

No. 60

THE SOCIALIST REPUBLIC OF THE UNION OF BURMA  
THE MASTER PLAN SURVEY REPORT  
ON  
THE IRRAWADDY BASIN  
INTEGRATED AGRICULTURAL DEVELOPMENT

ANNEX C  
AGRICULTURE

MARCH 1980

JAPAN INTERNATIONAL COOPERATION AGENCY





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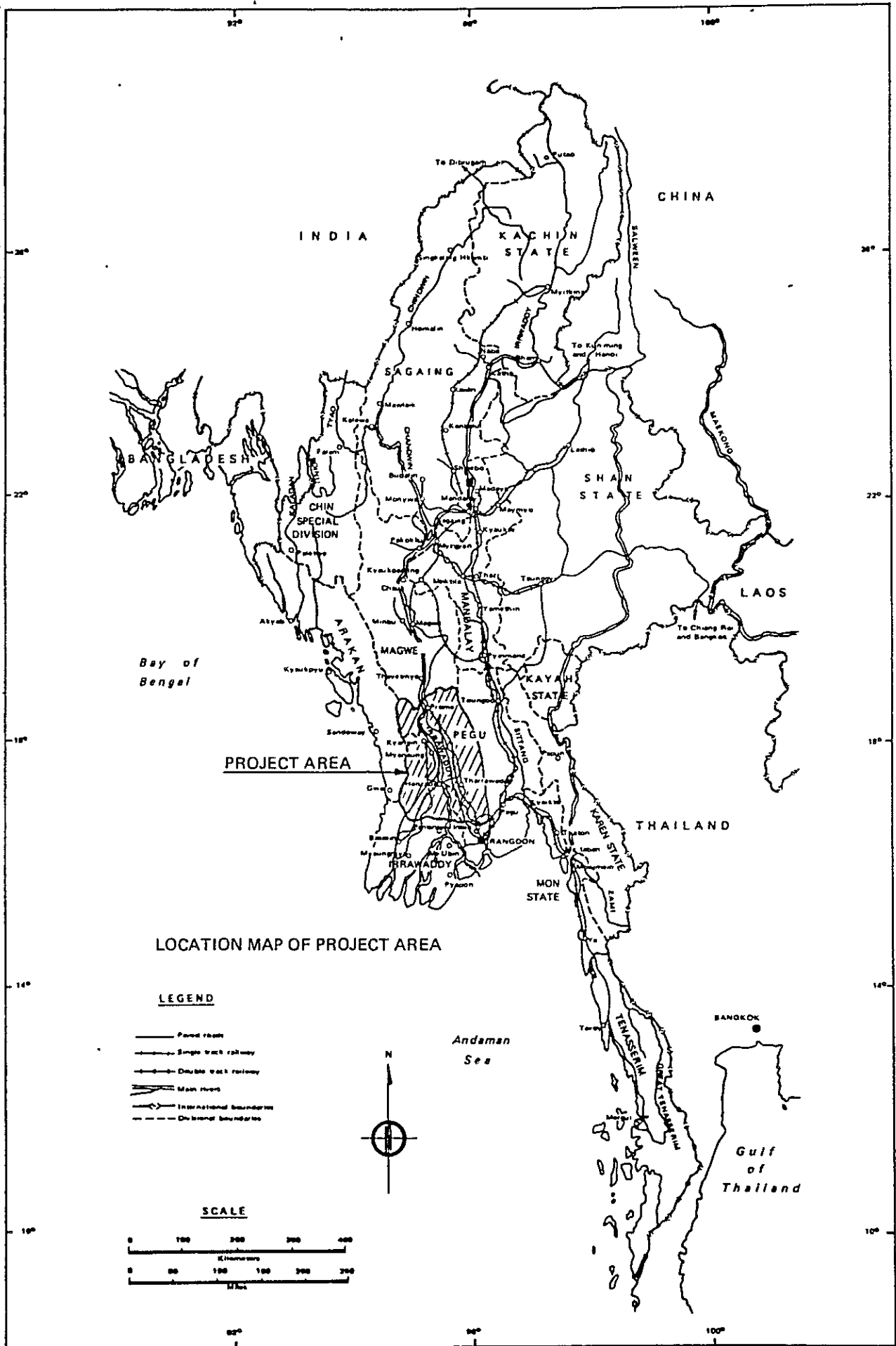
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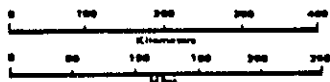
LOCATION MAP OF PROJECT AREA

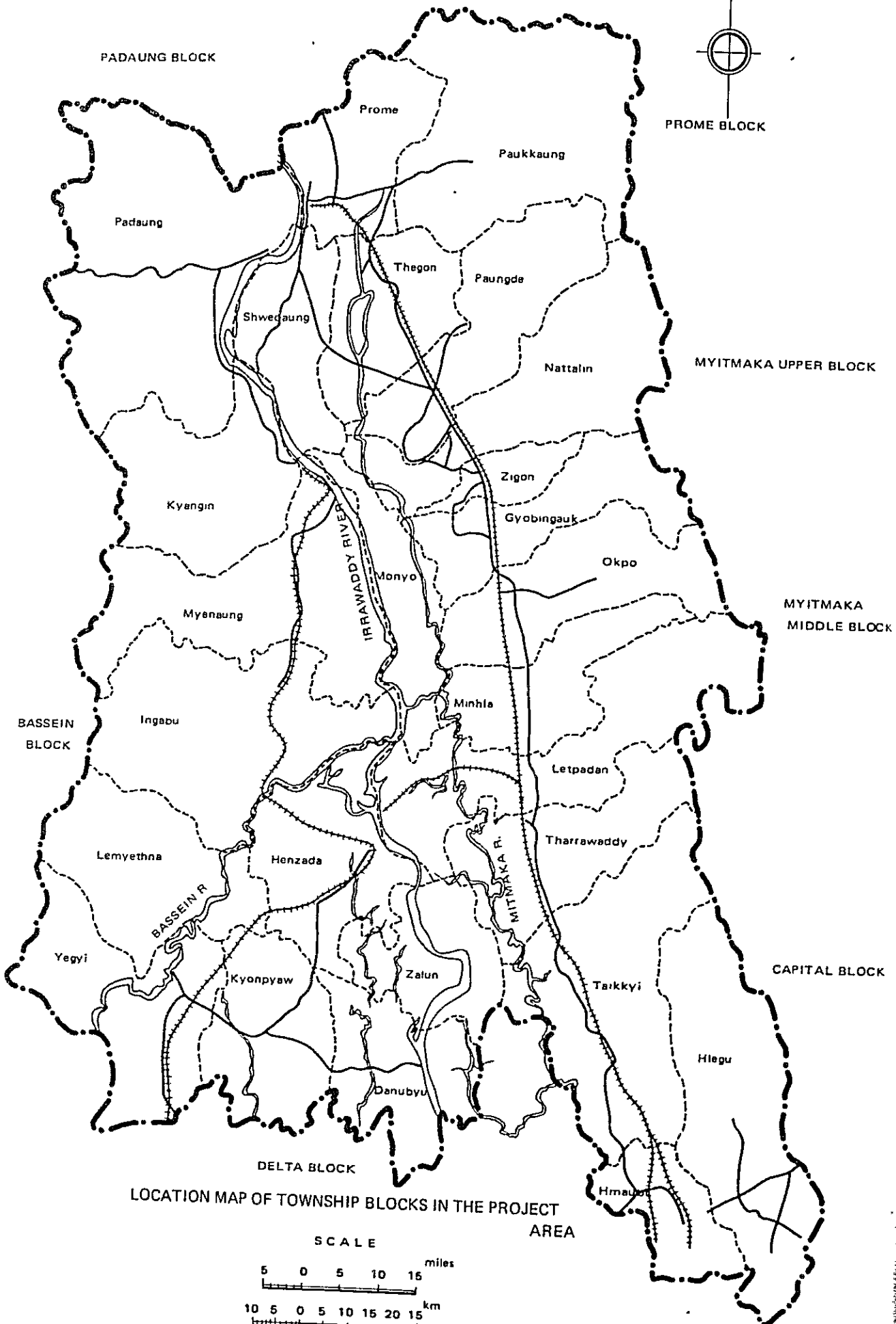
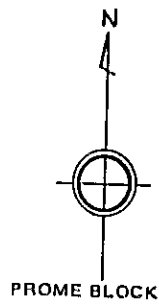
**LEGEND**

- Paved road
- Single track railway
- Double track railway
- Main river
- International boundaries
- Obstacle boundaries

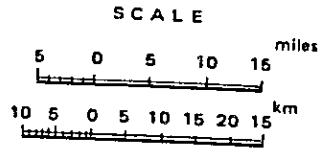


**SCALE**





LOCATION MAP OF TOWNSHIP BLOCKS IN THE PROJECT AREA



1:250,000



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ABBREVIATION, MEASURES AND GLOSSARIES

AC	Agriculture Corporation
ADB	Asian Development Bank
AE	Assistant Engineer
AGM	Assistant General Manager
AFPTC	Agricultural and Farm Produce Trade Corporation
AND	Agricultural Mechanization Department
APS	Advance Purchase System
Ave	Average
BAG	Bachelor of Agricultural University
BKT	Basket(s)
CIF	Cost Insurance and Freight
°C	Degree Centigrade
DAGM	Deputy Assistant General Manager
DG	Director General
DGM	Deputy General Manager
Dy	Deputy
EE	Executive Engineer
EL	Elevation
EPC	Electric Power Corporation
FC	Foreign Currency
FID	Fishery Department
FERD	Foreign Economic Relations Department
FIC	Foodstuff Industries Corporation
FOB	Free on Board
FoD	Forest Department
F/S	Feasibility Study
FY	Fiscal Year from April to March
GM	General Manager
GNP	Gross National Product
GWH	Giga Watt Hour
HP	Horsepower

HWL	High Water Level
HYV	High Yielding Variety (of paddy)
Hz.	Hertz per second
IBRD	International Bank for Reconstruction and Development
ID	Irrigation Department
IDA	International Development Association
KV	Kilo Volt
KW	Kilo Watt
KWH	Kilo Watt Hour
LC	Local Currency
LDMC	Livestock Development and Marketing Corporation
LIV	Local Improved Variety
LWL	Lower Water Level
LV	Local Variety
MAF	Ministry of Agriculture and Forests
MD	Managing Director
MHD	Meteorological and Hydrological Department
MI 1	Ministry of Industry No. 1
M/P	Master Plan
MPF	Ministry of Planning and Finance
MT	Ministry of Trade
MW	Mega Watt
MWL	Mean Water Level
PD	Project Director
pH	Potential of Hydrogen
PPFC	People's Pearl and Fishery Corporation, MAF
PPM	Part(s) per Million
%	Percent
PSD	Planning and Statistics Department
SD	Survey Department, MAF
SLRD	Settlements and Land Records Department, MAF
TC	Timber Corporation, MAF
TEM	Township Extension Manager
TSP	Triple Super Phosphate

UCC	University Computer Center
UGCF	Union Government Consolidated Fund
VAHD	Veterinary and Animal Husbandry Department
VTB	Village Tract Banks
WPSD	Working People's Settlement Department

## MEASURES

### Length

mm	millimeter (s)
cm	centimeter (s)
m	meter (s)
km	kilometer (s)
inch	25.4 mm
ft	foot (feet) = 12 inch = 30.48 cm
mile	5,280 feet = 1.609 km

### Area

sq.cm	square centimeter (s)
sq.m	square meter (s)
sq.km	square kilometer (s) = 100 ha
ac	acre (s) = 4,047 sq.m
sq.mile	square mile = 2.59 sq.km = 640 ac
ha	hectare

### Capacity

ℓ	litter
cu.m	cubic meter
MCM	Million Cubic Meter
cu.ft	cubic foot (feet) = 28.32 ℓ
cu.yd	cubic yard = 0.765 cu.m
AF	Acre Foot (feet) = 1,233.48 cu.m
Qt	Quart = 1/4 gl = 1.136 ℓ (UK) = 0.946 ℓ (US)
gl	gallon = 4.543 ℓ (UK) = 3.785 ℓ (US)

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Note: UK: British Measure  
US: US Measure

### Weight

g	gram (s)
kg	kilogram (s)
ton	metric ton
oz	ounce = 28.4 g
lb	Pound = 16 oz = 0.454 kg

### Others

cm/sec	centimeter per second
m/sec	meter per second
km/sec	kilometer per second
mile /hr	mile per hour = 1.609 km/hr = 0.447 m/sec
ft/second	feet per second
cu.m/sec	cubic meter per second
cfs/cu.sec	cubic foot (feet) per second = 0.0283 cu.m/sec
gl/sec	gallon per second = 4.543 l/sec = 0.0757 l/min

### Glossaries

lakh	100,000
crore	10,000,000
viss	1.633 kg
Pyi	2,127 kg
basket	20.9 kg (paddy)
basket	34.0 kg (rice)
bag	75.6 kg (rice)
Chaung	River or Stream
Kyat	Unit of Local Currency (about 30 Japanese Yen)
In	Lake or Swamp area
Yoma	Mountain range
1 US\$	6.44 kyats

## SUMMARY

The Project Area covers about 2.91 million ha (about 7.14 million ac). The cultivated land in the Project Area is about 1.18 million ha (about 2.91 million ac), which is equivalent to about 40 percent of the Project Area. The paddy fields occupy about 85 percent of the cultivated land (about 1.00 million ha or about 2.47 million ac), and the Kaing-land, the garden land and other lands occupy the remaining of 15 percent (about 0.18 million ha or about 0.44 million ac).

