavation	Tractor		35/acre		140
-4	Ploughing II rotavation	Tractor		25/acre		100
-1	Ploughing III rotavation	Tractor		15/acre		60
0	Seeding	Seed	160kg	1.0/kg	160	12
		manpower	1 manday	12		
	Ploughing IV rotavation	Tractor		15/acre		60
20	Irrigation					
22	Weed control	Arosolo	2 lit	30/lit	60	
		Facet	200 g	28.50/100g	57	
		manpower	0.5 manday	12		6
25	Fertilizer application	Compound	16bagx20kg	0.48/kg	153.6	6
		manpower	0.5 manday	12		
30	Weed control	Alley	100g	15.00/50g	30	
		Paraquart	8 lit	8/lit	64	
		manpower	2 manday	12		24
35	Fertilizer application	Urea	8bagx20kg	0.54/kg	86.4	6
		manpower	0.5 manday	12		
60	Fertilizer application	miracle greer	8lb	10.60/lb	84.8	6
		manpower	0.5 manday	12		
75	Fertilizer application	miracle greer	8lb	10.60/lb	84.8	6
		manpower	0.5 manday	12		
100	Draining off the field plot					
120	Harvesting		10.7ton	55/ton		588.5
	Transportation		10.7ton	25/ton		267.5

Table IV-A-3 Sample of Actual Farming Practice (Sungai Manik-3)

Days after Seeding	Activities	Input	Amount	Unit cost	(Unit: 3.2ha)	
					Cost	
					Material	Work
-20	Ploughing I rotavation	Tractor	8 acre	30/acre		240
-7	Ploughing II rotavation	Tractor	8 acre	30/acre		240
0	Seeding	Seed	270kg	1.0/kg	160	
		manpower	8 acre	10/acre		80
1	Ploughing III	Tractor	8 acre	20/acre		160
17	Irrigation					
24	Fertilizer application	Compound	32bagx20kg	0.48/kg	307.2	
		manpower	32 bag	1/bag		32
31	Weed control	Arosolo	5 lit	30/lit	150	
		manpower	8 acre	10/acre		80
34	Fertilizer application	Urea	16bagx20kg	0.54/kg	172.8	
		manpower	16 bag	1/bag		16
50	Rest control	Fastec	4 lit	28.50/lit	114	
		manpower	8 acre	10/acre		80
60	Rest control	Bassa 50 EC	2 lit	19.00/lit	38	
		manpower	8 acre	10/acre		80
70	Rat control	Drat	1 lit	42.00/lit	42	
		manpower		10		10
90	Draining off the field plot					
120	Harvesting		11.0ton	60/ton		660
	Transportation		11.0ton	25/ton		275

Table IV-A-4 Sample of Actual Farming Practice (Sungai Manik-4)

Days after Seeding	Activities	Input	Amount	Unit cost	(Unit: 2ha)	
					Cost	
					Material	Work
-18	Cleaning the field and farm ditches	Ronster	10 lit	6.40/lit	64	
		Rumputox	2.5kg	8.40/kg	21	
		Alley manpower	200g 1 round	49.00/200g 60	49	60
-15	Ploughing I rotavation	Tractor	5 acre	33/acre		165
-10	Irrigation					
-7	Ploughing II rotavation	Tractor	5 acre	30/acre		150
-1	Ploughing III rotavation	Tractor	5 acre	30/acre		150
0	Seeding	Seed manpower	200kg 5 acre	1.0/kg 10/acre	200	50
20	Weed control	Whip-S manpower	500 ml 5 acre	53.00/250ml 10/acre	106	50
23	Fertilizer application	Compound manpower	20bagx20kg 20 bag	0.48/kg 2/bag	192	40
25	Pest and Weed control	Rumputox Alley Nurelle 505 manpower	5bagx500g 200g 1 lit 5 acre	4.2/bag 49.00/200g 42.00/lit 10/acre	21 49 42	50
35	Fertilizer application and Pest control	Urea Furadan 3G manpower	10bagx20kg 5 bagx4kg 10 bag	0.54/kg 11/bag 2/bag	108 55	20
40	Rat control	Tiodan manpower	5 lit	17.00/lit 80	85	80
45	Rest control	Nurelle 505 manpower	3 lit 5 acre	41.00/lit 10/acre	123	50
60	Fertilizer application	Miracle grow manpower	6 lb 5 acre	32.00/3lb 10/acre	64	50
70	Fertilizer application	Nitro manpower	5 bag 5 bag	40/bag 10/bag	200	50
75	Fertilizer application and pest control	Fastec Miracle grow manpower	1 lit 6 lb 5 bag	28.00/lit 32.00/3lb 10/bag	28 64	50
90	Draining off the field plot					
120	Harvesting		10.0ton	48/ton		480
	Transportation		10.0ton	24/ton		240

Table IV-A-5 Sample of Actual Farming Practice (Changkat Jong)

Days after Seeding	Activities	Input	Amount	Unit cost	(Unit: 2.4ha)	
					Material	Cost
-18	Ploughing I rotavation	4w tractor	6 acre	25/acre		150
-10	Ploughing II rotavation	4w tractor	6 acre			130
-7	Irrigation					
-2	Ploughing III rotavation	4w tractor	6 acre	20/acre		120
0	Seeding	Seed manpower	400kg 6 acre	1.17/kg	440	80
2	Draining the field					
14	Weed control	Aroselo Facet manpower	6 lit 300 g 6 acre	30/lit 28.00/100g	180 84	80
16	Irrigation					
24	Fertilizer application	Compound manpower	18bagx20kg 6 acre	0.48/kg	172.8	60
31	Fertilizer application	Compound manpower	6bagx20kg 6 acre	0.48/kg	57.6	30
38	Pest control	Nurelle 505 Thiodan manpower	0.5 lit 1 lit 6 acre	42.00/lit 17.00/lit	21 17	40
46	Fertilizer application	Urea manpower	12bagx20kg 6 acre	0.54/kg	129.6	60
51	Pest control	Nurelle 505 Thiodan manpower	0.5 lit 1 lit 6 acre	42.00/lit 17.00/lit	21 17	40
56	Fertilizer application	Urea manpower	4bagx50kg 6 acre	0.54/kg	108	30
68	Pest control	Nurelle 505 Monceren Applaud manpower	0.5 lit 0.5 kg 250g 6 acre	42.00/lit 80/kg 63.00/250g	24 40 63	80
72	Fertilizer application	Urea manpower	4bagx50kg 6 acre	23.50/bag	94	8
80	Fertilizer application	NPK Hijau manpower	6bagx50kg 6 bag	42.00/bag 2.00/bag	252	12
82	Rest control	Nurelle 505 Monceren Applaud Benlate manpower	0.5 lit 0.5 kg 250g 500g 6 acre	42.00/lit 80.00/kg 63.00/250g 30.00/500g	21 40 63 30	80
94	Rest control	Nurelle 505 Monceren Benlate manpower	0.5 lit 0.5 kg 500g 6 acre	42.00/lit 80.00/kg 30.00/500g	21 40 30	80
100	Draining off the field plot					
118	Harvesting		20.52ton	45/ton		923.4
	Transportation		20.52ton	35/ton		718.2

**Table IV-A-6 Sample of Actual Farming Practice (FELCRA)**

Days after Seeding	Activities	Input	Ratio/a	Remark	Days after Seeding	Activities	Input	Ratio/a	Remark
-55	Land clearing and maintenance work			Done by contract labour and general labour within one month	9	Replacing the seedlings			Only to spots damaged by pest and others
-25	Renewing paddy mask			Performed after harvesting for 25 days	12	Herbicide (pre germination)			Using mist blower. Propand for 25 days
-24	Ploughing 1st round	Tractor	60 units	Performed under dry condition for 25 days using 60 units of tractors	14	Herbicide (pre germination repeat)			Applied to weed spots
-23	Bond repairing etc				15	Irrigation			Using 120 labours
-21	Land levelling			Dry condition. 30% of the paddy estate area using contractors	21	Insecticide I			Done for 25 days using several including so
-14	Irrigation through Primary canal			Done by DDO	25	Basal dressing	NPK 15.5-15.5-10	200 kg/ha	Using subsidised fertilizer the rate 200 kg/ha for 25 days
-13	Land ploughing 2nd round	Tractor	60 units	Dry ploughing for 25 days using 60 units tractors	29	Herbicide	Endax, Classic and J All		Specially for broad leaves and Scleria
	Applying Rodenticides			This pest control activity is done for the whole estate for 3 days using 2 ml Phosphide and Dhat mixed with paddy	35	Fertilizer supplement	NPK 17.5-15.5-10		Using compound fertilizer for areas that are not growing well
					43	Fertilizer application	Urea	100 kg/ha	Using subsidised fertilizer
-11	Plugging the field			As guides for insecticide spraying, weeding and fertilization	45	Pesticide			For the whole area for 25 days
-8	Irrigation through Secondary canal			Done by DDO	50	Draining	N/A/Noth		To reduce quantities for very healthy plants and solution for roots. 10 days
-7	Irrigation into the tertiary block			Done by FELCRA	53	Pesticide III			When the fertilization
-5	Herbicide application	Paragran		Using paragran for 25 days	60	Maintenance and rat control	Dea Insecticide	4000 kg seed or less required	Field inspection and taking sample seedlings/sq metre
-2	Soaking seeds			To speed up germination	64	Reduce irrigation supply	Field inlet	2.5cm	Reduce water level one day before fertilization
	Land ploughing 3rd round	Tractor	60 units	Done in wet condition with 2 cm of water for 25 days. 60 units tractors	65	4th round basal Urea 2	Urea Frandco 3G	25kg	Mixed thoroughly and apply evenly
-1	Arranging the paddy seeds				68	Irrigation	Field inlet	5-10 cm	Water level increased 3 days after fertilization.
-1	Land levelling/grading				70	Weeding	Knives and basket		Group work
0	Seeding			Using Mist blower done on group basis	75	Maintenance, surveillance and rat control	Dea		Field investigation/inspection at initiation stage and get sample no of grains per hill/square meter
		1.816/26531		9 groups with 10 workers per group for 25 days	95	Reduce irrigation	Field inlet	less than 5cm	Start draining gradually according to paddy growth stages
1	Retaining the water in the field plots			Standing water maintained over night	116	Draining	Field inlet		Ensure 100% drainage 2 weeks before ripening
2	Draining the field			to encourage germination	123	Data collection and sample collection			Sample and data collection. No. of good grains/panicle and weight of 1000 grains
4	Making small channels			Only in dry spots	130	Harvesting	Combine Harvester	Unit	Harvested at 85% ripening and water content not exceeding 25%.

