PEOPLE'S REPUBLIC OF BANGLADESH

Ministry of Irrigation, Water Development and Flood Control

Bangladesh Water Development Board

CYCLONE PROTECTION PROJECT II - FAP 7
FEASIBILITY AND DESIGN STUDIES

FINAL PROJECT PREPARATION REPORT
APPENDIX D - AGRICULTURE

May 1992

Joint Venture of
KAMPSAX INTERNATIONAL A/S,
BCEOM
DANISH HYDRAULIC INSTITUTE
in association with
DEVELOPMENT DESIGN CONSULTANTS LTD

Financed by European Community - Project No. ALA/87/05

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REPORT VOLUMES

The present Report Volume is part of the

CYCLONE PROTECTION PROJECT II - FAP 7
FEASIBILITY AND DESIGN STUDIES
BWDB COMPONENT
FINAL PROJECT PREPARATION REPORT

Consisting of the following Volumes :

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GLOSSARY

AEZ	Agro Ecological Zone.
AMAN	Rice planted before or during the monsoon and harvested in November or December.
AUS	Rice planted during February or March and harvested during June or July.
BARC	Bangladesh Agricultural Research Council.
B.AMAN	Broadcast Aman.
BBS	Bangladesh Bureu of Statistics.
BEEL	Low-lying area subject to flooding by rain or river water.
BORO	Rice Transplanted in January or February and harvested in May or June.
BRDB	Bangladesh Rural Development Board.
BWDB	Bangladesh Water Development Board.
CPP-II	Cyclone Protection Project-II .
GOB	Government of Bangladesh.
KHAL	National Canal.
HYV	High Yielding Variety.
KHARIF	Summer cropping season (May through November).
KHASLAND	Undisposed Government Land.
MONSOON	Period of rains starting in June and ending in October.
NGO	Non-government Organisation.
POLDER	Land area protected by embankment.
RABI	Winter cropping season (November through May).
SRDI	Soil Resources Development Institutes, Ministry of Agriculture.
T.AMAN	Transplanted Aman.
UPAZILA	Smallest administrative unit of local government.

LYV does not appear here, should be LIV

PART 1 PRESENT AGRICULTURE

1. INTRODUCTION

Bangladesh is in the delta region formed by the rivers Ganges and Brahmaputra. The land is largely flat and fertile. The country has typical tropical monsoon climate with temperatures varying from 4 degees centigrade in the winter months to as high as 40 degrees in the summer. Relative humidity is high - 80% to 95%.

The agricultural sector in Bangladesh provides almost half of the Nations GDP, 40% of the country´s export earnings and provides employment for about 60% of the population. Agricultural productivity in the coastal belt is generally low due to salinity problems, poor cummunication, service and credit facilities as well as natural calamities such as floods and cyclones.

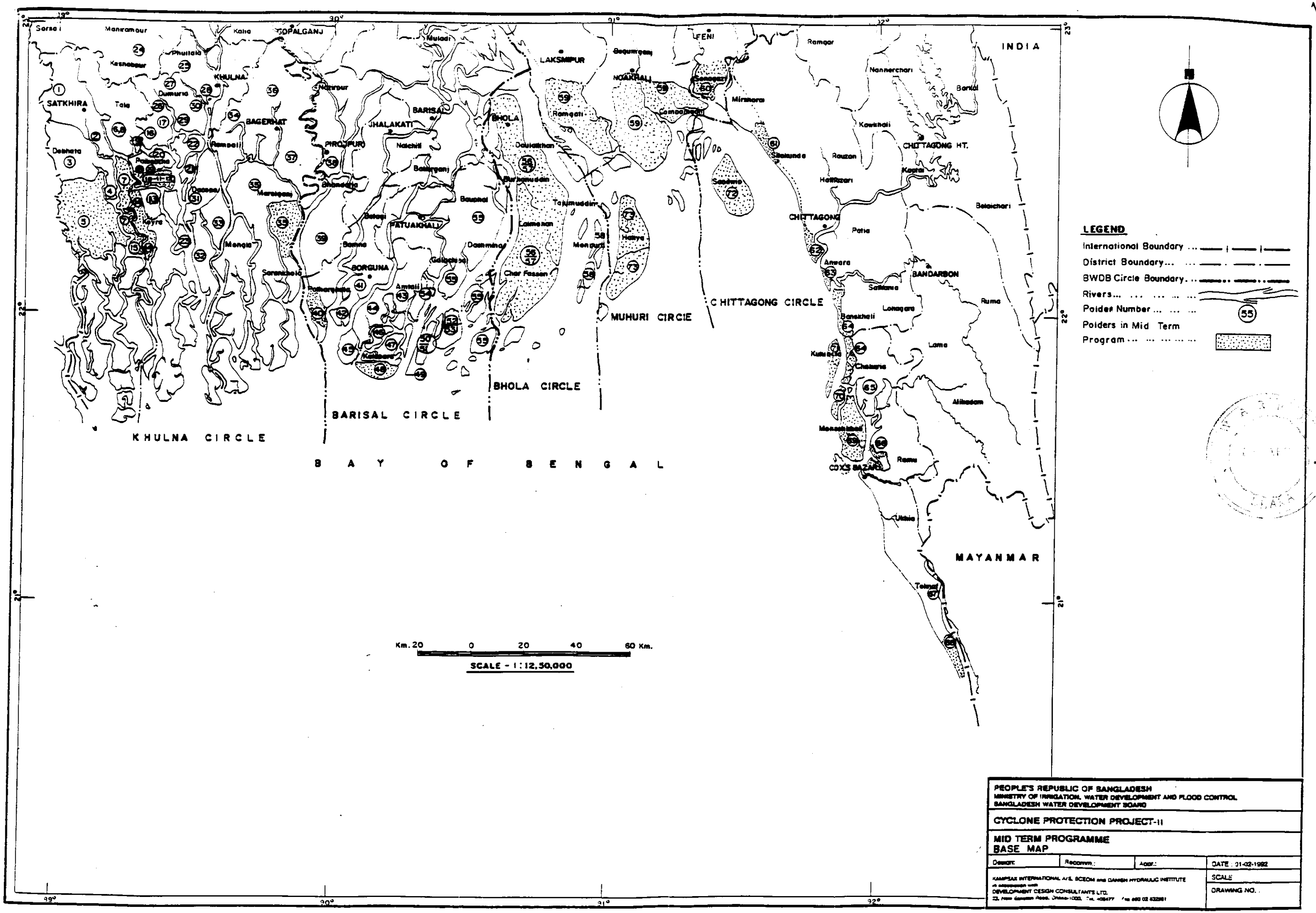
Natural calamities are the recurring phenomenon in Bangladesh. Cyclones have been reported around the Bay of Bengal and caused severe devastation and damage to lives, livestock, crops and properties. The damages are caused by both storm winds and the storm surges and the second one is most disastrous.

The project covers a vast area of about 401,680 ha. This consists of 11 districts, 5 Bangladesh Water Development Board (BWDB) Circles, and 33 polders (Table 1-1) and Base Map.

The coastal embankment in the study area will cover the coastal districts of Chittagong, Cox's-Bazar, Laxmipur, Feni, Noakhali, Patukhali, Bhola, Borguna, Bagerhat, Khulna and Satkhira. The embankments will be reconstructed with the main purpose of protecting the low lying land in the coastal belt from inundation and intrusion of saline water during high tide and thereby increase cultivable area, cropping intensity and yields.

Bangladesh includes a wide range of environmental conditions. Environmental diversity occurs not only at national or regional levels, it occurs also at Upazila and village levels. In fact small scale complexity of soil and hydrological conditions is an important characteristics of this kind of environment. Besides variability in moisture, temperature and flood regimes create major problems for planning environment, specific agricultural development, research and extension programmes.

It is necessary to develop a basic classification of the polders in accordance with the present level of agricultural development, agro- ecological conditions etc. Existing classification in Bangladesh have used soil, climate, flood and water data in developing area categories. One is the division into agro-ecological regions (AEZ), which use land forms as the main parameter.


Sarsa
Manirampur
Kalia
GOPALGANJ
Muladi
LAKSMIPUR
Begumganj
NOAKHALI
LFENI
Ramgar
INDIA
Nannerchari
Barkal
Kawkhali
CHITTAGONG HT.
Kaptai
Rangamati
Mirsharai
Sitakunda
Raozan
Hathazari
Sandwip
CHITTAGONG
Patia
Anwara
BANDARBON
Satkania
Lohagara
Ruma
Banskhali
Lama
Chakaria
Kutubdia
Alikadam
Naikhongchari
Ramu
COX'S BAZAR
Ukhia
Teknaf
MAYANMAR
SATKHIRA
Tala
Kashabpur
Phultala
KHULNA
Dumuria
Dacope
Paikgachha
Koyra
Mongla
Sarankhola
Nalian
Nazirpur
BAGERHAT
Rampal
Morrelganj
PIROJPUR
Bhandaria
JHALAKATI
Nalchiti
BARISAL
Betagani
Bauphal
Banaripara
PATUAKHALI
Galachipa
Dashmina
Lalmohan
Char Fasson
BORGUNA
Amtali
Kalikaini
BHOLA
Daulatkhan
Burhanuddin
Tajumuddin
Monpura
Hatiya
KHULNA CIRCLE
BARISAL CIRCLE
BHOLA CIRCLE
MUHURI CIRCIE
CHITTAGONG CIRCLE
B A Y O F B E N G A L
LEGEND
International Boundary
District Boundary
BWDB Circle Boundary
Rivers
Polder Number
Polders in Mid Term Program
55
Km. 20 0 20 40 60 Km.
SCALE - 1:12,50,000
99°
90°
91°
92°
22°
21°
PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION, WATER DEVELOPMENT AND FLOOD CONTROL
BANGLADESH WATER DEVELOPMENT BOARD
CYCLONE PROTECTION PROJECT-II
MID TERM PROGRAMME
BASE MAP
Design:
Recomm.:
Appr.:
DATE : 01-02-1992
SCALE
DRAWING NO. .
KAMPSAX INTERNATIONAL A/S, SCEOM and DANISH HYDRAULIC INSTITUTE
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30 (thirty) agro-ecological regions (AEZ) and 88 (eighty eight) sub-regions (Sub - AEZ) were established in Bangladesh by adding successive layers of information on the physical environment which are relevant for land use and for assessing agricultural potential. Regions 13, 18, 23 and 29 fall under this project (Table 1-1).

AEZ and sub-AEZ are very broad units.The fertility status of these regions varies considerably.Individual farmers have fragmented the land into small pieces causing wide variation in the management of each and every piece of the land by the farmers of different economic groups.This leads to the large variation in the fertility levels even between the adjacent plots. Another is the planning areas developed by MPO which uses water catchment as the main parameter. Neither of the two classifications provide sufficient details for the basic categorisation of polders within the context of the present project. They do,however,provide guidelines for such categorisation.

In a few cases polders will protect relatively new land, which will have a lower production potential than land further inland due to soil salinity. Such polders will be grouped together. Protection against sea waves and intrusion of saline water mainly result in reduced losses on the aman and aus crops but may not generate much winter cropping due to high soil salinity or lack of irrigation water. Mainly three categories of salinity exists in the project area but the range is S1 to S4 refer Table 1.3. The highest area is under S2 category which follows by Sl and then S3. However, in cases where the issue is improved drainage or even higher inflow of fresh water winter cropping may develop as a result of project activities.

Considering the above different points below follows a categorisation mainly focusing on the benefit side of the project.

Category - I : Polder nos. - 5, 7/l, 7/2, l0-l2, l4/l, l4/2, l5,3l, 32, 35/l -high to moderate dry soil salinity, high dry season soil salinity, low cropping intensity, shrimp culture.
Category - II : Polder nos. 40/l, 40/2, 45, 48 - moderate to low dry season soil salinity, high dry season water salinity, low cropping intensity.
Category - III : 56/57 (northern and central part) and 72- Moderate to low dry season soil salinity (Northern Bhola has nonsaline soil), high dry season water salinity, high cropping intensity.
Category-IV : 56/57 (Southern part) and 73/2B - High dry season soil salinity, high dry season water salinity, polders complete with severe damages or polder incomplete, low cropping intensity.
Category - V : 59/1A, 59/2, 59/3B, 59/3C and 60 - High dry season soil salinity, high dry season water salinity and low cropping intensity.
Category - VI : 6l/l, 62, 63/1A, 64/1A, 66/l, 66/3, 68, 69, 70, 7l - High to moderate to low dry season soil salinity, high dry season soil salinity, high cropping intensity and economic infrastructure.

BWDB Circle	Districts	Upazilas	Polders	AEZ and sub-AEZ Regions			
				13	18	23	29
Khulna	Satkhira	Kaligong + Shamnagar	5	5 (13 e&f)	-	-	-
		Ashasuni	7/1,7/2	7/1 (13f) 7/2(13f)			
		Shamnagar	15	15(13f)			
		Koyra	14/1,- 14/2	14/1(13f) 14/2(13f)			
	Khulna	10-12	10-12(1-3f)	-	-	-	-
		Dacope	31, 32	31(13f) 31, 32			
	Baghe-rhat	Sarankhola	35/1	35/1(13d)	-	-	-
Barisal Circle	Borguna	Pathorghata	40/1,- 40/2	40/1 (13d) 40/2 (13d)	-	-	-
		Borguna	45	45(13d)	-	-	-
	Patuak-hali	Kalapara	48	48(13d)	-	-	-
Bhola Circle	Bhola	Bhola		-	-	-	-
		Doulatkhan		-	-	-	-
		Tazumuddin		-	-	-	-
		Burhanu-ddin	56/57	-	-	-	-
		Lalmohan		-	-	-	-
		Charfasson		-	-	-	-
Muhuri Circle	Noakh-ali	Compani-gong	59/1A	-	59/1A(18f)	-	-
			59/3C	-	59/3C(18f)	-	-
		Degunbu-iyan					
		Begumgonj					
		Sudharam	59/3B	-	59/3B(18f)	-	-
			73/2B	-	73/2B(18f)	-	-
		Sudharam					
		Hatiya					
	Laxim-pur	Ramgati	59/2	-	59/2(18f)	-	-
	Feni	Sonagazi	60	-	60(18f)	-	-
Chittag-ong Cir-cle	Chitta-gong	Sandwip	72	-	72(18e)	-	-
		Sitakundu	61/1	-	-	61/1(23a)	-
		Chittagong (Port)	62	-	-	62(23b)	-
		Anowara	63/1A	-	-	63/1A(23a)	-
		Banskhali	64/1A	-	-	64/1A(23a)	-
	Cox's Bazar	Chokoria	64/2B	-	-	64/2B(23c)	-
		Ramu	66/1	-	-	66/1(23c)	-
		Cox's Bazar	66/3	-	-	66/3(23c)	-
		Kutubdia	71	-	-	71(23c)	-
		Teknaf	68	-	-	68(23d)	-
		Moheskhali	69,70	-	-	70(23c)	69 (2-9a)
Total			33	14	8	10	1

Table 1.1-Sheet 1: Polders under different Circles, District and AEZ Regions

13	Ganges Tidal Floodplain
d	Saline, noncalcareous
e	Saline, Calcareous and noncalcareous
f	Saline, Acid Sulphate Soils

18	Young Meghna Estuarine Flood-plain
a	Nonsaline : North Bhola
b	Nonsaline : Central Bhola
d	Saline : Central Bhola
e	Saline : Sandwip and South Bhola
f	Saline : Noakhali, Hatiya and Meghna Estuary

23	Chittagong Coastal Plains
a	Piedmont plains and river floodplain
b	Young tidal floodplain
c	Mangrove tidal floodplain
d	Beach ridges, mangrove tidal floodplain and mud complex

29	Northern and Eastern Hills
a	Mainly high hill ranges.

Table 1.1-Sheet 2 : **Agro-ecological Regions and Subregions**

2. LAND RESOURCES AND SOIL

2.1 Land Resources

The project area is dominated by medium high land (F1) followed by high land (F0) and medium low land (F2) and then low land (F3) Table 1.2 below gives the detail classifications and break-up of different land types of the project. Table 1.3 gives the detail soil salinity classification on the basis of electrical conductivity of the project and Fig. 2-I shows the soil salinity area under dry season condition of the project.

Out of 4 (four) Polders of Satkhira district. 5, 7/l, 7/2 represent four categories (SI-S4) of soil salinity but Polder l5 represents three (S2-S4) categories where S2 category is dominant. In Khulna district Polder l0-l2 represent four (S1-S4) categories of soil salinity but Polders l4/l, l4/2 and 3l, 32 represents three (S2-S4) categories. S2 category is more dominant in these above polders than other categories. In Bagerhat, Polder 35/l represents only S2 category of soil salinity.

Polders 40/l, 40/2, 45 of Borguna and Polder 48 of Patuakhali represent only two (S1-S2) types of soil salinity and S1 type is more dominant than S2 type. The categories of soil salinity which, exist in Polder 56/57 of Bhola are S1 and S2, but S2 is the dominant category. Largest saline area is found in Lalmohan and Charfession Upazilas.

Polders 59/lA, 59/3B and 59/3 of Noakhali represent mainly two (S1 -S2) categories and 73/2B represents also two (S2-S3). In both cases S2 category is dominant. Polders 59/2 and 60 of Laxmipur and Feni represent three (S1-S3) categories of salinity. In Polder 59/2, S1 is dominant and in Polder 60, S2 is dominant. In Chittagong district, Polder 63/1A represents only S2 category of salinity.

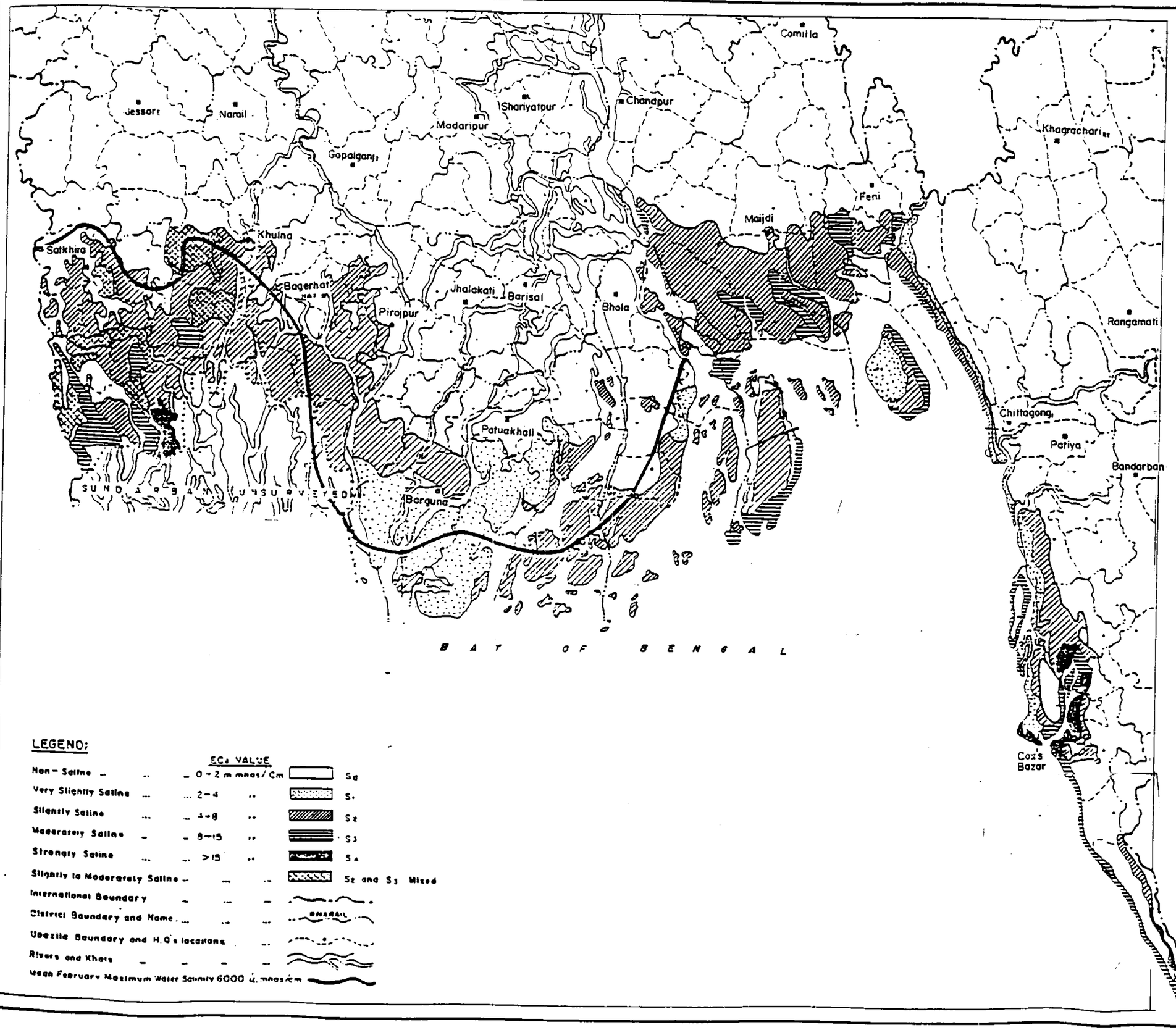
In Polders 62 only two (S1-S2) categories of soil salinity exist where S1 is dominant. In Polder 61/1 three (S1-S3) types and 72 four (S1-S4) types of soil salinity are found where also S1 is dominant.

In Polder 64/1A, three (S1-S2, S4) category is found where S2 category is dominant.In Cox's Bazar district Polders 64/2B, 66/3, 68, 69, 70 represent four (S1-S4) types of soil salinity where in Polder 66/3, S2 is dominant and in other polders S3 is dominant. In Polder 66/1 only two (S1-S2) category are found and S2 category is dominant.

Fig.2.1

COASTAL AREA SOIL SALINITY MAP

DRY SEASON CONDITION



N

20Km 0 20 40 Km

SCALE

LEGEND:

	EC₄ VALUE	
Non – Saline	0 – 2 m mhos/Cm	S_0
Very Slightly Saline	2 – 4 "	S_1
Slightly Saline	4 – 8 "	S_2
Moderately Saline	8 – 15 "	S_3
Strongly Saline	> 15 "	S_4
Slightly to Moderately Saline		S_2 and S_3 Mixed
International Boundary		
District Boundary and Name		BARISAL
Upazila Boundary and H.Q's locations		
Rivers and Khals		
Mean February Maximum Water Salinity 6000 µ mhos/cm		

PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF IRRIGATION, WATER DEVELOMENT AND FLOOD CONTROL BY BWDB

MINISTRY OF COMMUNICATION/ROADS BY RHD

CYCLONE PROTECTION PROJECT-II
BWDB COMPONENT

COASTAL AREA SOIL SALINITY MAP

KAMPSAX INTERNATIONAL A/S
BCEOM
and
DANISH HYDRAULIC INSTITUTE
in association with
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23, New Eskaton Road, Dhaka-1000
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High land (F0)	Land which is above normal flood level
Medium High land (F1)	Land which normally is flooded up to about 90 cm deep during the flood season.
Medium Low land (F2)	Land which normally is flooded between 90 and 180 cm deep during the flood season.
Low land (F3)	Land which normally is flooded between 180 and 300 cm deep during the flood season.
Very Low land (F4)	Land which normally is flooded deeper than 300 cm deep during the flood season.

Table 1.2 : Classification of land types.

Salinity Class	Conductivity of saturated extracts (dS m-1)	Plant growth condition
Non saline (So)	<2	Salinity effects mostly negligible
Slightly saline (S1) restricted.	2-4	Yields of very sensitive crops may be restricted.
Moderately saline (S2)	4-8	Yields of many crops are restricted.
Saline (S3)	8-6	Only tolerant crops yield satisfactory.
Highly saline (S4)	>16	Only very tolerant crops yield satisfactorily.

Table 1.3 : Soil Salinity classification on the basis of electrical conductivity.

2.2 Soil

In the project area 4(four) agro-ecological regions (Table 1-1) and 9 (nine) general soil types occur. Among AEZ regions the dominant ones are Ganges Tidal Floodplain. Nine main soil types are : Calcareous Alluvium, Noncalcareous Alluvium, Calcareous Grey Floodplain Soils, Noncalcareous Grey Floodplain Soils, Calcareous Dark Grey Floodplain soils, Noncalcareous Cark Grey Floodplain soils, Acid sulphate soils and peat. A summary soil characteristics is given below AEZ wise and categorywise.

AEZ 13 : Ganges Tidal Floodplain

Category I : 5, 7/1, 7/2, 14/1, 14/2, 15, 10-12, 31, 32, 35/1
Category II: 40/1, 40/2, 45, 48

This region occupies an extensive area of tidal flood plain land. The greater part of this region has smooth relief. There is a general soil pattern of grey, slightly calcareous, heavy soils on river banks and grey to dark grey noncalcareous, heavy silty clays in the extensive basins. Noncalcareous Grey Floodplain soil is the major component of general soil types. Acid sulphate soil also occupies significant part of the area, where it is extremely acidic during dry season. in general most of the top soil is acidic and sub-soil are neutral to mildly alkaline. Soils of Sunderban are strongly alkaline. General fertility level is high with medium to high organic matter content and very high CEC, but with limitations of high exchangeable Na and low Ca/Mg ratio.

According to the land capability classification this area is predominantly moderately good to poor agricultural land. Salinity is the major constraint with additional hazard of damage from storm surges. Intermittent tidal flooding (by breaking poor embankment) and drought are the limitations.

AEZ 18 : Young Meghna Estuarine Floodplain

Category - III: 56/57 (North and central part) and 72
Category - IV : 56/57 (Southern part) and 73/2B.
Category - V : 59/1A, 59/2, 59/3B, 59/3C, 60.

This region occupies young alluvial land in and adjoining the Meghna estuary. It is almost level with very low ridges and broad depressions. The major soils are grey to olive, deep, calcareous silt loam and silty clay loams and are stratified either throughout or at shallow depth. Calcareous Alluvium and Noncalcareous Grey Floodplain soils are the dominant soil types. The soils in the south become saline in dry season. Top soils and subsoils are mildly alkaline. General fertility is medium but low in N and organic matter. Sulphur status is moderate to high.

Land capability classification of this area presently covered by poor to moderately good agricultural land and poor to moderate suited land would become good to moderate good agricultural land and moderate to well suited land after strong flood protection.

AEZ 23 : Chittagong Coastal Plains

Category - VI: 61/1, 62, 63/1A, 64/1A, 64/2B, 66/1, 66/3, 68, 70, 71

This region occupies the plain land in greater Chittagong district and the eastern part of the Feni district. It is a compound unit of piedmont, river, tidal and estuarine floodplain landscapes. Grey, silt loam and silty clay loam soils are predominant. Acid sulphate soils, which are potentially extremely acidic occur in mangrove tidal floodplain. Noncalcareous Grey Floodplain soils, Noncalcareous Alluvium and Acid Sulphate soils are the major components of the general soil types of the area. General fertility

of the soils is medium but N and K are limiting. Status of S is high. Organic matter content is low to moderate.

The present land capability classes of this area presently covered by poor to moderately good agricultural land and poor to moderate suited land would become good to moderate good agricultural land and moderate to well suited land and will produce 2-3 crops per year.

AEZ 23 : Northern and Eastern Hills

Category VI : 69

This region includes country's hill area. Only polder no. 69 in Moheshkhali Upazila falls under this region. Soils are yellow brown to strong brown, permeable, friable, loamy, very strongly acidic and low in moisture holding capacity. Soil patterns are generally complex due to local differences in sand, silt and clay contents. Organic matter content and general fertility level is low.

3. LAND USE

Agricultural land use is primarily dependant upon soil characteristics, the hydrological conditions and the stage of development of agricultural infrastructure of the area. In the saline soils rice, jute sugarcane, pulse, oilseeds, spices, vegetables and fruits are grown but their productivity vary greatly with the salt content in the soils.

Category-I

The topography of the land of this category is somewhat regular, flat and low. The differences between maximum and minimum elevation is very small. This category covers a gross area of some 133,310 ha refer Table 3.1, Enclosure-1). of which about 80% (107,210 ha) are cultivated. The uncultivated area of about 20% (26,100 ha) includes homesteads, graveyards, markets, roads, schools, water bodies, embankments and fallow land etc.

The percentage proportions of the various depth of flooding classes in each sub-region cultivated area are shown in Table 3-2 (Enclosure-1).

Category-II

This category covers a gross area of 16,020 ha (Table 3-3, Enclosure-1) of which about 65% (10,445 ha) are cultivated and the rest about 35% (5,575 ha) area are uncultivated. In this Category T.aman (Local Variety) is the dominant crop. B.aman is also grown in some of the low lying areas of this category.

The percentage proportion of the various depth of flooding classes in each sub-region cultivated area are shown in Table 3.4 (Enclosure-1).

Category III

This category covers a gross area of 56,20 ha Table 3-5 (Enclosure-1) of which 76% (42,800 ha) are cultivated and the rest 24% (13,320 ha) are uncultivated. The main dominant crop is T.aman (Local Variety) followed by T.aman High Yield Variety (HYV) and then T.aus.

The percentage proportion of the various depth of flooding classes in each sub-region cultivated area as shown in Table 3.6 (Enclosure-1).

Category - IV

This category covers a gross area of 48,350 ha Table 3-7 (Enclosure-1) of which about 75% (36,150 ha) area are cultivated and 25% (12,200 ha) are uncultivated. T. Aman (Local Variety) is the dominant crop which covers about 71% of the total cropped area.

The percentage proportion of the various depth of flooding classes in each sub-region cultivated area are shown in Table 3-8 (Enclosure-1).

Category -V

This area covers a gross area of 99,640 ha in Table 3-9 (Enclosure-1) of which about 85% (85,085 ha) area are cultivated and the rest about 15% (14,555 ha) area are uncultivated. In most of the area only a single crop of T. Aman paddy is grown, but sometimes a poor crop like Kheshari or lentils is cultivated after the Aman. Dryland rabi crops especially chili are grown in a part of Noakhali mainland (sub-region 18f).

The percentage proportion of the various depth of flooding classes in each sub-region cultivated area are shown in Table 3-10 (Enclosure-1).

Category VI

This area consist of a gross area of 48,240 ha Table 3-11 (Enclosure-1) of which about 64% (30,960 ha) area are cultivated and 36% (17,280 ha) area uncultivated which include homesteads, markets, school, play ground embankment, water etc. B.aus , T. aman are the main crops of this area, cowpea, chili, watermelon are widely grown in the pre-monsoon season before aus is planted. Where irrigation facilities are available, HYV boro paddy is grown. Aus and Aman HYVs are also widely grown. Coconut, Betalnut are also grown in high land area. Betal leaf are the main cash crop of Teknaf area.