The acreage of cultivable waste lands in the Project Area (about 0.15 million ha or about 0.60 million ac) is equivalent to about 20 percent against the cultivated land. Most of the cultivable waste lands are sporadically located in the Project Area.

The cropping ratio to net area sown is 109 percent, which is smaller than the national average of 117 percent.

The average production of paddy for past eight years amounted to about 1.82 million ton (about 87.1 million baskets) and the average yield of paddy to planted acreage was about 2.0 ton per ha (about 40 baskets per ac). Above production of paddy occupied more than 20 percent of the total production of paddy in Burma. However, this ratio is slightly decreasing year by year because of delay in agricultural investment to the Project Area.

Major upland crops such as pulses, groundnuts, jute and sesame were planted in the area of about 180 thousand ha (about 440 thousand ha). These crops except jute are grown in the Kaing-lands from the end of the rainy season or in the paddy fields after harvesting of the rainy season paddy.

Most of the cultivated land were suffering from frequent water shortage. The frequent water shortage has resulted in poor harvest

or sometimes no harvest and prevented the stable production according to the varying cropping calendars from year to year. These factors are one of the cause to compel the country to carry out the extensive farming.

The Project Area has population of about 3.34 million and households of about 670 thousands in number. The number of total farm households having their operating lands amounts to about 590 thousands, which is equivalent to about 87 percent of total number of household in the Project Area. Hence, the net area sown per family was estimated at 1.85 ha (4.6 ac), which is less than the national average of 2.19 ha (5.4 ac) per farm family. The farm households occupying less than five ac of their operating lands occupy 64 percent of total number of farm households.

The investment to infrastructures of the agricultural sector will enable to increase the cultivated area by 120 thousand hectares (about 300 thousand acres) as well as to expand the net sown area by about 400 thousand hectares (about 1.1 million acres). (Refer to the respective Annexes concerned.)

The above investment will allow the major crop productions to be increased as shown in the following table.

#### INCREASE OF CROP PRODUCTION

(Unit: thousand ton)

<u>Crop</u>	<u>Present</u>	<u>With Project</u>		<u>Total</u>	<u>Increment</u>
		<u>With Irrigation</u>	<u>Without Irrigation</u>		
Paddy	1,872	2,197	1,743	3,940	2,068
Jute	16	19	35	54	38
Groundnut	46	141	50	191	145
Sesame	4	63	5	68	64
Pulses	44	125	38	163	119



Realizing such increase in crop productions will require not only to provide the irrigation facilities but to upgrade and strengthen the applied research activities, production of quality seeds, extension services, etc. In order to accomplish the target, it will be necessary to provide two new Central Farms, to improve the facilities of the existing seed farms and to increase the AC village managers 3.5 times as many as staffing at present. For further farm mechanization, the power tillers should be introduced as well as the tractors should be increased in number, and efficient operation of these machineries should be carried out for the ultimate purposes.

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## I. AGRICULTURAL BACKGROUND AT NATIONAL LEVEL

### I.1. Land Utilization

#### 1) Progress in Cropping Area

The total cultivated areas in Burma, including the fallow lands, were estimated at 25.0 million acres in 1977/78, and the ratio of the cultivated lands to the total national lands is 14.9 percent. The cropping intensity for the total net area sown in 20.0 million acres, out of 25.0 million acres of total cultivated areas, was computed by 118 percent. The fallow areas occupy about 20 percent of the total cultivable lands. Besides the existing cultivated lands, there are 21.2 million acres of cultivable waste lands, which is equivalent to 85 percent of 25.0 million acres of cultivated areas. (Refer to Table C-1-1.)

According to the data for 1975/76, the net area sown were specifically broken down into the following; paddy fields were recorded at 13.0 million acres occupying about 65 percent of the total, the Ya-lands 22.0 percent, Kain lands 4.0 percent, garden lands 5.0 percent and others 4.0 percent, respectively. (Refer to Table C-1-2.)

No increase in the cultivated areas during 14 years (1964/65 through 1977/78) was recorded; contrarily, decrease by one percent was observed. During the same period of 14 years, there had been little change recorded on the acreage of the cultivable waste lands. Furthermore, the acreage of the fallow lands has almost remained unchanged occupying about 20 percent of the total cultivated areas, and the net sown area, thus, has shown little change in its acreage during the period.

TABLE C-1-1 LAND UTILIZATION

Year	Cultivated Area		Cultivable Waste Land	Reserved Forest	Others	Total
	Net Area Sown <sup>1</sup> / Fallow Area	Total				
1936/37 - 1940/41 Ave.	17,469	3,838	19,126	19,964	65,825	104,915
1964/65	19,574	5,672	14,002	22,219	105,716	167,186
1965/66	19,462	5,718	13,703	22,170	106,133	167,186
1966/67	19,206	5,931	11,955	22,219	107,875	167,186
1967/68	18,933	6,285	21,565	22,219	98,184	167,186
1968/69	19,107	5,447	22,096	22,219	98,317	167,186
1969/70	19,036	5,570	22,067	22,273	98,240	167,186
1970/71	19,334	5,274	21,311	23,181	98,086	167,186
1971/72	19,647	5,108	21,254	23,476	97,674	167,186
1972/73	19,482	5,305	21,272	23,476	97,651	167,186
1973/74	19,927	4,947	21,206	23,476	97,630	167,186
1974/75	20,023	4,914	21,169	23,476	97,568	167,186
1975/76	20,088	4,881	21,119	23,477	97,621	167,186
1976/77	19,838	5,141	21,143	23,477	97,587	167,186
1977/78	20,013	4,977	21,165	23,477	97,554	167,186

Note: <sup>1</sup>/ Including the acrea cultivated within the reserved forest and demarcated grazing grounds.

Source: 1964/65 - 1971/72: Agricultural Statistic, 1973/74 - 1975/76

Other years: Report to the Pyithu Hluttaw, 1976-77 and 1978-79

(Data in 1976/77 and 1977/78 are provisional actual and provisional respectively.)

TABLE C-1-2 CULTIVATED AREA BY LAND CATEGORY AND CULTURABLE WASTE LAND  
(1975/76)

(Unit: 1,000 acre)

Division/State	Cultivated Area										Culturable Waste Land	
	Total	Paddy	Ya	Kaing	Garden	Dani	Shifting	Total	Fallow	Waste Land		
Pegu Division	2,995	2,420	47	87	94	0	13	2,661	334	598		
Irrawaddy Division	4,381	3,399	16	178	206	25	1	3,825	556	589		
Rangoon Division	1,555	1,309	-	3	95	8	-	1,415	140	193		
Sub-total	8,931	7,128	63	268	489	33	14	7,901	1,030	1,380		
		(90.2)	(0.8)	(0.4)	(6.2)	(0.4)	(0.2)	(100.0)				
Other Divisions	20,917	5,856	4,364	582	587	48	656	12,187	3,850	19,739		
		(48.1)	(35.8)	(4.8)	(4.8)	(0.4)	(5.4)	(100.0)				
Total Union	29,848	12,984	4,427	850	1,076	81	670	20,088	4,880	21,119		
		(64.6)	(22.0)	(4.2)	(5.3)	(0.4)	(3.3)	(100.0)				

Note: The figures in the parenthesis show shares to total net sown area.

Source: AC, Land Use Division

TABLE C-1-3 PROGRESS IN LAND CULTIVATION

Year	Sown Area	Net Area	Area Sown	% of Multiple	(Unit: 1,000 acre)	
	under Various Crops (1)	Sown (2)	more than Once (3)	Cropping Area (1)÷(2)×100 (4)	Matured Acreage (5)	% of Matured Area (5)÷(1)×100 (6)
1940-41	18,814	17,650	1,254	107	17,673	92.3
1947-48	14,972	14,008	964	107	13,823	92.3
1961-62	19,013	17,698	1,315	107	15,949	83.9
1964-65	21,649	19,623	2,026	110	19,309	89.2
1968-69	21,739	19,261	2,478	113	19,837	91.3
1969-70	21,761	19,219	2,542	113	19,777	90.9
1970-71	22,338	19,512	2,826	114	20,753	92.9
1971-72	22,701	19,674	3,027	115	20,721	91.3
1972-73	22,502	19,482	3,020	116	19,615	87.2
1973-74	23,276	19,927	3,349	117	21,132	90.8
1974-75	23,474	20,023	3,451	117	20,921	89.1
1975-76 (Provisional)	23,331	20,088	3,243	116	21,222	91.0
1976-77 (actual)	23,163	19,838	3,325	117	20,728	89.5
1977-78 (Provisional)	23,645	20,013	3,632	118	21,378	90.4

Note: Net area sown includes area cultivated within the reserved forest and demarcated grazing grounds.

Source: Report to the Pyithu Hluttaw, 1978-79

2) Multiple Cropping Area

The multiple cropping acreage, however, has been increased by 79 percent for above period to permit the total acreage sown under various crops to be increased by about nine percent during 14 years (1964/65 to 1977/78). (Refer to Table C-1-3). The increase in multiple cropping acreage, which is one of the mainstay of the government policy, has resulted largely from promotion of irrigated agriculture as well as farm mechanization.

The following Table C-1-4 shows the present land utilization in terms of cropping pattern with net areas sown based on the multiple cropping acreages in 1976/77.