**Table IV-A-7 Sample of Actual Farming Practice (Seberang Rerak)**

(Unit: 1.0 lot/2.43ha)

No	Activities	Input	Amount	Unit cost	Cost	
					Material	Work
1	Land preparation rotavation	Tractor	3 times			370
2	Seeding	Seed manpower	300kg 15 bag	1.0/kg 5.00/bag	300	75
3	Rodenticide	Zink phosp manpower	3 times	3	10	9
4	Weed control	Ekomec manpower	4 lit	31/lit	15.35	30
5	Weed control	Gramoxion manpower			36.5	60
6	Weed control	Gramoxion manpower			200	60
7	Subsidy Fertilizer application	manpower manpower	24 bag 12 bag	3/bag 3/bag		72 36
8	Fertilizer application	fertilizer manpower	6 bagx50kg 6 bag	50/bag 7/bag	300	42
11	Transport and others					50
					861.85	804



**Table IV-A-8 Sample of Recommendable Farming Practice (Ketara (Besut))**

Days after Seeding	Activities	Input	Ketaha	Remark	Days after Seeding	Activities	Input	Ketaha	Remark
-40 to -14	Land clearing and 1st round of rotation	Lime 4w-tractor	2.5ton 1.5hrs	Lime is applied before land leveling	35	2nd Basal Urea 1	Urea Furadan 3G	75kg 25kg	Mix thoroughly and spray evenly
-20 to -7	2nd round rotation	4w-tractor	1.5hrs	At least one week after the 1st rotation	48	Irrigation	Farm inlet	5-10cm	Water level increased 3 days after fertilization
-6	Spraying of weedicides	paraquat	5 liter	Spraying target weeds, including stony paddy	54	Reducing water	Farm inlet	2.5cm	Water level is decreased before fertilization
-3	Seed preparation soaking drying nut (de-soaking)	Approved seeds	75kg	soaking for 24hours, de-soaking 48hrs	55	Additional fertilizer	NPK 12:12:17+2	125kg	Apply and spray (herbicide) evenly.
-1	3rd round rotation	Power tiller	5hrs	Ploughing and leveling one day before seeds are broadcasted	58	Irrigation	Field inlet	5-10cm	Water level increased 3 days after fertilization.
0	Broadcasting of the seeds	Approved seeds	75kg	Broadcast evenly throughout the entire plot	60	Maintenance and rat control	Diat Insecticide	400ml/10kg seed (when sample seedlings/4q. more required)	Field inspection and taking sample seedlings/4q. more
5-7	Irrigating the plot	Farm inlet	2.5-10cm	Water level is gradually increased from 5th to 7th day.	64	Reduce irrigation supply	Field inlet	2.5cm	Reduce water level one day before fertilization
7	Pest and disease control	Diat insecticides	400ml/10kg paddy	Control by hunting and group efforts	65	4th round basal Urea 2	Urea Furadan 3G	75kg 25kg	Mixed thoroughly and apply evenly
10-15	Herbicide application	Monsieur/Quinclorac/Proflachlor/2,4 D/Buyteler	As per inspection (400ml/10kg on label)	Use proper weedicide, timely application and in right quantity	68	Irrigation	Field inlet	5-10cm	Water level increased 3 days after fertilization.
18-21	1st basal dressing and disease/pest control	compound Furadan 3G	200kg 25kg	Water level reduced to 2.5cm one day before fertilization. Mixed thoroughly and evenly spray/broadcasting.	70	Weeding	Knives and hatchet		Group work
21-24	Irrigation	Field inlet	5-10cm	Water level is increased to 5-10cm 3days after fertilization.	95	Maintenance, surveillance and rat control	Diat		Field investigation/inspection at initiation stage and get sample no. of grains per hill/square meter.
25	Maintenance and rat control	Diat and insecticide	400ml/10kg of seeds (when required)	Field inspection	100	Reduce irrigation	Field inlet	less than 5cm	Start draining gradually according to paddy growth stages.
30	Weed control Herbicide	2-4D amine	720ml/100lit	Direct spraying to weedy areas were problem is persistent.	116	Draining	Field inlet		Ensure 100% drainage 2 weeks before opening.
44	Raising water level	Farm inlet	2.5cm	Water level reduced to 2.5cm one day before fertilization.	123	Data collection and sample collection			Sample and data collection. No. of good grains/puddle and weight of 1000 grains
					130	Harvesting	Combine Harvester	1 unit	Harvesting at 85% ripening and water content not exceeding 25%.

**Table IV-A-9 Sample of Recommendable Farming Practice (Kemasin/Semerak)**

Direct seeding					Transplanting					(Unit 1.6ha)
Days after Seeding	Activities	Input	Amount	Unit cost	Days after Seeding	Activities	Input	Amount	Unit cost	
-30	Ploughing I rotavation	Tractor			-30	Land preparation	Tractor			35/acre
						Weed control	Herbicide			2 liter
-20	Irrigation rotavation	Tractor			-35	Nursery preparation		2 round		
-15	Land levelling I	Tractor			-30	Fertilizer application nursery	Amphosphos	20-25gm/m <sup>2</sup>		
-14	Lime application	Lime	2.5t/ha		-28	Soaking of nursery	Seeds	20-25kg/ha		
-7	Land levelling II	Tractor			-27	Seeding of nursery	Seeds	20-25kg/ha		
	Improvement of farm ditch				-20	Pest control of nursery				
-2	Soaking and de-soaking of seeds	Seeds	40-60kg/ha 24hrs soaking		-17	Irrigation				
	Draining the field				-15	Landpreparation I				
0	Seeding				-14	Lime application		2.5t/ha		
10	Weed control	Whip S	7.5ml/45lit water		-7	Land preparation II				
					-5	Land levelling				
11	Irrigation				-1	Planting out seedlings				
15	Fertilizer application Subsidy	Compound	5 bagx20kg		0	Transplanting		Space 20x30cm		
	Herbicide	Rumputox	1.5-2.0kg/ha		15	Fertilizer application	Compound	5 bagx20kg 100kg/ha		
						Pest control	Furadan	20kg/ha		
21	Pest control	Carbofuran	20kg/ha		21	Weed control	Rumputox	1-2.5kg/ha		
45	Fertilizer application Subsidy	Compound Urea	125kg/ha 40kg/ha		45	Fertilizer application	Compound Urea	5 bag x 20kg 2 bag x 20kg		
	Pest control	Endosulfan	5-10 ml/4.5lit water		50	Pest control	Lebaycid 10	15ml/9 lit water		
55	Fertilizer application	NPK blue	50kg/ha		65	Fertilizer application	Urea Baja makmur	3 bag x 20kg 2.5bag/ha 125kg/ha		
65	Fertilizer application	Urea baja makmur	4 bag/ha 2.5 bag/ha	50/bag						
75	Pest control	Lebaycid	10-15ml/9 lit water		90	Drainage off the field				
90	Drainage off the field				120	Harvesting		80% maturing		
120	Harvesting		80% of maturing							

**ANNEX-V**  
**FARMERS' ORGANIZATION**

ANNEX - V  
FARMERS' ORGANIZATION

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## V. FARMERS' ORGANIZATION

### 1. INTRODUCTION

#### 1.1. General Background

Irrigated agricultural development, in the Malaysian context, has been implemented largely on the basis of externally-induced approach. This could be associated with the fact that historically speaking Malaysian irrigation system had all along been one that is agency-managed and there was not a case of the farmer-initiated and farmer-managed system. This in turn is due to the absence of long-established indigenous water-based organisations. There has been of late a shift in the approach towards a more participatory one thus encouraging more participation of the farmers. However the level and nature of their participation has been confined to determining irrigation and planting schedules through various committees at the farm locality and district levels, except in the Muda scheme where farmers' participation in systems design has been promoted since mid-70s through *kursus tempatan* or local courses.<sup>1</sup> More recently the concept of Water User Group (WUG) has been introduced. This could be a more promising forum to generate more active farmer participation in a much wider scope than before.

An insight into the historical dimension of the long process and evolution of irrigated agricultural development in the country is useful in understanding some salient aspects of irrigation system planning and management. Some implications for development and reinforcement of farmers' organisation can be derived therefrom. These implications are presented in the ensuing section 1.3.

#### 1.2. Irrigated Agricultural Development - A Historical Perspective

Based upon literature review<sup>2</sup> and historical records, it can be inferred that the irrigation system in the country has been responsive to the demands of the socio-economic development processes starting as early as 1930s. The gradual evolution that it has gone through reflects the various orientations and types of policies set upon by the government. Chronologically the various stages of such evolution can be depicted as follows :-

##### (1) The Early Years - Irrigation Development Prior to 1930s

The overriding concern in the country during this period was to have rice for subsistence purposes. Paddy cultivation was mono-culture and rain-fed. Most of the major activities and tasks including irrigation, transplanting, harvesting were carried out largely

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1 The World Bank's Project Completion Report On Muda II Irrigation Project, December 1988, Item 7.2 of Section VII, states that "The kursus tempatan (local courses) for farmers have proved to be valuable both in gaining acceptance of farmers to tertiary development as well as providing valuable inputs to engineers in detailed design. These courses need to be emphasised in the future."

2 See Sardar Ali Raunkee : Sustainability of Irrigation - The Malaysian Experience - Keynote address at the Symposium On Sustainability Of Irrigation - IMMI Internal Program Meetings, 2nd - 6th December 1991, Colombo, Sri Lanka.

through village-based traditional arrangements. Irrigation system then was rudimentary with dual functions channel - i.e. irrigation during plant growth period and drainage towards the end of transplanting season. There were then no clear definitive policies of the government. However towards the turn of the century and in the early 1900's there were initial efforts by private enterprises with very minimum government assistance, to develop and improve the irrigation system. It was this private individuals' entrepreneurial spirit that propelled the establishment of the Krian irrigation project through the initiative of Tengku Menteri of Larut<sup>3</sup> in the late 1870's. While in the state of Kedah, the pioneering efforts of the Chief Minister Wan Mat Saman were instrumental in the development of basic irrigation system there.

## (2) The 1930 - 1950's Era - Government Intervention in Irrigation Development

The lesson from the critical food shortage of 1918-1920 spurred the government's more direct involvement in the irrigation system development. The consequent price escalation of imported rice constituted the additional factor behind the government intervention. The seriousness was underscored by the establishment of the Drainage & Irrigation Department and the Department of Agriculture in 1930s. Water distribution was still on plot-to-plot basis though an increasing number of facilities of water resource development were provided. Farmer participation in these schemes was still minimal and was confined along informal village-based institutions while deep-rooted traditional practices formed the basis of farm-management. The elements of regulations and enforcement began to be introduced by the government which formulated the Paddy Cultivation Ordinance (1934) and the Irrigation Areas Ordinance (1953). Food security was still the overriding government's policy emphasis during this era.