The percentage proportion of the various depth of flooding classes in each sub-region cultivated area shown in Table 3.12 (Enclosure-1).

The total area under study of the project consist of a gross area of 401,680 ha of which about 78% area are cultivated and about 22% are uncultivated, refer Table 3.13.

Categories	Gross Area		Cultivated Area *2*		Uncultivated Area	
	Area (ha)	%	Area (ha)	%	Area (ha)	%
Category- I	133,310	100	107,210	80	26,100	20
Category-II	16,020	100	10,445	65	5,575	35
Category-III	56,120	100	42,800	76	13,320	24
Category-IV	48,350	100	36,150	75	12,200	25
Category-V	99,640	100	85,085	85	14,555	15
Category-VI	48,240	100	30,960	64	17,280	36
Total	401,680	100	312,650	78	89,030	22

Table 3.13

* 2 * = The actual cultivated area polderwise are not available either in BWDB or Upazila level offices. Sometimes one polder covers 2-3 Upazilas or one Upazila covers 2-3 polders. So, calculation of cultivated area polderwise, is based on BSS- Upazila Statistics -1988-90. UAO offices and field visit experiences

4. FARMING PRACTICES

Seasons

The Wet Season (Kharif season)

The agricultural year is divided into two principal seasons: the kharif season which is the summer pre-monsoon and monsoon period from March until November and the rabi season which is the dry winter period from late November till March.

The khariff season is divided into two: i) kharif I, the early summer which in parts of the project area coincides with high salinity and ii) kharif II, the late summer with high rainfall and overall reduced salinity, refer Table 4.1.

There are two summer rice crops, The early, pre-monsoon Aus and the monsoon Aman. Aus is short-season, non-photo sensitive paddy that matures about 90 days after the seedling stage. Aman varieties are photo sensitive with inherent plant growth regulators that cause them to bloom in October/November after the day length has become less than the darkness. Both crops can be grown either by broadcasting or transplanting and exist in many varieties. Transplanted varities give higher yields but are more demanding with regard to growing conditions.

Transplanted varieties of aus (T.aus) are grown in irrigated seed beds. Transplanting takes place in the pre-monsoon period, where rainfall normally provides sufficient moisture for land preparation and planting. If the rainfall is inadequate land must be irrigated. T.aus is harvested in August.

Transplanted aman (T.aman) is transplanted into fields with a maximum of 0.3 m of water during August/September. Under optimal conditions T.aman may follow T.aus, particularly when inundation of the fields occurs late August/early September. T.aman is harvested in November/December.

On lands which are heavely innundated, farmers have traditionally grown broadcast aus (B.aus) and B.aman in the kharif season. B.Aman cultivated in the polders 45, 48, 56/57, 59/1A, 59/2, 59/3B, 59/3C, 71 & 72 in low basin pocket areas where there are no drainage facilities. In some cases they broadcast a mixture of aus and aman in March/April and allow the two crops to grow together. The aus will be harvested in July, if water level allows. The aman, which is floating rice with long stems, will be harvested in December . By planting the two crops together, the farmers hope to obtain at least one crop. Under average conditions they may secure a small aus crop which will tide them over the summer period until the harvesting of the main aman crop at the end of the year.

With the expansion of coastal protection since the 1960s farmers have gradually reduced mixed cropping of aus and aman.

The Dry Season (Rabi Season)

Rabi Growing Period:

The Rabi season (November-February) is characterised by low temperature, high radiation and low humidity. Salinity goes up towards the end of this season. So, farming practices of this zone are adopted according to this typical coastal agro-climatic conditions.

Accuracy of sowing/harvesting period depends on mainly availability of sweet water, labour and draught power at the right time.

In late November/December some rabi crops are planted under non-irrigated conditions when the soil still has a high moisture content after the heavy monsoon or flooding. Such crops are mustard, pulses, vegetables and wheat. In some cases pulses are sown together with aman, being left to grow in the fields after harvesting of paddy. The yield of these crops will depend on factors such as residual moisture after the rice crop, salt content in the soil and possible irrigation facilities.

In December, where sufficient irrigation water is available, the local varieties of boro rice are planted. These varieties are tolerant to low temperatures and are harvested before the rice of the monsoon floods. The high yielding varieties of boro cannot be transplanted as early as the local varieties because of their lack of tolerance to low temperatures.

Transplanting takes place from mid-January to mid-February. Irrigation requirements are heavy particularly during the month of March before rainfall starts and when temperatures are rising fast. Harvesting takes place during May/June.

Table 4.1 : Mean duration, starting date and end date of reference pre-kharif,kharif and rabi growing periods and mean duration of minimum temperatures of different agroecological regions in different districts under CPP-II.

District	Agroecological Regions	Reference Pre-Kharif growing period			Kharif growing period			Rabi Growing period			Duration in Days of minimum temparature			
		Mean Duration (days)	Starting Date	End Date	Mean Duration (days)	Starting Date	End Date	Mean Duration (days)	Starting Date	End Date	15.0 c	17.5 c	20.0 c	22.5 c
1.Satkhira	Ganges Tidal Floodplan	40-70	17 Mar	21 May	190-210	21 May	14 Dec	115-145	21 Oct	2 Mar	50-90	70-120	25-70	70-110
2.Khulana	Ganges Tidal Floodplan	50-70	17 Mar	18 May	200-220	16 May	10 Dec	115-135	15 Oct	17 Feb	40-70	70-105	25-50	70-90
3.Dagerhat	Ganges Tidal Floodplan	40-60	24 Mar	18 May	200-220	16 May	10 Dec	115-140	15 Oct	22 Feb	40-70	70-105	25-50	70-90
4.Barguna	Ganges Tidal Floodplan	40-60	24 Mar	18 May	210-220	9 May	10 Dec	120-140	15 Oct	22 Feb	30-70	65-105	15-50	70-90
5.Patuakhali	Ganges Tidal Floodplan	40-50	24 Mar	8 May	210-230	3 May	14 Dec	120-145	21 Oct	2 Mar	30-70	65-105	15-50	70-90
	Young Meghna Estuarine Flood plan													
6.Bhola	Young Meghna Estuarine Flood plan	40-50	24 Mar	8 May	220-240	27 Apr	18 Dec	120-145	21 Oct	5 Mar	30-70	65-105	15-50	70-90
7.Chittagong	Chittagonj Coastal plan, Young Meghna Estuarine Flood plan	40-50	24 Mar	8 May	220-240	27 Apr	18 Dec	120-145	21 Oct	5 Mar	30-70	65-105	15-50	70-90
8.Cox's Bazar	Chittagonj Coastal plan, Northern Eastern Hills	40-50	24 Mar	8 May	220-230	3 May	14 Dec	120-145	21 Oct	2 Mar	30-50	65-85	15-30	70-90
9.Noakhali	Young Meghna Estuarine Flood plan	30-50	22 Mar	8 May	220-240	27 Apr	18 Dec	120-145	24 Oct	2 Mar	30-70	65-105	15-50	70-90
10.Laxmipur	Young Meghna Estuarine Flood plan	40-50	24 Mar	8 May	220-240	3 May	18 Dec	120-145	21 Oct	5 Mar	30-70	65-105	15-50	70-90
11.Pani	Young Meghna Estuarine Flood plan	30-50	22 Mar	8 May	230-240	27 Apr	18 Dec	120-145	24 Oct	5 Mar	30-50	65-85	15-30	70-80

Sources : Coastal Saline Soils and Their Management in Bangladesh by Z. Karim, BARC Soils and Irrigation Publication No.8, 1983.

5. CROP CALENDER AND ITS PRACTICES

Aman (HYV and Local Varieties) is the main crop grown in the coastal area. In the Rabi season, a small area of Boro HYV, wheat, pulses, oilseeds, chillies, G.nut and winter vegetables are grown.

A general crop calendar illustrates the sowing - harvesting period of crops of the project area (Table 5-1)

Season	Crops	Land Preparation	Sowing/Transplanting	Harvesting
Kharif-I (March-June)	B. Aus T. Aus Jute S. Til S. Vegetable	February/March March February/March March March	Mid April-Mid May Mid April-Mid May Early March-Early April March April	Mid July-Mid August Early July-Late July Early July-Early August June July - September
Kharif-II (July-October)	T. Aman (HYV) T. Aman (L)	June July	Early July-Late July Late July-Late August	Late November-Mid December November/December
Rabi (November-Februray	Boro (HYV) Wheat Oil Seeds Potato S.Potato W.Melon Pulses W.Vegetable G. Nut Cowpea (Fal Chilli Spices	December/January November November November December December November November November December December	Late Jan.-Mid February Mid Nov.-Early Dec. December January January Late Nov.-Mid Dec. Mid Nov.-Mid Dec. December January January	Early June-Late June Late February-Early March February March May April-May February-March January-March March March-April March-April

Table 5-1 : Crop Calendar

6. CROPPING PATTERN AND INTENSITY

The cropping pattern is mainly conditioned by the flooding characteristics (depth,time and frequency), which in turn is related to the land topography, rainfall pattern, soil type, quality of water and soils as well as the stage of development of agricultural infrastructure i.e availability of irrigation, drainage efficiency of water management and institutional factors as well as the expected returns.

What was the methodology / source of these data?

Category-I :

Aman rice constitutes a major portion in this pre-dominantly single cropping zone. Salinity is the main limiting factor and farmers can only produce crops when and where the salinity level is sufficiently low.

The most favourable season of this zone is the wet season, Kharif-II. During the other seasons like Kharif-I and Rabi saline water sometimes inundates the fields during high tides or the salt level in the root zone increases as the soils dry out. Only on about 8% of these soils do the farmers grow a second crop after the Aman. The cropping pattern presently practiced in this zone are presented in Table 6-1 (Enclosure-2). This has also been displayed in Figure - I.

Category II :

yielding ? should not use this

Single croppping pattern is predominant with T. aman (LYV) of about 78% cultivated area, rest 22% is double cropping area. The cropping pattern of category -II are presented in Table 6-2 (Enclosure-2) diagrammatically in Figure - II.

Category III :

Double cropping pattern is predominant of about 50% of cultivated area, rest 35% is single and 15% is triple cropping area, Cropping pattern of Category - III is presented in Table 6-3 (Enclosure-3) and diagrammatically in figure-III.

Category IV :

Single cropping is predominant with T. aman (LYV) of about 83% of cultivated area, the rest 17% is double cropping area, Cropping pattern of category -IV are presented in Table 6-4 (Enclosure-2) and diagrammatically in figure - IV.

Category V :

The soils like Category I & II are also sometimes subjected to tidal

inundation at high tides. Saline water may enter into the polders through the breakage portion of the embankment. Due to this condition winter cropping in Rabi and Kharif-I season is very limited. Salinity level of both soils and water reduces with the onset of monsoon rainfall and conditions become favourable for T. aman cultivation. The cropping pattern is therefore, like category I & II aman rice based.

Single cropping pattern is pre-dominant with T.aman of about 64% of cultivated area the rest 36% is double cropping area. B.aus/ T.aus is grown to a very limited scale followed by T.aman. Pulse, oilseeds, chillies, cowpea (falon) are also grown as a rabi crops, HYV Boro and A. aus are grown widely in Bhola with LLP irrigation. Cropping patterns are presented in Table 6-5 (Enclosure-2) and diagrammatically in Figure - V.

Category VI :

The main crop of this category like the other categories is rice. Single crops (29%) like T.aman, betel leaf (Teknaf) are also practiced. Betel leaf is planted in Nov-Dec in high land in Teknaf area and harvested in May-June. After harvesting the land remain fallow, but in Sandwip and Moheshkhali and Bhola area the cultivation of betel leaf differ from Teknaf. The betel leaf of Sandwip and Moheshkhali is perennial and remain for many years in the same field and the farmers harvest the leaf from time to time. Double cropping of this region is about 59% and triple cropping area is about 12%.

The main cropping pattern presently practiced in the above categories are presented in Table 6-6 (Enclosure-2) and diagrammatically in figure - VII.

The average cropping intensity of the 6 categories in the project area is shown in Table 6-7.

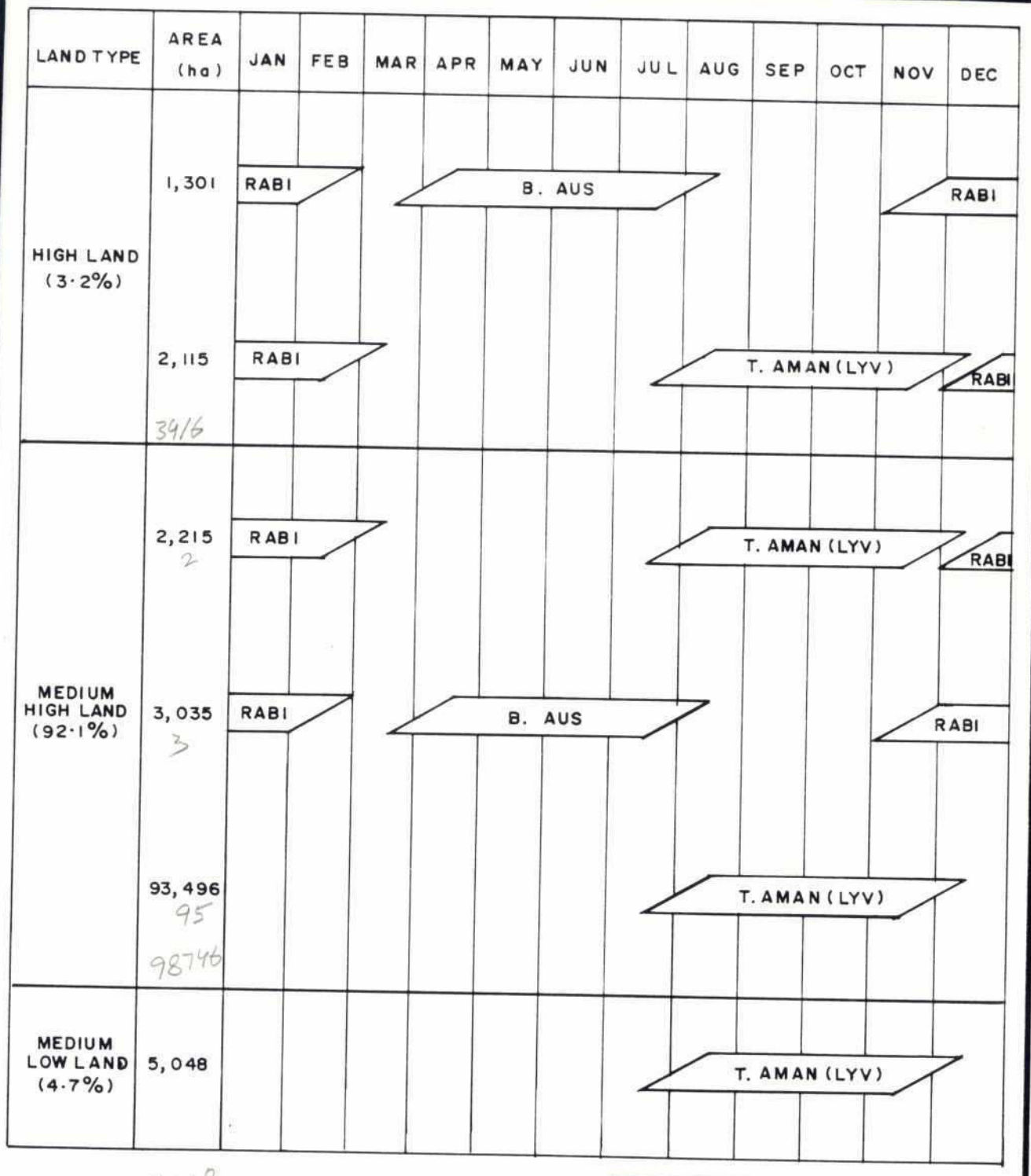
(Area HA)

Cate-gory	Single cropped area	Double cropped area	Tripple cropped area	cultivated area	Total cropped area
I	98544 (92%)	8666 (8%)	-	107210	115876
II	8193 (78%)	2252(22%)	-	10445	12697
III	14946 (35%)	21510(50%)	6344(15%)	42800	76998
VI	30041 (83%)	6109(17%)	-	36150	42259
V	54603 (64%)	30482(36%)	-	85085	115567
VI	8845 (29%)	18357(50%)	3758(12%)	30960	56833
	215172	87376	10102	312650	420230

Table 6-7 : The approx. present cropping intensity in the project area is = 134 %.

For polder in the Mid-Term Programme, Phase 2 the cropping pattern has been evaluated individually. The 1 ha Model Fram Budgets for these polders are included in Enclosure 2, Tables 6-7 to 6-18.

FIG. I

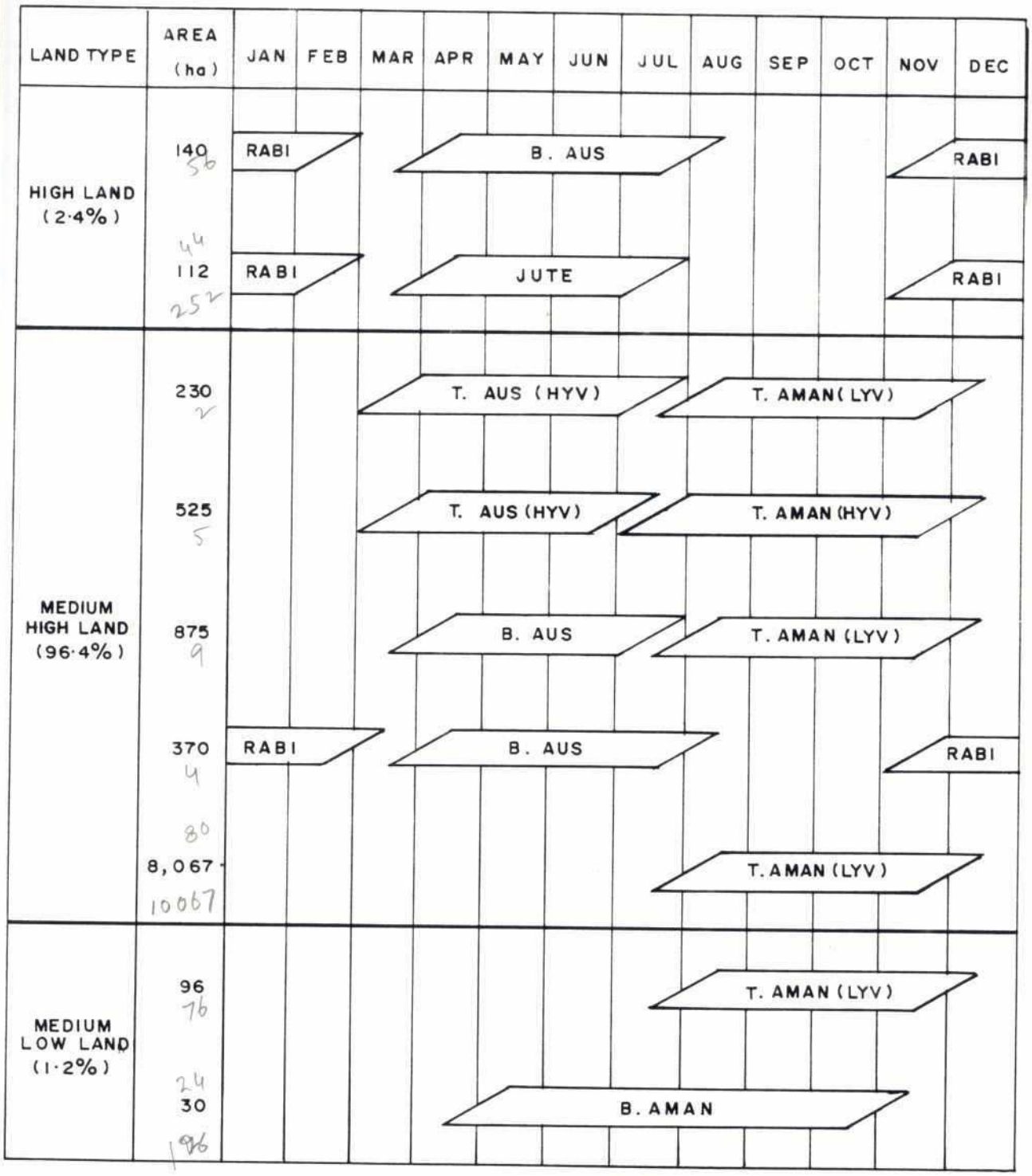


CATEGORY – I

PRESENT CROPPING PATTERN

C. P. P. – II

FIG. II

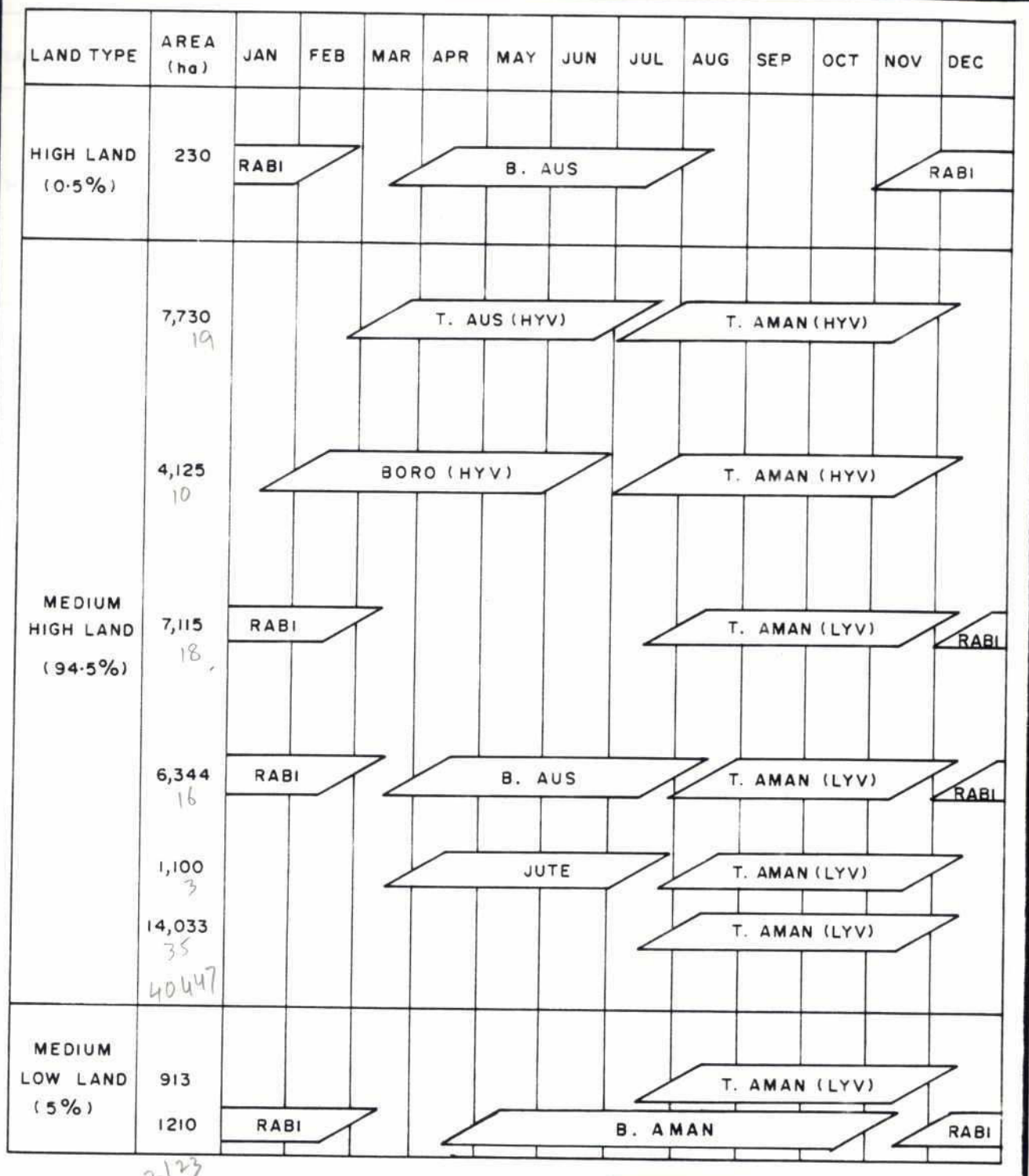


CATEGORY - II

PRESENT CROPPING PATTERN

C. P. P. - II

FIG. III



CATEGORY – III

PRESENT CROPPING PATTERN

C. P. P – II

FIG. IV

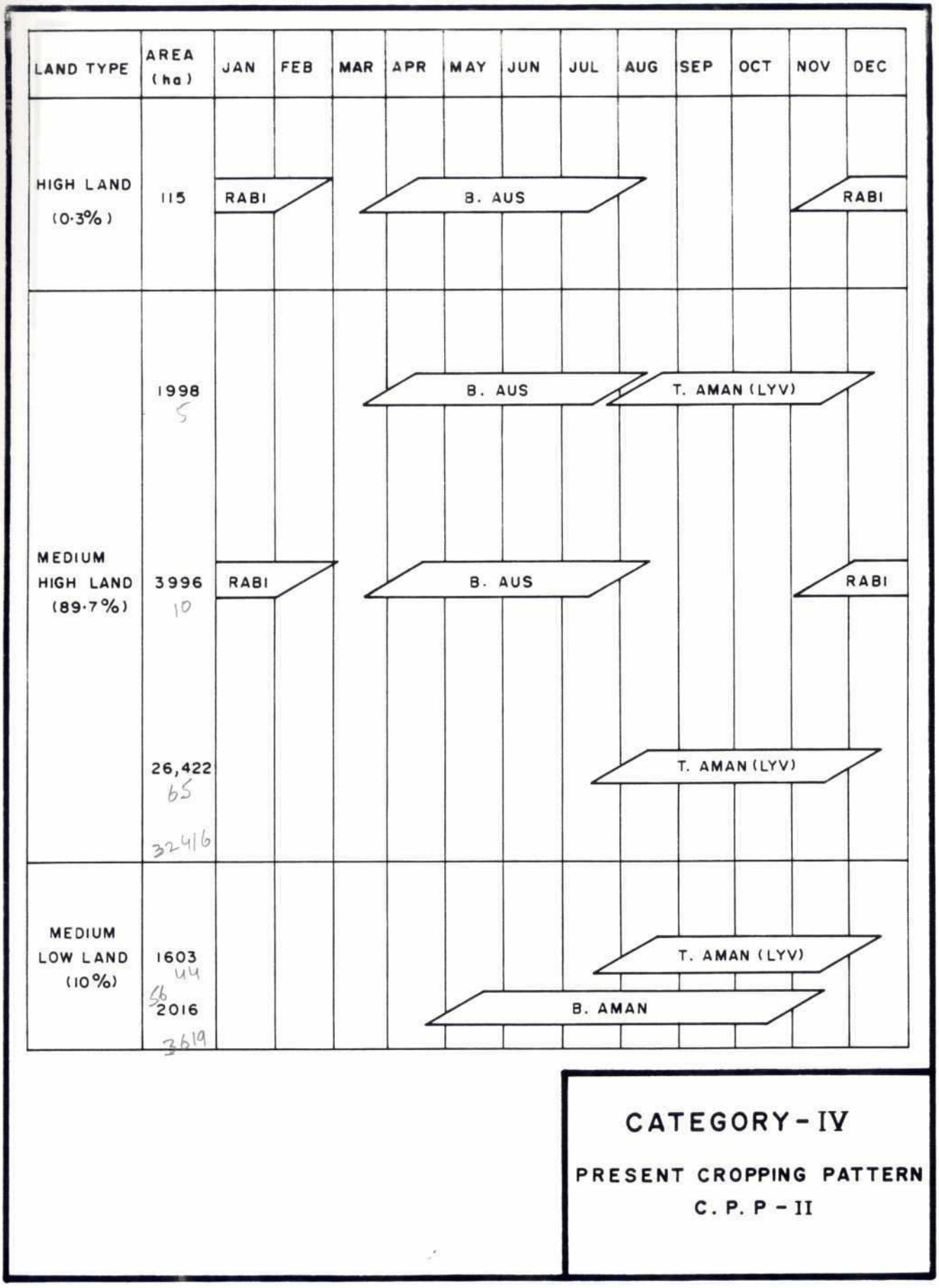

LAND TYPE
AREA (ha)
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
HIGH LAND (0·3%)
115
RABI
B. AUS
RABI
1998
5
B. AUS
T. AMAN (LYV)
MEDIUM HIGH LAND (89·7%)
3996
10
RABI
B. AUS
RABI
26,422
65
T. AMAN (LYV)
32416
MEDIUM LOW LAND (10%)
1603
44
T. AMAN (LYV)
56
2016
3619
B. AMAN
CATEGORY - IV
PRESENT CROPPING PATTERN
C. P. P - II