TABLE C-1-4 CROPPING PATTERN IN 1976/77

<u>Cropping Pattern</u>	<u>Net Area Sown</u> (1,000 ac)	<u>% of Total Net Area Sown</u> (%)
1. Single Cropping		
(a) Paddy	12,547	54.1
(b) Other Crops	7,291	31.5
<u>Sub-total</u>	<u>19,838</u>	<u>85.6</u>
2. Multiple Cropping		
(a) Pre-monsoon Upland Crops & Paddy	372	1.6
(b) Paddy & Paddy	60	0.3
(c) Paddy & Other Crops	769	3.3
(d) Other Crops & Other Crops	1,265	5.5
(e) Mixed Cropping	859	3.7
<u>Sub-total</u>	<u>3,325</u>	<u>14.4</u>
<u>Total</u>	<u>23,163</u>	<u>100.0</u>

Source: See Table C-1-3, C-1-5, and C-1-26

TABLE C-1-5 MULTIPLE CROPPING AND ITS ESTIMATED AREA (1976/77)

<u>Cropping Pattern</u>	<u>Cultivated (acre)</u>	<u>Percent of Total Multiple Cropping (acre)</u>
1. <u>Multiple Cropping before paddy</u>	<u>372,358</u>	<u>11.19</u>
Premonsoon Cotton (Long Staple)	101,562	3.05
Premonsoon Jute	84,227	2.53
Early Sesamum	136,395	1.10
Pre-monsoon Rice	50,154	1.51
2. <u>Multiple Cropping after Paddy</u>	<u>828,914</u>	<u>24.93</u>
Groundnut after Paddy	262,580	7.89
Paddy after Paddy	60,051	2.08
Pulses after Paddy	357,107	10.74
Others	140,176	4.22
3. <u>Multiple Cropping on "ya" Land</u>	<u>1,264,507</u>	<u>38.04</u>
Pulses after early Sesamum	911,207	27.41
Wheat after early Sesamum	144,332	4.34
Late Sesamum after Miaze	59,124	1.78
Long Staple Cotton after early Sesamum	22,954	0.69
Long Staple Cotton after Onion	7,303	0.22
Others	164,158	3.60
4. <u>Mixed Cropping</u>	<u>859,241</u>	<u>25.84</u>
Early Sesamum and Pigeon Pea	86,214	2.59
Groundnut and Pigeon Pea	65,947	1.98
Groundnut and Maize	262,501	7.89
Pigeon Pea and Wagale Cotton	31,848	0.95
Early Sesamum and Wagyi Cotton	70,773	2.13
Groundnut and Wagyi Cotton	34,099	1.03
Others	307,859	9.26
<u>Total Multiple Cropping Area</u>	<u>3,325,000</u>	<u>100.00</u>

Source: AC



The single cropping has been carried out in the areas of 19,838 thousand acres, about 86 percent of the total net area sown, while the multiple cropping has been carried out in the remaining areas of 3,325 thousand acres, about 14 percent.

In the multiple cropping paddy fields, 1,201 thousand acres which are equivalent to about nine percent of the total paddy fields, the fields sown with double cropping of paddy occupy only less than five percent of the total, then most of the multiple cropping paddy fields are cultivated with paddy as first crop and other diversified crops as second crops such as pulses, groundnut, sesame and jute. (Refer to Table C-1-5). In the multiple cropping fields other than paddy fields, which occupy about 64 percent of the total multiple cropping areas, "sesame + pulses" and "sesame + wheat" have been adopted as major patterns.

At present, the acreage in paddy double cropping is considerably small, and the upland crops are sown as second crops in the dry season after rainy season paddy harvesting. One of the reasons why so is considered that almost of all existing irrigation facilities are provided only for supplying supplemental irrigation water to paddy during the rainy season, not functioning for fully supplying the water in the dry season paddy cropping. In other words, most of the multiple cropping has been carried out in the manner that the upland crops are cultivated in the use of water retained in the soils of the paddy fields without systematic irrigation, after rainy season paddy is harvested.

TABLE C-1-6 COMPARISON ON DEVELOPMENT COST PER INCREASED PADDY PRODUCTION

Land Conditions	Un-Cultivated		Extensively Irrigated		Intensively Irrigated		Development Cost (1) (US\$/ha)	Increased Production (2) (ton/ha)	Cost of Increased Production (3)=(1)÷(2) (US\$/ton)	Priority
	-	-	-	-	-	-				
1. Irrigation Canal Intensity (m/ha)	-	-	-	-	-	-				
2. Paddy Yield, Wet Season (ton/ha)	-	1.0	3.0	3.5	3.0	3.5	3,000	6.0	500	4
Dry Season	-	-	* 1.0	** 2.5	4.0	6.0	1,500	5.0	300	2
Total	-	1.0	4.0	6.0	4.0	6.0	400	2.0	200	1
3. Range of Development	(1)	----->					3,000	6.0	500	4
	(2)	----->					1,500	5.0	300	2
	(3)	----->					400	2.0	200	1
	(4)	----->					2,600	4.0	650	5
	(5)	----->					1,100	3.0	367	3
	(6)	----->					1,500	1.0	1,500	6

Note: \* The yield is based on the assumption in one third.

\*\* The yield is based on the assumption that dry season cropping can be done in two third.

Source: ADB, Analyzed from ADB financed projects in 1968 to 1972.

In taking up the land reclamation and the improvement or new provision of the irrigation facilities for agricultural production increase, the comparative study on the above two cases based on the data prepared by the Asian Development Bank has revealed that the yield increase by improvement or new provision of the irrigation facilities would more effectively increase the production with less investment than the land reclamation would do. (Refer to Table C-1-6). The Burmese authorities concerned have given priority to production increase by yield increase and by cropping intensity increase as major agricultural policies; the stress is placed on the yield increase and cropping intensity increase for the existing cultivated lands rather than on the land reclamation of the cultivable waste lands for expanding acreage of cultivated lands.

### 3) Agricultural Regions

The lands of Burma are classified into 15 regions in terms of agricultural development potentiality, which are illustrated in Figure C-1-1.

According to the classification, most of the Project Area which belongs to the area of "Upper Irrawaddy Delta and Prome Paradelata", together with the area of "Lower Irrawaddy Delta Area" located at the immediate downstream of the Project Area, composes the whole Irrawaddy Delta Area.

The Irrawaddy Delta Area, connected with the Lower Sittang Pegu Plain in the lower basin of the Sittang River, has about three million hectare of the cultivated lands, mostly classified into three administrative divisions of Pegu, Irrawaddy and Rangoon.

These three divisions, as shown in Table C-1-7, involve about seven million acre paddy fields (2.8 million hectares), forming the so-called rice bowl of Burme. The paddy fields in this area occupy 54 percent of the total paddy field acreage of the nation, producing about 60 percent of the national paddy production.

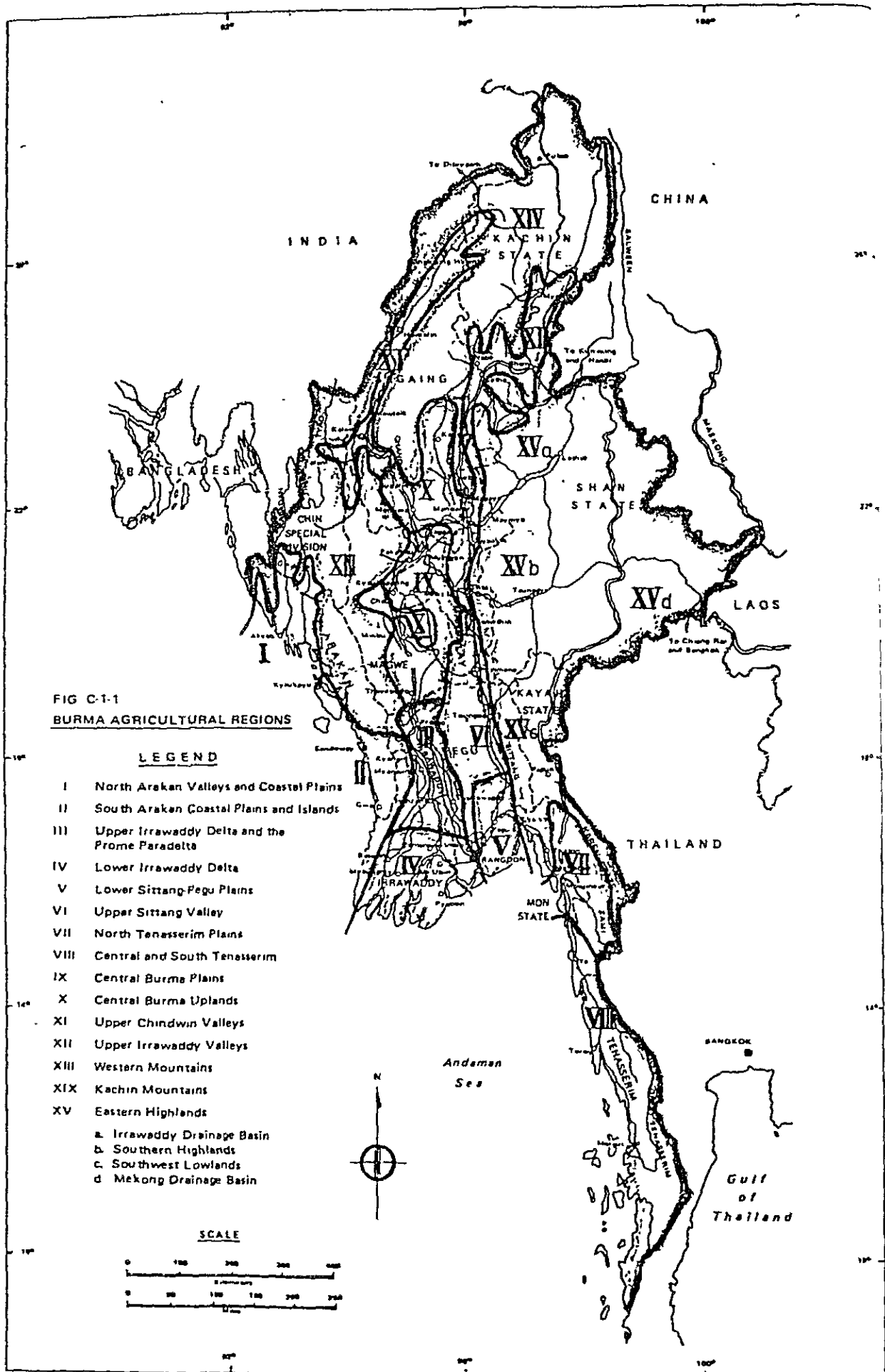


TABLE C-1-7 AREA UNDER PADDY CULTIVATION

<u>Regions</u>	<u>1936/41 Average</u>	<u>1964/65</u>	<u>Area</u>	(Unit: 1,000 acre)	
				<u>1974/75</u>	
				<u>% of Total Union</u>	<u>Change from 1936-41 to 1974/75 (%)</u>
1. Lower Burma					
(1) Pegu Division	2,465	2,356	2,301		
(2) Irrawaddy Division	3,634	3,391	3,318		
(3) Rangoon Division	1,386	1,317	1,296		
(Sub-total)	(7,485)	(7,064)	(6,915)	(54.0)	(92.4)
(4) Arakan Division	986	890	828		
(5) Tenassirim Division	205	212	216		
(6) Karen State	24	480	465		
(7) Mon State	1,201	701	667		
Total	9,901	9,347	9,091	71.1	91.8
2. Upper Burma					
(1) Sagaing Division	1,121	1,050	1,306		
(2) Mandalay Division	739	644	761		
(3) Magwe Division	479	415	467		
(4) Kachin Division	147	288	289		
Total	2,486	2,397	2,823	22.1	113.6
3. Hill Region					
(1) Shan State	-	779	750		
(2) Kayah State	-	29	56		
(3) Chin State	11	71	75		
Total	11	879	881	6.8	8,009.1
4. Total Union	<u>12,389</u>	<u>12,623</u>	<u>12,795</u>	<u>100.0</u>	<u>103.3</u>

Source: Agricultural Statistics, 1973/74 - 1975/76

#### 4) Government's Land Utilization Policy

Approximately 70 percent of the total paddy fields in the country (about 9.0 million acres) concentratively extend in the Lower Burma including the above three divisions, Arakan Division, Tenasserim Division, Karen State and Mon State. (Refer to Table C-1-7). In the Lower Burma, the Pegu Division, the Irrawaddy Division, the Rangoon Division, the Arakan Division and the Mon State are the five largest rice producing areas. The Government of Burma has been concentrating its effort to rice production increase in the above largest rice producers of the country according to land utilization programme on the basis of long-term development plan so that sufficient rice supply can be secured for export as well as domestic consumption, while promoting diversified crop production increase in the areas other than the above five areas by reduction of paddy fields in acreage to be converted into the fields to be cropped with various upland crops.