## (3) The 1960 - 1975 Era - Introduction of Double Cropping and Institution Building

This era saw a slight shift of government policy from being a purely food security oriented to one that concerned socio-economic status of the rural farming community. This policy shift was underlined by greater investment allocations to open up new land frontiers and establishment of bigger irrigation schemes such as the Muda Irrigation Scheme in Kedah, Krian, Tanjung Karang, Sungai Manik, Seberang Perai and Besut. The size of double-cropped area increased remarkably from 8,000 ha. to around 200,000 ha. The demand for a more comprehensive approach to irrigated agriculture development led to the establishment of agriculture supporting organisations like Federal Agricultural Marketing Authority or FAMA (principally concerned with marketing of other agricultural products than rice) in 1965, the Malaysian Agricultural Research and Development Institute (MARDI) in 1969, the Agricultural Bank of Malaysia (BPM) also in 1969, the National Paddy and Rice Board (LPN) in 1971 and the Farmers' Organisation Authority (LPP) in 1973. It was during this era that the government introduced the price support policies in the form of Guaranteed Minimum Price as well as paddy and subsidy policies for farm inputs. These were policy instruments that were formulated to promote greater farmer participation in irrigated agriculture development.

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<sup>3</sup> See : The Department of Irrigation and Drainage - State of Perak Darul Ridzuan - Krian Irrigation Scheme.

#### (4) The 1975 -1985 Era - An Integrated Approach to Irrigated Agriculture Development

This era saw an increasing emphasis on the twin objective of the government's policy i.e. poverty alleviation and food production. An integrated approach to irrigation development continued with increased emphasis into the late 70s and early 80s geared towards achieving national self-sufficiency target of 80 - 85% level. During this era, irrigation was slowly shifting its emphasis from structural aspects to water management issues.<sup>4</sup> The new concern of the irrigation systems planners was in the realm of maximisation of yields and conservation of water, which called for a better organised water and farm management practices. Increasing canal density from 10-12 m/ha to 30-35 m/ha, improving farm roads, concrete canals and drains, improving access for bigger farm machinery, were given priority in this era. The highly scheduled planting and irrigation activities called for stricter adherence by farmers. New referent point as a basis of farmers organisation shall now be the Irrigation Service Blocks and Irrigation Service Areas and Irrigation Service Units. This necessitated the formation of canal-based organisations that involved field neighbourhood as contrast to the traditional, village-based neighbourhood.

#### (5) 1985 - 1990s Era and Beyond - Irrigation System Within A Competitive Environment

The increased pace of industrialisation during the 80s with its concomitant demands which affected policy shifts and changes of development priorities, financial allocations, etc., has created a highly competitive environment for irrigation system management. The creation of more job opportunities within the manufacturing sector has drained off sizeable farm labour out of the farming community. This resulted in more and more lands being left idle. Labour intensive activities including transplanting and harvesting were slowly giving way to increasing mechanisation. This in turn necessitated improvements on farm roads, land levelling to suit direct seeding mode of cultivation (from the preceding direct transplanting mode), bigger drainage facilities and improved farm management techniques. Attempts at changing the farmers' organisation in paddy cultivation from the conventional to modern modes such as estate management were made in various parts of the country. Several pilot projects were undertaken in Asam Jawa, Pendang District, Kedah by MADA and later KEDA, in Sungai Burung in Pulau Pinang by KGN, a co-operative with the support of the IADP, in Kubur Panjang, Kedah by the Farmers' Organisation Authority (LPP) and in Seberang Perak by FELCRA.

It was also during this era that the National Agriculture Policy (1984-2010) was formulated. The NAP embodies various policy and options aimed at revitalisation of the agricultural sector vis-a-vis the vigorous expansion of the industrial or manufacturing sector. The achievement of 65% self-sufficiency of rice with 185% cropping intensity and the productivity level of 4.5 mt/ha (recently revised to be 5.5 mt/ha) are policy objectives as far as paddy sub-sector is concerned. The NAP stresses that rice cultivation on large scale production is to be solely confined to eight granary areas in the country. Focus shall be given to such critical areas as human resources development, employment of new improved technologies, intensification of R&D, factor productivity increases and factor use changes, and the needs to

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<sup>4</sup> See : Feasibility Report on Tertiary Irrigation Facilities for Intensive Agricultural Development In the Muda Irrigation Scheme, MADA, January 1977 by S.H Thavaraj, Wong Hin Soon and Sardar Ali.



remain competitive, dynamic and market driven. Of significance in this context is the strategy of re-organisation of the farm production system and structure and that the program to be undertaken will stress among other things on :

- (a) expansion of mini-estates, group farming and other forms of centralised management system,
- (b) enhancing the involvement of farmers' organisations, including also the private sectors which would be the medium through which substantial investments and technological resources can be mobilised, and
- (c) adoption of corporate management approach in agricultural development.

### **1.3. Implications For Planning, Implementation and Reinforcement of Farmers' Organisation**

From the above historical perspective and the process of evolution of irrigation systems development, several implications can be derived :

- (1) Irrigation development should be seen as both technological as well as cultural innovation. This implies that for irrigation development systems to be effective within a specific locality, it has to fulfil at least three basic conditions, namely (i) technical soundness, (ii) economic feasibility, and (iii) social acceptability. Furthermore the system should not be static. Again the case of Muda II indicates such an adaptive feature of the irrigation systems that makes it socially acceptable by the farming community it serves. Another dimension related to social acceptability is the valid assumption that farmers, in most cases, are capable of accepting change. But their refusal to accept change should be seen more of a symptom of, rather than a cause to a problem.
- (2) The overall policy shift towards encouraging greater participation of farmers in systems maintenance should be seen as move away from the conventional stereo-typed 'planning for the farmers' towards 'planning with the farmers' approach. As was mentioned earlier, the success of Muda II not only in terms of getting farmers' consent but also enabling their inputs to be used for engineering design purposes, indicates the significance and usefulness of the latter approach to farmer participation in irrigated agricultural development. The approach underscores the factor of 'social acceptance' in farmer mobilisation and it should prove useful in efforts to establish functional water user groups (WUGs) in the granary areas.
- (3) Although the whole process of irrigated agricultural development has taken more than six decades, the subsequent phase (i.e the present era) should not take equally long a period to realise the NAP objectives. This is due to several favourable predisposing factors such as (a) the accumulated wisdom, exposure and experience of the present generation of farmers, (b) the accumulated wisdom and expertise of the systems

planners and implementers, (c) the degree of organisational competency (though there are more rooms for improvement), and (d) the level of technology currently available.

- (4) The National Agriculture Policy's emphasis on structural change incorporating strategic approaches to rice sector development is understandable if viewed from the above historical perspective. After six decades of 'soul searching' and piece-meal approaches the government has finally identified the need for a broad-based policy objectives that among other thing emphasises the need for review of policies, adjustment of scope of works of agencies involved , consolidation of organisational resources (which could involve closure of some agencies), revitalisation and streamlining of departmental roles. Development and mobilisation of farmers' resources for modernisation of irrigation water management systems would be more effective if it is supported by parallel efforts to review,<sup>5</sup> adjust, consolidate, revitalise and streamline the bureaucratic system which administers and supervises the development processes. To what extent an approach can assume the 'strategic' character will depend greatly on the extent of the systems' commitment and the speed to effectuate the necessary changes and the fine tunings of the systems itself. This is one way of interpreting the government's emphasis on structural change in the National Agriculture Policy as a guide to efforts aimed at modernisation of the rice industry.

## **2. THE PRESENT CONDITION**

### **2.1 The Farming Community & The Institutions<sup>6</sup>**

#### **(1) Socio-economic Profile**

##### **(a) Race :**

Almost 94% of the farming community are Malays while Chinese farmers are found mostly in Kerian-Sungai Manik area.

##### **(b) Religion :**

The predominant religion in the granary areas is Islam (see Table V - 1).

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<sup>5</sup> This is analogous to efforts to enhance the performance of a vehicle. While periodic maintenance of the engine components is necessary, it is equally necessary (though seldom done) to review the chassis, which could be a cause of low performance. This 'chassis factor' is a structural issue which calls for structural treatment.

<sup>6</sup> The above account is based on socio-economic survey undertaken by JICA Study Team in the five granary areas. As the sample for this study is small (n=500), the data should be treated only as indicative of current trends.

(c) Age Structure :

From Table V-2, it can be seen that out of the total study population of 2,381, there are 1,161 (48.7%) who are under the 20-year and below category, 838 (35%) in the 20 - 50 years and 382 (16%) are in the 50 years and above category. There is an equal distribution by gender between male and female members of the population. Further treatment of the data on the distribution of age group shows a trend where there are more 'economically not active group' or ENAG ( those within the 10-20 years and 50 years and above categories) than those 'economically active group' or EAG (those between 20-50 years). In the Kemasin Semarak area, the combined percentage of the ENAG is 64.8% as against 34.8% of the EAG. In the Besut area, ENAG makes up 66.8% as against 31.2% of EAG. Almost a similar distribution is found in the IADP Pulau Pinang area where ENAG forms 65% as compared to 35% EAG. Then in the Seberang Perak area, it is 68.6% as compared to 31.4% while in the Kerian Sg.Manik area the ENAG makes up 57.9% while EAG is 42.1%. In terms of gender the data indicates that there are more females than males in the EAG, while gender distribution within the young category (10-20 years) is almost equal. However in the 50 years and above category, there are more females than males.

One significant implication that can be derived from the above analysis is that there is a high degree of dependency among the population. This means that there is a small group of economically active group (EAG) that supports a bigger economically-not-active group (ENAG).

(d) Family Size :

Within the study area, the general trend indicates that the size of farm households in the east coast (Kemasin Semarak in Kelantan and Besut in Trengganu) is larger than those in the west coast, with the exception of the estate component of Seberang Perak project. For instance, in the Kemasin Semarak 30.8% of the farmer-respondents have family size of 8 and above, 29.2% having between 6-7 members, another 29.2% having between 4-5 members and only 10.7% have 3 children and below. This distribution compares more or less with the distribution in KETARA. Here the largest majority (35%) reported having 8 and more children, 25% having between 6-7 members, another 25% having 4-5 members, and only 15% having less than 3 children in the households. On the west coast, in IADP Pulau Pinang area, only 9.5% of the farmer-respondents reported having more than 8 children, 25.4% having between 6-7, another 25.4% between 4-5 while the biggest majority (39.7%) have less than 3 children. Similarly in the Seberang Perak area, those having 8 and more children account for only 13.4%, those having 6-7 account for 28%, while those having between 4-5, 24.4% and the biggest majority, 34.1%, have less than 3 children. In the Seberang Perak area only 13.4% of the farmer-respondents reported having 8 and more children, 28% with between 6-7, 24.4% with between 4-5, while the majority, 34.1%, reported having 3 children and less. Distribution of responses in the Kerian-Sungai Manik area reveals almost a similar trend. Here again, those reported having 8 children and more represents the smallest percentage, 9.4%, followed by 17.4% having between 6-7

children. The biggest majority, 39.6%, reported having between 4-5 children while 33.5% have less than 3 children. Only the estate component (FELCRA) has a somewhat larger percentage of farmer-respondents who reported having bigger family size. Here 33% reported having more than 8, 28% with between 6-7 and an equal percentage with between 4-5, while only 11% reported having less than 3 children. The above distribution of responses on household size would be more significant and meaningful if we examine it vis-a-vis the distribution of percentage of household members who are not in the labour force and the degree of participation in both farm and non-farm occupations. As is indicated in Table V-3, out of the total of 1,525 who are not in the labour force, 18.2% are children, 57% students, 20.3% housewives and 4.5% are in the 'old category'. From Table V-4, it can be seen that out of a total of 1,247 responses, 68% are engaged in farm works while the remaining 32% are engaged in non-farm works. Further breakdown among those in the farm work category shows that 67.5% are full timers as against 32.5% who are part-timers.