FIG. V

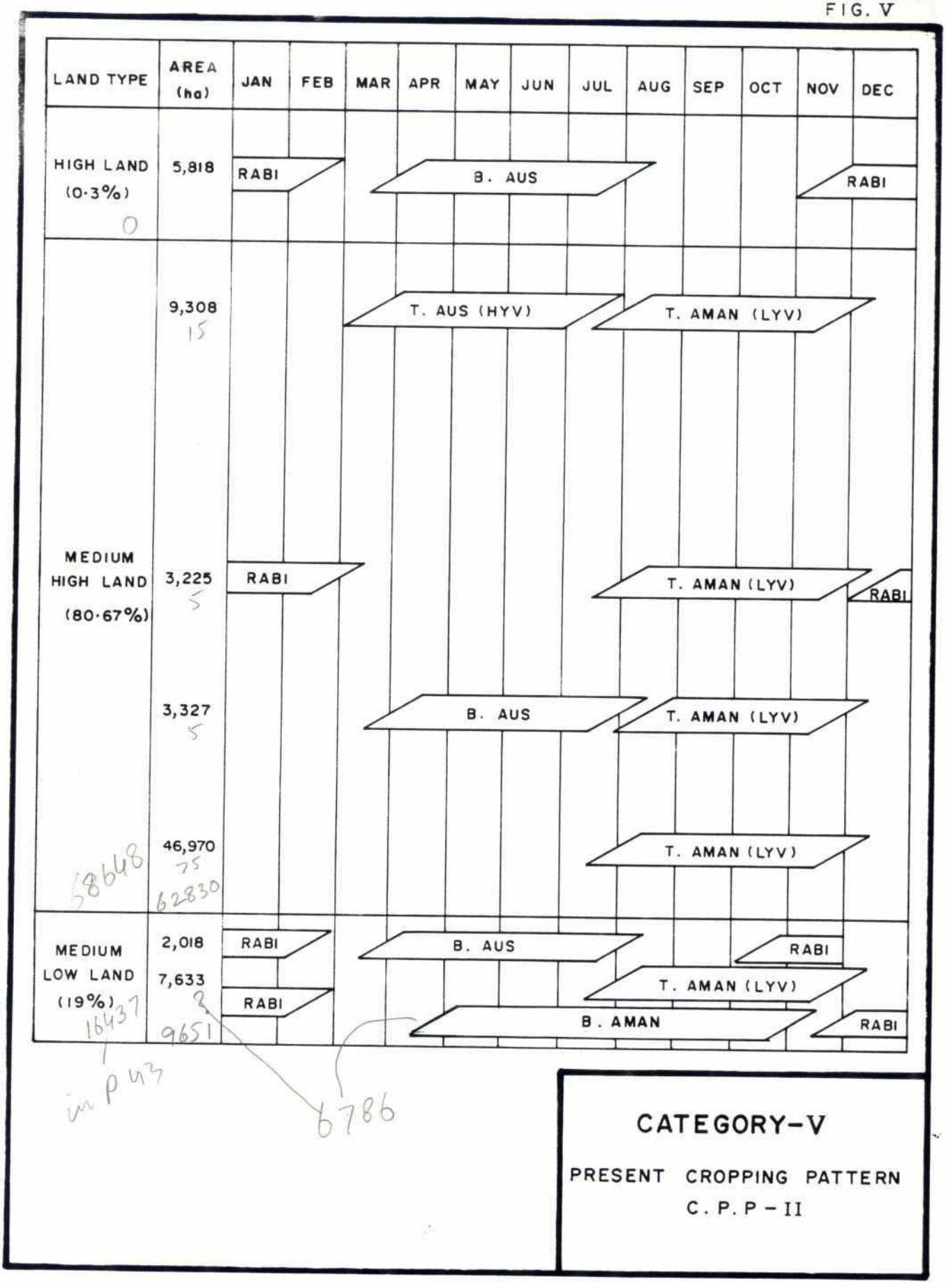
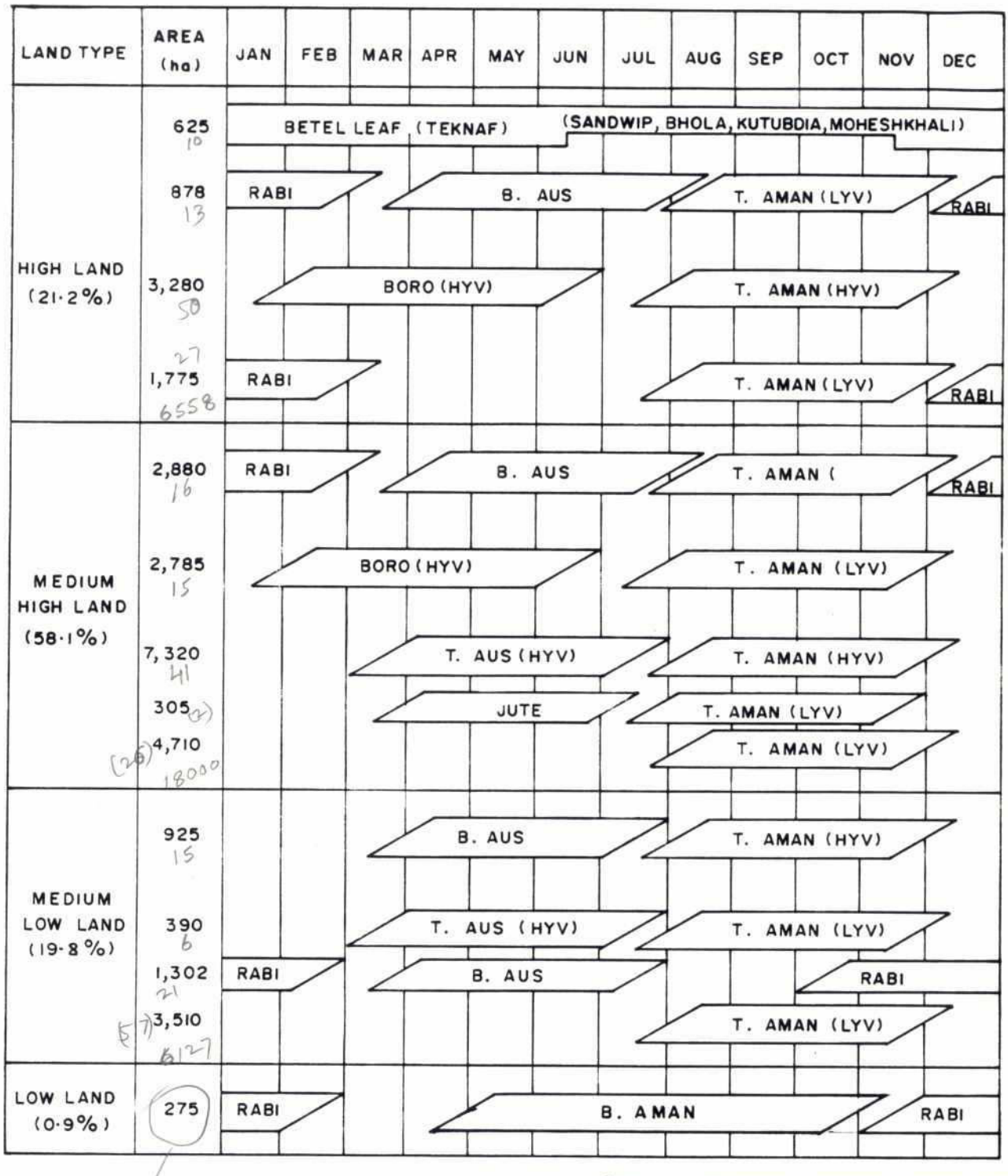

LAND TYPE
AREA (ha)
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
HIGH LAND (0·3%)
5,818
RABI
B. AUS
RABI
9,308
T. AUS (HYV)
T. AMAN (LYV)
MEDIUM HIGH LAND (80·67%)
3,225
RABI
T. AMAN (LYV)
RABI
3,327
B. AUS
T. AMAN (LYV)
46,970
T. AMAN (LYV)
MEDIUM LOW LAND (19%)
2,018
RABI
B. AUS
RABI
7,633
RABI
T. AMAN (LYV)
B. AMAN
RABI
CATEGORY-V
PRESENT CROPPING PATTERN
C. P. P - II

FIG. – VI



217 in P. 43

CATEGORY – VI

PRESENT CROPPING PATTERN

C. P. P – II

7. PRESENT CROPS ITS AREA AND YIELD

Rice is the most dominant crop in the project area occupying approximately 86.8% of the total cropped area. Of the total rice cropped area 61.7% by T.aman (Local Variety), 5.7% by T.aman(HYV), 8.5% B.aus, 6.1% T.aus(HYV) and 2.4% Boro(HYV)and 2.4% by B. aman. Rabi crops occupy 12.7% of the total cropped area of which 4.1% is Pulses (Kheshari, Mashkalai lentil etc). 1.5% chillis, 2.1% cowpea(falon), 0.7% oilseeds, 1.7% winter vegetables (cabbage, cauliflower, radish etc), 0.6% Potato, 1.6% Sweet Potato and the rest is under brinjal, wheat, cucumber, watermelon Betel leaf etc.

On the whole, the productivity level of different crops grown in the project area are lower than the national average.

The main reasons for the low productivity level are as follows -

- Sources of surface and ground water irrigation are very much limited and its management is inadequate.
- Farmers know-how on improved agricultural technology are limited.
- Low doses of input use.
- Difficult communications. This severely hampers administrative, extension, research, input, supply and works.
- Big land ownership specially in Satkhira, Khulna, Noakhali, Barisal districts. This means that most of the land is leased out to landless farmers who do not have the resourses to procure items such as fertilizers and pesticides even if they were available.
- Poor quality draft animal, due to poor feeding specially in wet-season.
- Embankment erosion along major rivers and sea facing polders
- Flooding in basin centres in deep area in the polders in rainy season.
- Salinity
- Exposure to cyclones and storm surges.

Category wise area under different crops with production are presented in Table 7.1 to 7.7 (Enclosure-3).

For polders under Mid-Term Programme, Phase 2 the cropareas and yields are shown in Enclosure 3, Tables 7.8 to 7.19.

8. PRESENT LEVEL OF INPUT USE

Level of input use in the context refers to seed, fertilizer and pesticides use, mechanization of agricultural practices, irrigation and water management. In association with above, availability of farm labour, agricultural loan and agricultural extension services and research must be tagged to get the full agricultural benefit of the project.

8.1 Seed Use

Improved seeds used by the farmers in the project area is very limited. It is mainly only used for crops like T.aus, T.aman, Boro and Watermelon. The most common crop in the area is T. aman (Local Variety). Almost all rabi crops cultivated in the project area are produced by seeds from local varieties.

The distribution of improved seeds by type and by former districts for 3 years are shown in Table 8.1.

Districts	Seasons	Aus		Aman		Boro		Wheat	Potato Seeds	Oil Seeds	W. Veg.
		LYV	HYV	LYV	HYV	LYV	HYV				
Chittagong	1986-87	3,500	20,530	6,450	183,500	-	74,540	12,080	77,990	1,100	416
	1987-88	4,460	27,990	3,330	125,210	-	89,380	26,120	108,007	1,097	426
	1988-89	1,330	19,420	3,930	129,610	-	87,460	157,660	52,525	996	289
Noakhali	1986-87	2,500	10,220	930	78,290	-	24,180	196,180	45,940	1,200	252
	1987-88	1,200	9,086	440	81,560	-	34,450	255,960	103,641	500	204
	1988-89	1,130	8,918	1,200	83,603	-	52,350	208,760	60,880	800	159
Barisal	1986-87	1,900	8,160	-	21,314	-	60,717	270,940	31,631	943	229
	1987-88	220	3,142	-	24,750	-	66,690	299,920	56,636	510	155
	1988-89	1,240	7,110	2,800	23,910	-	78,425	277,250	45,140	752	130
Khulna	1986-87	600	11,470	5,940	77,830	-	36,070	500,800	120,400	988	195
	1987-88	240	12,760	-	78,100	-	25,470	430,240	204,071	510	156
	1988-89	1,410	8,260	2,000	123,430	-	58,350	439,140	479,492	2228	169
Patuakhalil	1986-87	300	3,050	-	8,875	-	1,400	8,800	6,000	420	152
	1987-88	-	2,850	-	5,300	-	1,000	6,400	8,000	250	71
	1988-89	-	6,170	3,500	5,750	-	3,500	5,000	5,200	444	63

Table 8 - 1

Source : Statistical year book of Bangladesh - BBS - 1990.

8.2 Fertilizer Use

There is a considerable variation on the utilization of fertilizer in the different polders as well as among the districts. These variations can be contributed partly to the characteristics of the soils and partly to land ownership patterns and the farmers ablity to procure fertilizers.

Presently the fertilizer distribution and marketing system in the coastal areas include a combination of both public and private sector involvements. BADC has its Primary Distribution Point (PDP) at different district levels, which have been the main outlet for fertilizer to be supplied to the project area. Private wholesalers and dealers participate in the fertilizer marketing from the factory and / or PDP and down to the farmers level.

Fertilizers are generally used on HYV and irrigated crops. Although B.Aus is grown under rainfed condition, the crop often suffers under drought conditions or is damaged by saline water intrusion. So only a negligible quantity of fertilizers are used on this crop. During field visits, it was reported that only a small quantity of urea is applied as a top dressing in this crop.

The level of fertilizer used in local varieties of T.aman is also very low. Farmers also hesitate to invest on fertilizers in crops when considering the risk of crop damage by tidal inundation as the empoldered area is often damaged by storm, tidal wave, cyclones, river erosion etc.

In the Rabi season the plant may not utilize the fertilizers optimally, because of the low residual soil moisture content. Pulses especially Kheshari, which are grown as a relay crop with local varieties of T.aman rice, are leguminous crops and are not fertilized. Only a small quantity of fertilizers are used in oil seeds and vegetables,and even less is used on sweet potato and chillies.

Often farmers do not use the recommended doses of fertilizer due to their financial constraints. The ratio between urea and TSP & MP are much higher than the recommended ratios. The general practice is to apply uera two to three times during the growing period, whereas TSP & MPare only applied during planting.

Distribution of fertilizer by type and by district for 3 years are shown in Table 8.2 (Enclosure-4). Pattern of fertilizer consumption by district for 4 years are shown in Table 8.3.

	1985-86	1986-87	1987-88	1988-89
Chittagong	5	5	4	3
Noakhali	3	3	4	3
Barisal	2	3	3	3
Khulna	3	2	3	7
Patuakhali	-	1	1	1
Total	13	14	15	17
Bangladesh	100%	100%	100%	100%
% of 5 Districts in relation to Bangladesh	13%	14%	15%	17%

Table 8.3 : Pattern of chemical fertilizer consumption by former district

Source BADC and BBS - 1990.

8.3 Pesticides Use.

The incidence of pest and insect attack is higher in the aus and aman season than the Rabi season. The dry weather reduces the insect population though it is reported that in the 1990 rabi season the mustard crop was severely affected by the 'Zab' insect. It is reported that about most farmers in the coastal belt area were affected and the damage caused a loss of 10-15% of the total production.

Most farmers do not have adequate knowledge about the appropriate use of pesticides. They have little experience in chemical plant protection. The quantities of pesticides used are well below the recommended dosages which does not protect the plant effectively from insect infestation. The incorrect use of those pesticides can also cause serious health hazards to the users.

There is a lack of effecient extension services and motivation, and farmers have limited knowledge of the use of chemical insecticides, health hazards and the use of disease/pest resistant varieties. Since plant protection can not be done effectively on individual basis, due to the generally small plots, joint plant protection measures would be an important issue. However, at village level neighbour farmers co-operation is absent.

It was reported at the time of the field visit that the following insecticides were used in the project area.

1. Dimecron - 100
2. Sevin - 85 sp
3. Furadon - 3 G
4. Malathion - 57 EC or dust
5. Diazinon - 14 G
6. Phythilon -
7. Roxyon and different kinds of soil insecticides, fungicides, weedicides, Rodenticides etc.

Mechanical sprayers in most cases are not available and the spraying is done indegenously. The effectiveness of chemicals is sometimes reduced due to adulteration. Insects have also developed resistance against certain types of chemicals because of prolonged use. The districtwise distribution of pesticides for 3 years are furnished in Table 8.4 (Enclosure-5).

(Metric Tonne)

Former District	Year	Granular	Conventional-/Borerpestcomplex	Soil Insecticides	Acaricides	Fungicides	Rodenticides	Weedicides
Chittagong	1986-87	300	55	2.5	2	2	20	0.5
	1987-88	345	52	2	5	2	0.5	16
	1988-89	405	63	1.5	3	2	0.25	10
Noakhali	1986-87	210	33	1	1	2	-	0.5
	1987-88	230	32	1	5	1	-	-
	1988-89	270	46	1.5	2	3	0.5	-
Barisal	1986-87	190	32	0.5	1	-	-	-
	1987-88	212	30	-	2	-	-	-
	1988-89	245	34	-	1.5	-	-	-
Khulna	1986-87	80	20	1	0.5	1	-	-
	1987-88	92	18	1	1	1	-	-
	1988-89	107	26	1.5	1.5	2	-	-
Patuakhali	1986-87	150	16	-	0.5	-	-	-
	1987-88	180	16	-	2	-	-	-
	1988-89	185	21	-	1.5	-	-	-

Table 8.4 : Former District-Wise distribution of pesticides.

Source : Bangladesh Pesticides Association. BBS - 1990.

9. LIVESTOCK

Livestock plays a vital role for the draft power of the agricultural activities in the project area. They are utilized to a great extent for ploughing the land, transporting and threshing as well as producing milk and cowdung. In Khulna, Barisal and Noakhali about 45% to 49% households and 50% to 54% households in Chittagong and Patuakhali have livestocks (Agril and livestock census -1983-84). The per capita livestock number in Chittaging is 0.22, in Noakhali 0.19, in Barisal 0.23, in Khulna 0.31 and Patuakhali 0.33.

The scarcity of animal fodder and inadequate veterinary services are the basic problems for the livestock management in the project area. The short turn a round time between harvesting of the Aman crop and the planting of the Rabi crops coincides with the period where fodder is of greatest shortage. Therefore are most of the animals very thin and weak and not capable to undertake much work.

Upazila Livestock Offices (ULO) deal with the comprehensive livestock development programme in the project area including animal breeding, health care and extension services.Breeding work is, however, very limited in the project area. Medical treatment as well as preventive work of disease infection are also the concern of the Livestock Offices. Following malnutrition the most serious problem for cattle in the area is reported to be parasitical infestation.

10. AGRICULTURAL LOAN

Borrowing practice in cash and in the form of crop loan has been found to exist together. Cash loan is found prominent. Medium. small and tenant farmers largely depend on non-institutional sources (local lenders) for their credit whose interest rates they are reluctant to disclose. The amount of credit could not be quantified.

The institutional sources are Banks mainly Krishi and Grameen Bank and BRDB through the co-operative societies. The rate of interest is about 16% in case of Banks and 22% in case of BRDB.

Loans could be classified into three categories by terms and purposes. Short term credit might be provided principally for purchase of fertilizer, seed and pesticides with repayment after the crop has been harvested. Medium term credit has been provided mainly for the purpose of purchasing of draft animal, poultry or fishery equipment with a repayment period of 1 - 4 years. Long term credit may be provided mainly for purchase of agricultural machineries with 8 years repayment.

The recovery of agricultural loan is also a great problem and mainly depends on crop production and farmers financial condition.

11. FARM LABOUR

Farm labour is found to be an occupation of the male work force in the study area. Landless tenant and marginal household are the main sources of farm labour. There are many important market places where non-farm labours are available.

The demand and supply of farm labours is conditioned mainly by :

(a) Present land use and cropping pattern.
(b) Cost of cultivation per ha.
(c) Cultivable area of the project.
(d) Average labour force engaged in agricultural production per farm household.
(e) Number of land holding farm household in the project area.
(f) Number of landless tenant and marginal farm household.
(g) Per month workable day throughout a year.

It is evident that local farm labours are generally sufficient to meet the demand except in the peak period that is from June - July transplanting of T.aman crop. The wages differ according to season and crop conditions and it was reported during field visits that the average wages are generally more or less the same throughout the project area.

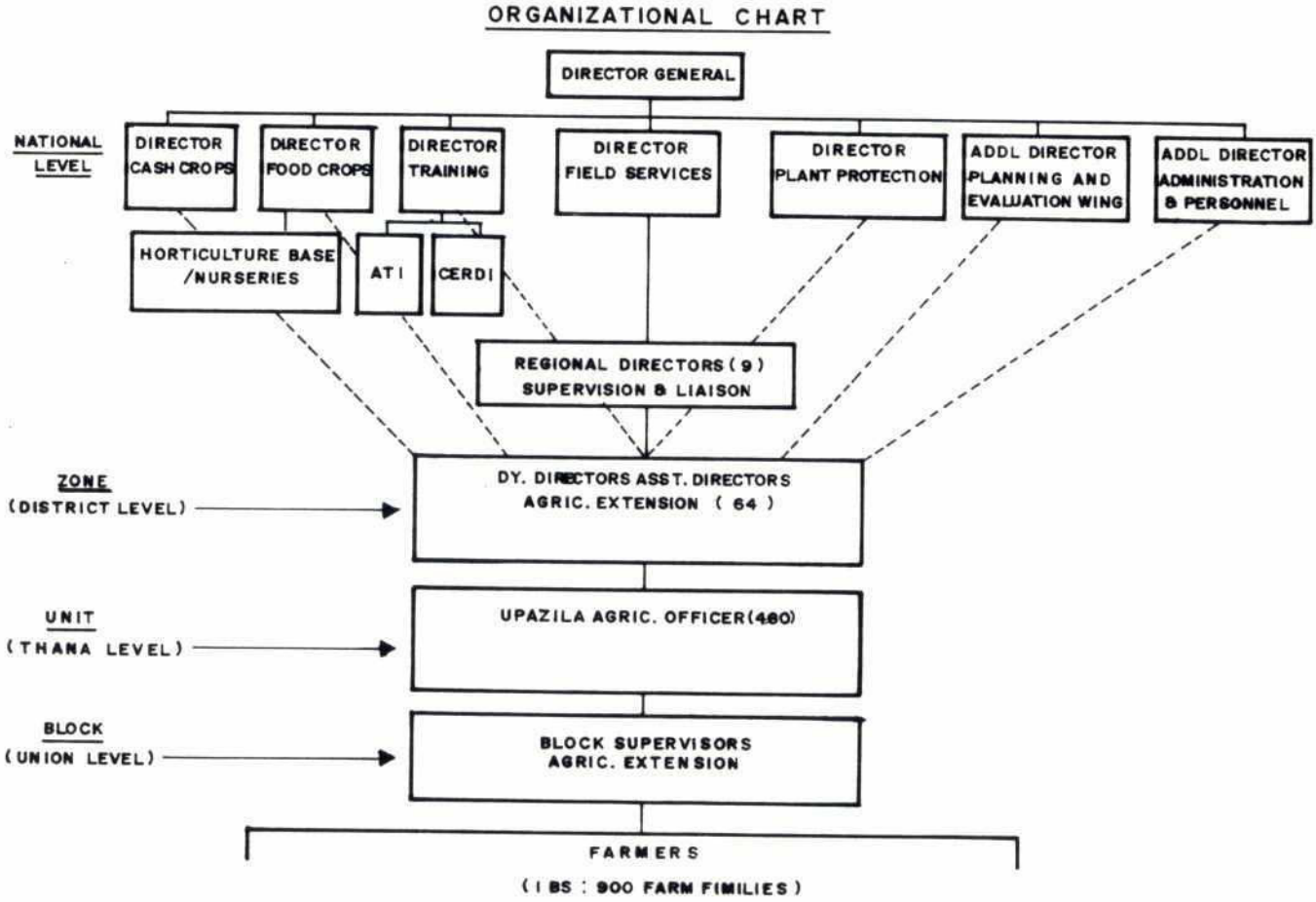
The participation of women labour force could not be estimated but it can be said without hesitation that they play a vital role in farm activities. Threshing, parboiling, cleaning, sunning and storing etc. are the activities which are performed mainly by the women. They grow most of the kitchen garden, fruit and vegetables, they care for livestocks and poultry beside performing typical household responsibilities as a wife and as a mother. Since these activities are not treated as directly remunerative, women are excluded from the civilian labour force in the conventional/traditional way.

12. AGRICULTURE EXTENSION SERVICES

The Extension Services play an important role in the agricultural development of the country. Their objective is to motivate, educate and help farmers to adopt improved farming practices leading to increased farm production and income.

The diffusion of new technology also requires development of local institutions and farmers organisations. These are needed because the majority of farmers are small and individually ineffective in obtaining the services and support required to sustain agricultural development.

Nationwide agricultural extension services are as shown below



The institutional foci for the management of the extension services are the blocks (union), Upazila, Districts and the Headquarter (National Level). At the national level the DAE is headed by a Director General, who is assisted by a Director each of the divisions of Cash Crop, Food Crop, Plant Protection Field Services and Training) and by an Addl. Director each of the Planning and Budget and Personnel and Administration Wings. The Headquarters Specialist Divisions provide technical supervision over the field extension personnel through appropriate SMSs. They also maintain liaison with concerned national level research institute. The line

function over the field extension services are exercised by the Field Services Division of DAE.

The District is the most important focal point for managing the operation of DAE. The managerial direction and administrative professional support for an average of 7-8 Upazilas with a combined establishment of over 300 personnel is provided either by an A.D. or D.D, supported by a team of 2-5 specialists and supervisory staffs (SMSs and TOs).

The Upazila is the closest point of institutional service to farmers. Each unit is under the UAO who is supported by 3-4 supervisory officers (SMO, AUAO, AAEO, JAEO).

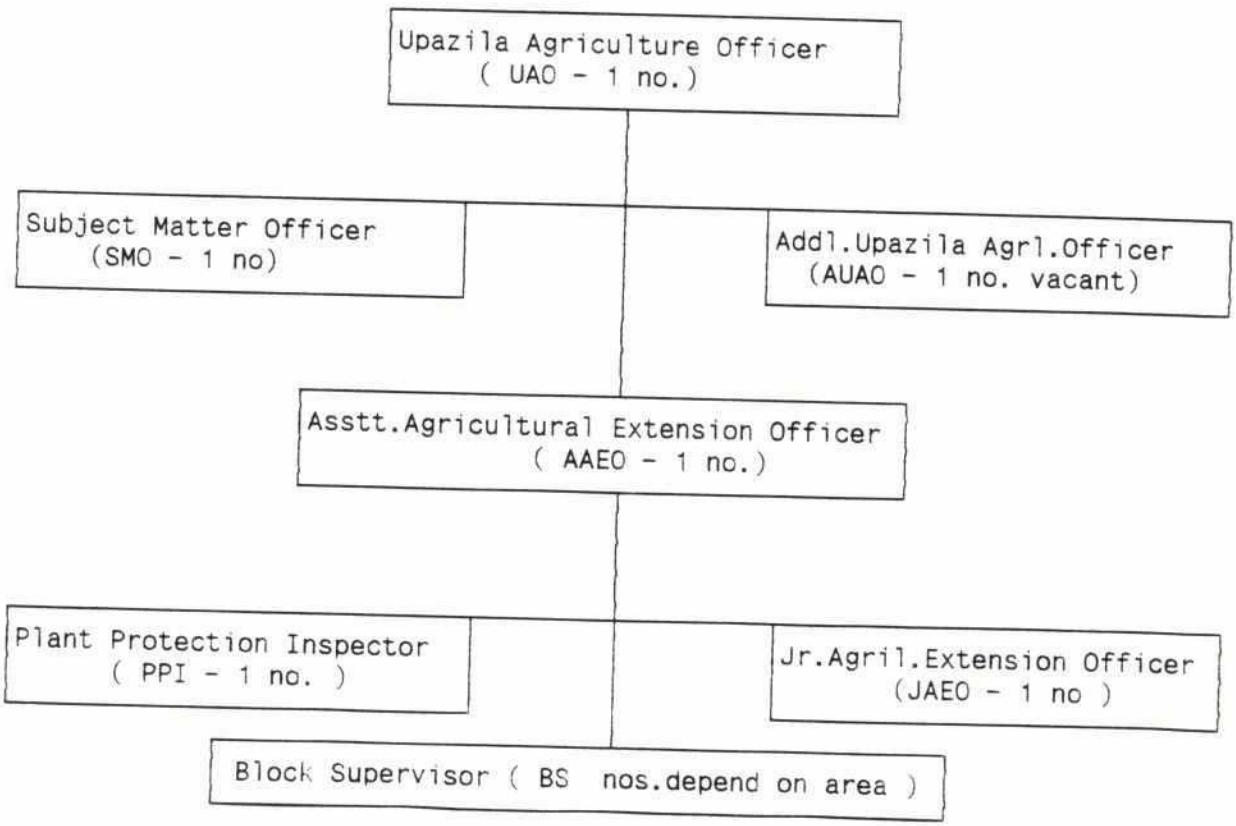
At the Block (Union) level there is a BSs who provides extension services to farmer or group of farmers. A BS covers 600 to 1200 farm families depending upon the intensity of agriculture in a given area.

The total staff strength of DAE is about 23,000 including those involved in service and regulatory functions.

Jurisdiction agriculture extension services under the project area covers the same boundaries as the local government.

The Upazila Agril.Extension Services who are practically engaged in the field level agricultural activities in the whole project area are similar and are as follows:-

Upazila Agricultural Extension Serivces



The extension staff (BS) posted at village level, carry out their extension activities following the Training and Visit (T&V) system. Under this system the union is divided in several blocks, each containing about a thousand households. A block is sub divided into 8 sub-blocks, each of which has 10 contact farmers with whom the BS maintains a regular contact. These contact farmers serve as change agent for the other farmers within the sub block. All BS attend a meeting in the Upazila Office once in a week either to report on their activities or to be trained on the coming fortnights impact points. Primary responsibility of the extension worker is to create awareness and advice farmers on the adoption of improved agricultural practices including cultivation of HYV crops.

BS is also responsible for establishing at least one demonstration block in farmers field to demonstrate improved technology to the farmers. All blocks are generally rice oriented. Farmers are provided with seeds, fertilizer and plant protection free of cost. They are allowed to retain the output.

The information gathered from the field level, is that the extension workers generally visit large and medium scale farmers and the farmers visit to extension workers is very insignificant.

Among the other important activities of UAO' offices are :-

- Supervision of Upazila Demonstration Farm.
- Farmer's Training Programme.
- Plant Protection
- Farmer's Motivation Tours.
- Farmer's Rally.
- Tree Plantation Programme.
- Upazila Soil Conservation and Research.
- Making of Compost Fertilizer Programme.
- Crop Cutting Programme and Prize Distribution.
- Upazila Nursery.
- Certified and Improved Seed Distribution
- Multiple Crop Demonstration and homestead Vegetable Programme.
- Crop Diversification Programme.

13. AGRICULTURE RESEARCH

There are many Institutes and Organisations which are carrying out research activities in Bangladesh. These include :

- Bangladesh Rice Research Institute (BRRI).
- Bangladesh Agricultural Research Institute (BARI).
- Bangladesh Jute Research Institute (BJRI).
- Bangladesh Institute of Nuclear Agriculture (BINA).
- Sugarcane Research and Training Institute (SRTI).
- Bangladesh Tea Research Institute (BTRI).
- Fisheries Research Institute (FRI).
- Bangladesh Livestock Research Institute (BLRI).
- Forest Research Institute (FRI).

The Bangladesh Agricultural Research Council (BARC) co-ordinates the activities of all these institutes.

RRI is responsible for research on various aspects of rice improvement and production and for training of extension workers and subject matter specialists on rice production. The main research station is at Joydebpur with nine Regional Stations. BRRI has four Sub-Stations, one of which is at Khulna. It is very near to the project area and is carrying out research on testing varieties under different agro-climatological conditions and topo-hydrological situations.

BARI also located at Joydebpur carries out research work on all crops other than rice, jute, tea and sugarcane. It has four Regional Research Stations specializing on the crops and cropping systems of the area. In addition there are 5 (Five) special crop stations and 18 (eighteen) Research Sub-stations, one of which is located in Jessore. It is headed by one SSO assisted by three SOs, One economist, three Field Assistants and a Fieldman.