This agricultural policy aims at the total farm production increase by applying the most reasonable land utilization throughout the country that the paddy cropping shall be concentrated to the five largest rice producing areas in considering the suitable conditions such as climate, etc. to paddy growing. This government policy is proved by the fact that introduction of the high yield varieties of paddy (HYV) has been promoted in the above five areas for yield increase on the basis of the long-term development plan, and about 60 percent of the paddy sown acreage of the areas is aimed to be cropped with HYV.

#### I.2. Irrigated Agriculture

##### 1) Progress in Irrigated Area

The existing irrigated fields were estimated at 2,384 thousand acres in 1977/78, which occupy 11.9 percent of the total net area sown, and the irrigated areas had been increased by about 23 percent in acreage for these 14 years 1964/65 through 1977/78. (Refer to

TABLE C-1-8 PROGRESS IN IRRIGATED AREA

(Unit: 1,000 acre)

<u>Year</u>	<u>Irrigated Area</u>	<u>Net area Sown</u>	<u>Percentage</u>
1. 1940-41	1,562	17,560	8.89
2. 1947-48	1,327	14,008	9.47
3. 1961-62	1,324	17,698	7.48
4. 1964-65	1,941	19,623	9.89
5. 1968-69	2,017	19,261	10.47
6. 1969-70	2,020	19,219	10.51
7. 1970-71	2,073	19,512	10.62
8. 1971-72	2,199	19,674	11.18
9. 1972-73	2,198	19,482	11.28
10. 1973-74	2,400	19,927	12.04
11. 1974-75	2,412	20,023	12.05
12. 1975-76	2,432	20,088	12.11
13. 1976-77 (Provisional actual)	2,318	19,838	11.68
14. 1977-78 (Provisional)	2,384	20,013	11.91

Note: Net area sown includes area cultivated within the reserved forest and demarcated grazing grounds.

Source: Report to the Pyithu Hluttaw, 1978-79.

TABLE C-1-9 IRRIGATED AREA BY VARIOUS MEANS OF IRRIGATION

Particulars	1973-74	1974-75	1975-76	(Unit: acre)		% of Total
				1976-77 (Provisional Actual)	1977-78 (Provisional)	
1. Canals	1,543,391	1,555,367	1,563,101	1,561,169	1,580,941	66.3
2. Tanks	249,323	240,571	261,427	300,930	200,490	8.4
3. Wells	29,042	30,413	30,602	32,890	33,855	1.4
4. Pumps	285,067	267,085	254,882	209,996	257,703	10.8
5. Windmills	1,170	1,384	1,658	653	991	0.0
6. Others	301,765	316,908	320,174	312,627	309,789	13.1
<u>Total</u>	<u>2,399,758</u>	<u>2,411,728</u>	<u>2,431,844</u>	<u>2,318,265</u>	<u>2,383,769</u>	<u>100.0</u>

Source: Report to the Pyithu Hluttaw, 1978-79



Table C-1-8). The annual increasing acreage during the period, however, remains only at 34 thousand acres (about 13 thousand ha), and 88 percent of the total net area sown in 1977/78 is still in non-irrigated conditions.

There are various irrigation methods adopted now in the country, such as by canals, pumps, wells, tanks, windmills, etc., and the canal irrigation covers 66.3 percent of the total irrigated area and the pump irrigation covers 10.8 percent at present. (Refer to Table C-1-9).

## 2) Multiple Cropping under Irrigation

The existing irrigated area available for multiple cropping is about 336 thousand acres which are equivalent to 14.1 percent of the total irrigated acreage.

The acreages which were used for multiple cropping in 1977/78 were estimated at 3,632 thousand acres in national total. (Refer to Table C-1-3). These figures show the fact that the irrigated acreages available for multiple cropping occupy only nine percent and most of the multiple cropping has been currently carried out under non-irrigated condition. This has resulted from insufficiency in provision of irrigation facilities. Most of multiple cropping seems to be carried out on the unstable basis that the second crops are grown depending upon the water retained in the soils after the rainy season paddy is harvested. For the recent five years, the increases in multiple cropping acreage and irrigated field acreage are 122 thousand acres (50 thousand ha) and 37 thousand acres (15 thousand ha) on the yearly average basis, respectively. Hence, more than two-thirds of the expanded multiple cropping areas would be under non-irrigated condition. Under the circumstances, it is self-explanatory that the promotion of irrigation projects to provide the facilities for supplying water for the dry season cropping is essentially required for successful multiple cropping in the area. (Refer to Table C-1-10 and Table C-1-11).

TABLE C-1-10 PROGRESS IN THE MULTIPLE CROPPING AREA  
UNDER IRRIGATION

(Unit: acre)

<u>Year</u>	<u>Irrigated Area (1)</u>	<u>Multiple Cropping Area (2)</u>	<u>Percentage (2)÷(1)×100</u>
1961-62	1,324,263	82,634	6.24
1964-65	1,941,236	160,055	8.25
1968-69	2,016,714	251,029	12.45
1969-70	2,020,155	270,359	13.38
1970-71	2,073,169	264,502	12.76
1971-72	2,199,079	299,853	13.64
1972-73	2,197,815	303,889	13.83
1973-74	2,399,758	313,475	13.06
1974-75	2,411,728	357,668	14.83
1975-76	2,431,844	353,963	14.56
1976-77 (Provisional Actual)	2,318,265	333,161	14.37
1977-78 (Provisional)	2,383,769	336,180	14.10

Source: Report to the Pyithu Hluttaw, 1978-79

TABLE C-1-11 IRRIGATION AREA BY CROPS

Crops	Cropping Area under Irrigation (acre)				Percentage of Cropping Area under Irrigation to Total Sown Area				
	1973-74	1974-75	1975-76	1976-77	1973-74	1974-75	1975-76	1976-77	1977-78
Paddy	2,041,248 (75.2)	2,154,693 (77.8)	2,163,340 (77.8)	2,054,584 (77.5)	2,070,708 (76.1)	16.3	16.8	16.4	16.3
Wheat	1,068 (0.0)	3,402 (0.1)	3,379 (0.1)	1,602 (0.0)	1,114 (0.0)	0.1	1.9	0.7	0.5
Maize	2,710 (0.1)	2,869 (0.1)	2,970 (0.1)	4,049 (0.2)	5,361 (0.2)	1.1	1.3	2.0	2.6
Other cereals	4,829 (0.2)	35 (0.0)	63 (0.0)	80 (0.0)	169 (0.0)	N.A	N.A	N.A	N.A
Pulses	69,127 (2.5)	70,240 (2.5)	78,590 (2.8)	81,793 (3.1)	84,233 (3.1)	N.A	N.A	N.A	N.A
Sugar-cane	15,573 (0.6)	15,989 (0.6)	17,506 (0.6)	20,655 (0.8)	18,788 (0.7)	6.6	7.6	8.2	6.8
Other edible crops	240,918 (8.9)	260,091 (9.4)	259,669 (9.3)	282,287 (10.6)	293,743 (10.8)	N.A	N.A	N.A	N.A
Cotton	116,532 (4.3)	139,044 (5.0)	143,159 (5.1)	110,331 (4.2)	105,576 (3.9)	22.1	25.6	27.4	26.1
Jute	208,101 (7.7)	110,698 (4.0)	106,135 (3.8)	84,245 (3.2)	127,645 (4.7)	71.5	66.2	61.9	72.5
Other non-edible crops	13,127 (0.5)	12,335 (0.4)	10,996 (0.4)	11,800 (0.4)	12,612 (0.4)	N.A	N.A	N.A	N.A
Total	2,713,233 (100.0)	2,769,396 (100.0)	2,785,807 (100.0)	2,651,426 (100.0)	2,719,949 (100.0)				

Note: The figures in the parenthesis show percentage of total irrigation area.

\* (Provisional actual) \*\* (Provisional)

Source: Report to the Pyithu Huttaw, 1978-79

These quantities of seeds distributed in 1974/75 could be converted into the approximate acreage sown for the respective crops; 620 thousand acres for paddy, 307 thousand acres for cotton and 64 thousand acres for jute.

As for seeds supply of cotton and jute, comparison of the above estimated sown acreage with the actual sown acreage in 1974/75 suggested that the quality seeds of the above two crops had been sufficiently supplied because the total acreages sown with the respective crops, cotton and jute in 1974/75 were smaller than the estimated acreages by conversion from seed quantities.

On the other hand, about 620 thousand acres, which are the paddy-sown acreage converted from the distributed seed quantity, were equivalent to only five percent of the actual total acreages sown with paddy in that year. However, on assumption that the seed renewal is made at every three years, the estimated acreage sown with paddy from the amount of distributed seeds is about 1,806 thousand acres in 1977/78. The actual total sown acreage with HYV in the same period was about 1,979 thousand acres. The above estimation, therefore, suggests that the quality seed supply for HYV might be sufficiently made in 1974/75.

Since 1975/76, however, the quantity of HYV seed distribution had been declining to reach about 193 thousand baskets in 1977/78, accounting for about 20 percent of that in 1974/75. Contrarily, the actual sown acreage with HYV in 1977/78 was recorded at 1,980 thousand acreages, which are in almost the same extent of that in 1974/75. This fact shows that the quality seed supply for paddy is insufficient and unstable.

In other respect, as the seed quality inspection system has not been established, even those seeds that are distributed by the Government are not always guaranteed in quality.

TABLE C-1-12 DISTRIBUTION OF QUALITY SEEDS OF PRINCIPAL CROPS

Particulars	Unit	1973-74	1974-75	1975-76	1976-77	1977-78
Paddy	Basket	-	930,670	543,940	190,820	192,971
Wheat	"	45,000	11,177	16,676	530	561
Maize seeds	"	4,422	11,723	3,604	467	4,790
Groundnut	"	43,357	20,081	3,073	4,812	396
Sesamum	"	-	150	60	-	-
Cotton	Viss	-	4,650,170	4,966,740	1,863,937	2,497,987
Jute	Basket	-	7,879	4,260	1,090	5,920
Palm oil	Seedling	-	-	-	30,000	21,000

Note: \* (Provisional actual) \*\* (Provisional)

Source: Report to the Pyithu Hluttaw, 1978-79.

In 1977/78, the paddy fields occupy 76.1 percent of the total irrigated acreage, followed by those upland fields for jute, cotton, pulses and sugar cane. (Refer to Table C-1-11). The Government has given priority to irrigated farming for jute, cotton and sugar cane. The irrigation ratio for paddy, jute, cotton and sugar cane croppings in 1977/78 were 16.3 percent, 72.5 percent, 26.1 percent and 6.8 percent, respectively, and almost all of the other crops have been rain-fed. Little increase in irrigated acreage has been marked since 1973/74 for the areas sown with the above-quoted major crops grown, and the irrigated agricultural development in these fields will be urgently required.

### I.3. Farm Input Use

#### 1) Seeds

Multiplication, production and distribution of the quality seeds have been controlled by the Applied Research Division, Agricultural Corporation (AC).

The Yezin Agricultural Institute (Pyinmana Township, Mandalay Division) as nucleus organization for breeding, 16 Central Farms and 56 Seed Farms have been conducting breeding, seed selection, productivity test of new varieties, multiplication of foundation seeds, etc. The staffs of the local offices of the Extension Division, AC, have been responsible for the production of quality seeds by entrusted farmers and sales of quality seeds to the general farmers. The Government, however, has sold the quality seeds only in the limited kinds of crops such as paddy, cotton and jute, and these seeds to be sold have the limit in quantity as well. Among various quality seeds to be distributed, the seeds of the above three crops have a relatively large quantity for distribution.

The respective quantities distributed in 1974/75 were about 930 thousand baskets for paddy, 4,600 thousand viss for cotton and 8 thousand baskets for jute. (Refer to Table C-1-12).

In the Lower Burma, many farmers grow the groundnuts as the second crop, but they are supplied with necessary seed nuts from the upper Burma because they have not provided with the storage facilities of the seeds during the rainy season. Such a long-distance supply from the Upper Burma has raised the seed cost considerably high.