(e) Educational Status :

Further analysis of the data in Table V-5 indicates that the farming community in the granary areas is one that is largely literate with 80.7% in the literate category as contrast to only 13.9% who are in the illiterate category. Another noteworthy aspect of education among these farmer-respondents is that a sizeable percentage(19.5%) of them have had religious educational background.

From the above data, one implication can be derived, that is extension strategies that incorporate religious rationales on development such as in water -related issues, stand greater probability of acceptance by the target farmers.

(f) Participation in organisations :

Generally, the farmers in the granary areas are involved in many forms of groupings or organisations. The 'depth' and the 'extent' of their involvement could give some bearing on efforts to organise, train and mobilise them for either *ladang kelompok* or mini-estate as well in water user groups. Tables V-6(A),V-6(B) and V-6(C) show the pattern of the respondents' participation in the three types of organisations, namely i) village-based, locally initiated organisations, ii) village-oriented formal organisations, and iii) project/farm-based organisations. It is quite evident that their participation in the *khairat kematian* (village funeral association) is the most dominant (52.8%) among the first type of organisations, followed by the *Jawatankuasa Masjid* (mosque committee) with 30.8%, and the *Persatuan Ibu Bapa Guru* (Parent Teachers' Association) with 28.6%. Their participation in the second type of organisation is very minimal. Only 3.2% participate in the *Kemajuan Masyarakat* (village development committee) and 22.4% in the *Jawatankuasa Kemajuan & Kesejahteraan Kampung* (village security and development committee). In the third category of organisations, their participation is more pronounced. For instance, 73.8% of the farmer-respondents in the study area reported participating in the *Pertubuhan Peladang Kawasan* (Area Farmers'

Organisation). Participation in estate type of farming is confined only to farmer-respondents in FELCRA Seberang Perak.

The implication here is that since PPK is the predominantly known organisation, it follows that efforts to reinforce the farmers should be channelled to or be based on this organisation.

(g) Rating of the organisations :

Rating of the organisations is reflective of the 'depth' of their participation. As shown in Table V-7, 31.8% gave a 'very useful' rating to the Area Farmers' Organisation (PPK), followed by 60.8% who gave 'useful' rating while 7.1% gave 'not so useful' while 0.5% gave 'not useful' ratings. On the question of the organisations' effectiveness, 22.5% gave a rating 'very effective', 66.3% gave 'effective' as against 10.8% who regarded it as 'not so effective' and 0.5% as 'not effective'.

(h) Perception Toward Paddy Farming :

Paddy farming is still attractive to a majority of the farmer-respondents (62.4%). To 17.1% of the respondents it is 'more attractive' while to 14.9% it is 'less attractive'. See Table V-8.

(i) Perception Toward Women's Roles :

When asked about the roles of women in development, an overwhelming combined majority of 87.6% were positive towards the issue. Thirty eight percent perceived the role as 'very important and necessary', 48.9% perceived it as 'important and necessary'. See Table V-9. Such as perception is further strengthened in farm decision making, where 58% of the farmer-respondents did actually consult their wives in selection of seeds and paddy varieties and land preparation, recruiting labour for farm operations (30.2%), repayment of loan (33.4%) and securing credit facilities (38.6%). See Table V-10.

An important implication here is that there should be more articulation channels to strengthen the contribution of farm women in matters related to the proposed modernisation program.

(j) Perception Toward Water Management & Related Issues :

The analysis of data related to water management issues indicates a general tendency of a positive inclination of the farmers toward the proposed systems modernisation. A large majority of them (76.5%) responded positively toward the importance of farmers' roles in water management in which 23.3% 'strongly agree' to the statement that 'farmers do have an important role to play in operations and maintenance of the tertiary system' while 53.2% 'agreed' to the statement (see Table V-11). Of those who disagreed, 57.6% maintained that 'farmers just can not operate and maintain the canals',

34.1% expressed that 'it is difficult without DID's support', 4.7% opined that 'even if DID gives support it is difficult'. A small number of them (4.7%) maintained that it would be more difficult if DID does not perfect the system before handing over to the farmers'. See Table V-12.

In relation to the issue of the importance of the farmers' roles in O&M, the study also addressed to the types of knowledge and skills that the farmer-respondents would like to be focused on in O&M. 'Technical aspect' seemed to be top priority (70% out of the 500 respondents), followed by 'management organisation' (39.4%), 'organisation of farmers' groups' (30.2%) and 'others' as mentioned by 4.4%. See Table V-13.

(k) Willingness to form water user groups (WUG) :

Willingness to form water user groups (WUG) is another indication of the positive perception of the farmer-respondents toward the proposed systems modernisation. As shown in Table V-14, a large majority of them (69.5%) indicated their willingness as against 30.5% who were not willing to do so. Breakdown of the distribution of the responses by project areas indicates that the largest percentage of agreement is in the IADP Pulau Pinang, where 84% expressed their willingness as against 16% who expressed the otherwise. This is followed by Kemasin Semarak where the distribution is 80% against 20%, Kerian Sg.Manik 74% against 26%, Besut with 62% as against 38%, Seberang Perak (share system) with 44% against 56% and finally Seberang Perak 42.5% as against 57.6%.

- (l) Another related dimension that the study looks into is the respondents' perception toward the burden of the government in financing the irrigation systems. A question was asked as follows : " It has been calculated that to supply even one inch of water to a farmer's paddy plot costs the government about RM1,000/acre. This means that to supply water to our farmers is very costly. Do you think that our farmers also have to share the burden with the government?". The study found out that a majority of them, 59%, were negative about this. Only 22.5% of them thought that there should be a sharing of the burden. Further treatment of the data shows that among the project areas that records the highest percentage of disagreement on this issue is Seberang Perak (share system) where the percentage is 89%, followed by IADP Pulau Pinang (83%), Kerian Sungai Manik (82%), Besut (78%), Seberang Perak (72%) and finally Kemasin Semarak (61.5%) See Table V-15. Another noteworthy aspect is the issue that a sizeable number of the respondents (14%) claimed that they were not aware (of the money value of irrigation water itself). The study delves further into the reasons for the negative response towards the issue of sharing the financial burden. Table V-16 shows the response distribution. A large majority of the farmer-respondents (74%) gave 'not enough money to pay' as the overriding reasons, 19% maintained that the 'government should pay', 3.6% gave 'others' while 3.3% said they had 'no idea'.

The data indicates that 'affordability' is the overriding factor and this should be considered in the proposed modernisation plan. Some alternative payment arrangements should be worked out.

(2) Farmers' Organisation

(a) Key Agencies Involved In Farmers' Organisation

There are three main agencies directly involved in organising farmers in paddy farming, namely the Department of Agriculture, the Farmers' Organisation Authority of Lembaga Pertubuhan Peladang (LPP) which undertakes farmer development program through the Area Farmers' Organisation of Pertubuhan Peladang Kawasan (PPK) and the Federal Land Consolidation & Rehabilitation Authority (FELCRA). The first two are under the Ministry of Agriculture (see Figure V-1) while FELCRA is under the Ministry of Rural And Co-operative Development. Under these agencies farmers are organised into group farming arrangements called ladang kelompok, mini-estate and large-scale paddy estate. While the DOA and PPK are both involved in ladang kelompok, only PPK has been known to be engaged in implementing mini-estates, while FELCRA is the only agency so far that is undertaking a large-scale paddy estate development in the country.

What differs between the approaches of DOA and PPK with respect to ladang kelompok is that participant-farmers in projects under DOA are organised on project-specific basis without pre-determined geographical boundaries, while those under PPK are organised within specific area or locality. This locality-specific approach of PPK has had its own history dated back to the 60's. It was modelled after Taiwanese area development centre concept. The project-specific approach of DOA (currently known as project-impacted approach) on the other hand, was formulated based on the Training & Visit (T&V) extension approach advocated by the World Bank around the 80's. It can be seen here that DOA's emphasis is more in extension program aimed at effectuating the transfer of new farming technology (see list of DOA's major activities below). Whereas PPK's emphasis is more on broader-based farmer development. Hence there are instances where ladang kelompok under DOA's supervision are located side by side with ladang kelompok under PPK's supervision. However within the granary areas, a varying degree of co-ordination has been maintained through the Project Management Unit (PMU) of the Integrated Agricultural Development Project or IADP. In the case of MADA and KADA, ladang kelompok and mini-estate projects are managed directly by these authorities. Hence the issue of co-ordination (or lack of it) does not arise.

(i) Department of Agriculture

Major Activities

- To increase productivity through effective transfer of farm technology
- To effect changes in the attitudes of farmers towards farming so that they are more willing to accept new technology to participate in agricultural development
- To increase the contribution of the agricultural sector to the national economy by encouraging and promoting the cultivation of specific crops.

(ii) **Farmers' Organisation Authority (LPP)**

Objectives

- To promote, stimulate and facilitate the economic and social development of farmers' organisation
- To register, control and supervise farmers' organisation and provide for related matters
- To plan and undertake agricultural development within designated farmers' development areas
- To control and co-ordinate the performance of the above mentioned activities.

Major Functions

- Providing financial assistance to farmers' organisation by financing their business or farming operations
- Providing technical services and guidance programs to enhance the overall development of farmers' organisation
- Providing development assistance in the form of basic infrastructure assistance such as office, building, machinery, stores, vehicles etc. to farming operations
- Providing managerial assistance by assigning management teams to operate and manage local farmers' organisations until they are self- sustaining.

(iii) **Federal Land Consolidation and Rehabilitation Authority (FELCRA)**

The country's only large-scale paddy estate is entirely managed by FELCRA in Seberang Perak, in the northern state of Perak. The project was successfully implemented with the assistance from the World Bank in late 1980s.

Objectives

- To create more employment in the agricultural sector
- To increase the productivity of the participants with improved agricultural methods and management of resources, and
- To increase land ownership with equitable distribution

Major Functions

- To rehabilitate state land schemes either on its own motion and with the approval of state government or at the request of state authority
- To develop and schemes with the approval of the state government
- To rehabilitate and develop alienated lands



(iv) Drainage & Irrigation Department

The Drainage & Irrigation Department (DID) has been the key supporting agency which is involved in water management for paddy farming since its establishment in 1930s. The National Water Management Training Centre that it supervises plays an important role on training both DID personnel as well as farmers in related fields of water management.