14. EXTENSION RESEARCH LINKAGE

The development of a close working relationship between extension and research is important for the successful operation of both. It involves a two-way flow of information between research and the farmers with extension bridging the two ends. Extension is required to bring the findings of research to the farmers. Without these the extension's impact on sustained agricultural growth would be very limited. Also findings have to be practical and should offer viable solutions to farm problems. Research need extension's help in bringing such problems to their attention.

The main operational features of the extension research linkage include the following :

- Identification of production constraints faced by farmers.
- Generation of improved technology and its on farm validation.
- Joint formulation of extension recommendations(impact point) by researchers and extensionists.
- Dissemination of technology.
- Development of an institutional framework for carrying out extension research linkage activities.

Extension and research work together in planning and implementing the above activities although their responsibilities vary. While the role of research is more dominant in technology generation, extension takes the main responsibility for spread of technology and for bringing farmers production problems to the attention of the researchers.

A regular, documented feed-back of farmers problems is an important aspect of the extension research linkage system. The operational steps for recording feed back is as follows :

- BS will record all field problems raised by farmers which they are unable to offer solutions during their visit. They also record their observations which they consider as problems.

- These problems will be discussed with SMOs in the training day

- As far as possible SMOs with the help of UAOs will provide solutions to BS and subsequently will prepare a list of unsolved problems with their recommendations/observations to DDAE/AD-AE within two days of each training day.

- DDAEs/ADAEs in consultation with SMSs should provide solutions to these problems and prepare a list of unsolved problems for discussion at the DTC. The DTC will prepare a list of unsolved

problems and send copies to (a) nearest research stations (b) Director, Field Services Division (c) RTC and (d) Directors of concerned research institutes.

- Local research stations initiate research programmes to solve these problems within their capabilities. Otherwise, they send these problems to the National Head Quarters (NTC) for their attention and solve.

The sequence of activities undertaken to generate improved technology is -

- Cropping Farming System Research (FSR)
- On-Farm Multilocation Testing
- Verification trial-cum-demonstration in farmers field.

The first two activities are jointly undertaken by research and extension. The last one is the exclusive responsibility of the extension services, although the help of research may be taken when planning the trials and in analysis of their results.

Crop Damages

District Technical Committees and Collaborating Research Stations : Under the project area.

Category I and special Destricts having DTC	Collaborating Research Stations	Category II Districts as members of DTC
1. Chittagong	BARI Pahartali BARI Hathazari BRRI Comilla	Cox's Bazar Noakhali Laxmipur
2. Khulna	BARI Jessore BRRI Barisal	Satkhira
3. Bagherhat	BARI Jessore BRRI Barisal	-
4. Barisal	BARI Barisal BRRI Barisal	Bhola, Patukhali Barguna.

Pest and Disease

In the past years farmers in the project area were not interested to protect crops from the attack of pest/disease but now a days they are very much aware against such attacks mainly by medium and large group of farmers. It is reported by the farmers of polders under AEZ Regions 13 and 18 that they are very much affected last season of T.aman period by the virus (locally called Zandish) disease. It is also reported that in some areas as much as 25-50% of the production was lost due to virus attack on the

T.aman crop. The Asstt. Director (Agril.Extension) expressed his views, that every year about 10-15% crops were damaged by such attacks. Generally T.aman is attacked by stem Borer and Bacterial diseases, Potato by leaf blight and mosaic, wheat by rust etc.

Salinity

Crop production in saline soils is constrained by salt accumulation and concentration in the crop root-zone. These salts are water soluble and are easily transported by water. If evaporation exceeds leaching the salt will accumulate in the root-zone and it will interfere with the crop growth when the concentration exceeds tolerance limits. The plants will suffer from water stress even though enough water may be present in the root-zone. This is because of higher osmotic potential created due to the presence of salt in the system. Crop production is possible in salt affected soils when the salt concentration in the root-zone is diluted or leached below the root-zone.

Germination and early vegetative stage of growth of most crops are affected by salinily Table refer 15.1 and 15.2 below :

Crop	EC water of Irrigation water (ds M 1)				
	2	4	8	12	16
Rice	82	78	47	43	5
Wheat	71	74	44	30	-
Barley	73	63	55	35	-
Maize	72	73	70	49	48
Mustard	76	73	30	22	-
Cotton	68	50	28	6	-

Table 15.1 : Germination percentage of some field crops as affected by saline water.

Source : Complied from Bhumbla and Singh (1968) ; Rai(1977a), and Rai (1977b)

Stages	EC extract (ds m1)			
	3	8	14	21
Early growth stage	0	50	75	96
Reproductive stage	0	0	10	52

Table 15.2 : Percent decreased of yield due to soil salinity at early growth

and reproductive stages of rice.

Source : Compiled from Das and Mchrotra (1971); BRRI (1983) and BARC (1981-82 & 1982-83).

15. MAJOR AGRICULTURAL DEVELOPMENT CONSTRAINTS

The agricultural development in the the project area is constrained by various physical, chemical and social factors. In general the major factors that impedes development are mentioned in this section.

* High year to year variability of rainfall, uncertain dates of onset and recession of seasonal floods and risk of drought restrict cultivation of aus and aman rice. Uncertain rainfall delays sowing /transplanting and flood damages aus and aman crops. Heavy monsoon rainfall causes delay in transplanting of aman and sometimes flash floods washes away the standing crop.

* In the coastal saline belt the winter season is very short, therefore, timely sowing/planting of rabi crops is essential but this is restricted by late harvest of aman rice.

* Soil salinity is the most dominant limiting factor in the region, especially during the dry season. It affects certain crops at different levels of soil salinity and at critical stages of growth, which reduces yield and in severe cases the total yield is lost . A substantial area of land is tidally affected by saline water, appropriate management practice for crop production in this area is not available.

* Fertility status of most saline soils ranges from low to very low in respect to organic matter content, nitrogen, phosphorus and micronutrient like zinc and copper. The crop yields obtained in these soils are also low.

* Scarcity of quality irrigation water during dry season limits cultivation of boro rice and rabi crops, and aus cultivation during kharif-I season.

* Narrow technological and germplasm bases for salt tolerant crops limit crop choices. On the other hand, due to the extensive cultivation of a particular cultivar of crop year after year makes the crop susceptible to pests and disease attack. Pests and diseases like hispa, leaf-hopper and tungro virus are prevalent in the region and extensive damage is caused by these almost every year.

* A considerable area of the coast is within the polders of different types. Soil salinity levels has not decreased considerably within the poldered areas. Polder management like maintenance of sluice gates, water height in different times of the year is not maintained matching with the present time agronomic development for the cultivation of modern cultivars. This seriously constrained the adoption of HYV aman and HYV aus in these areas.

* The texture of most of the saline soils varies from silty clay to clay. Land preparation becomes very difficult as the soil dries out, deep and wide cracks develop and the surface soil becomes very hard. After harvest of transplanted aman rice the turn around time to catch the optimum time for rabi crop is very short in this region.These necessitate deep and rapid tillage operations.

* Perennial water-logging due to inadequate drainage and faulty operation of sluice -gate facilities restricts potential land use of the lowlands within the poldered areas. In these areas unauthorized digging of channels for intake of saline water for shrimp culture by shrimp farmers also creates many social conflicts.

* Lack of appropriate extension programmes for diffusion of modern technologies. Extension personal trained in saline soil management is also inadequate. These lackings retarded adoption of HYV technologies.

* Big land ownerships and unfavorable land tenurial system, and dominance of absentee farmers discourages adoption of modern technologies.

* Difficult communication and remote marketing facilities also retard agricultural development of the region.

Considering the above constraints is there ample scope for agricultural development. Some of the constraints are inherent or natural but some are physical and social and could be completely or partially eliminated by improved management practices.

what about v shrimp ? competetion with

PART 2 **FUTURE AGRICULTURE**

16. INTRODUCTION

Increase in agriculture production is one of the main objectives of this project, and thereby the income of the farmers to improve their living standard and also to bring a change in the social and economic conditions by developing the land resources. Development plan of the land resources of the project area for potential agricultural production depends mainly on the engineering working development of the respective polder.

For achieving the above objective the project would

- prevent crop damage from mainly saline hazard, cyclone, storm surges.
- Remove drainage congestion of the entire project area.
- Remove drainage and irrigation structures which are partially or completely damaged.
- Re-sectioning of the existing embankment and providing new sluice gates to use tidal water with no or low salinity for supplemental irrigation or drainage.

In the dry season the project would check inflow of saline water into the project area. In the monsoon , cultivated area would be protected from inundation by high tides. The regulators would be used for intake of water during drought which also preserved sweet water stored in the Khals for irrigation of rabi crops.

17. FUTURE LAND USE

Salinity problems received very little attention in the past, but due to increased demand for growing more food to feed the booming population of the country it has become imperative to explore the potentials of these lands.

Therefore, it was felt essential to compile all the available indigenous research and survey information. This will serve as a data-base for planning adaptive research, formulating extension messages and production plans. These will provide the appropriate ways and means to maximize the agricultural land use of these regions and thereby attain the ultimate goal of increasing food production of the country.

Due to construction of high embankment and growing afforestation, the polders under this project will receive protection from tidal and monsoon

flooding and salinity intrusion and also from bank erosion.

The above provisions will enable the area under this project to increase agricultural production by increasing the cropping intensity. This will come about through improved agricultural practices and services and application of modern agricultural technologies. The present double and triple cropped areas will be increased. The land use within the project area is shown in Table 17.1.

(Area in ha)

Category	Gross Area	Uncultivated Area	Cultivated Area	Cultivated Area		
				Highland	Medium Highland	Medium Lowland
I	133310	26100	107210	3416	98746	5048
II	16020	5575	10445	252	10067	126
III	56120	13320	42800	230	40447	2123
IV	48350	12200	36150	115	32416	3619
V	99640	14555	85085	-	68648	16437
VI	48240	17280	30960	6558	18000	6217(217)
Total	401680	89030	312650	10571	268324	33755

Table 17.1

This project covers cultivated area 78% and uncultivated area 22% which include homesteads, markets, roads, schools, graveyard, water area and embankment etc.

18 PROJECTED POTENTIAL CROPPING PATTERN

High potentials of the area for increased crop production can be realised by intensifying cropping through desalinization, improved irrigation and drainage system and better soils and water management practices. Rice is grown extensively in the wet season and considered as a compatible crop in the area. This is not because of its growth being favoured in the saline soils but, because of dilution of salinity with the monsoon rains and leaching/washing of excess salts from the root-zone. This lowers the salinity level within the tolerance limit of the crop. Whereas wheat, barley, groundnut etc. being more salt tolerant crops than rice can bring substantial change in agricultural practice in the salt-affected soils towards increased crop production. Coastal saline soils and their management in Bangladesh, by Z. Karim, BARC soils and Irrigation publication No. 8, 1983.

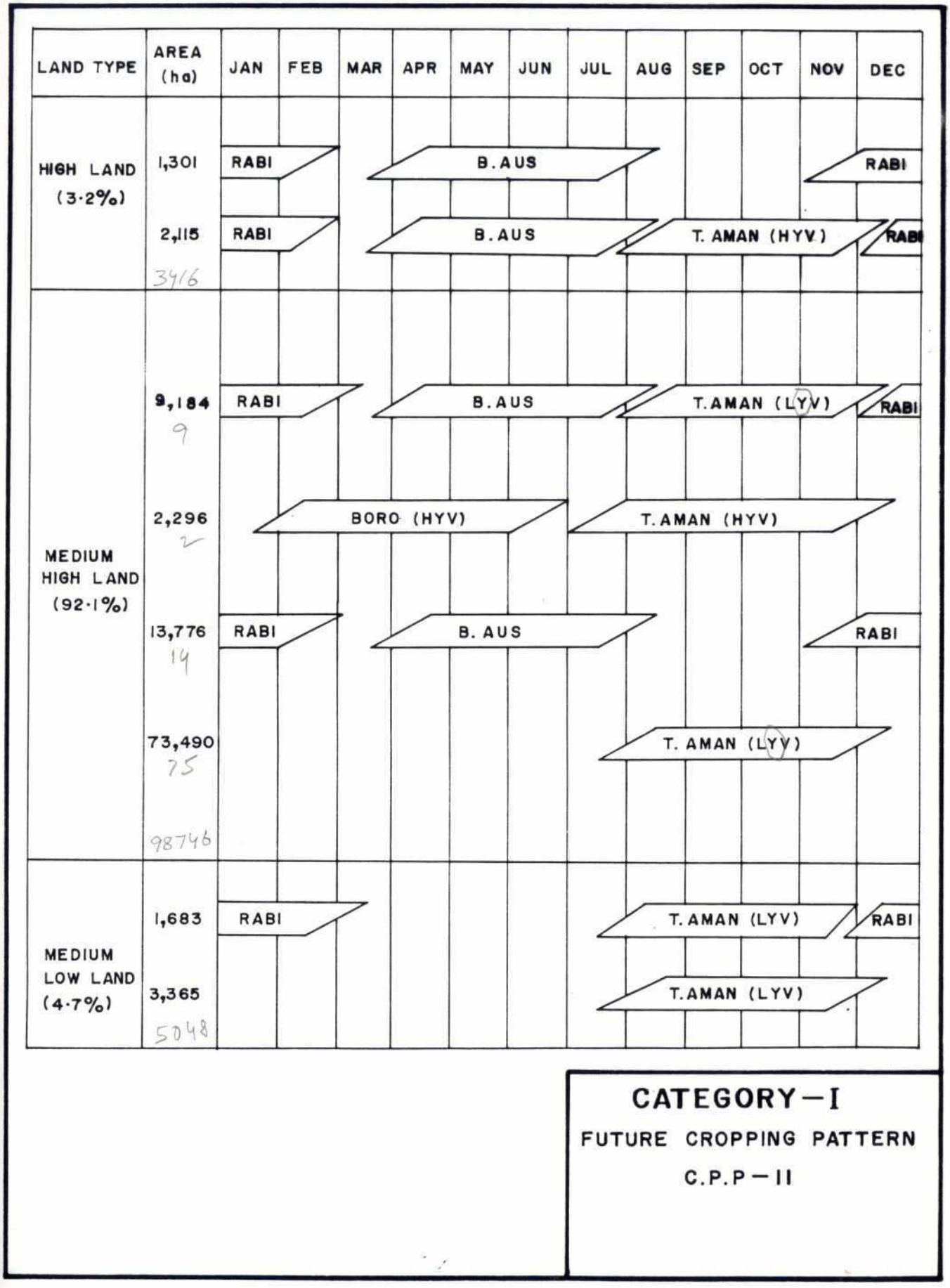
On analysing the crop tolerable limits of salinity refer Table 18-B (Enclosure-6) land resources data and soil salinity levels potential crops and cropping patterns will develop for optimum utilisation of the land resources of the coastal and off-shore regions.In doing so, emphasis has been given on crop growing season, land type, moisture availability, crop tolerance to soil salinity and climatic conditions. For growing modern varieties of rice, wheat and rabi vegetables irrigation should be applied. In case of scarcity of fresh water limited irrigation with brackish water may be practiced.

On lands where soil salinity is high, the land type is medium lowland to lowland and potentials for growing agricultural crops is limited, brackish water fish or shrimp farming may be practiced. This would be more rewarding than growing crops.

Monsoon season flooding condition improvement will influence the farmers in the selection of variety of aman rice crop grown. Flood free condition, with assurance of no or less damage by cyclone, intermittent flooding during high tides. significant increase in production and cropping intensity is expected. Local variety of T.aman will still continue to dominate after implementation of this project. Adaptation of local variety of T.aman, reasonable yield of the crop, with low level of management expenditure and the demand of its long straw as cattle feed would influence farmers to grow this crop as a major part of the cultivated area.

In dry season, protection of saline water intrusion would create scope of local B.aus cultivation on comparatively medium and lower medium elevation. Significant increase in area under rabi crops are also expected after implementation of this project. Farmers, after getting assurance from saline water intrusion will cultivate pulses as a relay crop with T.aman on the medium lower elevated area. Removal of saline inundation which acts as a great constraints, farmers would expect to grow more other rabi crops