Under the situation, the farmers, in general, have produced the seeds individually or supplied each other for their cropping. Such manners of seeds supply has resulted in degrading their quality to the great extent, being one of the causes for lowering the yields of major crops. Besides the above, delay in improvement of crop varieties has compelled the farmers to grow the local varieties with low yield.

The FAO/UNDP assisting Seed Development Project has been launched to improve the seed production system in the country. The Project aims to provide seed production farms, seed selection facilities, storage facilities, seed testing instruments and necessary buildings in the Central Farms and the Seed Farms together with training of the staff concerned.

## 2) Fertilizers

The chemical fertilizers currently applied in Burma are urea, super phosphate, potash-muriates, the dosing amounts of which have been increasing year by year as shown in Table C-1-13. The total amount dosed in 1977/78 reached five times as much as that dosed in 1961/62.

The respective amounts dosed in 1977/78 are 108 thousand tons of urea, 23 thousand tons of super phosphate and two thousand tons of potash-muriates, totalling 133 thousand tons.

The urea has been self-sufficient by annual domestic production of 130 thousand tons from two factories with capacity of 200 tons

TABLE C-1-13 DOMESTIC PURCHASE, IMPORTS AND UTILIZATION  
OF CHEMICAL FERTILIZERS

(Unit: Tons)

No.	Years	Local Purchase and Imports			Domestic Use	Trend 1961-62 =100
		Domestic Purchase	Imports	Total		
1.	1961-62	1,550	25,545	27,095	26,265	100
2.	1962-63	-	36,170	36,170	19,994	76
3.	1963-64	-	31,947	31,947	28,914	110
4.	1964-65	2,178	41,391	43,569	29,064	111
5.	1965-66	2,500	24,005	26,505	30,949	117
6.	1966-67	2,155	22,250	24,405	25,599	97
7.	1967-68	3,000	229,522	232,522	70,042	267
8.	1968-69	2,000	32,800	34,800	41,498	158
9.	1969-70	680	11,651	12,331	60,242	230
10.	1970-71	34,660	5,800	40,460	38,446	146
11.	1971-72	71,001	30,000	101,001	99,227	378
12.	1972-73	57,631	15,000	72,631	115,160	438
13.	1973-74 (6 months)	37,915	15,101	53,016	30,059	114
14.	1974-75	93,590	15,020	108,610	103,673	395
15.	1975-76	102,945	20,000	122,945	120,286	458
16.	1976-77 (Provisional Actual)	131,177	34,500	165,677	116,834	445
17.	1977-78 (Provisional)	120,000	64,700	184,700	127,619	486

Source: Report to the Pyithu Hluttaw, 1978-79.



TABLE C-1-14 PURCHASING & SELLING PRICES OF CHEMICAL FERTILIZERS  
(Agriculture Corporation)

Sr. No.	Particulars	Unit	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	1978/79
<b>A. UREA</b>											
1.	Purchased tons	ton	39,698	69,827	56,088	40,463	34,192	112,945	131,177	115,108	176,870
2.	Purchased Prices and expenses										
	(a) Factory price	Kyats/ton	386.15	386.15	386.15	386.15	386.15	386.15	457.40	457.40	457.40
	(b) Transportation, storage and distribution expenses	Ks/ton	62.70	62.70	62.70	123.74	123.74	138.20	160.68	213.49	275.00
3.	Total expenses	Ks/ton	448.85	448.85	448.85	509.89	509.89	524.35	618.08	670.89	732.40
		Ks/25Kg	11.22	11.22	11.22	12.75	12.75	13.11	15.45	16.77	18.31
4.	Selling Prices	Ks/ton	440.00	440.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00
		Ks/25Kg	11.00	11.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
<b>B. T. SUPER</b>											
1.	Purchased tons	ton	-	30,000	22,500	15,000	-	-	30,000	19,000	46,201
2.	Purchased prices and expenses										
	(a) C.I.F. value	Ks/ton	437.44	437.44	595.55	595.55	1,322.59	1,143.40	1,053.78	1,271.75	1,271.75
	(b) Transportation, storage and distribution expenses	Ks/ton	63.23	63.23	63.23	122.85	122.85	138.20	199.30	213.79	275.00
3.	Total Expenses	Ks/ton	500.67	500.67	658.78	718.40	1,445.44	1,281.60	1,253.08	1,485.54	1,546.75
		Ks/50Kg	25.03	25.03	32.94	35.92	72.27	64.08	62.70	64.25	77.34
4.	Selling prices	Ks/ton	463.00	463.00	463.00	463.00	1,244.00	1,244.00	1,244.00	1,244.00	1,244.00
		Ks/50Kg	23.15	23.15	23.15	23.15	62.20	62.20	62.20	62.20	62.20

(Cont'd)



per day, whereas the super phosphate and all the potash-muriates used in the country are supplied by import. (Table C-1-15).

In 1977/78, about 80 percent of the total urea applied was consumed for paddy, about 17 percent for other major crops such as jute, sugar cane and cotton, and only the remaining three percent of the total was for other minor crops. (Refer to Table C-1-16). The average nitrogen amount applied for paddy cropping in 1977/78 was estimated at 7.6 kg/ha, which was computed by dividing the total amount of the urea used for paddy cropping by the actual total acreage sown with paddy in that period. In assuming that all the urea was used for HYV cropping in that period, the estimated amount of nitrogen applied for HYV was 46 kg/ha. When the same computation was applied for the other major crops, 57 kg/ha was used for jute, 17 kg/ha for cotton, and 8 kg/ha for groundnut. The Government has taken a policy to supply the fertilizers concentratively to those farmers cropping jute, HYV paddy, long-staple cotton and sugar cane, although the above estimated amount applied in 1977/78 was considerably below the government standard of fertilization.

The urea applied acreage ratio to the total paddy-sown acreage in 1974/75 was at 19 percent as shown in Table C-1-16, and the average dosage of urea seems to be as small as 28 kg/ha of nitrogen converted into ingredient. The applied ratio of other fertilizers such as super phosphate and potash-muriates were much smaller than that of the urea. The urea applied acreage ratio to the total sown acreage of 23,473 thousand acres was at only 14 percent, being equivalent to 28 kg/ha in nitrogen (converted into ingredient). Such an extremely small fertilization in the country has seemed to be caused from short supply of fertilizers.

The Third Four-Year Plan has prepared the standard fertilization plan and the related supply plan as shown in Table C-1-17, so as to achieve the target of the agricultural production. The designed dosing urea amount in 1980/81 of the plan is 566 thousand tons which

TABLE C-1-15 PLANNED & ACTUAL USAGE OF UREA FERTILIZER

(Unit: ton)

Sr. No.	Crops	1970/71		1971/72		1972/73		1973/74		1974/75		1975/76		1976/77		1977/78		1978/79	
		Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual	Planned	Actual
1.	Paddy	27,224	16,590	32,681	29,782	48,144	43,965	46,562	47,202	44,900	60,067	66,690	62,468	79,455	73,489	109,163	87,292	147,538	
2.	Wheat	832	6,367	1,555	3,507	572	187	3,983	1,246	3,000	1,730	3,150	1,845	1,656	359	670	237	888	
3.	Maize	451	232	765	6,060	880	739	2,660	1,770	2,600	1,770	2,850	1,916	-	912	334	505	2,110	
4.	Ground Nut	2,422	1,435	4,736	2,618	2,456	2,119	4,944	2,474	4,000	3,448	4,200	4,096	2,187	2,231	3,207	2,056	5,183	
5.	Sesamum	450	355	1,171	-	-	25	-	50	-	729	-	901	-	575	-	543	-	
6.	Sunflower	-	-	-	-	-	-	-	53	50	10	50	89	509	189	271	512	1,029	
7.	LS-Cotton	763	462	3,966	-	-	5,161	971	1,842	900	3,163	960	3,044	1,916	1,683	2,770	2,742	2,956	
8.	Jute	4,210	21.9	6,343	6,679	9,000	11,453	14,563	10,690	12,000	5,300	12,375	5,627	13,640	6,970	6,317	9,030	1,801	
9.	Sugarcane	8,244	1,149	6,408	5,880	-	1,489	6,660	5,738	7,000	2,666	7,175	4,019	5,573	4,285	4,063	4,262	4,721	
10.	Rubber	-	65	-	-	-	185	-	925	-	207	-	248	1,712	253	1,194	91	643	
11.	Mulberry	-	106	-	100	-	4	73	10	50	8	50	8	60	15	181	-	271	
12.	Pulses	1,520	385	1,270	1,963	932	745	2,130	1,782	1,350	1,008	1,350	1,430	1,732	528	436	230	843	
13.	Chillies	195	284	252	214	146	42	130	205	100	494	100	187	-	60	-	45	-	
14.	Onion	1,224	300	1,264	300	305	512	200	1,200	150	616	150	503	-	42	-	290	-	
15.	Garlic	-	288	500	100	-	200	54	32	50	92	50	130	-	-	-	39	-	
16.	Virginia T.	250	239	50	-	-	-	-	-	-	-	-	-	232	-	494	-	515	
17.	Fruit Trees	450	347	1,040	141	-	513	85	206	150	76	150	83	120	78	-	-	-	
18.	Vegetables	1,420	1,230	-	469	-	1,359	-	1,866	200	659	200	872	-	486	-	-	-	
19.	Chroot Leave	-	-	-	792	535	-	473	173	200	67	200	71	-	-	-	-	-	
20.	Tea	-	-	-	-	-	-	-	-	-	5	-	83	-	-	-	-	-	
21.	Potatoes	253	236	708	527	396	230	382	508	300	268	300	305	765	428	764	634	808	
22.	Others	1,210	365	1,920	-	-	191	-	692	-	779	-	892	43	746	-	-	-	
23.	Oil Palon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	136	-	664	
Total		51,118	26,554	64,569	59,162	63,366	69,119	83,870	78,115	80,000	82,269	100,000	88,817	110,000	93,329	130,000	108,408	176,870	

TABLE C-1-16 UTILIZATION OF FERTILIZERS BY CROPS (1974/75)

Crop	Net Sown Area		Urea			Supper Phosphate			Muriate of Potash				
	Area ('000ac)	Area Sown Area (%)	Tonnage Used		Tonnage Used		Tonnage Applied		Tonnage Applied		Toonage Applied		
			Area ('000ton)	Kg/ac	Area ('000ton)	Kg/ac	Area ('000ton)	% of Net Sown Area	Area ('000ton)	% of Net Sown Area			
Paddy	12,793	2,407	18.8	60,167	25	977	7.6	12,209	13	224	1.8	1,399	6
Wheat	227	46	20.3	1,736	38	11	4.8	265	24	2	0.9	11	12
Maize	410	71	17.3	1,770	25	60	14.6	747	12	29	7.1	181	6
Groundnut	1,666	138	8.3	3,447	25	58	3.5	1,462	25	4	0.2	22	6
Sesame	2,609	29	1.1	729	28	21	0.8	262	12	-	-	-	-
Cotton	542	127	23.4	3,163	25	118	21.7	1,470	12	18	3.3	230	13
Jute	167	141	84.4	5,300	16	6	3.6	72	12	2	1.2	13	7
Sugarcane	211	36	17.0	2,666	74	5	2.4	190	38	5	2.4	29	6
Rubber	211	8	3.8	207	26	4	1.9	51	13	3	1.4	20	7
Sunflower	9	0.4	0.4	10	25	0.2	0.2	6	30	-	-	-	-
Pulses	1,785	81	4.5	1,008	12	5	0.3	114	23	5	0.3	29	6
Chillies	156	40	25.6	494	12	5	0.3	58	12	-	-	-	-
Onion & Garlic	61	57	93.4	708	12	11	18.0	133	12	1	1.6	4	4
Potato	27	11	40.7	268	24	7	25.9	187	27	3	11.1	17	6
Others	2,599	121	4.7	1,594	13	-	-	-	-	-	-	-	-
Total	23,473	3,314	14.1	83,267	25	-	-	-	-	-	-	-	-