Major Functions

- Expansion and improvement of irrigation, drainage and flood control facilities in paddy areas for crop improvement and crop intensification
- Planning and construction of major flood control and drainage works such as coastal and river bunds and tidal control gates
- Reclamation of swamp lands and tidal lands by providing drainage and irrigation and flood control facilities for cultivation of paddy and other non-paddy crops by small holders
- Mitigation of flooding in rural and/or agricultural areas by carrying out river improvement works such as de-silting, clearing, realignment and draining of rivers and the construction of major drainage works
- Planning and construction of flood mitigation works in urban areas
- Collection, dissemination and publishing of hydrological data and water resources information for the planning, development and management of the nation's water resources.

(v) National Water Management Training Centre

Objectives

- To provide training to the staff involved in the planning and operation of irrigation projects and systems and on-farm water management techniques for paddy cultivation
- To provide training to paddy farmers in on-farm water management techniques to improve cultivation and increase crop production
- To provide better understanding and co-operation between the engineering and agricultural personnel in the operation of irrigation projects through water management training courses

Major Functions

- To conduct training programs in various irrigation projects in the country and short-term courses for selected paddy farmers from various projects
- Operation of demonstration farms to demonstrate effective water management techniques

- To establish pilot farms in irrigation projects in different parts of the country to provide practical examples to farmers of improved water management, not only for paddy but also for high value crops such as fruits and vegetables.

(vi) **Integrated Agricultural Development Projects (IADP)**

The government of Malaysia has established IADPs as a major approach to promote integrated agricultural development in the country. Most of these IADPs were established during the 80's. There were altogether 15 IADPs in the whole country including Sabah and Sarawak. At the time of this study it was indicated that one (IADP Pahang Barat) has ceased operations. Five IADPs have involved in the study namely IADP Kemasin Semarak, KETARA, IADP Pulau Pinang, IADP Pulau Pinang, IADP Seberang Perak and IADP Kerian Sungai Manik. The project office known as Project Management Unit (PMU) supervises and co-ordinates planning and implementation of various projects undertaken by component departments such as DOA, DID, PPK and several others. For reference Fig.V - 2 illustrates the organisation structure of IADP Besut.

## 2.2 Organising The Farmers

### (1) A Brief Background

Farmers were first organised in 1960's under Persatuan Peladang or Farmers' Association principally in the Muda Irrigation Scheme. The whole Muda scheme of about 100,000 hectares were divided into 27 farm localities and in each of these 27 farm localities, a farmers' development centre was established. Each farm locality was demarcated on administrative boundaries such as kampung or mukim and not on irrigation boundaries. The kampung was the lowest unit of organisation. The farmers were organised into what was called yunit pertanian kecil or small agricultural unit. Here, the lowest unit or organisation was the kampung or village and farmers were organised into what was called yunit pertanian kecil or small agriculture unit (SAU) comprising one or more kampung. Farmers' leaders known as Ketua Yunit Pertanian Kecil (SAU Leaders) were elected to represent the farmers in the Board of Directors of each Farmers' Association. One of these leaders was elected to be the Chairman of the BOD, another as Deputy Chairman Association. One of these leaders was elected to be the Chairman of the BOD, another as Deputy Chairman, one as Secretary and another as Treasurer (however the latter two posts were sometime held by staff of the Association especially those that were newly established). Farmer leaders were elected once a year through mesyuarat agong tahunan (annual general meeting) and depending on their capability and leadership qualities they were entitled for re-election. The management of the FA was headed by a General Manager, assisted by several key staff each in charge of Agronomy, Farm Mechanisation, Water Management, Credit and Social-Welfare functions. Beside there were a few supporting staff in the administration section.

In later part of 1970s with the passage of Farmers' Organisation Authority Act 110, these Persatuan Peladang or FAs in the Muda and KADA irrigation schemes were changed to Pertubuhan Peladang Kawasan (PPK) to be consistent with those outside these two schemes.

However the day-to-day management of these PPKs in these two schemes were and are still under the direct management of both MADA and KADA, while those outside come under the jurisdiction of PPKs directly under the Farmers' Organisation Authority or LPP.

During the decade of 1980s, DOA under the National Extension Program intensified the extension activities using the T&V (training and visit) approach. This program led to the establishment of group farming (ladang kelompok) in various parts of the country through the IADP offices. Being project-specific in nature, these ladang kelompok concentrated on the cultivation and promotion of various types of crops including paddy.

Within this period also several attempts by various agencies in experimenting with newer approaches to promote paddy production were made. While in MADA and later in KADA schemes the approach adopted or experimented was the land consolidation (Tanah Merah Pilot Project, Kedah and the Ladang Merdeka at Mulong Lating, Kelantan respectively), PPK experimented with the mini-estate approach in several parts of the country such as Kubur Panjang (Kedah), Permatang Pauh (Kg. Pelet) and Sabak Bernam (Selangor).

One noteworthy feature during this decade of experimentation was that water management efficiency began to assume increasingly important role. One of the constraints was the issue of organising or re-organising the farmers based on new irrigation layout rather than on conventional criteria of residential or village neighbourhood. Efforts in this direction were started since mid-1980s by several agencies including MADA and KETARA. The focus is hereby given to KETARA in this context since it has successfully re-organised farmers on the basis of common water sources in each irrigation service area (ISA). In this way the farmers within each ISA are more or less independent in terms of water supply and management, hence better observance of irrigation and planting schedules.

## (2) Water User Group in Besut Irrigation Scheme - A Pilot Project In Water User Group

KETARA has undertaken rather a long-drawn experimentation in this direction. Water user group in KETARA started as ladang kelompok based on the project-specific T&V approach. The emphasis then was to transfer new farm management practices (higher yielding varieties and new fertiliser application methods to the farmers). Basis of grouping was the village from which they came. In 1979 there was some kind of inter-granary collaboration with North West Selangor IADP which at that time was at the advanced stage of planning for an irrigation-based group farming. Such collaboration resulted in more focussed attention given by KETARA to irrigation management matters. A Water Management Unit was established. Farmers began to be organised along irrigation service area or ISA. The subsequent progress, after taking almost 17 years, saw the success of re-organising the participant farmers according to irrigation lay-out. Based on the number of ISAs, the farmers were organised into 78 groups called Kumpulan Petani or KPs. Further efforts were made in 1997 by KETARA to 'fine tune' the water user group at the field level. This was because of the inter-dependence of farmers of two neighbouring ISAs when it came to the delivery of irrigation water hence affecting planting schedule. This time the farmers were re-organised according to common water sources. This resulted in the creation of only 30 ISAs due to consolidation of the service area. This means that these thirty KPs are now independent units in terms of water supply. The Kubang Depu pilot project can be used as a guide to efforts to re-organise farmers in other IADP areas (taking into consideration local socio-economic, political-cultural and physical-technical differences).

Quite recently KETARA has decided that in term of water management function, each kumpulan petani or KP should also function as kumpulan pengurusan air or water user group (WUG). The foundation is now set for these WUGs to function as a vehicle to enhance water management efficiency. See Fig.V-3 : Organisation Chart of Kubang Depu Water User Group.

### **3. PROPOSED MODERNISATION OF FARMERS' ORGANISATION - WATER USER GROUP (WUG)**

#### **3.1 Fundamental Assumptions**

The following proposal for modernisation of farmers' organisation, especially the establishment and promotion of water user groups (WUG) in the granary areas has been prepared by considering four fundamental assumptions, namely :

- (1) that majority of the farmers in the granary areas are capable and desirous of accepting change provided the change is technically sound, economically feasible and most importantly it is introduced to the farmers in the most socially acceptable manner.
- (2) that farmers would only co-operate if they are given the 'chance to say something' to those who plan the program of change. And that being more practical and rational in their farm operations (than those who plan the change itself) the farmers should be consulted during the whole design and implementation process.
- (3) that there must be excellent and functional communication at three critical levels, namely at (a) bureaucracy or agency level - communication between officer-officer, (b) at project level - communication between officer-farmer, and at (c) at farm level - communication between farmer-farmer.
- (4) that once a new practice (innovation) is accepted initially by a small group of farmers, the process of 'routinisation' of that practice would gradually lead to development of a tradition in the long term perspective. And that the 'routinisation' process itself takes time. Hence the will (especially political will), commitment, focus and institutional support must be sustainable over a long period of time.

#### **3.2 Proposed Guidelines For The Formation Of Water User Group**

A special committee comprising senior staff of DID, MADA,IADP North West Selangor and National Water Management Training Centre recently had completed preparing guidelines for the formation of water user group (WUG) in all the granary areas, including MADA,KADA and North West Selangor. The draft guideline will be submitted to the Ministry of Agriculture for approval. Following are the detail items in the guidelines :

- (1) Each WUG should be an independent unit with clearly demarcated irrigation-based boundary. This is to ensure the formulation of optimum water management strategy and to enhance efficiency of farm input utilisation which are essentials for agricultural development.
- (2) WUG should adopt the participatory planning approach. The target beneficiaries (the farmers) should be consulted during the planning process regarding their priority, perceptions and needs. Active involvement of farmers increases their acceptability of new concepts and ideas relating to water management.
- (3) To function effectively the participation of all farmers in designated WUG boundary is essential. Although it is appreciated that in many situations this may be difficult owing to political and social divisions, it is desirable that concerted efforts be made to solicit the participation of all farmers.
- (4) Members of WUGs should be *bona fide* farmers. When a farmer operates several parcels of land located in different areas, he is allowed to participate in different WUGs.
- (5) Each WUG should comprise only *bona fide* farmers within it. These farmers will elect a WUG committee through democratic process. This committee will in turn elect from among its members one head who represents that WUG at the grass root-level. The other main committee members are Treasurer and Secretary. Other portfolios can be arranged according to the scope and needs of agricultural activities in the WUG.
- (6) The roles of the WUG head is to inform all *bona fide* farmers within the WUG of his jurisdiction as to the irrigation and cropping schedules determined by the irrigation authority. The WUG head is also responsible to liaise with all the other WUG heads in areas requiring inter-WUG co-ordination, such as the organisation and deployment of labour and machines, so that the cropping schedules determined are achieved. His other responsibility is to act as representative and spokesman for all members in his WUG at the farm locality (PPK) level.
- (7) Each WUG should be linked horizontally with other WUGs within the locality and vertically with the Area Farmers' Organisation (PPK) so as to avoid institutional conflicts.
- (8) Government agency representatives e.g Agricultural Assistants from DOA and the Irrigation Inspectors from the DID) should attend WUG meeting at the locality level.
- (9) WUG at locality level should be chaired by the Deputy Chairman of the Area Farmers' with the General Manager of PPK as Secretary.
- (10) WUG at locality level will function as co-ordination centre for irrigation matters. It is also the main avenue for irrigation extension programs and acts as a source of feedback

on farm level problems to extension workers. One of the major roles of WUG at locality level is to ensure fair distribution of irrigation water and prompt response to any water- related problems that may arise.