FIG. I

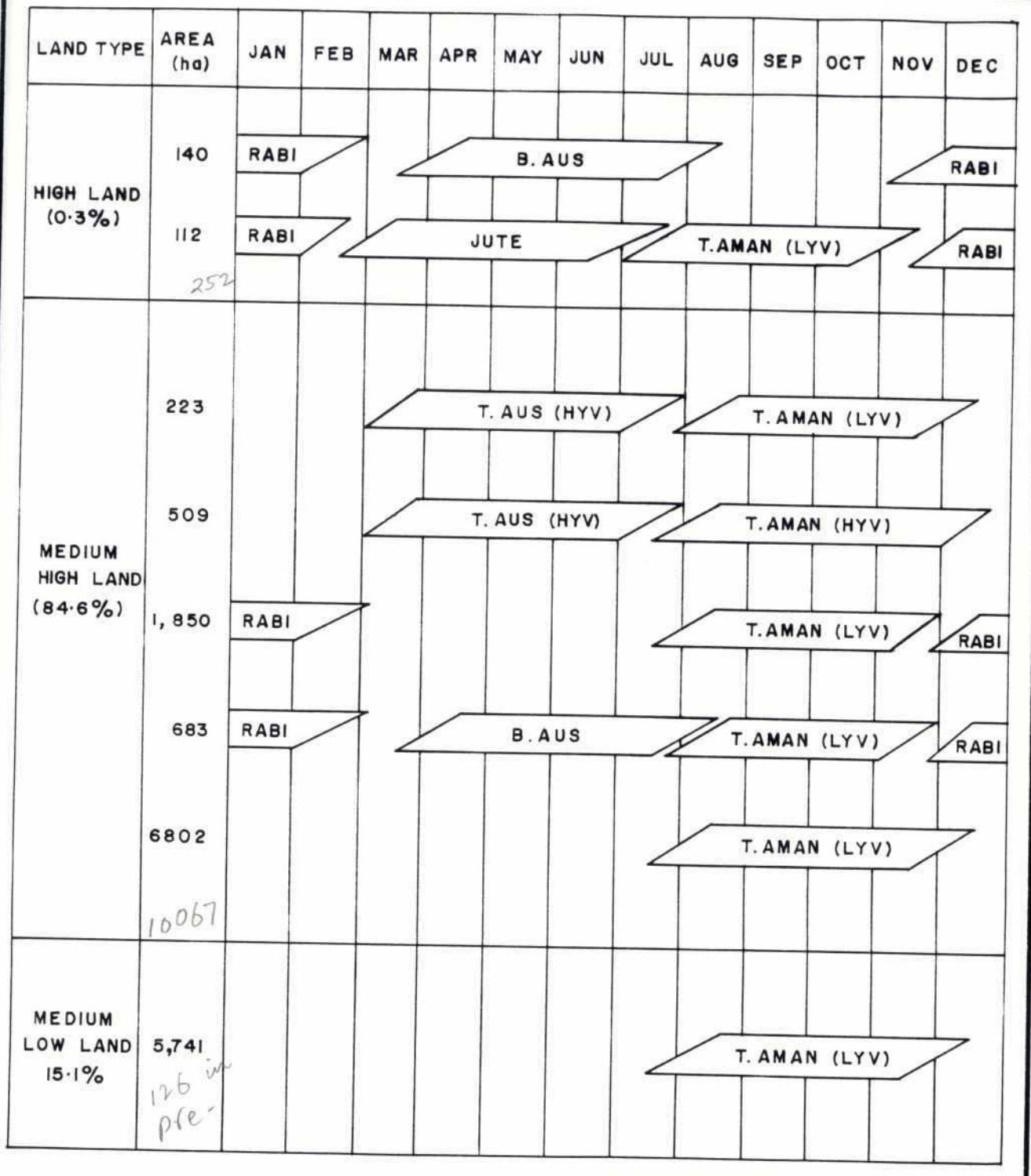


CATEGORY — I

FUTURE CROPPING PATTERN

C.P.P — II

FIG. II

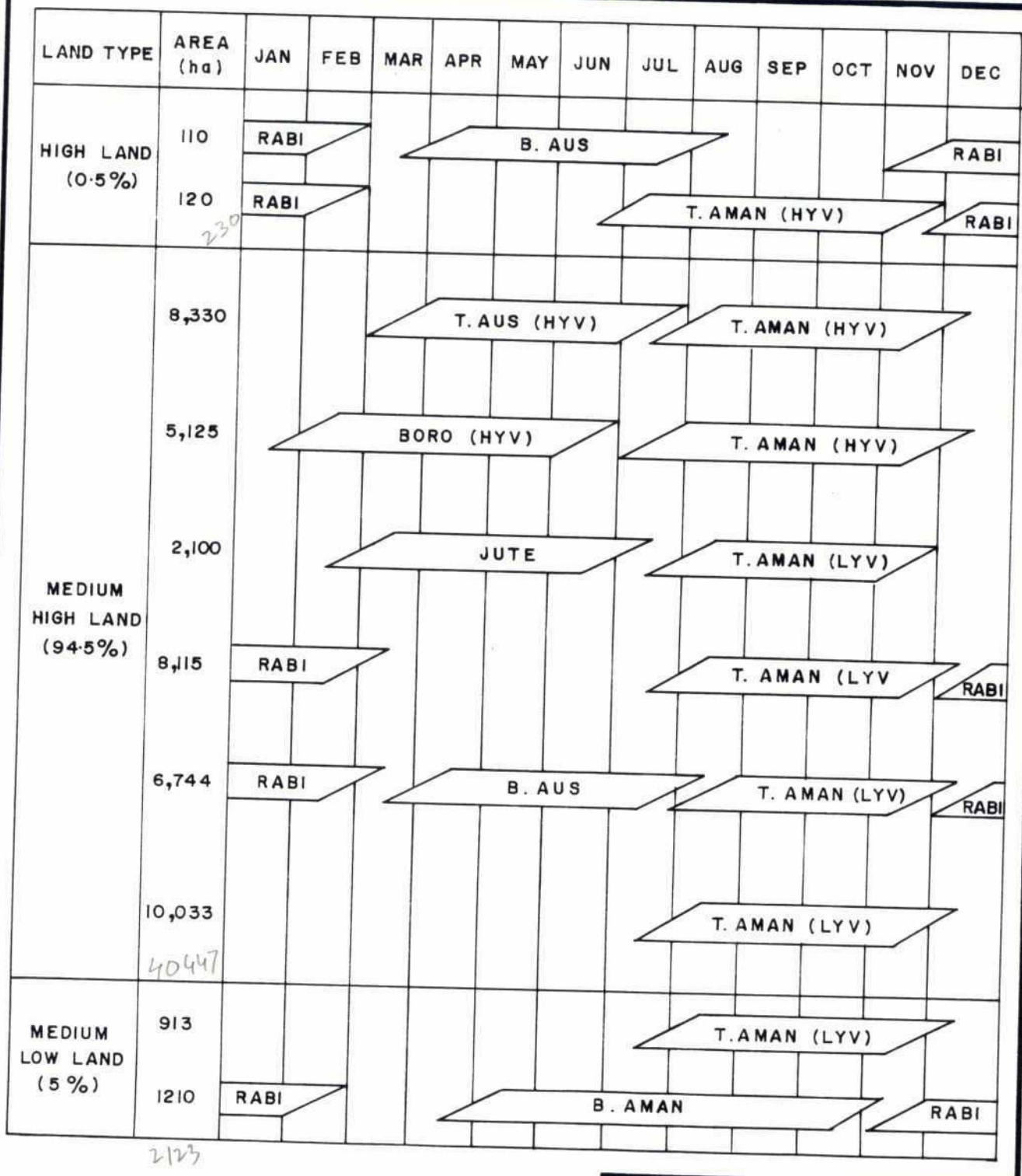


CATEGORY – II

FUTURE CROPPING PATTERN

C. P. P – II

FIG-III

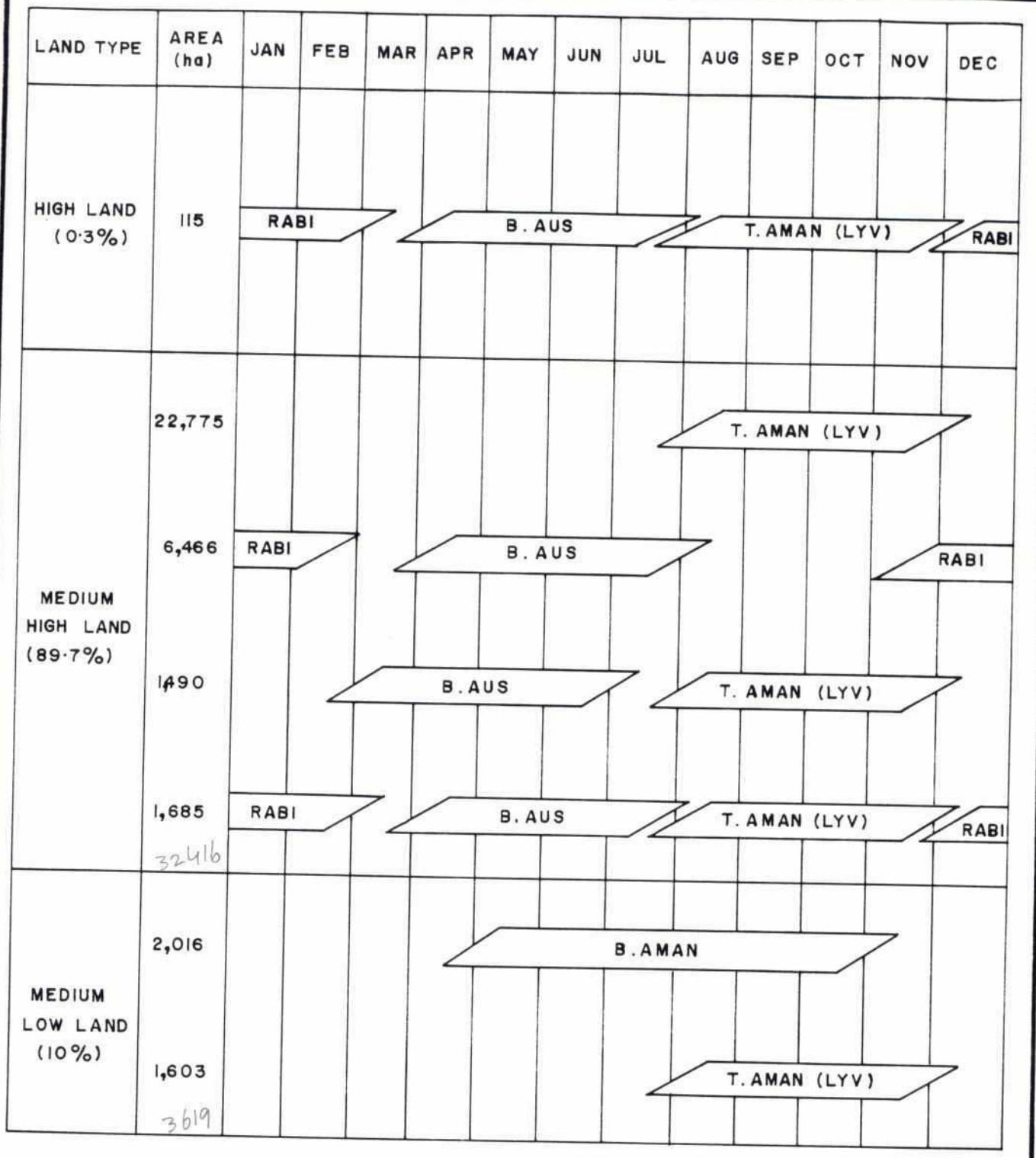


CATEGORY-III

FUTURE CROPPING PATTERN

C.P.P-II

FIG-IV

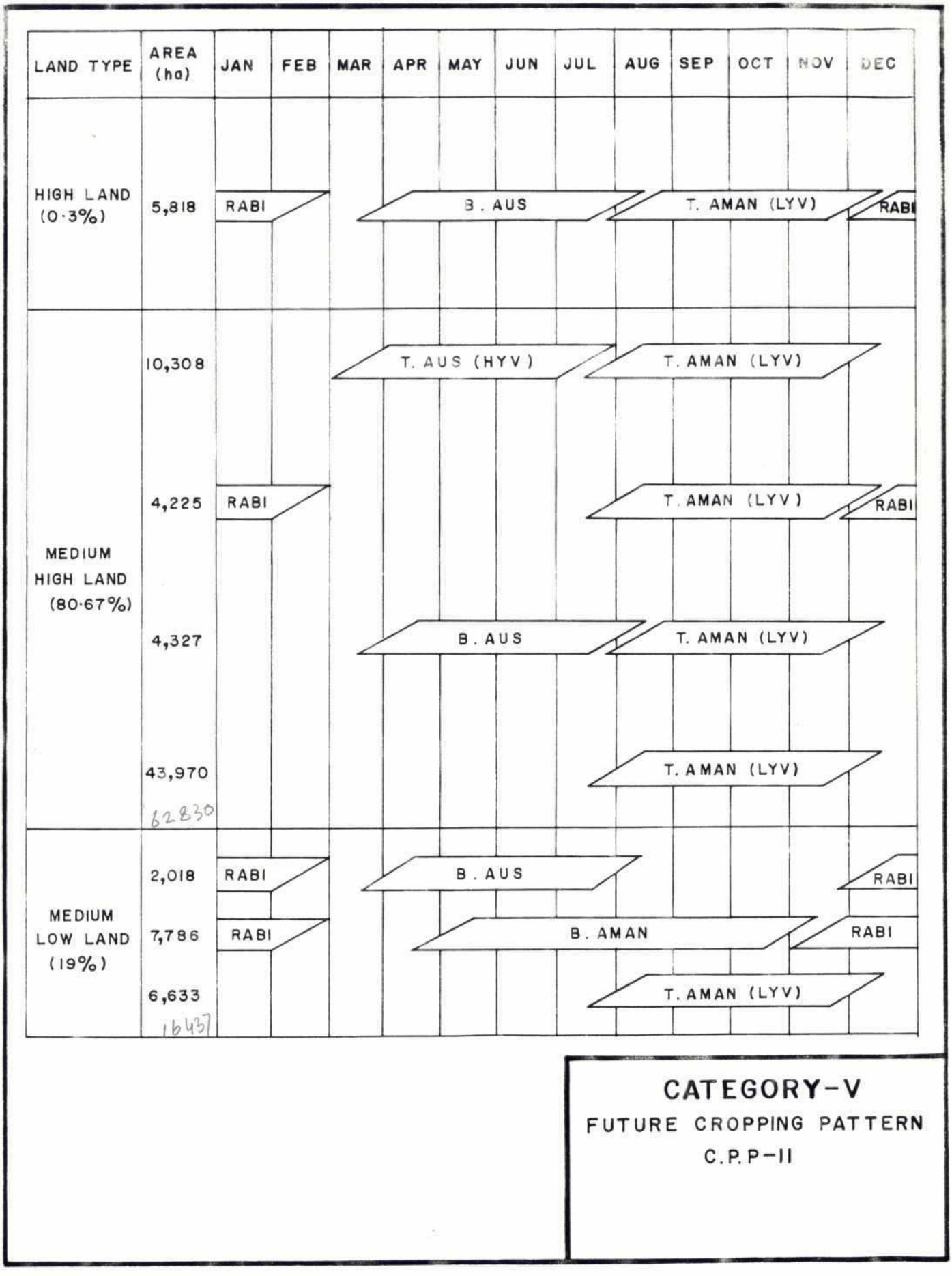


CATEORY–IV

FUTURE CROPPING PATTERN

C.P. P–II

FIG-V

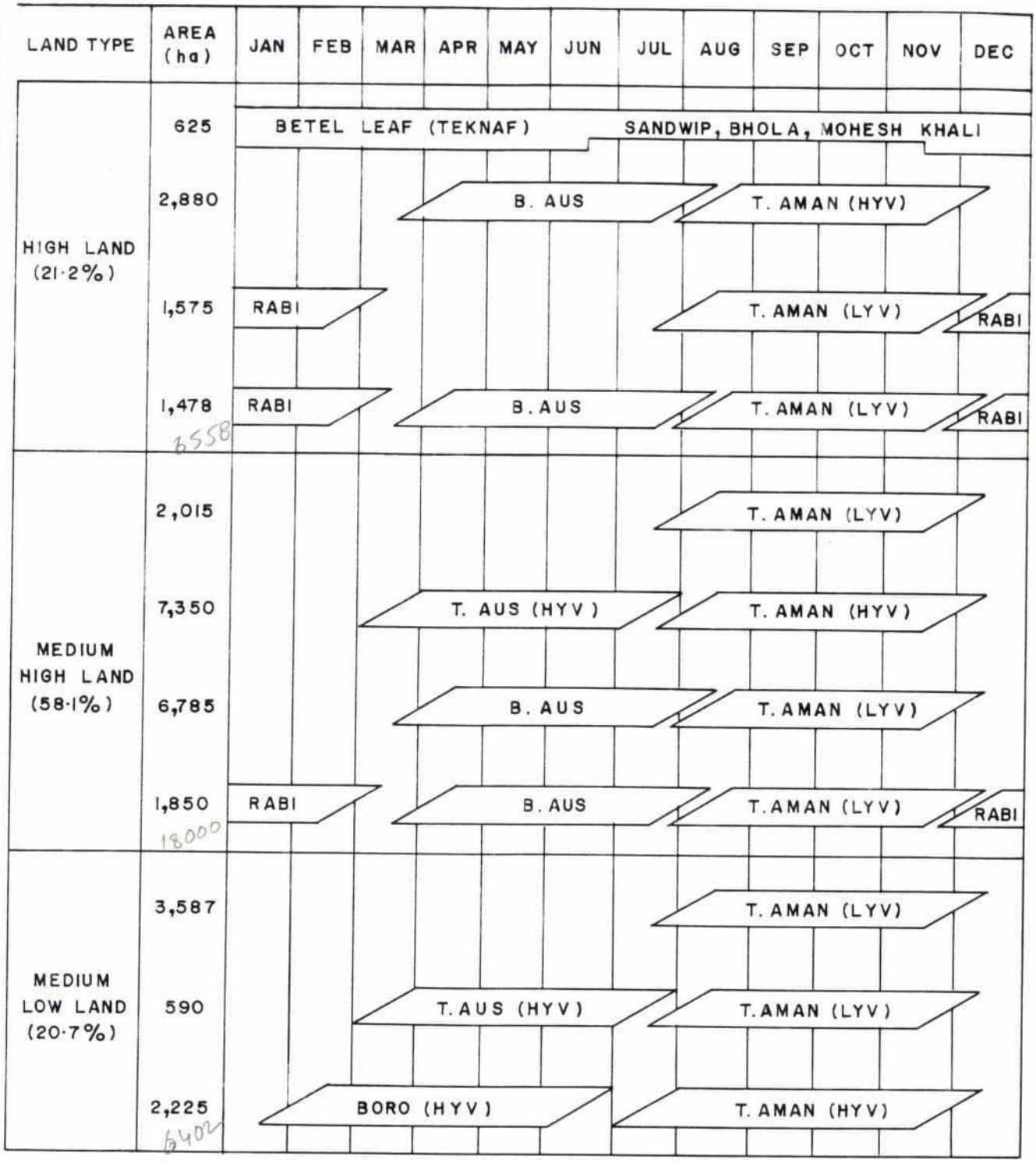


CATEGORY-V

FUTURE CROPPING PATTERN

C.P.P-II

FGI. VI



CATEGORY–VI

FUTURE CROPPING PATTERN

C.P. P–II

like oilseeds, chilies, water melon, cowpea(Falon), winter vegetables etc. In future cropping pattern of Category I and VI some HYV Boro cultivation is possible. In Catagory I some polders have some beel and low areas and some polders STW where irrigation is possible in Rabi season.In Category VI presently some HYV Boro is cultivated with the water coming from hilly areas like Sitakunda (61/1), Anowara (63/1A). So, this pattern should not be avoided. Cropping patterns which expected to be practiced after implementation of the project are presented in Tables 18.2 to 18.6 (Enclosure-7) category wise and diagrammatically in Fig Fig.-1 to Fig.-VI.

After implementation of the project the cropping intensity under category-1 polders would be increased by 31%(present 108%), single cropping area will decrease by 20% (Present 92%) and double cropping area will increase by 10% (Present 8%). Triple cropping pattern system is expected to introduce by 10% area.

The future cropping intensity under category-II polders would be increased by 20% (present 122%); single cropping area will be decreased by 13%, but double cropping area will be increased by 5.Triple cropping area will be introduced and the area will be enhanced by 8%.
The future cropping intensity under category-IV are expected to be increased by 8% (present 183%) but the single cropping area will be decreased by 9% and double and triple cropping area will be increased by 10% and triple cropped area will stand similar with present position.

The average cropping intensity of the 6(six) categories i.e the future(with project) cropping intensity of the project area is calculated below (Table 18.7) which will increase by 18% than the present intensity of 134%.

(Area in ha)

Catego-ry	Single Crop-ped Area	Double Crop-ped Area	Triple Cro-pped Area	Cultivat-ed Area	Total Cro-pped Area	Cropping Intensity
I	76855(72%)	19056(18%)	11299(10%)	107210	148864	139%
II	6832(65%)	2818(27%)	795(8%)	10445	14853	142
III	10946(26%)	24990(58%)	6864(16%)	42800	81518	190%
IV	26394(73%)	7956(22%)	1800(05%)	36150	47706	132%
V	50603(60%)	28664(34%)	5818(06%)	85085	125385	147%
VI	6227(20%)	21405(69%)	3328(11%)	30960	59021	191%
	177857(57%)	104889(33%)	29904(10%)	312650	477347	

Table 18.7
The increased cropping intensity of CPP-II will be 152%.
The above table shows that the single cropped area will be decreased by 12% but the double and triple cropped area will be increased by 5% and 7% respectively after the project implementation.

19. PROJECTED CROPS AREA AND YIELD

This never happened in Polder. How do we expect them to do this now? ১৩

After implementation of the project, the DAE,BARC,BRRI,BARI should give attention on different points in respect of agricultural development possibilities (Chapter-20) and agricultural research needs (Chapter-21). Under post-project condition, slight increase in HYV rice area and yield are expected. Higher level of input use in certain crops will contribute toward their yield increase. Safety from damages is also expected to increase yield of local T.aman rice. Post-project area and production from different crops are presented in Table 19.1 (Enclosure-8) categorywise and the total project in Table 19.7 (Enclosure-8).

For polders under the Mid-Term Programme, Phase2, the post project areas and production from different crops are presented in Enclosure 3, tables 7.8 to 7.19.

19.1 Projected Input Use.

Under post project conditions some increase in input use is expected in the project area. It is anticipated that farmers wil invest in more inputs on HYV crops. Input use in local variety is also expected to increase slightly as the risk of damage by saline water inundation will be reduced. Level of input use in rabi crops will also increase due to the same reason.

Post-project fertilizer recommendation of different crops are presented in Table 19.8 and 19.9 categorywise.

Category -I, II.IV and V

(In kg/ha)

Seasons	Crops	Category I & II				Category IV & V			
		N	P205	K20	S	N	P205	K20	S
Rainfed (Non-saline)	B. aus	20	-	-	-	-	-	-	-
	T. aman (HYV)	40	-	-	-	-	-	-	-
	T. aman (HYV)	60	20	20	10	-	-	-	-
	Wheat	40	20	20	-	-	-	-	-
	Chilli	60	60	40	-	-	-	-	-
	Mungbean	20	40	20	-	-	-	-	-
Rainfed (Saline)	B. aus	20	-	-	-	30	-	-	-
	T. aman (LYV)	40	-	-	-	40	20	20	-
	T. aman (HYV)	60	20	20	10	-	-	-	-
	Onion	50	40	100	10	-	-	-	-
	Watermelon	40	20	50	-	40	20	50	-
	Cowpea (Falon)	10	40	20	-	10	40	20	-
	Chilli	60	60	40	-	60	60	40	-
	Mustard	-	-	-	-	80	30	40	10
	Kheshari	-	-	-	-	10	-	-	-
Irrigated	Mustard	60	40	40	20	-	-	-	-
	Boro (HYV)	80	20	20	-	80	40	40	10
	T. aman (HYV)	60	20	20	-	60	30	30	-
	T. aman (LYV)	-	-	-	-	40	20	20	-
	T. aus (HYV)	-	-	-	-	60	-	-	-
	Wheat	-	-	-	-	80	30	40	10
	Boro (HYV)	-	-	-	-	60	20	20	10

Table 19.8

Source : Fertilizer recommendation guide-BARC

Category III and IV

(In kg/ha)

Seasons	Crops	Category I & II				Category IV & V			
		N	P205	K20	S	N	P205	K20	S
Rainfed (Non-saline)	B. aus	30	-	-	-	30	-	-	-
	T. aman (LYV)	50	20	20	-	50	20	20	10
	T. aman (HYV)	70	30	30	10	70	30	10	-
	Vegetables	150	80	100	-	70	40	50	-
	Cowpea (Falon)	-	-	-	-	20	50	40	-
	Brinjal	-	-	-	-	80	60	40	-
	Sweet Potato	-	-	-	-	80	60	100	-
Irrigated	T. aus (HYV)	70	40	40	-	70	40	40	-
	T. aman (HYV)	70	20	20	10	-	-	-	-
	Vegetables	150	80	100	-	150	80	100	-
	Gourd (diff. Type)	-	-	-	-	70	40	50	-
	Mustard	-	-	-	-	80	30	40	10
	Kheshari	-	-	-	-	10	-	-	-

Table 19.9

Source : Fertilizer recommendation guide - BARC

19.2 Improved Support Services

The support services from the Government are generally limited at Upazila level. Due to the difficulties in communication in the polder area, the Govt. officials are some what reluctant to visit the rural area. For the development of especially the agricultural sector, incremental support services are necessary. The extension staff (BS) should be provided with bicycles and Upazila Officers should be provided motor cycles. Regular training to BS and farmers must be ensured. DTC and RTC must be more active than the present position. Agricultural research should be more active in the coastal area.

It is realised from the field visit experiences that some small/large scale comprehensive water and agricultural development schemes of different types may be undertaken in the project area which requires a special organization set up of its own. Some possible schemes on agricultural development and agricultural research needs are described in chapter 20 and 21.

20. AGRICULTURAL DEVELOPMENT POSSIBILITIES

20.1 General

The coastal belt is pre-eminently suited to transplanted paddy cultivation. Therefore, development efforts need to focus on methods to increase paddy yields and production. Constraints appear to be as much social and economic as physical and deserve greater attention in project, research, extension and development planning.

20.2 Rainfed agriculture

i. Improve soil and crop management by :

- improved tillage on basin clays: either by use of stronger draught animals or by use of power tillers;
- increased use of fertilizers;
- improved pest/disease monitoring and treatment;
- improved regulation of water-levels within polders;
- use of supplementary irrigation from non-saline rivers;
- improve land tenancy conditions.

ii. Expand cultivation of HYV aus and HYV aman paddy.

iii. In areas of wet soils, make raised beds for cultivating dryland kharif and rabi crops.

iv. Grow fuelwood crop on river-bank soils.

v. Expand cultivation of quick maturing dry land rabi crops on ridge and marginal soils. Make field drains to reduce the risk of damage by late or early rains.

vi. Improve management of coconut, betelnut and betel leaf gardens, especially by using fertilizers, manures, mulches and better pest/disease management

vii. Dryland kharif crops and early rabi crops can be grown on level tops of some low hills or on slopes that are terraced. Suitable crops include : pineapple, ginger, cassava, aus paddy, maize, banana, betel leaf, jackfruit, coconut, betelnut etc.

20.3 Small-scale irrigation/drainage

i. Expand command areas of existing low-lift pumps by:

- round-the-clock pumping (where tidal conditions permit);

- rotational irrigation;

ii. Increase the number of pumps used in non-saline areas;

iii. Identify sites where double lifting of water would increase the irrigable area.

iv. Use traditional irrigation equipment.

v. Identify local schemes for flood protection and drainage to protect boro, aus and/or t.aman from damage by local floods.

vi. Where fresh water in tanks and in underground aquifers are not fully needed for domestic use, provide supplementary irrigation to dryland rabi crops.

vii. Use dug wells or STW's, where possible, to expand the cultivation of dryland rabi crops and to provide supplementary irrigation to aman on drought-prone soils.

viii. Improve crop management

20.4 Large-scale irrigation/drainage

i. Because most of this area is only shallowly flooded and it is well served with a network of perennial rivers and creeks, the need for large-scale irrigation projects is small. Embankment and pump drainage would benefit some northern parts to reduce flood-levels so that HYV aus and aman could be grown.

ii. The greatest need is to provide embankments to protect the land from salt water flooding and to provide sluice-gates to permit drainage of excess water derived from local rainfall and run-off. Improved management and maintenance of existing embankments, sluices, internal drainage channels and outlet channels are also needed.

iii. The possibility of making smaller polders than the existing Coastal Embankment Project polders deserves examination. This might simplify management, and make operation and maintenance by Union/Upazila Parishads possible.

iv. Large-scale embankment and drainage projects in this area should take into account:

- the saucer-shaped basin relief, creating problems for water management for transplanted aus and aman cultivation within embanked areas;

- the tendency for creeks to silt up rapidly after embankments are built;
- the difficulty of providing regular extension and support services because of difficult communications, especially in the rainy season;
- the prevalent heavy clay soils, difficult to compact by hand when constructing embankments and providing poor material for road foundations and surfacing;
- the unstable banks of some main river channels;
- the heavy monsoon rainfall of most of the area;
- the exposure of the region to cyclones and storm surges which can severely damage embankments, sluices, buildings and equipment; disrupt communications by breaching road embankments, destroying bridges/culverts and sinking ferry boats; flood land unseasonably causing widespread damage to crops; and cause large-scale human and livestock casualties;
- the fact that much land, especially in the south, is possessed by big, absentee, land owners who, to-date, have shown little interest in intensifying methods of crop production.

21. AGRICULTURAL RESEARCH NEEDS

Socio-economic surveys in different areas to identify actual constraints on more rapid development in particular areas. The objective should be to try to find possible ways to reduce or remove specific constraints.

Agronomic trials on different soils and land types in different parts under rainfed and irrigated conditions:

- new HYVs of boro, aus and aman paddy;
- dryland rabi crops to follow t.aman on basin margin and river bank soils; trial should include salt-tolerant crops and varieties.
- optimum use of fertilizers in different crop rotations on different soils;
- improved agricultural practices, including optimum plant spacing and pest/disease management;
- agricultural practices to minimize soil salinity or to minimize its effects on crop growth.

Fertilizer trials on different soils and cropping patterns:

- optimum doses.
- most efficient methods of application;
- optimum times of application in crop rotations;
- use of organic manures;
- special techniques for use on saline, calcareous and acid sulphate soils.

Water management trials, both on irrigated and non-irrigated land.

Soil management trials:

- improvement of land preparation on heavy basin clays.
- techniques of reducing topsoil salinity.
- methods of neutralizing acid sulphate acidity.

Trials with improved methods of seed/grain drying and storage.

Studies to investigate the acceptability of paddy threshers, driers and improved stores, especially in areas where big land-owners predominate.

Trials to identify improved management techniques for coconut, betelnut and betel leaf gardens.

Trials with quick-growing fuelwood species.

Trials with techniques for reclaiming Acid Sulphate Soils.

Study of possible ways to provide improved advisory, input supply and marketing services.

Study of techniques and crops suitable for the rapid rehabilitation of agriculture following:

- a cyclone and storm surge in the pre-monsoon season;
- a cyclone and storm surge in the post-monsoon season;
- damage to T.aman by late Ganges floods.
- damage to T.aman by salinity caused by salt-water flooding or resulting from drought within the kharif growing period;
- breaching of an embankment in any season;
- large-scale loss of animals.
- large-scale loss of seed of locally-adapted paddy varieties;
- scarcity of all or individual fertilizers.

Studies to monitor and assess changes in fertility and physical properties of different soils:

- in embankment areas;
- in irrigated areas;
- in areas used continuously for HYV paddy cultivation with continuous use of fertilizers;
- in areas near the boundaries between saline and non-saline zone.
- in areas affected by a saline storm surge.

Study of possible ways to improve advisory, input supply, equipment supply and maintenance, plant protection and marketing services by - providing boats or improving launch services;

- improving the network of all-weather roads and paths;
- reducing the work areas of field and supervisory officials to manageable sizes;
- improving radio communications and radio advisory services.

22. IMPROVED AGRICULTURAL PRACTICES FOR CONTROLLING SOIL SALINITY

22.1 Land Leveling

Slight variations in the micro-relief lead to salt accumulation in the raised spots. The effect of poor leveling is more pronounced in the presence of shallow saline ground water tables. During final land preparation all care should be taken for uniform leveling of the land. This will facilitate uniform germination of seeds and better growth of all field crops.

22.2 Tillage

After harvest of transplanted aman rice the turn around time left for growing rabi crops is very short. As moisture content in the soil drops deep and wide cracks develop and the surface soil becomes very hard and makes tillage operations very difficult with the traditional plough. Rapid and deep tillage reduces soil salinity by breaking the capillary continuity for upward movement of saline groundwater. Therefore, light mechanised tillage implements such as power tillers should be used to increase the speed and depth of tillage operation.

Avoiding Fallow Condition

Considerable quantity of salts may accumulate at the soil surface by evaporation particularly in the presence of shallow saline water table during the fallow periods. If the fallow period is long severe salinity may develop. Therefore, it is recommended to avoid fallowing of the land during rabi season. Salt tolerant crops should be chosen and as many crops as possible should be grown. This will lower the profile salinity.

22.3 Selection of Appropriate Cropping Patterns

The cropping patterns in an area influence soil salinization, chiefly by affecting the water regime. Frequent irrigation tends to maintain a net downward flux of water and salts thereby keeping the root-zone relatively salt free. Rabi crops of longer duration will favour the accumulation of salts in the root-zone . It is suggested to grow relatively salt tolerant crops in the saline areas.

22.4 Pre-plant Irrigation

Salinity above 3 dS m1 may seriously hamper crop germination and yield. Germination and early growth can be improved by a heavy pre-plant irrigation, which is likely to reduce the surface salts beyond the sowing depth and root-zone of the crop. This should be practiced well in advance of the desired planting date to allow for cultivation to remove weeds and

preparation of seedbeds.

Extra care should be taken in furrow irrigated fields as there is a possibility of salt accumulation on the ridges. The practice of knocking off the top of the ridge before planting can be used. Care must be taken, however, on seed placement.

It is better to apply an irrigation before the onset of scanty rains during winter. This irrigation will keep the soil profile saturated with water and winter rain water will provide excess fresh water for leaching.

Placement of Seed

It is experienced, that when poorer quality of water is used in furrow irrigated crops on saline soils, maintaining a desired stand is a serious problem. Farmers sometimes compensate by sowing two or three times as much seed as normal, or making appropriate adjustments in planting procedures. The soil area around the seeds is lowered in salinity to create an environment conducive to germination. This can be done by selecting suitable planting practices, bed shapes and irrigation management.

22.5 Fertilization

When salinity is a problem, care should be taken in placement and timing of fertilization. Seedlings are sensitive to salts and, while small, require little fertilization. Where salinity is a problem, early fertilizer applications should be lower than normal and the main application made at a later date. Therefore, in deciding on split fertilization practices, soil analysis for EC extract, N, P, K and other elements prior to planting should be advised. If soil salinity and fertility are limiting yields, correction of the most limiting factor should be made get a yield increase.

Pre- or Post-? In case of post, how has the area been calculated?

20

Category - I

Table 3.1

Polders with AEZ Sub - regions	Gross area		Cultivated area		Uncultivated area	
	Area(ha)	%	Area (ha)	%	Area (ha)	%
5 (60% 15e +40% 13f)	55,400	100	48,560	88	6,840	12
7/1 (13f)	3,890	100	2,830	73	1,060	27
7/2 (13f)	10,890	100	7,690	71	3,200	29
14/1 (13f)	2,550	100	2,020	79	530	21
14/2 (13f)	11,330	100	8,950	80	2,380	20
15 (13f)	3,320	100	3,040	92	280	8
10-12 (13f)	16,230	100	14,160	87	2,070	13
31 (13f)	10,360	100	7,080	68	3,280	32
32 (13f)	6,350	100	4,280	67	2,070	33
35/1 (13d)	12,990	100	8,600	66	4,390	34
Total	1,33,310	100	1,07,210	80	26,100	20

Source : (I) Khulna Coastal Embankment Rehabilitation Project.
(II) BBS - Upazila Statistics - 1988 - 90 - Data by Upazila
(III) UAO offices.

Table 3.2

(Area in ha)

Sub-regions	High land	Medium High Land	Medium Low Land	Low Land	Total
13d	207	8,289	104	-	8,600
13e	2,428	25,667	1,041	-	29,136
13f	781	64,790	3,903	-	69,474
Total	3,416	98,746	5,048	-	1,07,210

Source : Based on Report - 2 AEZ Regions of Bangladesh, UNDP/FAO/BARC.

Data by AEZ
How have these two been integrated?

Category - II

Table 3.3

Polders with AEZ Sub - regions	Gross area		Cultivated area		Uncultivated area	
	Area(ha)	%	Area (ha)	%	Area (ha)	%
40/1(13d)	2,100	100	1,175	56	925	44
40/2(13d)	4,450	100	2,405	54	2,045	46
45 (13d)	4,090	100	3,150	77	940	23
48 (13d)	5,380	100	3,715	69	1,665	31
Total	16,020	100	10,445	65	5,575	35

Source : (I) On the basis of BBS - 1988-90
(II) UAO Offices
(III) Field visit experiences.

Table 3.4

(Area in ha)

Sub-regions	High land	Medium High Land	Medium Low Land	Low Land	Total
13d	252	10,067	126	-	10,445

Source : Based on Report - 2 AEZ Regions of Bangladesh.

Category - III

Table 3.5

Polders with AEZ Sub - regions	Gross area		Cultivated area		Uncultivated area	
	Area(ha)	%	Area (ha)	%	Area (ha)	%
56/57(North + central part)	33,450	100	23,750	71	9,700	29
18a+18b+18d	22,670	100	19,050	84	3,620	16
72 (18e)						
Total	56,120	100	42,800	76	13,320	24

Source : (I) BBS
(II) UAO Offices
(III) Field visit experiences.

Table 3.6 (Area in ha)

Sub-regions	High land	Medium High Land	Medium Low Land	Low Land	Total
18a	-	10,053	126	-	10,179
18b	-	11,484	391	-	11,875
18d	-	1,696	-	-	1,696
18e	230	17,214	1606	-	19,050
Total	230	40,447	2123	-	42,800

Source : Based on Report - 2 AEZ Regions of Bangladesh.

Category - IV

Table 3.7

Polders with AEZ Sub - regions	Gross area		Cultivated area		Uncultivated area	
	Area(ha)	%	Area (ha)	%	Area (ha)	%
56/57(Southern part)(18b+18e)	39,750	100	28,250	71	11,500	29
73/2B (18f)	8,600	100	7,900	92	700	8
Total >	48,350	100	36,150	75	12,200	25

Source : (I) BBS
(II) UAO Offices
(III) Field visit experiences.

Table 3.8 (Area in ha)

Sub-regions	High land	Medium High Land	Medium Low Land	Low Land	Total
18b	-	17,385	593	-	17,978
18e	115	8,657	1500	-	10,272
18f	-	6,374	1526	-	7,900
	1150	32,416	3619	-	36,150

Source : Based on Report - 2 AEZ Regions of Bangladesh.

* Polder 56/57 (Bhola) covers 5(Five) AEZ sub-regions.
The approx. percentage of area may be 18a = 30%,
18b = 35%, 18d = 5%, 18e = 20% and 18f = 10%.

Category V

Table 3.9

Polders with AEZ Sub - regions	Gross area		Cultivated area		Uncultivated area	
	Area(ha)	%	Area (ha)	%	Area (ha)	%
59/3B (18f)	31,380	100	27,615	88	3,765	12
59/3C (18f)	18,020	100	13,875	77	4,145	23
59/2 (18f)	26,520	100	24,130	91	2,390	9
59/1A (18f)	15,500	100	13,795	89	1,705	11
60 (18f)	8,220	100	5,670	69	2,550	31
Total	99,640	100	85,085	85	14,555	15

Source : (I) BBS
(II) UAO Offices
(III) Field visit experiences.

Table 3.10

(Area in ha)

Sub-regions	High land	Medium High Land	Medium Low Land	Low Land	Total
18f	-	68,648	16,437	-	85,085

Source : Based on Report - 2 AEZ Regions of Bangladesh.

Category - VI

Table 3.11

Polders with AEZ Sub - regions	Gross area		Cultivated area		Uncultivated area	
	Area(ha)	%	Area (ha)	%	Area (ha)	%
61/1 (23a)	7,690	100	4,930	64	2,760	36
62 (23b)	1,580	100	890	56	690	44
63/1A (23a)	6,400	100	3,650	57	2,750	43
64/1A (23a)	5,750	100	4,890	85	860	15
64/2B (23c)	6,960	100	4,245	61	2,715	39
66/1 (23c)	2,590	100	1,500	58	1,090	42
66/3 (23c)	2,220	100	1,400	63	820	37
68 (23d)	3,520	100	2,530	72	990	28
69(a)	1,780	100	500	28	1,280	72
70 (23c)	3,030	100	2,060	68	970	32
71 (23c)	6,720	100	4,365	65	2,355	35
Total >	48,240	100	30,960	64	17,280	36

Source : (I) Based on BBS Upazila Statistics - 1988-90
(II) UAO Offices. (III) Field visit experiences.

Table 3.12

(Area in ha)

Sub-regions	High land	Medium High Land	Medium Low Land	Low La	Total
23a + 29a	4,665	7,410	1,620	275	13,970
23b	18	750	122	-	890
23c	1,495	9,360	2,715	-	13,570
23d	380	480	1,670	-	2,530
	6,558	18,000	6,127	275	30,960

Source : Based on Report - 2 AEZ Regions of Bangladesh.

Category - I

Table 6.1

Land Type	Cropping Pattern *4*	Cultivated area *3*	Cropped area	Remarks
High Land (3.2%)	1. B.aus - Rabi crops (W.Veg, Oil seeds, Pulses Potato, S.Potato, Chilli etc).	1,301	2,602	Double Cropping
	2. T.aman(LYV)-Rabi(Pulse chilli, cowpea)	2,115	4,230	-do-
Medium High Land (92.1%)	1. B.aus- Rabi crops (Pulse, cowpea, chilli) etc.	3,035	6,070	Double Cropping
	2. T.aman(LYV)-Rabi(Pulse, cowpea, chilli, etc)	2,215	4,430	-do-
	3. T.aman(LYV) Fallow	93,496	93,496	Single cropping
Medium Low Land(4.7%)	1. T. aman (LYV) Fallow	5,048	5,048	Single cropping
	Total	1,07,210	1,15,876	

Cropping intensity - 108 %

* 3 * = Cultivated area estimated on the basis of Upazila Statistics - BBS, UAO offices and field visit experiences.

* 4 * = Basis of calculating cropping pattern is

i. Field visit experiences
ii. D. D./A.D and UAO offices of Agril. Extension
iii. Fertilization Recom. Guide - BARC
iv. Report - 2 Agro - Ecological Regional of Bangladesh - UNDP, FAO, BARC.

None of these sources give cropping pattern by land type? How has this been calculated to the last digit?

Category - II

TABLE 6.2

(Area in ha)

Land type	Cropping pattern *4*	Cultivated area *3*	Cropped area	Remarks
High land 2.4%	1. B. aus - Rabi(Pulse, Mustard, Cowpea etc.)	140	280	Double cropping
	2. Jute - Rabi (Millet,Pulse,Mustard, etc.)	112	224	-do-
Medium High Land (96.4%)	1. b. aus - T. aman (LYV)	875	1750	double
	2. T. aus (HYV)- T. aman (LYV)	230	460	-do-
	3. T. aus (HYV) - T. aman (HYV)	525	1050	-do-
	4. B. aus - Rabi (pulse, Cowpea, Chilli, etc.)	370	740	-do-
	5. T. aman (LYV) - Fallow	8067	8067	Single cropin g
Medium Low land (1.2%)	1. T. aman (LYV) - Fallow	96	96	Single croppe
	2., B. Aman - Fallow	30	30	-do-
		10445	12697	

Cropping intensity=122%

Category - III

Table 6.3

Land type	cropping pattern *4*	Cultivated area *3*	Cropped area	Remarks
High Land (0.5%)	1. B. aus - Rabi (W. Veg., Pulse, oilseeds, Chilli, S. Potato, Cowpea etc.)	230	460	Double croping
Medium High land (94.5%)	1. B. aus - T. aman (LYV)- Rabi (Pulse, Cowpea,wheat, Mustard, Chilli etc.)	6,344	19,032	Triple cropping
	2. T. Aus (HYV) - T. Aman (TYV)	7,730	15,460	double
	3. Boro (HYV) - T. Aman (HYV)	4,125	8,250	-do-
	4. Jute- T. aman (LYV)	1,100	2,200	-do-
	5. T. aman (LYV)- (pulse, Chilli,Cowpea, S. potato, Chilli etc.)	7,115	14,230	-do-
	6. T. Aman (LYV) - Fallow	14,033	14,033	Single
Medium low land (5%)	1. B. Aman - Rabi (Pulse, Cowpea etc.	1,210	2,420	Double croppin
	2. T. Aman (LYV) - Fallow	913	913	Single Cropping
		42,800	76,998	

Cropping intensity =180%

Category - IV

Table 6.4

Land type	Cropping pattern *4*	Cultivated area *3*	Cropped area	Remarks
High lands (0.3%)	1. B. Aus - Rabi (W. Veg. oilseeds Pulse, Chilli, Millet etc.)	115	230	Double
Medium High land (89.7%)	1. B. Aus - T. aman (LYV) 2. B. Aus - Rabi (Pulse, Cowpea, oilseeds, S. potato etc.) 3. T. Aman (LYV) - Fallow	1,998 3,996 26,422	3,996 7,992 26,422	double -do- Single
Medium low lands (10%)	1. T. Aman (LYV) - Fallow 2. B. Aman - Fallow	1,603 2,016	1,603 2,016	Single -do-
		36,150	42,259	

Cropping intensity = 117%.