Source: Agricultural Statistics, 1973/74-1975/76

TABLE C-1-17 FERTILIZER UTILIZATION PLAN DURING THE THIRD FOUR YEAR  
ECONOMIC PLAN (1978-79 to 1981-82)

Sr. No.	Crops	Percentage of Sown Area to be Fertilized				(Unit: %)		
		1978-79	1979-80	1980-81	1981-82	Urea	T.super	Potash Kieserite
1.	Paddy							
	1. High yielding varieties	100	100	100	100	112	56	14
	2. Improved varieties	100	100	100	100	84	28	-
	3. Local improved varieties	65	70	70	80	56	-	-
	4. Others varieties	10	10	10	10	28	-	-
2.	Wheat (HYV)	25	25	25	25	56	28	-
3.	Maize							
	1. HYV	100	100	100	100	112	56	-
	2. Improved varieties	25	25	25	25	56	56	-
4.	Groundnut							
	1. Raining season (HYV)	50	50	50	50	56	56	-
	2. Winter season (after paddy)	20	20	20	20	28	28	-
5.	Oil plam	100	100	100	100	315	200	165
6.	Sunflower	50	50	50	50	56	56	-
7.	Jute	65	65	65	65	84	-	14
8.	Long staple cotton	70	70	70	70	56	28	14
9.	Matpe (High yielding)	50	50	50	50	28	28	-
10.	Butter bean (High yielding)	25	25	25	25	28	28	-
11.	Sultapya ( )	25	25	25	25	28	28	-
12.	Soy bean ( )	25	25	25	25	28	28	-
13.	Gram ( )	25	25	25	25	28	28	-
14.	Rubber ( )	50	50	50	50	56	52	-
15.	Virginia Tobacco	50	50	50	50	112	56	-
16.	Potatoes	100	100	100	100	56	56	-
17.	Mulberry	100	100	100	100	112	56	28
18.	Sugarcane (for factory)							
	1. High yielding	100	100	100	100	244	112	-
	2. Others	60	60	60	60	112	56	-

TABLE C-1-18 TARGETED UTILIZATION PLAN, ACTUAL PURCHASED AMOUNT & SHORTAGES  
OF CHEMICAL FERTILIZERS (1979-80 to 1981-82)

Sr. No.	Crops	Unit	1979-80			1980-81			1981-82		
			Urea	T.super	Potash	Urea	T.super	Potash	Urea	T.super	Potash
<b>1. Basic Plans</b>											
1.	Paddy	ton	172,776	38,378	6,014	197,014	44,430	7,426	225,416	52,467	9,292
2.	Wheat	"	932	466	-	976	488	-	1,021	511	-
3.	Maize	"	2,707	1,407	-	3,359	1,727	-	4,020	2,053	-
4.	Groundnut	"	5,498	5,488	-	5,941	5,929	-	6,281	6,268	-
5.	Sunflower	"	1,259	1,128	-	1,515	1,460	-	1,767	1,726	-
6.	Long Staple Cotton	"	3,055	1,528	764	3,375	1,588	794	3,296	1,648	824
7.	Jute	"	9,127	-	1,115	9,500	-	1,143	9,847	-	1,201
8.	Sugar Cane	"	5,861	2,931	-	7,006	3,503	-	8,142	4,071	-
9.	Rubber	"	659	571	59	675	583	60	692	598	45
10.	Mulberry	"	299	149	74	322	161	80	357	178	89
11.	Pulses	"	985	985	-	1,115	1,115	-	1,250	1,250	-
12.	Virginia Tobacco	"	530	265	-	548	274	-	569	284	-
13.	Potatoes	"	933	933	-	986	986	-	1,044	1,044	-
14.	Palm Oil	"	945	600	495	1,227	779	642	1,508	958	789
	<b>Total</b>	"	<b>205,566</b>	<b>54,829</b>	<b>8,521</b>	<b>233,359</b>	<b>63,023</b>	<b>10,145</b>	<b>265,210</b>	<b>72,996</b>	<b>12,240</b>
<b>2. Special Plans</b>											
1. Whole Township Paddy Production Plan (1979-80 - 1981-82)											
2.	Paddy after Paddy	"	11,154	8,069	2,470	12,269	8,876	2,717	13,496	9,764	2,989
3.	Maize	"	3,177	2,593	-	3,495	2,852	-	3,845	3,137	-
4.	Matpe	"	2,773	4,628	-	3,050	5,091	-	3,355	5,600	-
	<b>Total</b>	"	<b>157,506</b>	<b>92,388</b>	<b>31,464</b>	<b>229,417</b>	<b>132,466</b>	<b>46,208</b>	<b>301,500</b>	<b>172,697</b>	<b>60,977</b>
3.	1 + 2	"	363,072	147,217	39,985	462,776	195,487	56,353	566,710	245,693	73,217
4.	Purchasable Qty.	"	130,000	46,000	4,000	130,000	46,000	4,000	130,000	46,000	4,000
5.	Difference (3-4)	"	233,072	101,217	35,985	332,776	149,489	52,353	436,716	199,693	69,217

TABLE C-1-19 FERTILIZER CONSUMPTION PER SOWN ACREAGE  
IN ASIAN COUNTRIES (1975)

	<u>N</u>	<u>P<sub>2</sub>O<sub>5</sub></u>	<u>K<sub>2</sub>O</u>	<u>Total</u>
Republic of Korea	193.4	97.8	66.7	357.9
North Korea	122.8	58.0	20.9	201.8
Viet Nam	36.6	18.0	6.4	61.0
West Malaysia	21.8	9.2	28.4	59.4
People's Republic of China	35.3	9.7	3.1	48.1
Sri Lanka	19.1	5.4	8.0	32.5
Turkey	16.0	13.2	0.5	29.8
Philippines	16.8	5.0	6.2	28.1
Pakistan	22.7	5.2	0.1	28.0
Indonesia	18.4	6.3	1.3	26.0
Bangladesh	15.9	5.4	1.4	22.6
Iran	11.8	8.6	0.2	20.7
India	12.1	2.7	1.6	16.5
Thailand	4.8	3.8	2.4	10.9
Iraq	4.7	1.3	0.3	6.3
Afganistan	3.3	1.0	-	4.3
Burma	3.4	0.6	0.1	4.1
Japan	114.5	111.9	92.9	319.3
<u>Average</u>	<u>37.4</u>	<u>20.2</u>	<u>13.4</u>	<u>71.0</u>

Source: FAO, Annual Fertilizer Review, 1976



is five times as much as that in 1977/78. (Refer to Table C-1-18). However, the annual urea production amount expected will be 280 thousand tons, which is short in supply 1/2 to the target amount, even if the planned new urea plant can produce 150 thousand tons per annum (about 500 ton on the daily basis), since the production capacity of existing two urea plants is 130 thousand tons per annum. The designed dosing amount of super phosphate and potash-muriate is about 11 times and 35 times of those in 1977/78. The crop-wise fertilization acreage and the dosing amount per unit acreage are shown in Table C-1-17.

It is learned from the table that the HYV paddy will be fertilized by the rate of 100 percent and the amounts to be dozed for the respective ingredients are 56 kg/ha for N, 28 kg/ha for P<sub>2</sub>O<sub>5</sub>, and 9 kg/ha for K<sub>2</sub>O. This fertilization plan aims to concentratively fertilize the HYV paddy and is considered reasonable. Actually, however, a considerable amount of urea would be short in supply to the target, and much more super-phosphate and potash-muriate would have to be imported to meet the designed requirements.

The Table C-1-19 reveals that Burma belongs to the group in the lower level in fertilization as compared with the Asian countries. However, this means that the countries belonging to the low fertilization level group have a possibility to increase the agricultural production by much more fertilization.

### 3) Agricultural Chemicals

The insecticides have been increasingly applied at almost the same rate of the increase in fertilizers application. Actually, however, the amount applied in 1977/78 was as small as 0.3 lbs per acreage in powder and 0.03 gallons per acre in liquid for the paddy or other cereals cropping. The pest control carried out in 1974/75 covered only a few percent of the acreage sown with various crops. (Refer to Table C-1-20, C-1-21 and C-1-22).

TABLE C-1-20 UTILIZATION OF INSECTICIDES

<u>Years</u>	<u>Number of Sprayers</u>	<u>Insecticides</u>	
		<u>Lbs.</u>	<u>Gallons</u>
1. 1962-63	8,966	725,839	20,320
2. 1963-64	13,186	683,222	11,411
3. 1964-65	14,539	691,175	14,484
4. 1965-66	13,438	296,569	14,432
5. 1966-67	12,299	398,212	26,321
6. 1967-68	13,887	469,577	385,319
7. 1968-69	22,812	506,764	40,034
8. 1969-70	27,090	850,608	44,771
9. 1970-71	27,531	544,224	56,026
10. 1971-72	31,876	323,272	89,200
11. 1972-73	35,626	2,162,655	175,801
12. 1973-74 (6 months)	37,061	605,231	22,390
13. 1974-75	38,851	1,773,066	60,584
14. 1975-76	41,101	2,359,372	148,205
15. 1976-77 (Provisional actual)	41,101	1,161,539	100,914
16. 1977-78 (Provisional)	41,101	1,166,460	114,826

Source: Report to the Pyithu Hluttaw

TABLE C-1-21 UTILIZATION OF INSECTICIDES BY CROPS

Crops	1973-74 (6 months)		1974-75		1975-76		1976-77 (Provisional Actual)		1977-78 (Provisional)	
	Lbs.	Gallons	Lbs.	Gallons	Lbs.	Gallons	Lbs.	Gallons	Lbs.	Gallons
1. Paddy, Wheat, Maize	147,966	4,989	688,527	14,482	1,255,380	38,999	270,868	37,518	453,528	35,232
2. Other Cereals	-	-	2,239	4	-	-	-	-	200	10
3. Groundnut	230,988	2,986	507,441	4,648	492,173	1,015	573,477	12,806	259,899	12,765
4. Sesamum	-	-	16,007	1,137	12,360	341	33,360	795	23,986	859
5. Cotton	21,978	11,448	226,872	35,492	311,388	98,270	102,432	41,569	48,354	47,198
6. Jute	-	-	128,307	1,139	2,215	4,771	12,402	749	10,269	997
7. Rubber	2,689	-	1,200	-	-	-	-	-	-	-
8. Pulses	138,017	1,934	19,952	501	-	-	12,398	3,396	9,523	3,763
9. Chillies	102	55	495	7	-	-	50	50	3,302	95
10. Onion/Garlic	-	-	1,354	15	-	-	-	400	100	400
11. Potatoes	9,156	330	47,579	131	37,855	142	2,390	216	-	-
12. Sugar Cane	45,648	110	58,164	1,351	99,183	2,642	73,494	179	92,287	598
13. Garden Crops	-	-	9,443	736	-	-	5,239	350	5,644	442
14. Vegetables	1,317	115	11,193	299	7,329	358	16,534	1,769	12,014	798
15. Thanapet	-	-	33,305	185	-	-	-	-	-	-
16. Sunflower	-	-	-	-	-	-	31,000	566	36,895	612
17. Peboke (Soyabean)	-	-	-	-	-	-	1,195	106	-	-
18. Others	7,370	423	20,988	457	141,489	1,667	26,700	445	210,559	11,057
Total	605,231	22,390	1,773,066	60,584	2,359,372	148,205	1,161,539	100,914	1,166,460	114,826

Source: Report to the Pyithu Hluttaw, 1978-79

TABLE C-1-22 PLANT PROTECTION IN 1974/75

Crop	Sown Area ( '000ac)	Infested Area ( '000ac)	Protected or Controlled Area Area ( '000ac)	% of Sown Area (%)	Insecticides* Lbs ( '000lbs)	Gallon. ( '000gal)
Paddy	12,793	191	190	1.5	} 688	} 14
Wheat	227	40	38	16.7		
Maize	499	7	7	1.4		
Sesame	2,609	12	11	0.4	16	1
Cotton	1,666	101	100	6.0	227	35
Jute	166	3	3	1.8	128	1
Pulsed	1,785	1	1	0.0	20	1
Onion/Garlic	61	1	1	1.6	1	0
Potato	27	2	2	7.4	48	0
Sugarcane	211	16	16	7.6	58	1
Fruit Trees	386	6	6	1.6	9	1
Others					578	7
<u>Total</u>					<u>1,773</u>	<u>61</u>

Source: Agricultural Statistics, 1973/74, 1974/75 and 1975/76

\* Report to the Pyithu Hluttaw, 1978-79

The most popular agricultural chemicals in Burma are insecticides such as Drin-series chemicals, BHC, and DDT which have been banned on their use in many countries in the world due to their residual toxicity.