- (11) All the IADPs should develop a comprehensive program on WUG development in their respective command areas. Time frames should be developed to ensure WUG establishment is according to schedule. The above program should also clearly define the supervisory roles of the IADP staff involved in WUG activities.
- (12) Pilot studies and communication surveys on knowledge, attitude and practice of farmers should be conducted where necessary for further refinement of WUG performance.
- (13) Incentives will be provided to encourage active participation of farmers in WUG activities. This could be implemented by channelling part of the maintenance allocation to WUG. All WUGs should be recognised as functional and direct recipients of such allocation. All the farmers in each WUG are entitled to participate in the maintenance works and receive payment commensurate with the efforts contributed by them.
- (14) Payment of allowances to the heads of the WUGs by government is to be avoided.
- (15) System of payment to WUG for maintenance work should be clearly formulated in accordance with Treasury Instructions.
- (16) The formation of WUG in each IADP should begin in areas where farmers are well organised and responsive to innovative ideas.
- (17) Listing of all the bona fide farmers in WUG should be the joint responsibility of the agriculture and irrigation staff of IADPs.
- (18) Identification of contact farmers (potential leaders and key informants) should be carried out with consultation with PPK.
- (19) All IADPs should develop training program for staff and farmers on the concept, principles and modus operandi of WUG in their command areas. Training should follow the principles of rural reconstruction : "Start with what people already know and build on what they have".
- (20) Training curriculum for WUG should be developed to ensure uniformity and consistency.
- (21) The initiation of WUG should be on a phased basis beginning with situations with the greatest chances of success. This will act as practical demonstration of the usefulness of WUGs to other farmers. Conversely a blanket approach to widespread formation of WUGs should be avoided.

- (22) As IADPs vary in their physical, socio-economic and institutional environments, tailoring of WUGs to local conditions is to be left to the discretion of the IADP management.
- (23) Although WUGs are not paid allowances by the government, it is recommended that each WUG establish a fund consisting of nominal contributions from members. This will be helpful in defraying incidental expenses incurred for WUG meetings as well as funding communal group activities (gotong royong).

### 3.3 Proposed Structure For Modernisation Program

Since the program of promoting water user group would be a major exercise, and to ensure its sustainability, WUG should be integrated to a wider and higher level structures of the development systems bureaucracy. Issues such as organised participation of WUG in large scale O&M contracts, involvement in mini-estate management, integrating DOA's group farms (ladang kelompok) under PPK set up, land levelling and more critically land consolidation - all these require deliberations and decisions at high level levels of the bureaucracy. For this purpose, it is proposed that three major pre-requisites (which necessitate and expedite structural changes as well as incorporating strategic approaches) be considered, namely :

- Establishment of organisational structure aimed at promoting integration of all key 'players' - the farmers, the planners, the implementers and the decision-making system
  - Formation of Inter-Granary Task Force to expedite the planning and implementation of WUGs
  - Formation of Inter-Granary WUG Leaders' Council
- (1) Establishment of organisational structure that promotes integration of all key 'players' is imperative. Fig. V- 4 illustrates the various levels where such integration should be promoted. The levels are :-
- (a) Level 1 : Farm Level involving farmers in irrigation service unit or irrigation service block (depending on the scheme).

At this level a Water User Group Committee (Jawatankuasa Kumpulan Pengguna Air or JKPA) shall be formed comprising farmers within each irrigation service area. The chairman of this committee shall be the WUG Leader (Ketua Tani as is known in Besut scheme) and members shall comprise Irrigation Service Unit Heads or Block Leaders. Although the exact nature or procedure of forming this Water User Group Committee has not been spelt out and much of the matter shall be left to the discretion of the respective IADPs, it is felt that existing group farming committee (Jawatankuasa Ladang Kelompok) and the management committee of mini-estate can be transformed

into WAUGC. However this transformation should be done when re-organisation of farmers according to new irrigation layout is completed or is at an advanced stage.

(b) Level 2 : Area/Locality/Compartment

At this level, a committee called Area/Locality Irrigation Committee (Jawatankuasa Pengairan Kawasan) shall be established and to be chaired either by General Manager of Area Farmers' Organisation (PPK) or Assistant Agriculture Officer or Compartment Task Force Head as in the Besut scheme. Members of this committee shall comprise relevant agencies' staff and WUG Leader (Ketua Tani as in Besut scheme)

(c) Level 3 : District Level

A District Irrigation Committee (Jawatankuasa Pengairan Daerah) is to be chaired either by District Engineer or District Agriculture Officer while membership shall comprise staff from relevant agencies and WUG Leaders each representing his Representation from farmers within relevant districts. However this committee will be relevant with Besut scheme which involves only one district, namely Besut.

(d) Level 4 : Project/Scheme Level

A committee known as IADP Implementation Committee (Jawatankuasa Pelaksanaan IADP) shall be formed at this level to be chaired by General Manager MADA/KADA or IADP Director.

(e) Level 5 : Ministry Level

A Task Force to be chaired by Senior Official from the Ministry of Agriculture is proposed at this level. Membership shall comprise senior officials from relevant departments and agencies such as Drainage & Irrigation Department, Department of Agriculture, Farmers' Organisation Authority (FOA).

Two options are proposed here. The first option proposes that the Task Force is to be chaired by the Ministry of Agriculture while the second option is to have this Task Force chaired by the Economic Planning Unit of the Prime Minister's Department. The second option is proposed in view of such major undertakings as land consolidation that is planned under the modernisation program. And as land consolidation involves tremendous problems and constraints - both social and political - it is felt that this matter should be given attention by the highest level of the bureaucratic systems. Furthermore as land is a state matter, high level representation from the relevant state governments is crucial indeed.

(2) Formation Of Inter-Granary Task Force - this Task Force should comprise experienced personnel from key departments and agencies such as MADA, DOA, KADA,



KETARA, DID and PPK. Members from other agencies could be opted at a later stage. While detail terms of reference and scope of works of this Task Force should be decided later, its main objective is to assist IADPs in the setting up of WUGs and related matters such re-organising farmers according to new irrigation boundaries etc. A pool of combined professional resources is required in this very difficult but challenging works. MADA's approach in extension through the *kursus tempatan* or local courses<sup>7</sup> shall be useful in strengthening extension activities required by the modernisation program. And this input shall be harnessed significantly by MADA's involvement in this proposed Task Force.

- (3) Formation Of Inter-Granary WUG Leaders' Council - as this modernisation program is of a major scale, it is felt very vital to have direct and active involvement of farmers' leaders. The effectiveness of farmers' representation shall be achieved through what is proposed to be known as the Inter-Granary WUG Leaders' Council. This could be a positive platform for a strong farmers' participation not only in irrigation planning and implementation but also (though at a later stage) in commercialisation and privatisation programs. Some reference to Jawatankuasa Penyelaras Pengerusi Pertubuhan Peladang MADA or MADA's Farmers' Organisation Chairmen Co-ordinating Council which has instrumental in efforts to mobilise Muda farmers' resources, should be useful. Through intensive and properly planned social engineering program, a functional communication between agency-to-agency, between agency-to-farmers and between farmers-to-farmers can be fostered. Active co-ordination and interactions between this WUG Leaders' Council and the Inter-Granary Task Force would greatly smoothen the implementation of the proposed modernisation program.

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<sup>7</sup> *Kursus tempatan* or local course is a specially designed and formulated extension program which aims at getting farmers' reactions, comments, criticisms and suggestions toward a proposed project through a very casual manner. An extension team normally comprising experienced Agricultural Technicians, one with a religious knowledge and background, one who is good at 'casually provoking' and one who is proficient in irrigation matters. Sometime other staff (Sociologist, Planning Engineer) do attend also. These extension sessions are held in such informal places as farmers' houses, suraus, mosques and community halls. Through these very casual and friendly sessions (lunch and refreshments are served on MADA's account) farmers' genuine reactions are obtained and 'brought back' to planning office. The effectiveness of this kind of extension approach could be proved by the trouble-free land acquisition process for the tertiary development program of MADA and it has been acknowledged by the World Bank.

## ***TABLES***



**Table V-1 : Distribution of Study Population By Race & Religion**

Area	Ethnic Group				
	Malay	Chinese	Indian	Others	Total
K/Semarak	406	-	-	-	406
Ketara/Besut	386	-	-	-	386
IADP P/Pinang	570	-	1	-	571
Sbg.Perak	406	-	-	-	406
Kerian S/Manik	529	165	-	1	695
Sbg.Perak (share system)	114	-	-	-	114
Total	2411	165	1	1	2578

**Table V-2 : Distribution of Study Population By Age Group & Gender**

Age Category	Below 20 years			20-50 years			50 years and above			Total
	Male	Female	Total	Male	Female	Total	Male	Female	Total	
K/Semarak	101	93	194	65	68	133	30	25	55	292
Ketara/Besut	116	112	228	59	60	119	20	14	34	381
Pulau Pinang	105	131	236	83	91	174	36	56	92	502
Sbg Perak	89	89	178	51	62	113	26	43	69	360
Kerian S/Manik	133	124	257	125	147	272	69	48	117	646
Sbg Perak (share system)	37	31	68	9	18	27	9	6	15	110
Total	581	580	1161	392	446	838	190	192	382	2381

**Table V-3: Distribution of Household Members Not In the Labour Force**

Area	Children	Student	Housewife	Age Person	Total
K/Semarak	38	168	27	10	243
Ketara/Besut	67	140	35	5	247
Pulau Pinang	41	199	105	18	363
Sbg Perak	58	125	59	16	258
Kerian S/Manik	46	203	66	16	331
Sbg Perak (s/system)	28	35	17	3	83
Total	278	870	309	68	1525
%	18.2	57	20.3	4.5	100

**Table V- 4 : Distribution Of Respondents' Occupation By Farm Work & Non-farm Work**

Area	Full Time	Part Time	Total	Self Employed	Public Sector	Private Sector	Total
K/Semarak	106	34	140	25	13	1	39
Ketara	60	38	98	26	11	25	62
Pulau Pinang	121	57	178	41	23	45	109
S/Perak	81	31	112	7	18	22	47
Kerian S/Manik	188	116	304	37	23	67	127
S/Perak (s/system)	18	-	18	10	1	5	16
Total	572	276	848	145	89	165	399
%	67.5	32.5	100	36.3	22.3	41.4	100

**Table V- 5 : Distribution of Respondents By Educational Status**

Area	NFE *	Primary	Form 1-5	Lower 6-Upper 6	Higher School Certificate	Vocational & Technical	Religious Education	Total
K/Semarak	57	120	153	15	8	1	55	409
Ketara	44	129	138	15	1	-	22	349
P/Pinang	51	228	216	15	23	3	198	734
S/Perak	44	167	142	5	5	1	53	417
Kerian S/Manik	40	285	254	33	22	5	207	846
S/Perak (s/system)	8	60	33	-	1	1	26	129
Total	244	989	936	83	60	11	561	2884
%	8.5	34.3	32.5	2.9	2.1	0.4	19.5	100

\* NFE = no formal education

**Table V - 6 (A) : Participation Rate In Locally-initiated Village Organisations**

Area	Village Funeral Association 1	Village Feast Utensils Association 2	Mosque Committee	Parent-Teachers Association
K/Semarak	10	-	10	18
Ketara/Besut	13	5	18	29
Pulau Pinang	60	46	32	10
Sbg Perak	62	13	18	32
Kerian S/Manik	104	62	72	49
Sbg Perak (s/system)	15	4	4	5
Total	264	126	154	143
%	52.8	25.2	30.8	28.6