Category - V

Table 6.5

Land type	Cropping Pattern *4*	Cultivated area *3*	Cropped area	Remarks
Medium High Land (80.7%)	1. B. aus - Rabi crops (W. Veg, pulse, oil seeds chilli, sweet Potato etc.	5818	11636	Double cropping
	2. T. aus (HYV) - T. aman (LYV)	9308	18616	- do -
	3. T. aman (LYV) - Rabi crops (pulse, oil seeds chilli, cowpea, S. potato etc.	3225	6450	- do -
	4. B. aus - T. aman (LYV)	3327	6454	- do -
	5. T. aman(LYV) - Fallow	46970	46970	single
Medium Low (19.3%)	1. T. aman(LYV)- Fallow	7633	7633	Single cropping
	2. B. aus - RAbi (Pulse, S. potato, cowpea etc.)	2018	4036	double -do-
	3. B. aman - Rabi (pulse, cowpea etc.)	6786	13572	
		85,085	115,567	

Cropping intensity = 136%.

Category - IV

Table 6.6

Land Type	Cropping Pattern *4*	Cultivated area *3*	Cropped area	Remarks
High Land (21.2%)	1.Betel Leaf - Fallow	625	625	Single cropping
	2.B.aus- T.aman(LYV) - Rabi(W.Veg).	878	2,634	Triple cropping
	3.Boro(HYV)-T. aman	3,280	6,560	Double cropping
	4.T.Aman(LYV)-Rabi(Potato,S.Potato,Chillis,Lentil,cowpea,Oilseeds water melon etc.)	1,775	3,550	-do-
Medium High Land (58.1%)	1.B.aus-T.aman(LYV)-Rabi (Chilli,cowpea,lentil, Brinjal,Potato,S.Potato, water melon).	2880	8,640	Triple cropping
	2.Boro(HYV)-T. aman(LYV)	2,785	5,570	Double cropping
	3. T.aus(HYV)-T.aman(HYV	7,320	14,640	-do-
	4.T.aman(LYV)-Fallow	4,710	4,710	Single cropping
	5. Jute - T. aman (LYV)	305	610	double cropping
Medium Low Land (19.8%)	1.B. aus -T.aman(HYV)	925	1850	Double cropping
	2.T.aus(HYV)-T.aman(LYV)	390	780	-do-
	3.T.aman(LYV) - Fallow	3,510	3510	Single cropping
	4.B. aus - Rabi (pulse, cowpea, etc.)	1302	2604	double cropping
Low Land (0.9%)	1.B. aman - Rabi (pulse etc.)	275	550	double cropping
	Total	30,960	56,833	

Cropping intensity = 183%

BANGLADESH
CYCLONE PROTECTION PROJECT-II
FARM BUDGET: 1 HECTARE MODEL FARM /a
SUBPROJECT : POLDER 35/1

Enclosure 2
TABLE 6.7

		B.Aus LV	T.Aman LV	T.Aman HYV	Pulses	Oilseeds	Cowpea	Sweet Potato	Chilli (green)	Vegetable	Potato	Total
Percentage	P	3.70	88.81	0.00	2.13	0.19	1.39	1.20	1.11	1.02	0.46	100
	W	17.71	58.89	4.54	5.47	1.08	3.46	2.45	1.51	4.46	0.43	100
Area, ha	P	0.04	0.96	0	0.023	0.002	0.015	0.013	0.012	0.011	0.005	1.08
	W	0.246	0.818	0.063	0.076	0.015	0.048	0.034	0.021	0.062	0.006	1.39
Production Cost, Tk/b												
Labour	P	170	5760	0	63	6	41	98	93	105	50	6385
	W	1169	5317	457	247	49	156	255	173	667	63	8552
Bullock	P	36	1152	0	17	2	11	16	15	15	7	1271
	W	295	982	85	57	11	36	43	26	84	8	1627
Seed	P	32	346	0	15	1	10	2	2	4	16	428
	W	199	294	25	50	9	29	15	3	23	19	668
Urea	P	0	288	0	0	0	0	0	3	3	4	297
	W	0	147	43	18	0	0	4	7	30	5	255
TSP	P	0	0	0	0	0	0	0	1	2	2	6
	W	0	74	21	9	0	0	2	4	15	3	127
MP	P	0	0	0	0	0	0	0	1	1	1	2
	W	0	41	9	5	0	0	1	2	6	1	65
Pesticides	P	5	240	0	6	1	2	2	3	6	3	266
	W	37	205	32	11	4	12	7	5	31	3	346
Irrigation	P	0	0	0	0	0	0	0	6	23	6	35
	W	0	0	0	0	0	0	0	16	127	11	154
Misc	P	10	442	0	21	0	3	5	5	7	4	496
	W	94	391	43	31	4	13	11	13	41	5	645
Total	P	258	8467	0	128	10	69	125	132	170	94	0 9454
	W	1831	7655	747	440	81	258	344	254	1054	121	12785
Production Value												
Production	P	36	1152	0	11	1	8	82	24	101	51	1465
(Kg)	W	271	1227	170	38	8	25	231	44	636	76	2726
Gross Value/c	P	370	12035	0	159	16	136	165	379	299	139	13698
(Tk)	W	2764	12826	1765	567	125	459	479	693	1909	181	21768
Net Farm Income, Tk/d												
	P	112	3568	0	31	6	67	40	247	129	45	4244
	W	933	5171	1018	127	44	201	135	439	855	60	8983

/a P = Present; W = With Project ; Hired labour and bullock 30% of total cost
/b Labour, bullock seeds, fertilizers, pesticides and out put prices are in Annex 7 Summary of Financial Prices.
/c Including bi-product
/d Gross Value - Total Cost

Where are the unit costs?

Very confusing! Physical units and unit cost need to be shown.

BANGLADESH
CYCLONE PROTECTION PROJECT-II
FARM BUDGET: 1 HECTARE MODEL FARM /a
SUBPROJECT : POLDER 40/2

Enclosure 2
TABLE 6.8

		B.Aus LV	T.Aus HYV	T.Aman LV	T.Aman HYV	B.Aman	Pulses	Oilseeds	Cowpea	Sweet Potato	Chilli (green)	Vegetable	Millet	Total
Percentage	P	10.96	5.98	74.67	4.15	0.25	1.99	0.33	0.91	0.00	0.66	0.00	0.08	100
	W	5.03	5.52	35.48	33.57	0.64	5.17	1.06	4.53	3.05	1.20	4.53	0.21	100
Area, ha	P	0.132	0.072	0.899	0.05	0.003	0.024	0.004	0.011	0	0.008	0	0.001	1.20
	W	0.071	0.078	0.501	0.474	0.009	0.073	0.015	0.064	0.043	0.017	0.064	0.003	1.41
Prodtn. Cost, Tk/b														
Labour	P	528	576	6068	388	14	66	11	30	0	62	0	5	7748
	W	319	644	3382	3792	43	201	41	176	333	140	640	14	9725
Bullock	P	119	31	1133	69	3	19	3	9	0	10	0	1	1456
	W	85	98	601	640	8	55	11	48	54	21	86	3	1712
Seed	P	107	29	324	20	2	14	2	7	0	1	0	0	507
	W	58	31	180	190	7	44	9	38	19	3	24	1	604
Urea	P	0	22	270	27	0	0	0	0	0	0	0	0	318
	W	0	23	90	327	0	18	0	0	5	6	31	0	500
TSP	P	0	11	0	14	0	0	0	0	0	1	0	0	25
	W	0	12	45	156	0	9	0	0	3	3	15	0	243
MP	P	0	5	0	5	0	0	0	0	0	0	0	0	11
	W	0	6	25	71	0	4	0	0	1	1	6	0	115
Pesticides	P	0	13	225	13	0	6	1	1	0	2	0	0	261
	W	11	14	125	237	0	11	4	16	9	4	32	0	462
Irrigation	P	0	0	0	0	0	0	0	0	0	4	0	1	5
	W	0	0	0	0	0	0	0	0	0	13	131	0	144
Misc	P	23	34	414	25	1	5	1	2	0	4	0	0	509
	W	27	37	239	327	0	29	4	17	15	10	43	1	750
						0								
Total	P	777	780	8433	560	21	110	18	49	0	84	0	7	10839
	W	500	865	4688	5740	58	370	69	296	439	202	1008	18	14254
Production Value														
Production	P	145	135	1438	113	4	12	2	6	0	17	0	1	1874
(Kg)	W	89	211	902	758	14	47	10	38	292	39	659	2	3062
Gross Value/cP		1481	1421	17324	1075	45	185	31	96	0	265	0	11	21934
(Tk)	W	903	2206	10859	12609	153	709	142	580	588	627	1979	28	31383
Net Income, Tk/d														
	P	704	641	8891	516	24	75	13	47	0	181	0	4	11095
	W	403	1341	6171	6869	95	339	73	284	149	425	971	10	17129

/a P = Present ; W = With Project ; Hired labour and bullock 30% of total cost
/b Labour, bullock seeds, fertilizers, pesticides and out put prices are in Annex 7 Summary of Financial Prices.
/c Including bi-product
/d Gross Value - Total Cost

BANGLADESH
CYCLONE PROTECTION PROJECT-II
FARM BUDGET: 1 HECTARE MODEL FARM /a
SUBPROJECT : POLDER 48

Enclosure 2
TABLE 6.9

		B.Aus LV	T.Aus HYV	T.Aman LV	T.Aman HYV	B.Aman	Jute	Pulses	Oil-seeds	Cowpea	Sweet Potato	Chilli (green)	Vegetable	Millet	Total
Percentage	P	10.82	5.90	72.70	4.10	0.25	0.90	2.38	0.82	0.98	0.00	0.82	0.00	0.33	100
	W	4.76	5.12	53.15	18.37	0.66	0.81	5.64	1.02	4.61	1.83	3.22	0.37	0.44	100
Area, ha	P	0.132	0.072	0.887	0.05	0.003	0.011	0.029	0.01	0.012	0	0.01	0	0.004	1.22
	W	0.065	0.07	0.726	0.251	0.009	0.011	0.077	0.014	0.063	0.025	0.044	0.005	0.006	1.37
Production Cost, Tk/b															
Labour	P	594	576	6431	400	17	91	87	30	36	0	85	0	24	8371
	W	358	613	5445	2134	54	102	250	46	205	188	363	56	27	9839
Bullock	P	119	91	1064	68	3	13	22	8	9	0	13	0	5	1414
	W	78	88	871	339	10	15	81	11	47	32	55	7	8	1641
Seed	P	107	29	355	15	2	2	11	4	5	0	2	0	1	533
	W	61	28	261	100	8	2	30	5	28	11	7	2	1	546
Urea	P	0	26	266	27	0	0	0	0	0	0	3	0	0	322
	W	0	32	240	173	0	6	18	0	0	3	15	2	1	489
TSP	P	0	13	133	14	0	0	0	0	0	0	2	0	0	161
	W	0	15	131	83	0	3	9	0	0	2	8	1	0	251
MP	P	0	5	44	5	0	0	0	0	0	0	1	0	0	56
	W	0	7	54	38	0	0	5	0	0	1	3	1	0	108
Pesticides	P	17	18	224	25	0	6	7	3	2	0	3	0	0	303
	W	10	26	182	126	1	6	12	4	16	0	11	3	2	396
Irrigation	P	0	118	0	0	0	0	0	0	0	0	5	0	0	123
	W	0	115	0	0	0	0	0	0	0	0	33	10	0	158
Misc	P	49	38	408	23	1	5	6	2	3	0	4	0	2	541
	W	25	39	347	173	4	7	31	4	17	9	26	3	3	687
Total	P	902	932	9149	601	25	122	141	49	56	0	119	0	32	12127
	W	541	988	7712	3291	78	145	448	72	329	244	533	88	42	14511
Production Value															
Production	P	139	135	1419	113	4	15	15	6	7	0	21	0	2	1876
(Kg)	W	81	189	1271	703	13	19	42	8	38	170	99	51	4	2689
Gross Value/c	P	1450	1391	14839	1157	46	159	227	80	117	0	326	0	33	19825
(Tk)	W	854	1930	13276	7191	129	199	633	126	677	345	1570	190	47	27167
Net Farm Income, Tk/d															
	P	548	459	5690	556	21	37	86	31	61	0	207	0	1	7698
	W	313	942	5564	3900	51	54	185	54	348	101	1037	102	5	12656

/a P = Present ; W = With Project ; Hired labour and bullock 30% of total cost
/b Labour, bullock seeds, fertilizers, pesticides and out put prices are in Annex 7 Summary of Financial Prices.
/c Including bi-product
/d Gross Value - Total Cost

BANGLADESH
CYCLONE PROTECTION PROJECT-II
FARM BUDGET: 1 HECTARE MODEL FARM /a
SUBPROJECT : POLDER 59/2

Enclosure 2
TABLE 6.10

		B.Aus LV	T.Aus HYV	T.Aman LV	T.Aman HYV	B.Aman	Jute	Pulses	Oil-seeds	Cowpea	Sweet Potato	Chilli (green)	Vegetable	Millet	Total
Percentage	P	8.18	8.31	65.84	0.59	4.25	0.00	4.58	0.72	1.05	2.29	1.64	2.55	0.00	100
	W	9.71	8.25	57.02	2.98	6.20	0.00	4.80	1.46	2.40	1.70	2.40	3.10	0.00	100
Area, ha	P	0.125	0.127	1.006	0.009	0.065	0	0.07	0.011	0.016	0.035	0.025	0.039	0	1.53
	W	0.166	0.141	0.975	0.051	0.106	0	0.082	0.025	0.041	0.029	0.041	0.053	0	1.71
Production Cost, Tk/b															
Labour	P	563	921	6539	70	309	0	193	30	44	271	200	419	0	9558
	W	789	1093	7313	421	504	0	234	71	113	239	338	596	0	11709
Bullock	P	150	160	1207	12	72	0	53	8	12	46	32	108	0	1860
	W	199	178	1170	69	118	0	59	18	30	38	52	72	0	2001
Seed	P	118	51	362	4	59	0	28	4	7	16	4	14	0	667
	W	157	56	351	20	95	0	89	9	18	13	7	20	0	835
Urea	P	0	46	302	5	0	0	0	0	0	0	8	16	0	376
	W	0	63	322	35	0	0	20	0	0	6	14	25	0	485
TSP	P	0	23	241	2	0	0	0	0	0	0	0	8	0	275
	W	0	30	176	17	0	0	10	0	0	3	7	13	0	255
MP	P	0	10	50	1	0	0	0	0	0	0	1	4	0	66
	W	0	14	73	8	0	0	5	0	0	2	3	5	0	110
Pesticides	P	16	32	254	2	8	0	9	1	0	0	6	20	0	347
	W	25	53	244	26	13	0	12	6	5	6	10	27	0	427
Irrigation	P	0	208	0	0	0	0	0	0	0	0	10	80	0	298
	W	0	231	0	0	0	0	0	0	0	0	31	109	0	371
Misc	P	46	67	463	5	26	0	15	2	3	15	11	25	0	679
	W	63	78	466	35	42	0	33	7	11	16	25	35	0	811
Total	P	908	1549	9672	103	482	0	306	48	66	348	278	714	0	14473
	W	1258	1850	10357	656	785	0	473	118	182	329	496	928	0	17433
Production Value															
Production	P	138	251	1761	23	78	0	35	6	9	242	45	351	0	2937
(Kg)	W	191	324	1755	153	148	0	45	14	25	218	86	546	0	3505
Gross Value/cP		1437	2567	18402	227	817	0	525	83	131	405	706	1025	0	26325
(Tk)	W	1993	3304	18340	1569	1554	0	674	210	368	433	1373	1627	0	31445
Net Farm Income, Tk/d															
	P	529	1018	8730	124	335	0	219	35	65	57	428	311	0	11852
	W	735	1454	7983	913	769	0	201	93	186	104	877	699	0	14012

/a P = Present ; W = With project ; Hired labour and bullock 30% of total cost
/b Labour, bullock seeds, fertilizers, pesticides and out put prices are in Annex 7 Summary of Financial Prices.
/c Including bi-product
/d Gross Value - Total Cost

BANGLADESH
CYCLONE PROTECTION PROJECT-II
FARM BUDGET: 1 HECTARE MODEL FARM /a
SUBPROJECT : POLDER 59/3B

Enclosure 2
TABLE 6.11

		B.Aus LV	T.Aus HYV	T.Aman LV	T.Aman HYV	B.Aman	Pulses	Oil-seeds	Cowpea	Sweet Potato	Chilli (green)	Vegetable	Millet	Total
Percentage	P	11.62	8.47	55.49	0.00	6.44	6.65	1.05	1.54	2.80	2.31	3.64	0.00	100
	W	13.58	7.64	41.95	13.96	5.81	5.12	1.58	2.59	1.83	2.59	3.35	0.00	100
Area, ha	P	0.166	0.121	0.793	0	0.092	0.095	0.015	0.022	0.04	0.033	0.052	0	1.43
	W	0.215	0.121	0.664	0.221	0.092	0.081	0.025	0.041	0.029	0.041	0.053	0	1.58
Prodtn. Cost, Tk/b														
Labour	P	747	968	5749	0	483	261	41	61	290	281	520	0	9401
	W	1075	1029	4980	1879	506	263	81	133	225	338	557	0	11065
Bullock	P	149	152	952	0	102	71	11	17	50	42	66	0	1612
	W	258	152	797	278	102	85	19	31	37	52	72	0	1882
Seed	P	134	48	317	0	75	38	6	10	18	5	19	0	671
	W	203	48	239	88	83	87	9	18	13	7	20	0	816
Urea	P	0	44	238	0	0	0	0	0	6	10	22	0	319
	W	0	64	256	159	0	23	0	0	4	16	30	0	550
TSP	P	0	22	119	0	0	0	0	0	3	5	11	0	159
	W	0	30	139	60	0	11	0	0	2	9	15	0	266
MP	P	0	9	40	0	0	0	0	0	1	2	5	0	58
	W	0	17	70	28	0	7	0	0	1	4	7	0	134
Pesticides	P	21	30	198	0	12	24	4	3	8	8	13	0	320
	W	32	45	166	55	12	12	6	10	6	10	27	0	382
Irrigation	P	0	0	0	0	0	0	0	0	0	13	107	0	120
	W	0	198	0	0	0	0	0	0	0	31	109	0	338
Misc	P	61	64	365	0	37	21	3	4	14	15	35	0	619
	W	82	67	317	102	37	33	7	11	10	25	35	0	725
						0								
Total	P	1113	1337	7978	0	708	415	66	94	390	381	797	0	13278
	W	1651	1650	6964	2649	739	521	122	204	297	491	870	0	16158
Production Value														
Production	P	203	272	1546	0	110	52	8	12	276	73	468	0	3020
(Kg)	W	280	303	1461	685	129	49	15	25	232	98	567	0	3842
Gross Value/cP		2123	2784	16157	0	1148	784	113	215	566	1173	1405	0	26468
(Tk)	W	2926	3093	15256	7004	1339	732	229	439	474	1561	1685	0	34738
Net Income, Tk/d														
	P	1010	1447	8179	0	440	369	47	121	176	792	608	0	13190
	W	1275	1443	8292	4355	600	211	107	235	177	1070	815	0	18580

/a P = Present; W = With Project ; Hired labor and bullock 30% of total cost
/b Labour, bullock seeds, fertilizers, pesticides and out put prices are in Annex 7 Summary of Financial Prices.
/c Including bi-product
/d Gross Value - Total Cost

BANGLADESH
CYCLONE PROTECTION PROJECT-II
FARM BUDGET: 1 HECTARE MODEL FARM /a
SUBPROJECT : POLDER 59/3C

Enclosure 2
TABLE 6.12

		B.Aus LV	T.Aus HYV	T.Aman LV	T.Aman HYV	B.Aman	Pulses	Oil-seeds	Cowpea	Sweet Potato	Chilli (green)	Vegetable	Millet	Total
Percentage	P	10.29	7.86	56.94	0.00	7.42	6.47	1.03	1.47	2.72	2.28	3.53	0.00	100
	W	10.52	8.01	45.25	11.33	7.39	4.61	2.37	3.73	1.63	2.31	2.85	0.00	100
Area, ha	P	0.14	0.107	0.775	0	0.101	0.088	0.014	0.02	0.037	0.031	0.048	0	1.36
	W	0.155	0.118	0.667	0.167	0.109	0.068	0.035	0.055	0.024	0.034	0.042	0	1.47
Prodtn. Cost, Tk/b														
Labour	P	630	856	5619	0	530	242	39	55	268	264	480	0	8982
	W	775	1003	5003	1420	600	221	114	179	186	281	441	0	10221
Bullock	P	126	135	930	0	112	66	11	15	47	39	60	0	1541
	W	186	149	800	225	121	71	26	41	30	43	57	0	1750
Seed	P	113	43	310	0	82	35	6	9	17	5	18	0	637
	W	146	47	240	67	98	73	13	25	11	6	16	0	741
Urea	P	0	39	233	0	0	0	0	0	5	9	20	0	306
	W	0	62	257	134	0	19	0	0	3	13	24	0	512
TSP	P	0	19	116	0	0	0	0	0	3	5	10	0	153
	W	0	29	140	64	0	10	0	0	2	7	12	0	263
MP	P	0	8	39	0	0	0	0	0	1	2	5	0	55
	W	0	17	70	35	0	6	0	0	1	4	6	0	138
Pesticides	P	18	27	194	0	13	22	4	3	7	8	12	0	306
	W	23	44	167	84	14	10	9	14	5	9	21	0	398
Irrigation	P	0	0	0	0	0	0	0	0	0	12	98	0	111
	W	0	194	0	0	0	0	0	0	0	26	86	0	305
Misc	P	52	56	357	0	40	19	3	4	13	14	32	0	590
	W	59	65	319	115	44	27	9	15	8	20	28	0	710
						0								
Total	P	939	1182	7797	0	777	384	61	85	361	358	736	0	12680
	W	1190	1609	6995	2144	876	438	171	273	246	407	689	0	15039
Production Value														
Production	P	154	212	1356	0	121	44	7	11	255	56	432	0	2648
(Kg)	W	178	271	1201	468	153	37	19	33	185	71	433	0	3049
Gross Value/c	P	1605	2162	14174	0	1263	664	105	201	528	895	1296	0	22893
(Tk)	W	1857	2781	12538	4766	1592	557	290	590	378	1135	1300	0	27784
Net Income,Tk/d														
	P	666	980	6378	0	486	280	44	116	167	537	560	0	10213
	W	667	1172	5543	2622	716	119	119	317	132	728	611	0	12745

/a P = Present ; W = With Project ;Hired labour and bullock 30% of total cost
/b Labour, bullock seeds, fertilizers, pesticides and out put prices are in Annex 7 Summary of Financial Prices.
/c Including bi-product
/d Gross Value - Total Cost

BANGLADESH
CYCLONE PROTECTION PROJECT-II
FARM BUDGET: 1 HECTARE MODEL FARM /a
SUBPROJECT : POLDER 60

Enclosure 2
TABLE 6.13

		B.Aus LV	T.Aus HYV	T.Aman LV	T.Aman HYV	B.Aman	Pulses	Oil-seeds	Cowpea	Sweet Potato	Chilli (green)	Vegetable	Millet	Total
Percentage	P	9.66	8.08	57.96	3.01	5.86	5.78	0.95	1.27	2.38	1.98	3.09	0.00	100
	W	10.33	8.78	44.76	19.19	6.60	3.11	1.01	1.55	1.09	1.55	2.02	0.00	100
Area, ha	P	0.122	0.102	0.732	0.038	0.074	0.073	0.012	0.016	0.03	0.025	0.039	0	1.26
	W	0.133	0.113	0.576	0.247	0.085	0.04	0.013	0.02	0.014	0.02	0.026	0	1.29
Prodtn. Cost, Tk/b														
Labour	P	549	816	5307	304	426	201	33	44	218	213	390	0	8499
	W	732	989	4320	2100	510	130	42	65	109	165	293	0	9453
Bullock	P	110	129	878	51	82	55	9	12	38	32	49	0	1444
	W	160	142	691	333	94	42	10	15	18	25	35	0	1566
Seed	P	99	41	293	15	60	29	5	7	14	4	14	0	580
	W	126	45	207	99	77	43	5	9	6	3	10	0	630
Urea	P	0	37	220	24	0	0	0	0	4	3	22	0	314
	W	0	59	222	199	0	11	0	0	2	8	15	0	515
TSP	P	0	18	110	12	0	0	0	0	2	4	11	0	157
	W	0	28	121	95	0	6	0	0	1	4	7	0	262
MP	P	0	8	37	7	0	0	0	0	1	2	5	0	59
	W	0	16	60	52	0	3	0	0	0	2	4	0	138
Pesticides	P	15	26	183	19	9	18	3	2	6	6	20	0	307
	W	20	42	144	124	11	6	3	5	3	5	13	0	376
Irrigation	P	0	0	0	0	0	0	0	0	0	10	80	0	90
	W	0	185	0	0	0	0	0	0	0	15	53	0	254
Misc	P	45	54	337	26	30	16	3	3	11	11	26	0	561
	W	51	62	275	170	34	16	4	5	5	12	17	0	652
						0								
Total	P	818	1127	7364	458	606	319	52	68	293	289	617	0	12012
	W	1088	1569	6041	3171	725	257	63	99	144	239	446	0	13845
Production Value														
Production	P	134	202	1281	95	89	38	7	9	207	53	351	0	2465
(Kg)	W	153	260	1094	741	119	24	8	12	97	46	283	0	2837
Gross Value/cP		1375	2016	13119	965	912	569	96	159	421	831	1050	0	21513
(Tk)	W	1565	2597	11215	7416	1220	351	110	213	196	718	828	0	26429
Net Income, Tk/d														
	P	557	889	5755	507	306	250	44	91	128	542	433	0	9501
	W	477	1028	5174	4245	495	94	47	114	52	479	382	0	12584

/a P = Present ; W = With Project ; Hired labour and bullock 30% of total cost
/b Labour, bullock seeds, fertilizers, pesticides and out put prices are in Annex 7 Summary of Financial Prices.
/c Including bi-product
/d Gross Value - Total Cost

BANGLADESH
CYCLONE PROTECTION PROJECT-II
FARM BUDGET: 1 HECTARE MODEL FARM /a
SUBPROJECT : POLDER 66/1

Enclosure 2
TABLE 6.14

		B.Aus LV	T.Aus HYV	T.Aman LV	T.Aman HYV	Boro HYV	Pulses	Oil-seeds	Cowpea	Potato	Chilli (green)	Vegetables	Water Melon	Betel Leaf	Salt	Shrimp	Total
Percentage	P	9.99	15.06	34.70	5.34	2.29	7.70	0.00	5.76	1.04	1.18	3.47	2.29	1.87	4.65	4.65	100
	W	19.69	5.52	34.47	5.52	3.16	4.72	0.00	5.52	2.46	2.46	3.40	3.26	3.68	6.94	6.94	100
Area, ha	P	0.144	0.217	0.5	0.077	0.033	0.111	0	0.083	0.015	0.017	0.05	0.033	0.02	0.067	0.067	1.44
	W	0.417	0.117	0.73	0.117	0.067	0.1	0	0.117	0.052	0.052	0.049	0.047	0.05	0.1	0.1	2.12
Prodtn. Cost, Tk/b																	
Labour	P	648	1736	3625	616	289	305	0	228	150	145	525	272	243	302	251	9335
	W	2085	995	5475	995	620	300	0	351	559	429	515	388	490	450	375	14025
Bullock	P	130	273	600	97	40	83	0	62	21	21	63	42	10	0	0	1442
	W	500	147	876	147	80	105	0	88	72	66	66	59	19	0	0	2226
Seed	P	117	87	200	31	13	44	0	37	47	3	19	83	500	0	201	1380
	W	394	47	263	47	27	108	0	53	164	9	18	118	981	0	300	2526
Urea	P	0	78	150	42	22	0	0	0	12	5	21	26	24	0	52	432
	W	0	61	281	84	44	28	0	0	41	20	27	37	48	0	78	749
TSP	P	0	39	75	21	11	0	0	0	6	3	11	13	14	0	0	191
	W	0	29	153	32	22	14	0	0	20	11	14	18	27	0	0	340
MP	P	0	16	25	10	4	0	0	0	2	1	5	6	3	0	0	72
	W	0	16	77	15	8	8	0	0	8	5	7	8	5	0	0	158
Pesticides	P	18	54	125	19	17	28	0	10	4	4	13	17	14	0	50	372
	W	63	44	183	29	34	15	0	29	13	13	25	24	27	0	75	571
Irrigation	P	0	0	0	0	116	0	0	0	18	7	103	41	33	0	134	451
	W	0	192	0	0	235	0	0	0	64	39	100	58	65	0	200	953
Misc	P	53	114	230	35	25	25	0	16	10	8	34	26	567	436	784	2362
	W	159	65	349	54	50	40	0	32	35	31	33	38	1113	650	1170	3818
Total	P	966	2398	5030	870	535	485	0	355	270	196	792	524	1407	737	1473	16037
	W	3201	1596	7656	1402	1120	619	0	552	975	623	804	747	2775	1100	2198	25368
Production Value																	
Production	P	176	488	975	216	106	61	0	46	158	37	450	363	32	623	7	3737
(Kg)	W	542	293	1606	363	235	60	0	70	624	125	524	588	80	930	12	6050
Gross Value/cP		1835	4980	10189	2210	1125	913	0	825	477	587	1350	1833	1964	1240	2144	31672
(Tk)	W	5660	2979	16790	3694	2462	900	0	1260	1855	1978	1897	2936	4773	1860	3200	52244
Net Income.Tk/d																	
	P	869	2582	5159	1340	590	428	0	470	207	391	558	1309	557	503	671	15635
	W	2459	1383	9134	2292	1342	281	0	708	880	1355	1093	2189	1998	760	1002	26876