The sprayers used for pest control are difused at the rate of one sprayer for 100 farmers, totalling about 40 thousand units throughtout the country in 1977/78.

There are no data available for application of herbicides, but the interview survey with farmers in the Master Plan Study Area has revealed that little herbicide has been applied in their farming.

#### I.4. Animal Power and Farm Mechanization

##### 1) Animal Power

The draft animals, mainly cattle and buffalo, totalled 4.4 million heads in 1976/77 in Burma. The farm household was recorded also by 4.4 million in total in the same year. (Refer to Table C-1-23).

In Burma, most of the draft animal works is carried out by a pair of animals; thereby, one farm household out of two usually keeps a pair of bullocks or buffalos and a pair of bullocks or buffalo would cover nine acres on an average because the average farm size is about 4.5 acres.

The following table shows the comparison of the increase rate of acreage sown and number of heads of draft animals (cattle or buffalo) between 1964/65 and 1976/77, taking the figures in 1964/65 by 100.

	<u>1964/65</u>	<u>1974/75</u>	<u>1977/78</u>
(1) Net Area Sown	100	102	102
(2) Acreage Sown under various crops	100	108	109
(3) Acreage Sown more than once	100	170	179
(4) Draft animals (cattle/buffalo)	100	116	119

Source: See Table C-1-23 and Table C-1-3.

TABLE C-1-23 DRAUGHT CATTLE AND AGRICULTURAL IMPLEMENTS

Year	(Unit: 1,000)						
	Draught Cattle	Draught Buffalo	Spike Harrow	Inter Cultivator	Plough Share	Rotary Harrow	Cart
1. 1964-65	3,236	426	1,756	115	1,597	266	941
2. 1968-69	3,531	496	1,931	72	1,725	248	1,229
3. 1969-70	3,557	516	1,963	77	1,759	248	1,253
4. 1970-71	3,620	529	2,062	82	1,832	254	1,270
5. 1971-72	3,665	535	2,060	81	1,835	258	1,277
6. 1972-73	3,689	540	2,079	82	1,891	257	1,305
7. 1973-74	3,666	539	2,114	87	1,866	262	1,310
8. 1974-75	3,710	545	2,125	92	1,899	266	1,331
9. 1975-76	3,749	549	2,149	93	1,907	274	1,358
10. 1976-77	3,791	564	2,165	92	1,944	275	1,371
	(Provisional						
	Actual)						
11. 1977-78	3,810	576	2,176	93	1,971	277	1,380
	(Provisional)						

Note: Draught cattle and draught buffalo are those trained for agricultural purposes.

Source: Report to the Pyithu Hluttaw, 1978-79.

The above table clarifies that the increase in number of draft animals are larger than the increase in net area sown and total acreage sown per annum, whereas smaller than the increase in the multiple cropping acreages.

As a general rule, the successful increase in multiple cropping areas requires a sufficient number of draft animals. Therefore, the necessary labors for the expanded multiple cropping areas should be covered by farm mechanization as mentioned in the succeeding paragraph.

## 2) Farm Mechanization

The agricultural mechanization in Burma has been promoted under the government guidance, and the Agricultural Mechanization Division (AMD) has arranged 3,500 units of large-size tractors with attachments (as of 1977/78) at 88 tractor stations throughout the country for rendering machine services in the farm works. Furthermore, the AMD has supplied the machineries and equipment to individual farmers and the agricultural cooperative societies with such machines and equipment currently provided as 3,750 units of large-size tractors with attachments, 140 units of power tillers, 8,244 sets of irrigation pumps, etc. (Refer to Table C-1-24 and Table C-1-25).

The AMD has been rendering repair services of the machines and equipment including those sold to the agricultural cooperative societies or individual farmers at every tractor stations and seven other workshops for medium and large-scale repairing. Furthermore, the AMD has established two training schools for tractor operators and repairing mechanics and also provided and operated the machines and equipment for land clearing and farming works in reclaiming the cultivable waste lands.

The operation service results of tractors held by AMD were 735 thousand acre-turns and the annual operation results were 304 hrs/machine or 210 acre/machine in 1977/78. (Refer to Table C-1-24).

TABLE C-1-24 UTILIZATION OF TRACTORS OWNED BY THE AGRICULTURAL MECHANIZATION DEPARTMENT

Particulars	Unit	1973-74 (6 months)				
		1974-75	1975-76	1976-77*	1977-78*	
1. Tractor Stations	No.	88	88	88	88	88
2. Tractors						
1. Agricultural Tractors	No.	3,235	2,779	2,752	3,500	
2. Tractors for hauling	"	170	170	170	170	
3. Tractors for workshop and training	"	130	130	130	130	
4. Unserviceable tractors	"	286	1,307	1,459	200	
5. Total	"	3,821	4,386	4,511	4,000	
3. Utilization of tractors						
1. Field hours	Hour	490,916	1,119,362	877,737	1,065,600	
2. Road hours	"	103,677	428,452	357,006	238,500	
3. Total	"	594,593	1,578,347	1,234,743	1,304,100	
4. Average field hour per tractor	"	152	322	319	304	
5. Total tillage acre-turn	Acre-turn	289,058	754,192	614,925	735,600	
6. Average acre-turn per tractor	"	89	216	223	210	

Note: \* (Provisional actual) \*\* (Provisional)

Source: Report to the Pyithu Hluttaw, 1978-79



TABLE C-1-25 TRACTORS, WATER PUMPS AND AGRICULTURAL IMPLEMENTS OWNED BY  
CO-OPERATIVE SOCIETIES

<u>Particulars</u>	<u>Unit</u>	<u>1973-74</u>	<u>1974-75</u>	<u>1975-76</u>	<u>1976-77</u> <sup>1/</sup>	<u>1977-78</u> <sup>2/</sup>
1. Tractor	No.	2,769	3,021	3,307	3,407	3,750
2. Harrow	"	2,938	3,130	2,990	3,047	3,485
3. Disc plough	"	-	-	3,158	3,225	3,556
4. Rotor cultivator	"	-	-	8	8	8
5. Trailer	"	531	802	766	797	872
6. Water pump	"	2,862	4,328	5,739	6,284	9,244
7. Power tiller	"	19	60	73	91	140
8. Thresher	"	29	35	39	39	55
9. Rice huller	"	28	37	37	37	74
10. Rotary slasher	"	-	-	4	4	7
11. Groundnut digger and windower	"	-	-	-	-	5

Note: \* According to the latest available data.

1/ (Provisional actual)

2/ (Provisional)

Source: Report to the Pyithu Hluttaw, 1978-79.

The total acreage of the tractor-operated farm lands in 1977/78 was estimated at 1.4 million acre-turns including those cultivated by machines of cooperatives' and individual farmers. The acreage of 1.4 million acre-turn is equivalent to six percent and 39 percent of 23.6 million acres of the total cropping area and 3.6 million acres of the acreage sown more than once a year, respectively.

If the machine application for a certain land is repeated at the rate of 2 to 3 acre-turns for plowing and harrowing, the actual machine applied acreage of farm lands would not be so large.

The annual average operation hours of the AMD holding tractors were as short as only about 300 hours. The major causes preventing the tractors from sooth operation are shortage in spare parts, few farm roads available, irregularity in plot shape, improper drainage condition in on-farm, etc. In order to encourage the mechanized farming, it is essentially required to provided the adequate number of workshops, sufficient supply of spare parts, well-arranged farm roads and regular shape plots in most of the farm lands, and proper drainage facilities in on-farm and also to introduce the power tillers for the vast areas without land consolidation.

For encouraging the multiple cropping, it is required to save the manpower labor by mechanization of harvesting and post-harvesting works as well as land preparation works.

In Lower Burma where the long rainy season prevails, the mechanization of harvesting and post-harvesting works should be promoted to encourage the large-scale multiple cropping in the area because there is only a short period available between the harvesting of the rainy season paddy and the sowing of the following second crops.

The AMD, in recognition of these problems, has started test operation of the farm mechanization at two test sites in the Lower Burma under cooperation of the AC with extensive land consolidation

on the one acre-one plot basis and adopting Japan-made binders, IRRI-type threshers and dryers, since 1978/79. The Burmese authorities concerned have been looking for the best suited approach of farm mechanization to the condition of agriculture in Burma through the series of tests in the sites.

#### I.5. Crop Production

##### 1) Crop Production

The major crops grown in Burma are paddy, sesame, pulses, and groundnut, and the percentages of sown acreages for the respective crops are 53.9 percent of the total acreage sown, 11.4 percent, 11.4 percent and 6.3 percent. The total sown acreage of these four major crops occupies about 80 percent of the whole acreage sown in Burma. (Refer to Table C-1-26).

The crops whose increase rate in acreages sown exceed the increase rate of the total acreages sown are pulses such as sultapya, butter bean, soya bean, gram, matpe, etc., and the industrial crops such as sesame, jute, sugar cane, tobacco, and wheat. The new crop showing rapid increase in sown acreage is sunflower, which the Government has been encouraging its production increase for supplying the food oil as a measure to realize self-sufficiency. (Refer to Table C-1-27).

The crops whose increase rate in production exceed the population growth rate between 1961/62 and 1978/79 are sultapya, butter bean, gram, sesame, jute, sugar cane and tobacco. (Refer to Tables C-1-31 and C-1-32). Recently, wheat has exceeded its 1964/65 production level by yield increase, although its sown acreage has not reached the level in that period. Production of cotton has remained by 2/3 of that in 1964/65 level because its sown acreage has been reduced to 2/3 of the above year and the yield has not been increased so much as expected. The production increase rate of groundnut has been below the population growth rate. (Refer to Table C-1-28).