1 Khairat Kematian 2 Syarikat Pinggan Mangkok

**Table V - 6 (B) : Participation In Village-Oriented Formal Organisations**

Area	Community Development/KEMAS	Village Development & Security Committee
Kemasin Semarak	1	16
Ketara/ Besut	5	16
Pulau Pinang	0	16
Sbg. Perak	7	13
Kerian S/Manik	2	46
Sbg Perak (share system)	1	2
Total	16	112
Answer/500	32%	22.4%

**Table V - 6 (C) : Participation In Farm/Project-based Organisations**

Area	Area Farmers' Organisation	FELCRA
Kemasin Semarak	49	1
Ketara/Besut	25	1
IADP Pulau Pinang	70	0
Sbg Perak	36	61
Kerian Sungai Manik	179	3
Sbg Perak (share system)	10	11
Total	369	77
Answer/500	73.8%	15.4%

**Table V - 7 : Respondent's Rating of Area Farmers' Organisation (PPK)**

Area	V/U	Useful	N/S/U	Total	V/E	Efficient	N/S/E	N/E	Total
Kemasin	15	34	4	53	11	36	6	0	53
Ketara	8	40	4	53	7	29	6	1	43
P'Pinang	40	30	5	75	31	24	2	0	57
S/Perak	18	41	8	67	14	44	8	0	66
Kerian	58	120	9	188	27	135	20	1	183
S/Perak (s/system)	4	10	2	16	4	9	3	0	16
Total	143	275	32	452	94	277	45	2	418
%	31.6	60.8	7.1	100	22.5	66.3	10.8	0.5	100

V/U = very useful N/S/U = not so useful V/E = very efficient N/S/E = not so efficient N/E = not efficient

**Table V - 8 : Respondents' Views Toward Paddy Farming**

Area	Still Attractive	More Attractive	Less Attractive	Not Attractive Anymore	No Idea	Total
Kemasin	42	17	5	0	1	65
Ketara/Besut	44	3	10	0	3	60
P/Pinang	56	2	15	0	2	75
Sbg Perak	45	21	7	1	6	80
Kerian S/Manik	112	38	35	6	9	200
Sbg Perak (share system)	12	4	3	0	0	18
Total	311	85	74	7	21	498
%	62.4	17.1	14.9	1.4	4.2	100

**Table V-9 : Respondents' Perception Toward Women's Roles In Farm Operation**

Area	Very Important & Necessary	Important & Necessary	Not Important	No Idea	Total
Kemasin	28	33	3	0	64
Ketara/Besut	20	36	3	1	60
Pulau Pinang	8	52	13	2	75
Sbg Perak	40	32	7	1	80
Kerian S/Manik	85	82	17	13	197
Sbg Perak (share system)	10	6	1	0	17
Total	191	241	44	17	493
%	38.7	48.9	8.9	3.4	100

**Table V - 10 : Respondents' Consultation With Wives In Farm Decision Making**

Area	Seed/Variety Selection	Land Preparation	Recruitment of Labour	Loan Repayment	Securing Credit
Kemasin	51	49	9	7	6
Ketara/Besut	41	46	21	11	11
Pulau Pinang	23	15	8	24	28
Sbg Perak	32	23	32	31	40
Kerian S/Manik	133	114	73	87	98
Sbg Perak (share system)	10	7	8	7	10
Total	290	254	151	167	193
%	58	50.8	30.2	33.4	38.6

**Table V - 11 : Views Toward Farmers' Role In O & M**  
(Question : " Do you agree that farmers have a role to play in O&M of tertiary system?")

Area	Strongly Agree	Agree	Disagree	No Idea	Total
Kemasin	11	44	9	1	65
Ketara/Besut	9	30	17	4	60
Pulau Pinang	25	45	5	0	75
Sbg Perak	19	25	26	11	81
Kerian S/Manik	50	110	21	14	195
Sbg Perak (share system)	1	9	7	1	18
Total	115	263	85	31	494
%	23.3	53.2	17.2	6.3	100



**Table V - 12 : Reasons For Disagreement To Farmers' Role In O&M**

Area	Farmers cannot operate & maintain the system	It's difficult without DID's support & advice	It's difficult even with DID's support & advice	It's difficult to collect fees	It's even more difficult if DID does not perfect the system first
Kemasin	3	3	1	1	1
Ketara/Besut	12	10	0	0	0
Pulau Pinang	2	2	1	0	0
Sbg Perak	17	5	3	1	0
Kerian S/Manik	10	9	1	1	3
Sbg Perak (share system)	5	0	1	1	3
Total	49	29	7	4	4
%	57.6	34.1	8.2	4.7	4.7

**Table V - 13 : Types of Knowledge & Skills In O&M Preferred By Respondents**

Area	Technical Aspect	Management Organisation	Organisation of Farmers' Group	Others
Kemasin	55	21	17	1
Ketara/Besut	44	19	15	8
Pulau Pinang	66	37	21	2
Sbg Perak	55	28	18	5
Kerian S/Manik	117	88	73	6
Sbg Perak (share system)	13	4	7	0
Total	350	197	151	22
% (answer/500)	70 %	39.4 %	30.2 %	4.4 %

**Table V - 14 : Willingness of Respondents To Form Water User Group**

Area	Willing	Not Willing	Total
Kemasin	52	13	65
Ketara/Besut	37	22	59
Pulau Pinang	63	11	74
Sbg Perak	34	46	80
Kerian S/Manik	148	10	18
Sbg Perak (share system)	8	10	18
Total	342	150	492
%	69.5	30.5	100

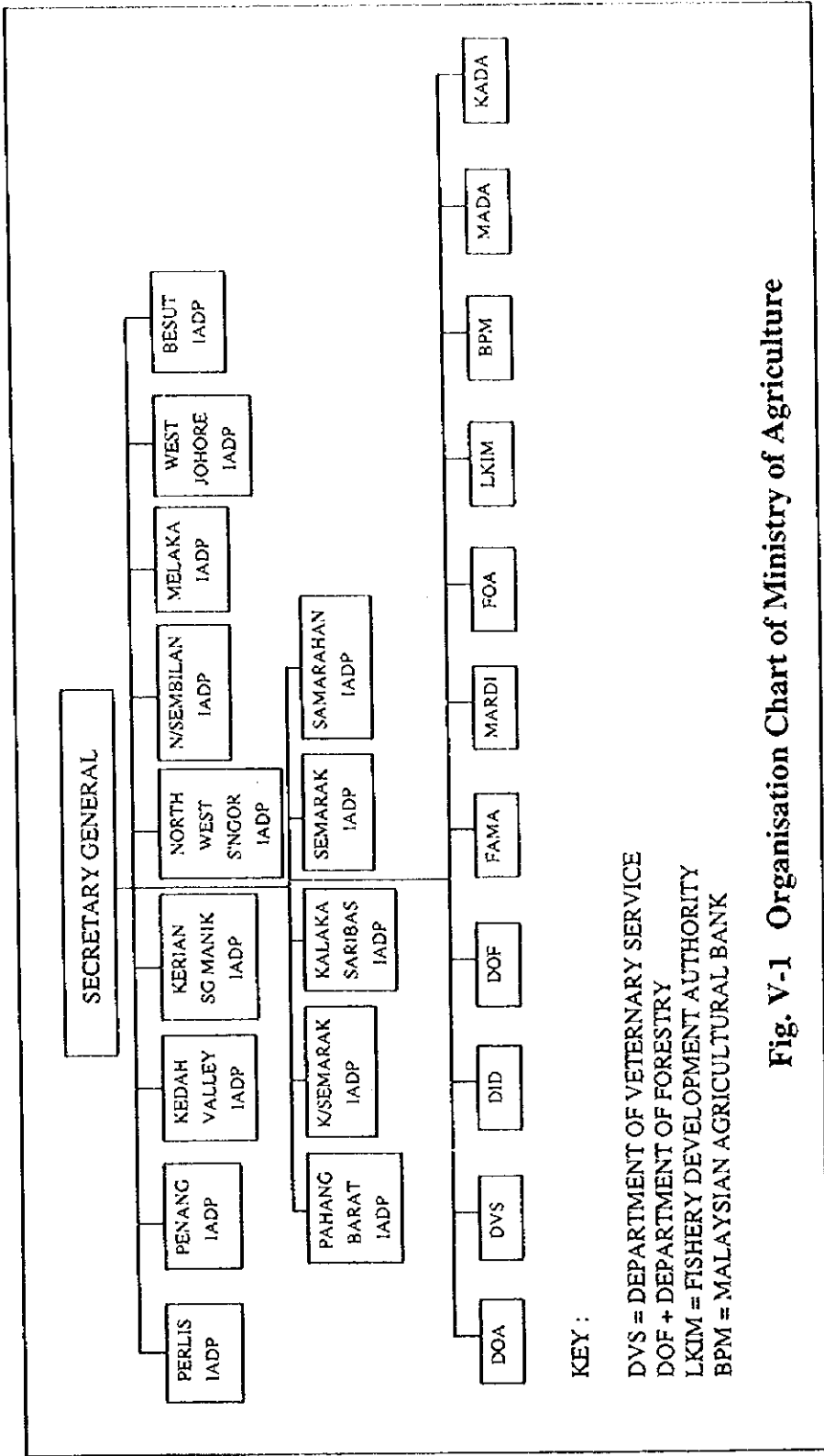
**Table V - 15 : Views Toward Sharing of Financial Burden**

Area	Yes	No	Not Aware	No Idea	Total
Kemasin	25	28	9	3	65
Ketara/Besut	13	39	8	0	60
Pulau Pinang	13	51	10	0	74
Sbg Perak	23	46	3	9	81
Kerian S/Manik	36	117	39	7	199
Sbg Perak (share system)	2	12	1	3	18
Total	112	293	70	22	497
%	22.5	59	14.1	4.4	100