/a P = Present ; W = With Project ; Hired labour and bullock 30% of total cost
/b Labour, bullock seeds, fertilizers, pesticides and out put prices are in Annex 7 Summary of Financial Prices.
/c Including bi-product
/d Gross Value - Total Cost

BANGLADESH
CYCLONE PROTECTION PROJECT-II
FARM BUDGET: 1 HECTARE MODEL FARM /a
SUBPROJECT : POLDER 68

Enclosure 2
TABLE 6.15

		B.Aus LV	T.Aus HYV	T.Aman LV	T.Aman HYV	Boro HYV	Pulses	Oil-seeds	Cowpea	Potato	Chilli (green)	Vegetables	Water Melon	Betel Leaf	Salt	Shrimp	Total
Percentage	P	10.47	8.38	43.85	16.16	10.93	1.77	0.20	1.64	1.05	0.59	0.46	0.52	1.24	1.37	1.37	100
	W	23.64	8.98	27.98	15.76	2.82	2.53	1.67	1.86	1.53	1.38	4.38	1.57	2.29	3.99	3.99	100
Area, ha	P	0.16	0.128	0.67	0.247	0.167	0.027	0.003	0.025	0.016	0.009	0.007	0.008	0.01	0.021	0.021	1.53
	W	0.495	0.188	0.586	0.33	0.059	0.053	0.035	0.039	0.032	0.029	0.067	0.024	0.03	0.061	0.061	2.09
Prodtn. Cost, Tk/b																	
Labour	P	720	1024	4858	1976	1461	74	8	69	160	77	74	66	171	95	79	10910
	W	2475	1598	4395	2805	546	159	105	117	344	239	704	198	324	275	229	14512
Bullock	P	144	161	804	311	200	20	2	19	22	11	9	10	7	0	0	1721
	W	594	237	703	416	71	56	37	29	44	37	90	30	13	0	0	2356
Seed	P	130	51	268	99	67	11	1	11	50	1	3	20	352	0	63	1126
	W	468	75	211	132	24	57	38	18	101	5	25	60	648	0	183	2043
Urea	P	0	46	201	133	110	0	0	0	12	3	3	6	17	0	16	549
	W	0	99	226	238	39	15	10	0	25	11	38	19	32	0	48	797
TSP	P	0	23	101	67	55	0	0	0	6	1	1	3	10	0	0	267
	W	0	46	123	89	19	7	5	0	12	6	19	9	18	0	0	355
MP	P	0	10	34	31	21	0	0	0	2	1	1	1	2	0	0	102
	W	0	26	62	41	7	4	3	0	5	3	9	4	4	0	0	169
Pesticides	P	20	32	168	62	84	7	1	3	4	2	2	4	10	0	16	413
	W	74	71	147	83	30	8	5	10	8	7	34	12	18	0	46	550
Irrigation	P	0	0	0	0	585	0	0	0	20	4	14	10	23	0	42	697
	W	0	308	0	0	207	0	0	0	39	22	137	30	43	0	122	908
Misc	P	59	67	308	114	125	6	1	5	11	4	5	6	399	137	246	1492
	W	189	104	280	152	44	21	14	11	22	17	45	19	735	397	714	2763
Total	P	1073	1414	6740	2792	2708	118	13	107	288	104	111	127	990	231	462	17278
	W	3800	2564	6146	3955	986	328	217	184	600	347	1100	381	1832	671	1341	24452
Production Value																	
Production	P	195	288	1307	692	534	15	2	14	168	20	63	88	23	195	2	3605
(Kg)	W	644	470	1289	1023	207	32	21	23	384	70	717	300	53	567	7	5806
Gross Value/c	P	2040	2942	13653	7055	5627	225	30	252	504	320	189	440	1380	390	567	35614
(Tk)	W	6729	4801	13472	10450	2166	480	315	414	1152	1120	2151	1500	3180	1134	1952	51016
Net Income,Tk/d																	
	P	967	1528	6913	4263	2919	107	17	145	216	216	78	313	390	159	105	18336
	W	2929	2237	7326	6495	1180	152	98	230	552	773	1051	1119	1348	463	611	26564

/a P = Present ; W = With Project ; Hired labour and bullock 30% of total cost
/b Labour, bullock seeds, fertilizers, pesticides and out put prices are in Annex 7 Summary of Financial Prices.
/c Including bi-product
/d Gross Value - Total Cost

BANGLADESH
CYCLONE PROTECTION PROJECT-II
FARM BUDGET: 1 HECTARE MODEL FARM /a
SUBPROJECT : POLDER 70

Enclosure 2
TABLE 6.16

		B.Aus LV	T.Aus HYV	T.Aman LV	T.Aman HYV	Boro HYV	Pulses	Oil-seeds	Cowpea	Potato	Sweet Potato	Chilli (green)	Vegetables	Water Melon	Betel Leaf	Salt	Shrimp	Total
Percentage	P	2.16	5.23	5.91	6.22	4.31	0.80	0.12	0.86	0.12	0.12	0.31	0.25	0.12	0.68	36.39	36.39	100
	W	6.07	3.92	8.95	8.28	4.36	0.94	0.11	0.44	0.17	0.22	0.33	0.12	0.12	0.80	36.39	36.39	100
Area, ha	P	0.035	0.085	0.096	0.101	0.07	0.013	0.002	0.014	0.002	0.002	0.005	0.004	0.002	0.01	0.591	0.591	1.62
	W	0.11	0.071	0.162	0.15	0.07	0.017	0.002	0.008	0.003	0.004	0.006	0.002	0.002	0.01	0.591	0.591	1.81
Prodtn. Cost, Tk/b																		
Labour	P	158	680	696	808	613	36	6	39	20	15	43	42	17	99	2660	2216	8144
	W	550	604	1215	1275	731	51	6	24	32	31	50	21	17	120	2660	2216	9602
Bullock	P	32	107	115	127	84	10	2	11	3	3	6	5	3	4	0	0	510
	W	132	89	194	189	95	18	2	5	4	5	8	3	3	5	0	0	752
Seed	P	28	34	38	40	28	5	1	6	6	1	1	1	5	204	0	1773	2172
	W	104	28	58	60	32	18	2	4	9	2	1	1	5	241	0	1773	2338
Urea	P	0	31	29	55	46	0	0	0	2	0	2	2	2	10	0	461	638
	W	0	37	62	108	52	5	1	0	2	1	2	1	2	12	0	461	746
TSP	P	0	15	14	27	23	0	0	0	1	0	1	1	1	5	0	0	89
	W	0	17	34	41	26	2	0	0	1	0	1	1	1	7	0	0	131
MP	P	0	6	5	13	9	0	0	0	0	0	0	0	0	1	0	0	35
	W	0	10	17	19	10	1	0	0	0	0	1	0	0	1	0	0	60
Pesticides	P	4	21	24	25	35	3	1	2	1	0	1	1	1	5	0	443	568
	W	17	27	41	38	40	3	0	2	1	1	2	1	1	7	0	443	620
Irrigation	P	0	0	0	0	245	0	0	0	2	0	2	8	2	14	0	1182	1456
	W	0	116	0	0	277	0	0	0	4	0	5	4	2	16	0	1182	1606
Misc	P	13	45	44	46	53	3	0	3	1	1	2	3	2	231	3842	6915	11203
	W	42	39	77	69	59	7	1	2	2	1	4	1	2	273	3842	6915	11336
Total	P	235	939	966	1142	1135	57	9	60	36	20	58	63	32	573	6501	12990	24815
	W	844	968	1699	1798	1320	105	12	38	56	41	72	33	32	681	6501	12990	27191
Production Value																		
Production	P	42	191	187	283	224	7	1	8	21	14	11	36	22	13	5496	89	6645
(Kg)	W	143	177	356	465	277	10	1	5	36	32	14	21	25	20	5496	95	7174
Gross Value/c	P	452	1955	1958	2883	2366	105	12	144	63	28	176	106	110	794	10984	14332	36468
(Tk)	W	1498	1810	3729	4738	2907	150	14	90	108	64	224	63	125	1205	10984	15218	42927
Net Income, Tk/d																		
	P	217	1016	992	1741	1231	48	3	84	27	8	118	43	78	221	4483	1342	11653
	W	654	842	2030	2940	1587	45	2	52	52	23	152	30	93	524	4483	2228	15736

/a P = Present ; W = With Project ; Hired labour and bullock 30% of total cost
/b Labour, bullock seeds, fertilizers, pesticides and out put prices are in Annex 7 Summary of Financial Prices.
/c Including bi-product
/d Gross Value - Total Cost

BANGLADESH
CYCLONE PROTECTION PROJECT-II
FARM BUDGET: 1 HECTARE MODEL FARM /a
SUBPROJECT : POLDER 72

Enclosure 2
TABLE 6.17

		B.Aus LV	T.Aus HYV	T.Aman LV	T.Aman HYV	B.Aman	Jute	Pulses	Oil-seeds	Cowpea	Sweet Potato	Chilli (green)	Vegetable	Wheat	Total
Percentage	P	8.85	10.40	51.32	5.52	0.29	1.49	7.93	3.91	4.71	1.90	2.36	0.00	1.32	100
	W	11.13	10.24	34.24	16.65	1.47	0.00	8.14	4.83	3.26	2.99	2.99	2.84	1.21	100
Area, ha	P	0.154	0.181	0.893	0.096	0.005	0.026	0.138	0.068	0.082	0.033	0.041	0	0.023	1.74
	W	0.212	0.195	0.652	0.317	0.028	0	0.155	0.092	0.062	0.057	0.057	0.054	0.023	1.90
Prodtn. Cost, Tk/b															
Labour	P	693	1448	6474	768	26	234	380	187	226	239	349	0	138	11161
	W	1060	1658	4890	2695	154	0	504	299	202	442	470	567	150	13089
Bullock	P	139	228	1072	130	6	33	104	51	62	42	52	0	17	1932
	W	254	246	782	428	31	0	163	69	47	72	72	73	17	2253
Seed	P	125	72	357	38	4	5	55	27	37	15	7	0	21	763
	W	200	78	235	127	25	0	167	33	28	26	9	20	21	969
Urea	P	0	65	268	60	0	14	0	0	0	5	12	0	4	429
	W	0	102	251	255	0	0	43	0	0	8	22	30	4	716
TSP	P	0	33	134	30	0	5	0	0	0	2	6	0	3	213
	W	0	48	137	122	0	0	22	0	0	4	12	15	3	362
MP	P	0	14	45	17	0	2	0	0	0	1	3	0	1	82
	W	0	27	68	67	0	0	13	0	0	2	6	8	1	192
Pesticides	P	19	45	223	48	1	13	35	17	10	7	10	0	3	431
	W	32	73	163	159	4	0	23	23	16	11	14	27	3	547
Irrigation	P	0	0	0	0	0	0	0	0	0	0	17	0	0	17
	W	0	320	0	0	0	0	0	0	0	0	43	111	0	473
Misc	P	57	95	411	66	2	14	30	15	16	12	18	0	8	745
	W	81	108	312	219	11	0	62	25	17	20	34	36	8	932
						0	0								
Total	P	1033	2000	8984	1158	38	320	603	297	350	322	474	0	194	15772
	W	1628	2659	6838	4070	225	0	998	449	308	585	683	886	206	19534
Production Value															
Production	P	169	353	1518	278	7	41	83	34	41	248	86	0	32	2890
(Kg)	W	265	439	1174	1030	39	0	101	55	37	439	128	567	38	4312
Gross Value/cP		1765	3597	15871	2855	69	429	1242	508	735	502	1370	0	512	29455
(Tk)	W	2770	4474	12265	10528	413	0	1512	826	673	902	2057	1707	605	38732
Net Income,Tk/d															
	P	732	1597	6887	1697	31	109	639	211	385	180	896	0	318	13683
	W	1142	1815	5427	6458	188	0	514	377	365	317	1374	821	399	19198

/a P = Present ; W = With Project ; Hired labour and bullock 30% of total cost
/b Labour, bullock seeds, fertilizers, pesticides and out put prices are in Annex 7 Summary of Financial Prices.
/c Including bi-product
/d Gross Value - Total Cost

BANGLADESH
CYCLONE PROTECTION PROJECT-II
FARM BUDGET: 1 HECTARE MODEL FARM /a
SUBPROJECT : POLDER 73/1B

Enclosure 2
TABLE 6.18

		B.Aus LV	T.Aus HYV	T.Aman LV	T.Aman HYV	B.Aman	Pulses	Oil-seeds	Cowpea	Sweet Potato	Chilli (green)	Vegetable	Millet	Total
Percentage	P	14.44	0.00	71.03	0.00	4.79	3.85	0.77	1.28	1.11	1.03	1.28	0.43	100
	W	20.45	0.00	46.36	11.59	4.24	5.91	0.91	1.74	2.50	1.97	2.80	1.52	100
Area, ha	P	0.169	0	0.831	0	0.056	0.045	0.009	0.015	0.013	0.012	0.015	0.005	1.17
	W	0.27	0	0.612	0.153	0.056	0.078	0.012	0.023	0.033	0.026	0.037	0.02	1.32
Prodtn. Cost, Tk/b														
Labour	P	761	0	5402	0	266	124	25	41	101	96	161	23	6998
	W	1283	0	4284	1224	266	222	34	69	272	215	416	90	8375
Bullock	P	203	0	997	0	62	34	7	11	17	15	41	6	1394
	W	324	0	734	207	62	56	9	17	44	33	49	24	1558
Seed	P	160	0	299	0	50	18	4	7	6	2	6	5	556
	W	255	0	220	61	50	84	4	10	15	4	14	19	738
Urea	P	0	0	249	0	0	0	0	0	0	4	6	0	259
	W	0	0	202	106	0	19	0	0	7	9	18	0	360
TSP	P	0	0	199	0	0	0	0	0	0	0	3	0	203
	W	0	0	110	50	0	9	0	0	4	5	9	0	188
MP	P	0	0	42	0	0	0	0	0	0	1	2	0	44
	W	0	0	46	23	0	5	0	0	2	2	0	0	77
Pesticides	P	21	0	208	0	7	6	1	2	0	3	8	1	256
	W	41	0	153	77	7	12	3	0	7	7	19	3	326
Irrigation	P	0	0	0	0	0	0	0	0	0	5	31	0	36
	W	0	0	0	0	0	0	0	0	0	20	76	0	95
Misc	P	63	0	382	0	22	10	2	3	6	5	10	2	505
	W	103	0	293	106	22	31	3	0	18	16	25	7	624
						0								
Total	P	1207	0	7778	0	408	191	38	64	129	131	267	36	10249
	W	2005	0	5042	1853	408	439	53	96	368	308	624	143	12340
Production Value														
Production	P	176	0	1413	0	67	20	4	6	98	20	121	5	1930
(Kg)	W	297	0	1163	459	76	43	7	14	264	55	333	18	2727
Gross Value/cP		1837	0	14754	0	700	301	67	95	196	320	367	67	18704
(Tk)	W	3102	0	11063	4365	717	643	98	203	529	889	998	284	22891
Net Income,Tk/d														
	P	630	0	6976	0	292	110	29	31	67	189	100	31	8455
	W	1097	0	5021	2512	309	204	45	107	161	581	374	141	10551

/a P = Present ; W = With Project ; Hired labour and bullock 30% of total cost
/b Labour, bullock seeds, fertilizers, pesticides and out put prices are in Annex 7 Summary of Financial Prices.
/c Including bi-product
/d Gross Value - Total Cost

Present or future?

Category I

Table 7.1

Transboro

Nos	Crops	cropped area(ha)	% of cropped area	Av. Yield (T/ha)	Total Production (T)
	A - Paddy	107210	92.5		
1	B. aus	4336	3.7	0.9	16043
2	T. aman	102874	88.8	1.20	123448
	B. Rabi	8666	7.5		
1	Pulse	2425	2.1	0.47	1139
2	Cowpea	1617	1.4	0.50	808
3	S. Potato	1386	1.2	6.30	8739
4	W. veg.	1155	1.0	9.15	10568
5	Chilli (Green)	1270	1.1	2.00	2540
6	Potato	577	0.5	10.20	2942
7	Oil seeds	236	0.2	0.50	118
		1,15,876	100.0		

Category -II

Table 7.2

Nos	Crops	Cropped area (ha)	% of cropped area	Av. yield (T/ha)	Total Production (T)
	A. Paddy	11963	94.2		
1	B.aus	1385	10.9	1.05	1454
2	T. aus	755	6.0	1.88	1419
3	B. aman	30	0.2	1.48	44
4	T. aman	9268	73.0	1.60	14828
5	T. aman	525	4.1	2.25	1181
	B. Rabi	622	4.9		
1	Pulse	303	2.4	0.52	157
2	Cowpea	127	1.0	0.55	69
3	Chilli (Green)	101	0.8	2.10	212
4	Mustard	50	0.4	0.55	27
5	Millet	41	0.3	6.30	258
	C. Jute	112	0.9	1.40	156
		12,697	100.0		

Category III

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Table 7.3

Sl. No.	Crops	Cropped area (ha)	% Cropped area	Av. Yield (T/ha)	Total Production (T)
A.	Paddy	60999	79.2		
1	B. aus	6574	8.5	1.08	7099
2	T. aus	7730	10.0	1.95	15073
3	T. aman (LYV)	29505	38.3	1.70	50158
4	T. aman (HYV)	11855	15.3	2.90	34379
5	Boro (HYV)	4125	5.6	3.10	12787
6	B. aman	1210	1.5	1.35	1633
B.	Rabi Crops	14899	19.4		
1	Pulse	4224	5.5	0.60	2535
2	Cowpea	3840	5.0	0.55	2112
3	chilli (Green)	1920	2.5	2.10	4032
4	S. Potato	1536	2.0	7.50	11520
5	Mustard	921	1.2	0.50	460
6	Wheat	1075	1.4	0.58	623
7	W. Veg.	1383	1.8	9.00	12447
C	Jute	1100	1.4	1.58	1738

Category VI

Table 7.4

Sl. No.	Crops	Cropped area (ha)	% Cropped area	Av. Yield (T/ha)	Total Production (T)
A.	Paddy	38148	90.3		
1	B. aus	6109	14.5	1.04	6359
2	T. aus	30023	71.0	1.25	37528
3	B. aman	2016	4.8	1.32	2661
B.	Rabi Crops	4111	9.7		
1	Pulse	1611	3.8	0.45	724
2	W. veg.	551	1.3	8.05	4435
3	Cowpea	1018	2.4	0.42	427
4	Oilseeds	339	0.8	0.48	162
5	Chilli (Green)	424	1.0	1.70	720
6	Millet	168	0.4	6.10	1024
		42259	100.0		

Category V Table 7.5

Sl. No.	Crops	Cropped area (ha)	% Cropped area	Av. Yield (T/ha)	Total Production (T)
A.	Paddy	97720	84.6		
1	B. aus	11163	9.7	T. Aman yields should be higher 1.10	12279
2	T. aus (HYV)	9308	8.0	1.98	18429
3	T. aman (LYV)	70463	61.0	1.75	123310
4	B. aman	6786	5.9	1.20	8143
B.	Rabi Crops	17847	15.4		
1	Pulse	6606	5.7	0.50	3303
2	W. veg	3593	3.1	9.00	32337
3	Chilli (Green)	2318	2.0	1.80	4172
4	Oilseeds	1043	0.9	0.48	500
5	S. potato	2782	2.4	6.90	19196
6	Potato	1505	1.3	9.90	14899
	Total	115567	100.0		

Category VI Table 7.6 Annex-3

Sl. No.	Crops	Cropped area (ha)	% Cropped area	Av. Yield (T/ha)	Total Production (T)
A.	Paddy	48793	85.9		
1	B. aus	5985	10.5	1.22	7302
2	T. aus (HYV)	7710	13.6	2.25	17347
3	T. aman (LYV)	17233	30.3	1.95	33604
4	T. aman (HYV)	11525	20.3	2.80	32270
5	Boro (HYV)	6065	10.7	3.20	19408
6	B. aman	275	0.5	1.27	349
B.	Jute	305	0.5	1.66	506
C.	Betel leaf	625	1.1	14.80	9250
D.	Rabi	7110	12.50		
1	W. veg.	610	1.10	10.50	6405
2	Potato	408	0.72	12.50	5100
3	S. potato	814	1.43	8.50	6919
4	Chilli (Green)	460	0.80	2.20	1012
5	Lentil	56	0.09	0.60	34
6	Pulse	2080	3.70	0.65	1352
7	Oil seeds	254	0.04	0.50	127
8	Cowpea	2280	4.00	0.55	1254
9	Watermelon	70	0.12	12.60	882
10	Brinjjal	78	0.14	4.70	337

Table 7.7

Sl No.	Crops	Cropped area (ha)	% Cropped Area	Total Production (T)
	A. Paddy	364833	86.80	
1	T. aman(LYV)	259366	61.70	382876
2	T. aman (HYV)	23905	5.70	67830
3	B. aus	35552	8.50	50530
4	T. aus (HYV)	25503	6.10	52268
5	Boro (HYV)	10190	2.40	32195
6	B. aman	10317	2.40	12830
	B. Rabi Crops	53255	12.70	598529
1	Pulse	17249	4.10	9210
2	Cowpea	8882	2.10	4670
3	S. Potato	6518	1.60	46374
4	W. Veg.	7292	1.70	66192
5	Chilli (Green)	6493	1.50	12688
6	Potato	2490	0.60	22941
7	Oil seeds	2843	0.70	1394
8	Watermel	70	0.01	882
9	Wheat	1075	0.31	623
10	Brinjal	78	0.02	337
11	Lentil	56	0.01	34
12	Millet	209	0.05	1282
	C. Betel Leaf	625		9250
	D. Jute	1517		2400
	Total	420230		

5 The average yield per ha in tons has been considered on the basis of the following -

i. From farmers level at the time of field visit
ii. UAO offices
iii. Different books printed by BARI, BRRI
iv. Upazila Statistics - BBS

BANGLADESH

Enclosure 3
TABLE 7.8

CYCLONE PROTECTION PROJECTON PROJECT-II

CROP AREAS /a, YIELDS AND PRODUCTION /b

SUBPROJECT: Polder 35/1

T. Aman area would not be lower than present

	Area, ha			Yield, M. T/ha			Production, M.T.		
Crop	P	W̄	W	P	W̄	W	P	W̄/c	W
B. Aus LV	170	170	1038	0.9	0.8	1.1	153	138	1142
T.Aman LV	4050	4050	3453	1.2	1.1	1.5	4860	4374	5180
T.Aman HYV	0	0	264	0.0	0.0	2.07	0	0	546
Pulses	95	95	319	0.5	0.4	0.5	45	40	160
Oilseeds	9	9	64	0.5	0.5	0.55	5	4	35
Potato	23	23	24	10.2	9.2	12.7	235	211	305
S. Potato	54	54	145	6.3	5.7	6.8	340	306	986
Vegetable	46	46	262	9.2	8.2	10.25	421	379	2686
Cowpea	64	64	203	0.5	0.5	0.53	32	29	108
Chilli(green)	50	50	87	2.0	1.8	2.1	100	90	183
Total	4561	4561	5859				6190	5571	11329

Increased

Increased

Note: P = Present
W bar = Without Project
W = With Project

/a Cropping intensity increase from 108% without project to 139% with project and change from rice local varieties to rice HYV and crop diversification is estimated to occur in seven years period.
/b Without the project it is expected that the production will decrease 2% the first year, 4% the second year, 6% the third year, 8% the fourth year and 10% starting the fifth year.
/c Crop production without the project in the fifth year.

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TABLE 7.9

BANGLADESH

CYCLONE PROTECTION PROJECTON PROJECT-II

CROP AREAS /a, YIELDS AND PRODUCTION /b

SUBPROJECT: Polder 40/2

	Area, ha			Yield, M. T/ha			Production, M.T.		
Crop	P	$\bar{W}$	W	P	$\bar{W}$	W	P	$\bar{W}$/c	W
B. Aus LV	317	317	170	1.10	0.99	1.25	349	314	213
T.Aus HYV	174	174	188	1.88	1.69	2.70	327	294	508
T.Aman LV	2161	2161	1204	1.60	1.44	1.80	3458	3112	2167
T.Aman HYV	121	121	1140	2.25	2.03	2.80	272	245	3192
B.Aman	7	7	22	1.48	1.33	1.60	10	9	35
Pulses	57	57	175	0.52	0.47	0.65	30	27	114
Oilseeds	9	9	35	0.55	0.50	0.65	5	4	23
S. Potato	0	0	104	0.00	0.00	6.80	0	0	707
Vegetable	0	0	154	0.00	0.00	10.30	0	0	1586
Cowpea	28	28	155	0.55	0.50	0.60	15	14	93
Chilli(green)	19	19	41	2.10	1.89	2.30	40	36	94
Millet	3	3	7	0.55	0.50	0.60	2	1	4
Total	2896	2896	3395				4508	4057	8736

Note: P = Present
$\bar{W}$ = Without Project
W = With Project

/a Cropping intensity increase from 120% without project to 141% with project and change from rice local varieties to rice HYV and crop diversification is estimated to occur in seven years period.
/b Without the project it is expected that the production will decrease 2% the first year, 4% the second year, 6% the third year, 8% the fourth year and 10% starting the fifth year.
/c Crop production without the project in the fifth year.

Enclosure 3
TABLE 7.10

BANGLADESH

CYCLONE PROTECTION PROJECTON PROJECT-II

CROP AREAS /a, YIELDS AND PRODUCTION /b

SUBPROJECT: Polder 48

	Area, ha			Yield, M. T/ha			Production, M.T.		
Crop	P	$\bar{W}$	W	P	$\bar{W}$	W	P	$\bar{W}$/c	W
B. Aus LV	491	491	243	1.05	0.95	1.25	516	464	304
T.Aus HYV	269	269	260	1.88	1.69	2.70	506	455	702
T.Aman LV	3297	3297	2697	1.60	1.44	1.75	5275	4748	4720
T.Aman HYV	187	187	934	2.25	2.03	2.80	421	379	2615
B.Aman	11	11	34	1.48	1.33	1.35	16	15	46
Pulses	108	108	285	0.52	0.47	0.55	56	51	157
Oilseeds	36	36	52	0.55	0.50	0.60	20	18	31
S. Potato	0	0	92	0.00	0.00	6.80	0	0	626
Vegetable	0	0	23	0.00	0.00	10.25	0	0	236
Cowpea	44	44	233	0.55	0.50	0.60	24	22	140
Chilli(green)	36	36	162	2.10	1.89	2.25	76	68	365
Millet	14	14	18	0.55	0.50	0.60	8	7	11
Jute	40	40	40	1.40	1.26	1.75	56	50	70
Total	4533	4533	5073		0.00		6973	6276	10021

Note: P = Present
$\bar{W}$ = Without Project
W = With Project

/a Cropping intensity increase from 122% without project to 137% with project and change from rice local varieties to rice HYV and crop diversification is estimated to occur in seven years period.
/b Without the project it is expected that the production will decrease 2% the first year, 4% the second year, 6% the third year, 8% the fourth year and 10% starting the fifth year.
/c Crop production without the project in the fifth year.

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TABLE 7.11

BANGLADESH

CYCLONE PROTECTION PROJECTON PROJECT-II

CROP AREAS /a, YIELDS AND PRODUCTION /b

SUBPROJECT: Polder 59/2

	Area, ha			Yield, M. T/ha			Production, M.T.		
Crop	P	$\bar{W}$	W	P	$\bar{W}$	W	P	$\bar{W}$/c	W
B. Aus LV	520	520	690	1.10	0.99	1.15	572	515	793
T.Aus HYV	528	528	585	1.98	1.78	2.30	1045	941	1346
T.Aman LV	4186	4186	4056	1.75	1.58	1.80	7326	6593	7301
T.Aman HYV	37	37	213	2.50	2.25	3.00	93	83	639
B.Aman	291	291	442	1.20	1.08	1.40	349	314	619
Pulses	291	291	340	0.50	0.45	0.55	146	131	187
Oilseeds	46	46	106	0.50	0.45	0.55	23	21	58
S. Potato	122	122	120	6.90	6.21	7.50	842	758	900
Vegetable	158	158	219	9.00	8.10	10.30	1422	1280	2256
Cowpea	66	66	170	0.55	0.50	0.60	36	33	102
Chilli(green)	102	102	170	1.80	1.62	2.10	184	165	357
Total	6347	6347	7111				12037	10833	14558

Note: P = Present
$\bar{W}$ = Without Project
W = With Project

/a Cropping intensity increase from 153% without project to 171% with project and change from rice local varieties to rice HYV and crop diversification is estimated to occur in seven years period.
/b Without the project it is expected that the production will decrease 2% the first year, 4% the second year, 6% the third year, 8% the fourth year and 10% starting the fifth year.
/c Crop production without the project in the fifth year.

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TABLE 7.12

BANGLADESH

CYCLONE PROTECTION PROJECTON PROJECT-II

CROP AREAS /a, YIELDS AND PRODUCTION /b

SUBPROJECT: Polder 59/3B

	Area, ha			Yield, M. T/ha			Production, M.T.		
Crop	P	W̄	W	P	W̄	W	P	W̄/c	W
B. Aus LV	1839	1839	2379	1.22	1.10	1.30	2244	2019	3093
T.Aus HYV	1338	1338	1338	2.25	2.03	2.50	3011	2709	3345
T.Aman LV	8758	8758	7330	1.95	1.76	2.20	17078	15370	16126
T.Aman HYV	0	0	2443	0.00	0.00	3.10	0	0	7573
B.Aman	1011	1011	1011	1.20	1.08	1.40	1213	1092	1415
Pulses	1050	1050	898	0.55	0.50	0.60	578	520	539
Oilseeds	166	166	281	0.50	0.45	0.60	83	75	169
S. Potato	442	442	319	6.90	6.21	8.00	3050	2745	2552
Vegetable	591	591	580	9.00	8.10	10.70	5319	4787	6206
Cowpea	240	240	449	0.55	0.50	0.60	132	119	269
Chilli(green)	368	368	449	2.20	1.98	2.40	810	729	1078
Total	15803	15803	17477				33516	30165	42365

Note: P = Present
W bar = Without Project
W = With Project

/a Cropping intensity increase from 143% without project to 158% with project and change from rice local varieties to rice HYV and crop diversification is estimated to occur in seven years period.
/b Without the project it is expected that the production will decrease 2% the first year, 4% the second year, 6% the third year, 8% the fourth year and 10% starting the fifth year.
/c Crop production without the project in the fifth year.

Enclosure 3
TABLE 7.13

BANGLADESH

CYCLONE PROTECTION PROJECTON PROJECT-II

CROP AREAS /a, YIELDS AND PRODUCTION /b

SUBPROJECT: Polder 59/3C

	Area, ha			Yield, M. T/ha			Production, M.T.		
Crop	P	W̄	W	P	W̄	W	P	W̄/c	W
B. Aus LV	1389	1389	1537	1.10	0.99	1.15	1528	1375	1768
T.Aus HYV	1063	1063	1177	1.98	1.78	2.30	2105	1894	2707
T.Aman LV	7708	7708	6629	1.75	1.58	1.80	13489	12140	11932
T.Aman HYV	0	0	1657	0.00	0.00	2.80	0	0	4640
B.Aman	1002	1002	1082	1.20	1.08	1.40	1202	1082	1515
Pulses	880	880	672	0.50	0.45	0.55	440	396	370
Oilseeds	139	139	350	0.50	0.45	0.55	70	63	193
S. Potato	371	371	238	6.90	6.21	7.70	2560	2304	1833
Vegetable	479	479	434	9.00	8.10	10.30	4311	3880	4470
Cowpea	202	202	543	0.55	0.50	0.60	111	100	326
Chilli(green)	309	309	336	1.80	1.62	2.10	556	501	706
Total	13542	13542	14655				26372	23735	30458

Note: P = Present
W bar = Without Project
W = With Project

/a Cropping intensity increase from 136% without project to 147% with project and change from rice local varieties to rice HYV and crop diversification is estimated to occur in seven years period.
/b Without the project it is expected that the production will decrease 2% the first year, 4% the second year, 6% the third year, 8% the fourth year and 10% starting the fifth year.
/c Crop production without the project in the fifth year.

Enclosure 3
TABLE 7.14

BANGLADESH

CYCLONE PROTECTION PROJECTON PROJECT-II

CROP AREAS /a, YIELDS AND PRODUCTION /b

SUBPROJECT: Polder 60

	Area, ha			Yield, M. T/ha			Production, M.T.		
Crop	P	$\bar{W}$	W	P	$\bar{W}$	W	P	$\bar{W}$/c	W
B. Aus LV	595	595	648	1.10	0.99	1.15	655	589	745
T.Aus HYV	496	496	550	1.98	1.78	2.30	982	884	1265
T.Aman LV	3569	3569	2810	1.75	1.58	1.90	6246	5621	5339
T.Aman HYV	188	188	1204	2.50	2.25	3.00	470	423	3612
B.Aman	362	362	415	1.20	1.08	1.40	434	391	581
Pulses	353	353	194	0.52	0.47	0.60	184	165	116
Oilseeds	58	58	61	0.55	0.50	0.60	32	29	37
S. Potato	148	148	69	6.90	6.21	6.90	1021	919	476
Vegetable	191	191	126	9.00	8.10	10.90	1719	1547	1373
Cowpea	80	80	98	0.55	0.50	0.60	44	40	59
Chilli(green)	123	123	97	2.10	1.89	2.30	258	232	223
Total	6163	6163	6272				12045	10840	13827

Note: P = Present
$\bar{W}$ = Without Project
W = With Project

/a Cropping intensity increase from 126% without project to 129% with project and change from rice local varieties to rice HYV and crop diversification is estimated to occur in seven years period.
/b Without the project it is expected that the production will decrease 2% the first year, 4% the second year, 6% the third year, 8% the fourth year and 10% starting the fifth year.
/c Crop production without the project in the fifth year.

Enclosure 3
TABLE 7.15

BANGLADESH

CYCLONE PROTECTION PROJECTON PROJECT-II

CROP AREAS /a, YIELDS AND PRODUCTION /b

SUBPROJECT: Polder 66/1

	Area, ha			Yield, M. T/ha			Production, M.T.		
Crop	P	$\bar{W}$	W	P	$\bar{W}$	W	P	$\bar{W}$/c	W
B. Aus LV	95	95	275	1.22	1.10	1.30	116	104	358
T.Aus HYV	143	143	77	2.25	2.03	2.50	322	290	193
T.Aman LV	330	330	482	1.95	1.76	2.20	644	579	1060
T.Aman HYV	51	51	77	2.80	2.52	3.10	143	129	239
Boro HYV	22	22	44	3.20	2.88	3.50	70	63	154
Pulses	73	73	66	0.55	0.50	0.60	40	36	40
Oilseeds	0	0	0	0.50	0.45	0.60	0	0	0
S. Potato	0	0	0	6.90	6.21	8.00	0	0	0
Vegetable	33	33	39	9.00	8.10	10.70	297	267	417
Cowpea	55	55	77	0.55	0.50	0.60	30	27	46
Chilli(green)	11	11	34	2.10	1.89	2.40	23	21	82
Potato	10	10	34	10.50	9.45	12.00	105	95	408
Water Melon	22	22	31	11	9.90	12.5	242	218	388
Betel Leaf	18	18	35	1.2	1.08	1.5	22	19	53
Salt	44	44	66	9.3	8.37	9.3	409	368	614
Shrimp	44	44	66	0.1	0.09	0.12	4	4	8
Total	951	951	1403				2467	2220	4058

Note: P = Present
$\bar{W}$ = Without Project
W = With Project

/a Cropping intensity increase from 143% without project to 211% with project and change from rice local varieties to rice HYV and crop diversification is estimated to occur in seven years period.

/b Without the project it is expected that the production will decrease 2% the first year, 4% the second year, 6% the third year, 8% the fourth year and 10% starting the fifth year.

/c Crop production without the project in the fifth year.

Enclosure 3
TABLE 7.16

BANGLADESH

CYCLONE PROTECTION PROJECTON PROJECT-II

CROP AREAS /a, YIELDS AND PRODUCTION /b

SUBPROJECT: Polder 68

	Area, ha			Yield, M. T/ha			Production, M.T.		
Crop	P	W̄	W	P	W̄	W	P	W̄/c	W
B. Aus LV	240	240	743	1.22	1.10	1.30	293	264	966
T.Aus HYV	192	192	282	2.25	2.03	2.50	432	389	705
T.Aman LV	1005	1005	879	1.95	1.76	2.20	1960	1764	1934
T.Aman HYV	370	370	495	2.80	2.52	3.10	1036	932	1535
Boro HYV	250	250	88	3.20	2.88	3.50	800	720	308
Pulses	40	40	80	0.55	0.50	0.60	22	20	48
Oilseeds	4	4	52	0.50	0.45	0.60	2	2	31
S. Potato	0	0	0	6.90	6.21	8.00	0	0	0
Vegetable	11	11	100	9.00	8.10	10.70	99	89	1070
Cowpea	37	37	59	0.55	0.50	0.60	20	18	35
Chilli(green)	14	14	43	2.10	1.89	2.40	29	26	103
Potato	24	24	48	10.50	9.45	12.00	252	227	576
Water Melon	12	12	36	11.00	9.90	12.5	132	119	450
Betel Leaf	29	29	53	1.20	1.08	1.5	35	31	80
Salt	31	31	91	9.30	8.37	9.3	288	259	846
Shrimp	31	31	91	0.10	0.09	0.12	3	3	11
Total	2290	2290	3140				5404	4863	8698

Note: P = Present
W bar = Without Project
W = With Project

/a Cropping intensity increase from 153% without project to 209% with project and change from rice local varieties to rice HYV and crop diversification is estimated to occur in seven years period.
/b Without the project it is expected that the production will decrease 2% the first year, 4% the second year, 6% the third year, 8% the fourth year and 10% starting the fifth year.
/c Crop production without the project in the fifth year.

Enclosure
TABLE 7.17

BANGLADESH

CYCLONE PROTECTION PROJECTON PROJECT-II

CROP AREAS /a, YIELDS AND PRODUCTION /b

SUBPROJECT: Polder 70

	Area, ha			Yield, M. T/ha			Production, M.T.		
Crop	P	W̄	W	P	W̄	W	P	W̄/c	W
B. Aus LV	45	45	140	1.22	1.10	1.30	55	49	182
T.Aus HYV	108	108	90	2.25	2.03	2.50	243	219	225
T.Aman LV	122	122	206	1.95	1.76	2.20	238	214	453
T.Aman HYV	128	128	190	2.80	2.52	3.10	358	323	589
Boro HYV	89	89	100	3.20	2.88	3.50	285	256	350
Pulses	16	16	22	0.55	0.50	0.60	9	8	13
Oilseeds	2	2	2	0.50	0.45	0.60	1	1	1
S. Potato	3	3	5	6.90	6.21	8.00	21	19	40
Vegetable	5	5	2	9.00	8.10	10.70	45	41	21
Cowpea	18	18	10	0.55	0.50	0.60	10	9	6
Chilli(green)	6	6	7	2.10	1.89	2.40	13	11	17
Potato	3	3	4	10.50	9.45	12.00	32	28	48
Water Melon	2	2	2	11.00	9.90	12.5	22	20	25
Betel Leaf	14	14	17	1.20	1.08	1.5	17	15	26
Salt	750	750	750	9.30	8.37	9.3	6975	6278	6975
Shrimp	750	750	750	0.10	0.09	0.12	75	68	90
Total	2061	2061	2297				8397	7558	9061

Note: P = Present
W bar = Without Project
W = With Project

/a Cropping intensity increase from 162% without project to 181% with project and change from rice local varieties to rice HYV and crop diversification is estimated to occur in seven years period.

/b Without the project it is expected that the production will decrease 2% the first year, 4% the second year, 6% the third year, 8% the fourth year and 10% starting the fifth year.

/c Crop production without the project in the fifth year.

what would prompt farmers for crop diversification?

Enclosure 3
TABLE 7.18

BANGLADESH

CYCLONE PROTECTION PROJECTON PROJECT-II

CROP AREAS /a, YIELDS AND PRODUCTION /b

SUBPROJECT: Polder 72

	Area, ha			Yield, M. T/ha			Production, M.T.		
Crop	P	$\bar{W}$	W	P	$\bar{W}$	W	P	$\bar{W}$/c	W
B. Aus LV	814	814	1124	1.10	0.99	1.25	895	806	1405
T.Aus HYV	957	957	1032	1.95	1.76	2.25	1866	1680	2322
T.Aman LV	4735	4735	3456	1.70	1.53	1.80	8050	7245	6221
T.Aman HYV	511	511	1681	2.90	2.61	3.25	1482	1334	5463
B.Aman	26	26	150	1.35	1.22	1.40	35	32	210
Pulses	731	731	822	0.60	0.54	0.65	439	395	534
Oilseeds	359	359	486	0.50	0.45	0.60	180	162	292
S. Potato	173	173	303	7.50	6.75	7.70	1298	1168	2333
Vegetable	0	0	287	9.00	8.10	10.50	0	0	3014
Cowpea	433	433	330	0.50	0.45	0.60	217	195	198
Chilli(green)	216	216	303	2.10	1.89	2.25	454	408	682
Wheat	121	121	122	1.40	1.26	1.65	169	152	201
Jute	136	136	0	1.58	1.42	0	215	193	0
Total	9212	9212	10096				15298	13768	22875

Note: P = Present
$\bar{W}$ = Without Project
W = With Project

/a Cropping intensity increase from 174% without project to 190% with project and change from rice local varieties to rice HYV and crop diversification is estimated to occur in seven years period.
/b Without the project it is expected that the production will decrease 2% the first year, 4% the second year, 6% the third year, 8% the fourth year and 10% starting the fifth year.
/c Crop production without the project in the fifth year.

Enclosure 3
TABLE 7.19

BANGLADESH

CYCLONE PROTECTION PROJECTON PROJECT-II

CROP AREAS /a, YIELDS AND PRODUCTION /b

SUBPROJECT: Polder 73/1B

	Area, ha			Yield, M. T/ha			Production, M.T.		
Crop	P	W̄	W	P	W̄	W	P	W̄/c	W
B. Aus LV	1335	1335	2132	1.04	0.94	1.10	1388	1250	2345
T.Aus HYV	0	0	0	0.00	0.00	0.00	0	0	0
T.Aman LV	6561	6561	4837	1.70	1.53	1.90	11154	10038	9190
T.Aman HYV	0	0	1209	2.50	2.25	3.00	0	0	3627
B.Aman	441	441	441	1.20	1.08	1.35	529	476	595
Pulses	352	352	616	0.45	0.41	0.55	158	143	339
Oilseeds	74	74	94	0.48	0.43	0.55	36	32	52
S. Potato	103	103	261	7.50	6.75	8.00	773	695	2088
Vegetable	120	120	292	8.05	7.25	9.00	966	869	2628
Cowpea	119	119	178	0.42	0.38	0.60	50	45	107
Chilli(green)	93	93	209	1.70	1.53	2.10	158	142	439
Millet	37	37	156	0.90	0.81	0.90	33	30	140
Total	9235	9235	10425				15245	13721	21550

Note: P = Present
W bar = Without Project
W = With Project

/a Cropping intensity increase from 130% without project to 147% with project and change from rice local varieties to rice HYV and crop diversification is estimated to occur in seven years period.
/b Without the project it is expected that the production will decrease 2% the first year, 4% the second year, 6% the third year, 8% the fourth year and 10% starting the fifth year.
/c Crop production without the project in the fifth year.

Table 8.2

Distribution of fertilizer by type and by former district

(in MT).

Former	Year	Urea	TSP	MP	DAP HPs Oth	Total	N	P2o5	K20	Gyp-sum	Zinc	Total
Chittagong	1986-87	56930	13927	824	40	71721	26188	6406	494	-	57	33155
	1987-88	51938	11852	1161	216	65167	23891	5452	697	5	197	30242
	1988-89	38956	10651	882	-	50489	17920	4899	629	-	-	23348
Noakhali	1986-87	33651	10441	789	-	44881	15479	4803	473	4	41	20800
	1987-88	39467	15560	2024	-	57051	18155	7158	1214	-	50	26577
	1988-89	31928	13561	2149	-	47638	14687	6238	1289	-	-	22214
Barisal	1986-87	24585	7628	1237	-	33450	11309	3509	742	9	30	15599
	1987-88	28205	9969	685	-	38859	12974	4586	411	28	61	18060
	1988-89	31137	10518	991	-	42646	14323	4838	595	-	-	19756
Khulna	1986-87	22365	5831	1122	-	29318	10288	2682	673	36	92	13771
	1987-88	38746	11106	992	-	50844	17823	5109	595	18	157	23702
	1988-89	79088	25293	3843	-	10822	36380	11635	2306	-	-	50321
Patuakhali	1986-87	6812	1258	225	-	8295	3134	579	135	1	2	3851
	1987-88	8446	1899	38	-	10383	3885	874	23	5	-	4788
	1988-89	8240	1019	55	-	9314	3790	469	33	-	-	4292

Note : N = 46% of Urea, P2o5 = 46% of TSP, K20 = 60% of MP
Source : BADC, & BBS - 1990.

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Table 8.4

Former District-Wise distribution of pesticides.

(In Matric Ton)

Former district	Year	Granular	Conventional/Borer pestcomplex	Soil Insecticides	Acaricides	Fungicides	Rodenticides	Weedicides
Chittagong	1986-87	300	55	2.5	2	2	20	0.5
	1987-88	345	52	2	5	2	0.5	16
	1988-89	405	63	1.5	3	2	0.25	10
Noakhali	1986-87	210	33	1	1	2	-	0.5
	1987-88	230	32	1	5	1	-	-
	1988-89	270	46	1.5	2	3	0.5	-
Barisal	1986-87	190	32	0.5	1	-	-	-
	1987-88	212	30	-	2	-	-	-
	1988-89	245	34	-	1.5	-	-	-
Khulna	1986-87	80	20	1	0.5	1	-	-
	1987-88	92	18	1	1	1	-	-
	1988-89	107	26	1.5	1.5	2	-	-
Patuakhali	1986-87	150	16	-	0.5	-	-	-
	1987-88	180	16	-	2	-	-	-
	1988-89	185	21	-	1.5	-	-	-

Source : Bangladesh Pesticides Association. BBS - 1990.

Table 18-B

Tolerable Limit of Salinity

crop	water			soil		
	T.D.S mg/1	Cl mg/1	BCw mmho/cm	T.D.S. mg/1	Cl. mg/1	ECc mmho/cm
B. aus			2.0	-	-	3.0
Local T. aman	-	-	2.0	-	-	3.0
Local T. aman	-	-	2.0	-	-	3.0
HYV Aman	-	-	2.0	-	-	3.0
Pulses	-	-	N.A	-	-	3.0
Chillies	-	-	N.A	-	-	N.A
Cowpea	-	-	0.9	-	-	1.3
Drinking water	1500	600	-	-	-	-

Source : Coastal saline soils and their Management in Bangladesh by Z.
Karim et al. 1983. BARC Soils and Irrigation Publication No. 8 1983.

The original source i.e. Ayers & Westcot (1976) should have been quoted.

Pre- or Post?

Category - I

Table 18.1

(area in ha)

Land type	Cropping pattern	Cultivated area	Cropped area	Remarks
High land (3.2%)	1. B.aus-Rabi (pulse, W.veg. Potato, Chilli, Oilseeds etc.)	1301	2602	Double cropping
	2. B. aus - T. aman (HYV)-Rabi (W.veg., oilseeds, Potato, Chiili etc.)	2115	6345	Triple cropping
Medium high land (92.1%)	1. T. aman(LYV) -Fallow	73490	73490	Single cropping
	2. B. aus -Rabi (Pulse, S.potato, Chilli cowpea, (Falon) etc.	13776	27552	Double Cropping
	3. Boro (HYV) -T.aman (HYV)	2296	4592	-do-
	4. B. aus - T. aman (LYV)-Rabi (Cowpea pulse, S. potato, Chilli etc.)	9184	27552	Triple cropping
Medium Low land (4.7%)	1. T. aman(LYV) -Rabi (pulse, cowpea, S. potato etc.)	1683	3366	Double cropping
	2. T. aman (LYV)-Fallow	3365	3365	Single Cropping
	Total	107210	148864	

Crooping intensity = 139%

Category - II

Table 18.2

(Area in ha)

Land type	Cropping pattern	Cultivated area	Cropped area	Remarks
High land (0.3%)	1. B. aus -Rabi (pota to,oilseeds,W.veg. Chilli, etc.).	140	280	Double cropping
	2. Jute-T.aman(LYV) Rabi (W.veg., pulse, cowpea etc.	112	336	Triple cropping
Medium high land (84.6%)	1. T. aus (HYV) -T. aman (LYV)	223	446	Double cropping
	2. T. aus (HYV)-T. aman(HYV)	509	1018	-do-
	3. T. aman(LYV)-Rabi (Pulse,oilseeds, chilli, cowpea,S. potato	1850	3750	-do-
	4. B. aus-T. aman(LYV -Rabi (pulse oilseeds, S. potato, cowpea, etc.)	683	2049	Triple cropping
	5. T. aman (LYV) -Fallow	6802	6802	Single cropping
Medium Low land (15.1%)	1. B. aman-Rabi (pulse, cowpea,S. potato etc.)	96	192	Double cropping
	2. T. aman (LYV)-Fallow	30	30	Single Cropping
	Total	10445	14853	

Cropping intensity = 142%

Category - III

Table 18.3

Land Type	Cropping Pattern	Cultivated area *3*	Cropped area	Remarks
High Land (0.5%)	1. B. aus-Rabi (W.veg, pulse oilseeds, chili, S. potato, Cowpea etc.	110	220	Double Cropping
	2. B. aus-T aman (HYV)-Rabi (W. veg., oilseeds, potato)	120	360	Triple Cropping
Medium Highland (94.5%)	1. B. aus - T. aman(LYV)- Rabi (pulse, cowpea, wheat, mustard, chili etc.)	6744	20232	Triple Cropping
	2. T. aus (HYV) - T. aman (HYV)	8330	16660	Double Cropping
	3. Boro(HYV) - T. aman (HYV)	5125	10250	-do-
	4. Jute-T. aman(LYV)	2100	4200	-do-
	5. T. aman(LYV) - Rabi(pulse, cowpea, S. potato etc.)	8115	16230	-do-
	6. T. aman(LYV) - Fallow.	10033	10033	Single
Medium Lowland	1. B. aman-Rabi (pulse, cowpea, etc.)	1210	2420	Double Cropping
	2. T. aman(LYV) - Fallow	913	913	Single Cropping
	Total	42800	81518	

Cropping intensity = 190%.

Category - IV

Table 18.4

(Area in ha)

Land Type	Cropping Pattern	Cultivated area *3*	Cropped area	Remarks
High Land (0.3%)	1. B. aus-T. aman-Rabi (W.veg, pulse oilseeds, chili, millet, wheat etc.)	115	345	Triple Cropping
Medium Highland (89.7%)	1. B. aus - T. aman(LYV)	1490	2980	Double Cropping
	2. B. aus-T. aman(LYV)-Rabi (pulse, cowpea, wheat, oilseeds, potato etc.)	1685	5055	Triple Cropping
	3. B. aus - Rabi (pulse, cowpea, oilseeds, S. potato etc.)	6466	12932	Double Cropping
	4. T. aman(LYV) - Fallow.	22775	22775	Single
Medium (10%)	1. T. aman(LYV) - Fallow	1603	1603	Single Cropping
	2. B. aman - Fallow	2016	2016	Single Cropping
	Total	36150	47706	

So, the Cropping intensity stands = 132%.

Category - V

Table 18.5

Land Type	Cropping Pattern	Cultivated area *3*	Cropped area	Remarks
High Land (0.3%)	1. B. aus-T. aman(LYV) -Rabi (W.veg, pulse, oilseeds, chili, S. potato etc.)	5818	17454	Triple Cropping
Medium Highland (80.67%)	1. T. aus(HYV) - T. aman(LYV)	10308	20616	Double Cropping
	2. T. aman(LYV)- Rabi(pulse, cowpea, wheat, oilseeds, S.potato, chili etc.)	4225	8450	Double Cropping
	3. B. aus - T. aman (LYV)	4327	8654	Double Cropping
	4. T. aman(LYV) - Fallow.	43970	43970	Single
Medium (19%)	1. B. aus - Rabi (pulse, potato, cowpea, etc.)	2018	4036	Double Cropping
	2. B. aman - Rabi (pulse, cowpea etc.)	7786	15572	Single Cropping
	3. T. aman(LYV) - Fallow	6633	6633	Single Cropping
	Total	85085	125385	

Cropping intensity = 147%.

Category - VI

Table 18.6

(Area in ha)

Land Type	Cropping Pattern	Cultivated area *3*	Cropped area	Remarks
High Land (21.2%)	1. Betel leaf - Fallow	625	625	Single Cropping
	2. B. aus - T. aman(HYV)	2880	5760	Double Cropping
	3. T. aman(LYV) - Rabi(potato, chilli, lentil, oilseeds, etc.)	1575	3150	-do-
	4. B. aus - T. aman (LYV)- Rabi (W. veg., oilseeds, cowpea, potato, etc.)	1478	4434	Triple Cropping
Medium Highland (58.1%)	1. T. aman (LYV) - Fallow	2015	2015	Single Cropping
	2. T. aus(HYV)- T. aman (HYV)	7350	14700	Double Cropping
	3. B. aus - T. aman (LYV)	6785	13570	-do-
	4. B. aus - T. aman (LYV) - Rabi(pusle, cowpea, lentil, brinjal, potato, s. potato).	1850	5550	Triple Cropping
Medium (20.7%)	1. T. aman - Fallow	3587	3587	Single Cropping
	2. T. aus(HYV) - T. aman (LYV)	590	1180	Double Cropping
	3. Boro(HYV) - T. aman(HYV)	2225	4450	Double Cropping
	Total	30960	59021	

Cropping intensity = 191%.

Category I

Table 19.1

Sl no	Crops	Area(ha)	% of Cropped area	Post Project: AV.yield (T/ha)	Total Production (T)
	A. Paddy	120805	81		
1	B. aus	26376	18.0	1.10	29014
2	T. aman(LYV)	89837	60.0	1.50	134755
3	T. aman(HYV)	2296	1.5	2.70	6199
4	Boro(HYV)	2296	1.5	3.50	8036
	B. Rabi Crops	28069	19.0		
1	Pulse	8122	5.5	0.50	4061
2	W. Veg.	6645	4.5	10.25	68111
3	S. Potato	3691	2.5	6.80	25099
4	Chilli(Green)	2218	1.5	2.10	4658
5	Oilseeds	2215	1.5	0.55	1218
6	Cowpea	5168	3.5	0.53	2739
	Total	148864	100.0		

Category II

Table 19.2

Sl no	Crops	Area(ha)	% of Cropped area	Post Project: AV.yield (T/ha)	Total Production (T)
	A. Paddy	11860	80.0		
1	B. aus	823	5.5	1.25	1029
2	T. Aus (HYV)	732	5.0	2.70	1976
3	T. aman (LYV)	9700	65.3	1.50	14550
4	T. aman (HYV)	2509	3.5	2.80	1425
5	B. aman	96	0.7	1.35	130
	B. Jute	112	0.7	1.75	
	C. Rabi Crops	2881	19.3		
1	Pulse	761	5.1	0.55	419
2	W. Veg.	702	4.7	10.25	7196
3	S. Potato	417	2.8	6.80	2836
4	Chilli(Green)	179	1.2	2.25	403
5	Oilseeds	151	1.0	0.60	91
6	Cowpea	971	4.5	0.60	403
	Total	14853	100.0		

Category III

Table 19.3

Sl no	Crops	Area(ha)	% of Cropped area	Post Project: AV.yield (T/ha)	Total Production (T)
	A. Paddy	63119	77.4		
1	B. aus	6974	8.6	1.35	9415
2	T. Aus (LYV)	8330	10.2	2.30	19159
3	T. aman (LYV)	27905	34.2	1.75	48434
4	T. aman (HYV)	13575	16.7	3.25	44119
5	Boro (HYV)	5125	6.3	3.50	17938
6	B. aman	1210	1.4	1.35	1634
	B. Jute	2100	2.6	1.80	
	C. Robi Crops	16299	20.0		
1	Pulse	4075	5.0	0.65	2649
2	W. Veg.	3259	4.0	1.50	37220
3	Chilli(Green)	2444	3.0	2.25	5499
4	S. Potato	2444	3.0	7.70	18819
5	Potato	2038	2.5	12.70	25823
6	Oilseeds	1224	1.5	0.60	734
7	Wheat	815	1.0	0.65	530
	Total	81518	100.0		

Category IV

Table 19.4

Sl no	Crops	Area(ha)	% of Cropped area	Post Project: AV.yield (T/ha)	Total Production (T)
	A. Paddy	39440	82.7		
1	B. aus	9756	20.5	1.10	10732
2	T.aman (LYV)	27668	58.0	1.50	41502
3	B. aman	2016	4.2	1.35	2722
	B. Rabi Crops	8266	17.3		
1	Pulse	2819	5.9	0.50	1409
2	W. veg	1338	2.8	10.50	14049
3	Chilli	955	2.0	2.10	2006
4	Wheat	812	137.0	0.60	487
5	Millet	717	1.5	0.50	358
6	Oilseeds	430	0.9	0.55	237
7	S. potato	1195	2.5	6.80	8126
	Total	47706	100.0		

Category V

Table 19.5

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Sl no	Crops	Area(ha)	% of Cropped area	Post Project AV.yield (T/ha)	Total Production (T)
	A. Paddy	105538	84.1		
1	B. aus	12163	9.7	1.15	13987
2	T. aus (HYV)	10308	8.2	2.30	23708
3	T. aman (LYV)	75281	60.0	1.80	135506
4	B. aman	7786	6.2	1.40	10900
	B. Rabi crops	19847	15.9		
1	Pulse	5992	4.8	0.55	3296
2	Oilseeds	1872	1.5	0.50	936
3	Chilli (Green)	2996	2.4	2.10	6292
4	W. Veg.	3870	3.1	10.30	39861
5	S. Potato	2122	1.7	6.90	14642
6	Cowpea	2995	2.4	0.55	1647
	Total	125385	100.0		

Category VI

Table 19.6

Sl no	Crops	Area(ha)	% of Cropped area	Post Project AV.yield (T/ha)	Total Production (T)
	A. Paddy	53493	90.7		
1	B. aus	12993	22.0	1.30	16891
2	T. aus (HYV)	7940	13.5	2.50	19850
3	T. aman (LYV)	17880	30.3	1.95	34866
4	T. aman (HYV)	12455	21.1	3.10	38610
5	Boro (HYV)	2255	3.8	3.55	8005
	B. Betelleaf	625	1.0	14.90	
	C. Rabi Crops	4903	8.3		
1	Pulse	886	1.5	0.65	576
2	Potato	531	0.9	13.50	7168
3	Oilseeds	413	0.7	0.65	268
4	Cowpea	650	1.1	0.65	422
5	S. Potato	591	1.0	8.70	5142
6	W. Veg	295	0.5	10.70	3156
7	Watermelon	413	0.7	12.70	5245
8	Chilli (Green)	473	0.8	2.30	1088
9	wheat	473	0.8	0.70	331
10	Brinjal	178	0.3	4.80	854
	Total	59021	100.0		

Table 19.7

Category VII : TOTAL AREA OF THE PROJECT

Sl no	Crops	Area(ha)	% of Cropped area	Total Production (T)
	A. Paddy	394255	82.6	
1	B. aus	69085	14.5	81068.00
2	T. aus(HYV)	27310	5.8	64693.00
3	T. aman(LYV)	248271	52.0	409613.00
4	T. aman (HYV)	28835	6.0	90353.00
5	Boro (HYV)	9646	2.0	33979.00
6	B. aman	11106	2.4	15386.00
	B. Jute	2212	0.05	695092
	C. Betel Leaf	625	0.1	
	D. Rabi Crops	80255	16.8	
1	Pulse	22655	4.7	12410.00
2	Cowpea	19484	1.9	5211.00
3	S. Potato	10460	2.2	74664.00
4	W. Veg	16109	3.5	169593.00
5	Chilli (Green)	9265	1.9	19946.00
6	Potato	2569	0.5	32991.00
7	Oilseeds	6305	1.3	3484.00
8	Watermelon	413	1.0	5245.00
9	Wheat	2100	0.4	1348.00
10	Brinjal	178	0.1	854.00
11	Millet	717	0.2	358.00
	Total	477347	100.0	326104