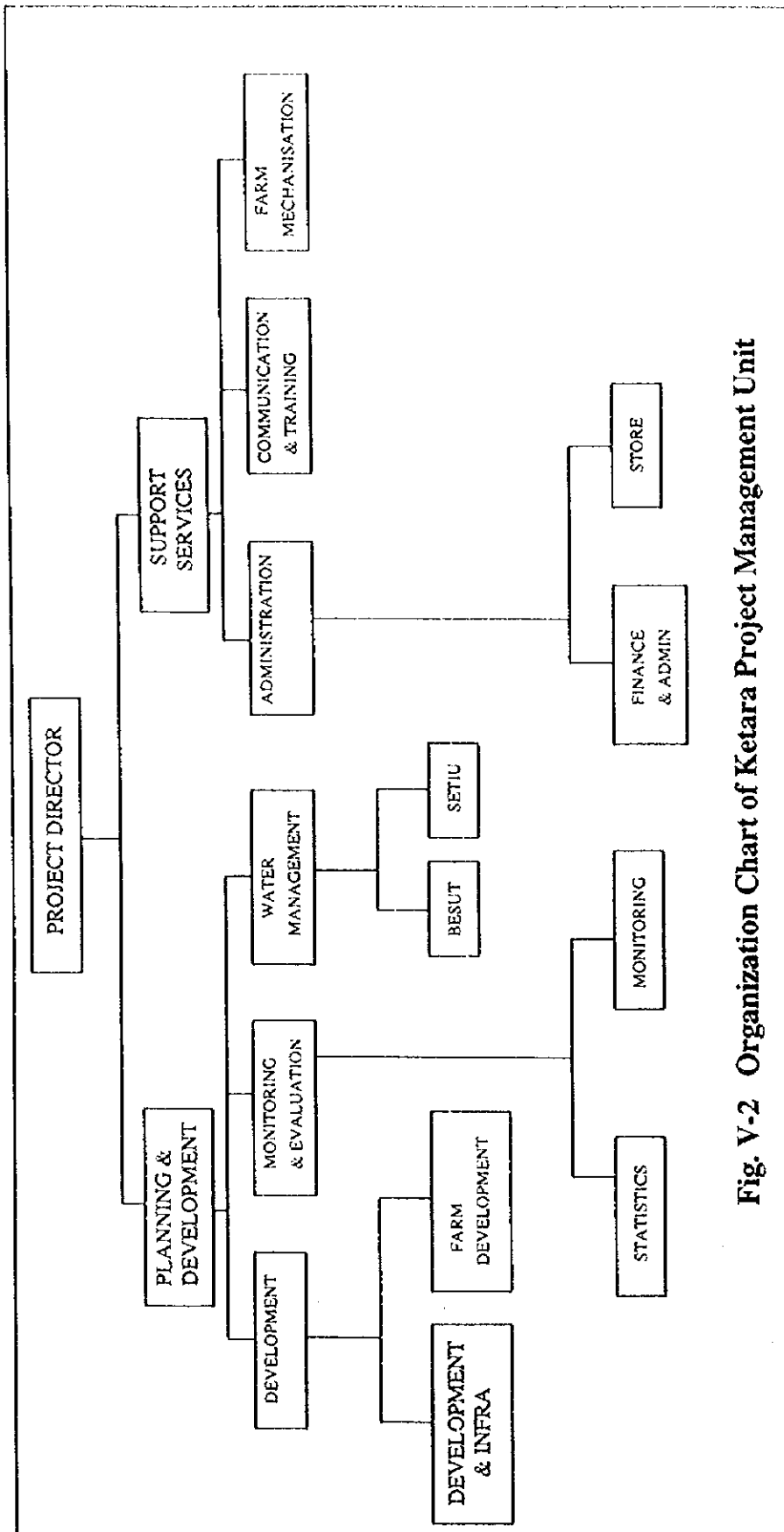
**Table V - 16 : Reasons For Disagreement On Sharing Of Financial Burden**

Area	Not enough money	Govt should pay	Others	No idea	Total
Kemasin	22	9	0	1	32
Ketara/Besut	36	4	3	3	46
Pulau Pinang	38	10	1	1	50
Sbg Perak	37	4	1	3	45
Kerian S/Manik	85	27	6	2	120
Sbg Perak (share system)	8	4	0	0	12
Total	226	58	11	10	305
%	74.1	19	3.6	3.3	100

## ***FIGURES***



**Fig. V-1 Organisation Chart of Ministry of Agriculture**



**Fig. V-2 Organization Chart of Ketara Project Management Unit**

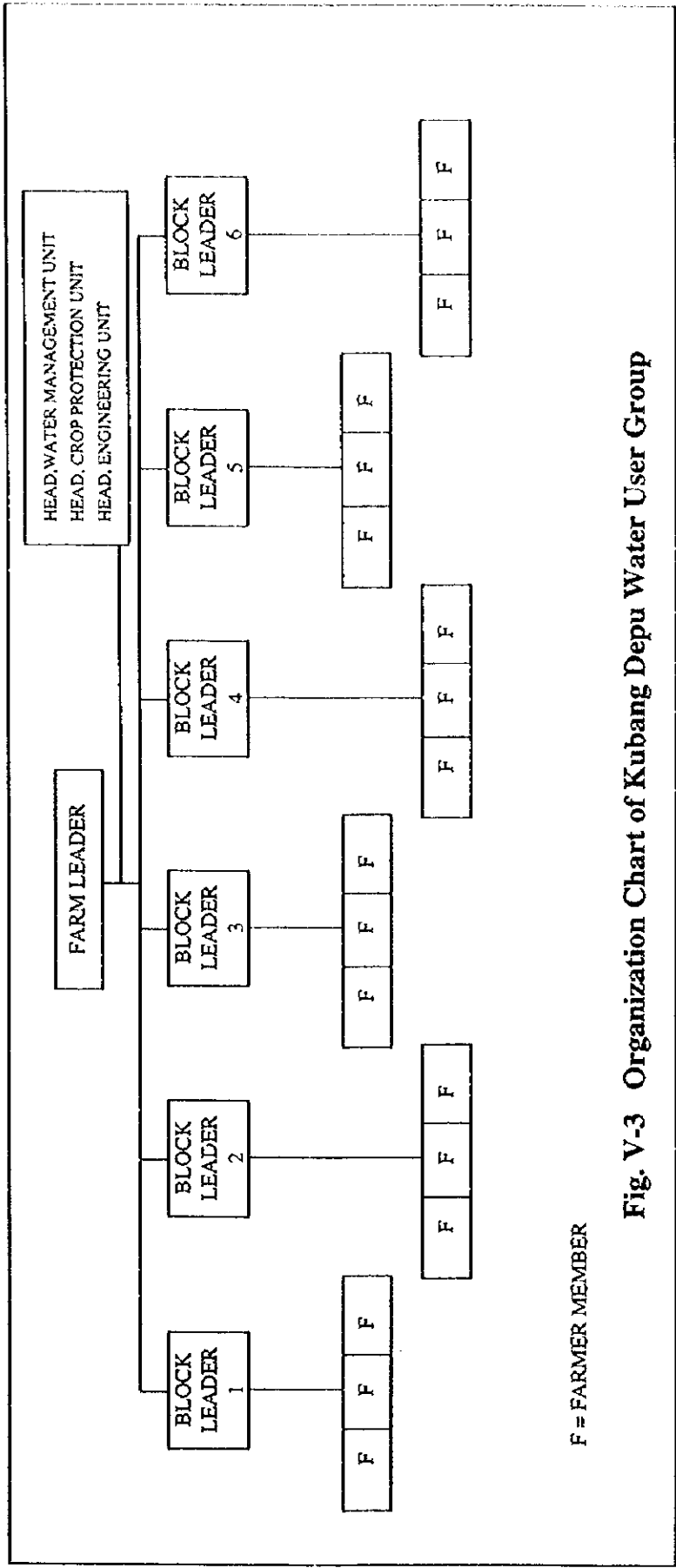


Fig. V-3 Organization Chart of Kubang Depu Water User Group

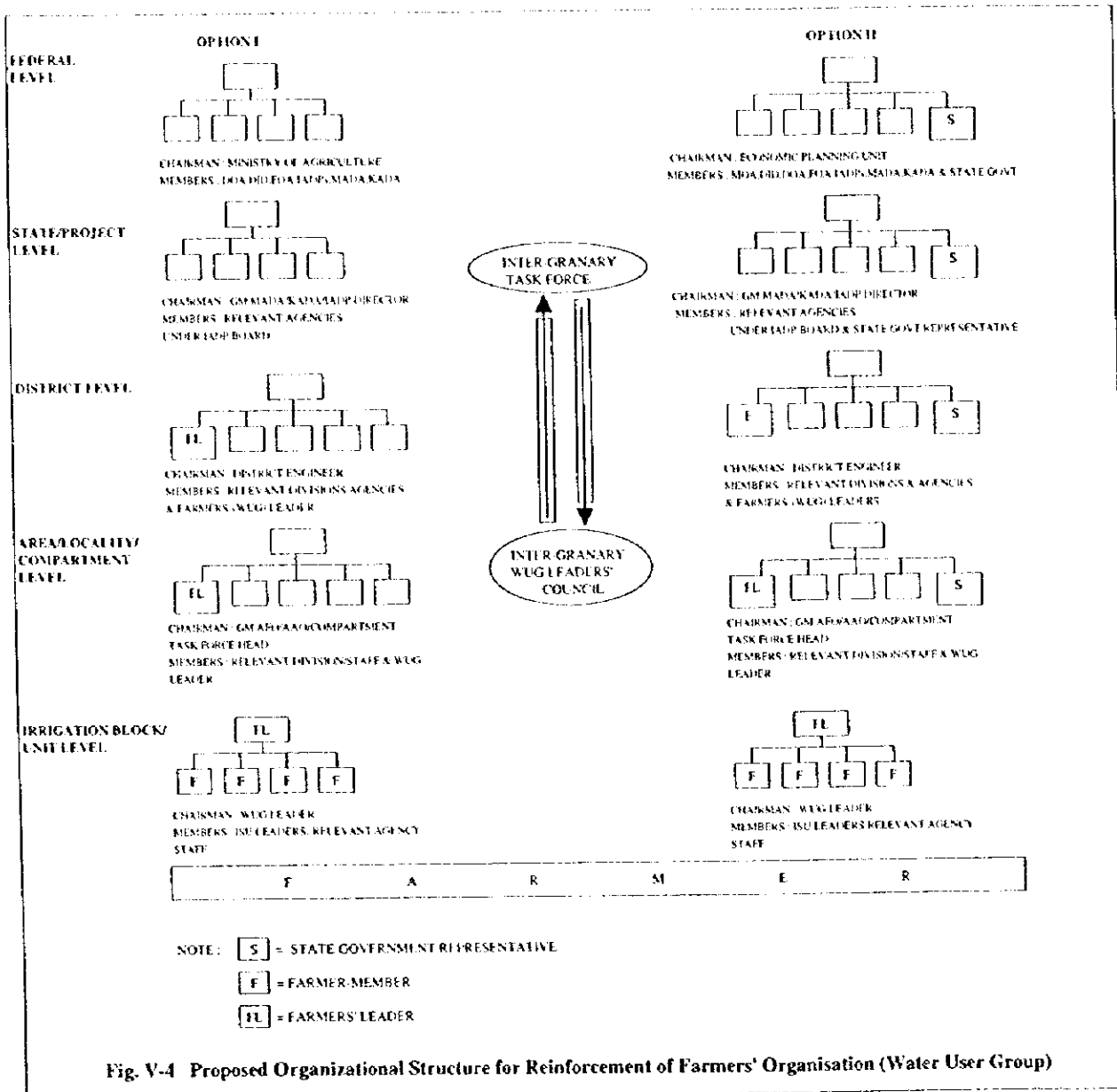


Fig. V-4 Proposed Organizational Structure for Reinforcement of Farmers' Organisation (Water User Group)