TABLE C-1-26 SOWN ACREAGE OF SELECTED CROPS

Crops	(Unit: 1,000 acre)											1977-78**		
	1961 -62	1964 -65	1967 -68	1968 -69	1969 -70	1970 -71	1971 -72	1972 -73	1973 -74	1974 -75	1975 -76	1976* -77	Area	% of Total Sown Acreage
1. Paddy	11,359	12,624	12,193	12,402	12,243	12,294	12,300	12,014	12,575	12,793	12,793	12,547	12,736	53.9
2. Wheat	98	298	235	151	166	172	156	137	156	227	232	233	235	1.0
3. Maize seeds	199	221	232	216	179	176	250	235	219	215	203	199	207	0.9
4. Matpe	123	216	175	158	130	135	189	184	164	164	121	88	164	0.7
5. Butter bean	73	160	176	147	142	132	196	207	183	180	158	143	157	0.7
6. Sulta pya	10	69	90	93	84	90	126	134	107	122	117	126	137	0.6
7. Peboke(Soya bean)	38	34	43	43	46	49	50	51	52	54	56	61	59	0.2
8. Gram	291	271	272	410	350	358	457	449	379	373	385	434	442	1.9
9. Other pulses	849	859	860	900	879	812	837	836	802	892	819	814	790	3.3
10. Groundnut	1,396	1,332	1,259	1,510	1,510	1,735	1,674	1,563	1,638	1,666	1,696	1,507	1,481	6.3
11. Sesamum	1,530	1,960	2,050	2,037	2,258	2,510	2,292	2,256	2,660	2,609	2,464	2,630	2,696	11.3
12. Sunflower	-	1	-	-	-	-	-	-	8	9	10	25	101	0.4
13. Cotton	469	616	526	389	362	467	554	532	527	542	514	402	405	1.7
14. Jute	24	53	87	99	104	115	226	288	291	167	148	136	176	0.7
15. Rubber	155	213	219	220	219	217	214	214	213	211	207	204	204	0.9
16. Sugarcane	95	120	146	162	201	237	273	292	235	211	247	251	278	1.2
17. Barmese Tobacco	106	116	145	133	120	123	153	147	98	99	124	160	145	0.6
18. Virginia Tobacco	7	13	12	12	12	13	16	14	10	13	12	15	18	0.1
19. Other crops	2,191	2,473	2,647	2,953	2,756	2,703	2,738	2,949	2,960	2,926	2,960	3,188	3,214	13.5
Total	19,013	21,649	21,367	21,739	21,761	22,338	22,701	22,502	23,277	23,473	23,331	23,163	23,645	100.0

Note: \*(Provisional Actual) \*\*(Provisional) Source: Report to the Pyithu Hluttaw, 1978-79

TABLE C-1-27 INCREASED SOWN ACREAGE OF SELECTED CROPS  
(1961 - 62 = 100)

Crops	(Unit: %)													
	1961	1964	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
	100	111	107	109	108	108	108	106	111	113	113	110	110	112
1. Paddy	-62	-65	-68	-69	-70	-71	-72	-73	-74	-75	-76	-77	-78	-78
2. Wheat	100	304	240	154	169	176	159	140	159	232	237	238	240	240
3. Maize Seeds	100	111	117	109	90	88	126	118	110	108	103	100	104	104
4. Matpe	100	176	142	128	106	110	154	150	133	133	98	72	133	133
5. Butter bean	100	137	241	201	195	181	268	284	251	247	216	196	215	215
6. Sulta Pya	100	690	900	930	840	900	1,260	1,340	1,070	1,220	1,170	1,266	1,370	1,370
7. Peboke (Soya Bean)	100	89	113	113	121	129	132	134	137	142	147	161	155	155
8. Gram	100	93	93	141	120	123	157	154	130	128	132	149	152	152
9. Other Pulses	100	101	101	106	104	96	99	98	95	105	96	96	93	93
10. Groundnut	100	95	90	108	108	124	120	120	117	119	121	108	106	106
11. Sesamum	100	128	134	133	147	164	150	147	174	171	161	172	176	176
12. Cotton	100	132	112	83	77	100	118	113	112	116	110	86	86	86
13. Jute	100	221	36	413	433	479	941	1,200	1,213	696	612	567	733	733
14. Rubber	100	137	141	142	141	140	138	138	137	136	134	132	132	132
15. Sugarcane	100	126	154	171	212	249	287	307	247	222	260	264	293	293
16. Burmese Tobacco	100	109	137	125	113	116	144	139	92	93	117	151	137	137
17. Virginia Tobacco	100	186	171	171	171	186	229	200	143	186	171	214	257	257
18. Other Crops	100	113	121	135	126	123	125	135	135	134	135	146	147	147
Total	100	114	112	114	114	117	119	118	122	123	123	122	124	124

Note: \* (Provisional Actual) \*\* (Provisional)  
Source: Report to the Pyithu Hluttaw, 1978-79

TABLE C-1-28 PRODUCTION AND USE OF PADDY

Year	Production		Procurement by Government		Reserved Amount by Farmers (M ton)	Estimated <sup>2/</sup> Seeds and Waste (M ton)	Domestic <sup>3/</sup> Consumption (M ton)	Popula- tion (M)		
	Sown Area (M ha)	Yield (ton/ha)	Production (M ton)	For Export (M ton)					1/ For Domestic Use (M ton)	Total (M ton)
1936-41 Average	5.02	1.40	7.03	4.89	-	4.89	2.14	0.08	2.06	15.7
1964/65	5.11	1.64	8.37	2.09	1.92	4.36	4.01	0.08	6.20	23.7
1965/66	5.02	1.58	7.93	1.00	2.24	4.69	3.24	0.07	6.85	24.2
1966/67	4.99	1.31	6.53	0.54	1.47	4.52	2.01	0.07	5.92	24.8
1967/68	4.94	1.55	7.65	0.55	1.61	5.49	2.16	0.08	7.03	25.3
1968/69	5.02	1.57	7.90	1.02	1.98	4.90	3.00	0.08	6.80	25.9
1969/70	4.96	1.59	7.86	1.18	1.79	4.89	2.97	0.08	6.60	26.4
1970/71	4.98	1.61	8.03	1.11	1.85	5.07	2.96	0.08	6.84	27.0
1971/72	4.98	1.62	8.05	0.40	1.81	5.84	2.21	0.08	7.57	27.6
1972/73	4.86	1.49	7.24	0.14	1.07	6.03	1.21	0.07	7.03	28.3
1973/74	5.09	1.66	8.47	0.29	1.20	6.98	1.49	0.08	8.10	28.9
1974/75	5.18	1.63	8.45	0.67	1.99	5.79	2.66	0.08	7.70	29.5
1975/76	5.21	1.74	9.06	1.02	2.16	5.88	3.18	0.09	7.95	30.2

Note: 1/ Except for 1936-41 average, exported amounts are in paddy and these amount in certain year are considered to come from production amount in preceding year.

2/ Estimated at 1 % of production amount

3/ Production amount minus "exported amount" and "estimated seeds and waste"

Source: Report to the Pyithu Hluttaw, 1978-79 and Agricultural Statistics, 1973/74-1975/76

TABLE C-1-29 YIELD PER ACRE OF SELECTED CROPS

Crops	Unit	1961	1964	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976*	1977**
		-62	-65	-68	-69	-70	-71	-72	-73	-74	-75	-76	-77	-78
1. Paddy	46lbs	31.16	31.16	32.02	32.67	33.15	32.92	32.28	31.51	34.19	34.09	35.51	36.80	37.11
2. Wheat	72lbs	5.11	7.99	7.14	5.80	6.88	7.74	6.81	6.79	5.64	9.23	8.09	10.88	12.71
3. Maize Seeds	55lbs	13.31	10.51	11.65	12.22	11.19	11.46	12.06	11.38	12.47	13.31	12.95	12.50	15.42
4. Matpe	72lbs	7.42	7.61	5.23	4.63	4.97	5.54	5.69	6.34	5.93	5.92	4.99	6.64	7.03
5. Butter bean	69lbs	5.27	6.02	7.26	7.56	6.76	7.37	7.20	6.17	7.71	6.86	7.27	7.88	8.20
6. Sultapya	69lbs	8.60	6.89	6.26	5.49	5.28	6.82	6.68	6.00	4.87	4.85	5.38	7.41	7.72
7. Peboke (Soya bean)	72lbs	8.74	7.41	7.79	7.83	8.61	8.06	8.31	8.43	7.72	7.93	7.16	8.56	8.47
8. Gram	69lbs	5.61	7.23	6.99	6.82	6.25	6.87	7.00	5.54	5.57	6.68	6.46	7.85	7.76
9. Groundnut	25lbs	25.53	23.14	26.33	23.81	26.54	27.26	26.00	22.46	23.04	25.23	22.18	26.44	29.42
10. Sesamum	54lbs	2.82	2.36	2.76	2.44	2.53	2.75	2.68	2.35	3.22	2.40	3.34	2.55	3.03
11. Sunflower	21lbs	-	-	-	-	-	-	-	-	14.65	14.48	14.73	14.88	15.77
12. Cotton	Viss	30.66	72.64	72.40	67.26	69.48	66.06	58.63	63.89	55.07	62.16	59.28	62.77	79.40
13. Jute	"	182.45	138.75	182.63	167.59	178.68	176.00	204.60	212.90	213.28	212.25	219.07	204.61	238.22
14. Rubber	Lbs	369.54	221.25	224.34	227.52	233.82	254.14	267.07	272.84	273.65	275.96	272.30	285.54	205.01
15. Sugarcane	Ton	12.08	12.42	12.64	13.06	13.18	13.48	13.92	14.26	14.43	13.31	14.11	14.59	14.32
16. Burmese tobacco	Viss	218.20	220.45	213.62	205.86	204.11	207.58	213.12	217.48	212.87	227.03	225.38	233.22	233.90
17. Virginia tobacco (Green)	"	1,380.38	919.60	1,002.82	688.53	777.13	811.56	744.26	797.67	757.32	1,002.07	677.32	914.42	870.80

Note: The figures in the units from serial No.1 to No.11 are equivalent to one basket of each crop product respectively.

\*(Provisional Actual) \*\*((Provisional)

Source: Report to the Pyithu Hluttaw, 1978-79

TABLE C-1-30 INCREASE OF YIELD PER ACRE OF SELECTED CROPS  
(1961 = 100)

Crops	(Unit: %)													
	1961	1964	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976*	1977**	
1. Paddy	100	100	103	105	106	106	107	101	110	109	114	118	119	
2. Wheat	100	156	140	114	135	151	133	133	110	181	158	213	249	
3. Maize Seeds	100	70	88	92	84	86	91	85	94	100	97	94	116	
4. Matpe	100	103	79	62	67	75	77	85	80	80	67	89	95	
5. Butter Bean	100	114	138	143	128	140	137	117	146	130	138	150	156	
6. Sultapya	100	80	73	64	61	79	78	70	57	56	63	86	90	
7. Peboke (Soya bean)	100	85	89	90	99	92	95	96	88	91	82	98	97	
8. Gram	100	129	125	122	111	122	125	99	99	119	115	140	139	
9. Groundnut	100	91	103	392	104	107	102	88	90	99	87	104	115	
10. Sesamum	100	84	98	87	90	98	95	83	114	85	118	90	107	
11. Cotton	100	237	236	220	227	215	191	208	179	203	193	205	259	
12. Jute	100	76	100	92	98	96	112	117	117	116	120	112	131	
13. Rubber	100	60	61	62	63	69	72	74	74	75	74	77	55	
14. Sugar Cane	100	103	105	108	109	112	115	118	119	110	117	121	119	
15. Burmese Tobacco	100	101	98	94	94	95	98	100	98	104	103	107	107	
16. Virginia Tobacco (Green)	100	67	73	50	56	62	54	58	55	73	49	66	63	

Note: \* (Provisional Actual) \*\* (Provisional)

Source: Report to the Pyithu Hluttaw, 1978-79



TABLE C-1-31 PRODUCTION OF SELECTED CROPS

Crops	Unit	1961	1964	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976*	1977**
		-62	-65	-68	-69	-70	-71	-72	-73	-74	-75	-76	-77	-78
1. Paddy	Ton	6,726	8,373	7,647	7,896	7,859	8,033	8,046	7,241	8,466	8,448	9,062	9,172	9,489
2. Wheat	"	15	71	50	25	33	39	26	26	24	63	56	75	92
3. Maize seeds	"	55	53	64	61	47	47	57	55	61	64	60	57	74
4. Matpe	"	27	47	26	21	17	21	29	32	24	23	15	12	34
5. Butter bean	"	12	30	34	32	26	29	41	36	41	36	34	32	36
6. Sultapya	"	2	14	16	14	12	17	23	22	13	16	17	26	30
7. Peboke (Soya bean)	"	10	7	10	11	12	13	13	13	12	13	12	16	16
8. Gram	"	45	54	52	80	60	70	89	60	54	66	67	93	100
9. Other Pulses	"	164	129	126	156	142	135	118	102	120	47	111	135	131
10. Groundnut (in shell)	"	387	338	365	392	437	521	478	377	405	459	404	416	457
11. Sesamum	"	75	99	106	82	100	130	111	69	152	94	132	91	109
12. Sunflower	"	-	-	-	-	-	-	-	-	1	1	1	3	14
13. Cotton	"	21	68	48	32	34	42	42	43	37	42	37	31	41
14. Jute	"	6	10	22	21	22	28	65	88	78	39	37	27	55
15. Rubber	"	25	13	12	12	13	13	14	15	15	15	14	15	15
16. Sugarcane	"	1,072	1,067	1,423	1,287	1,291	1,414	1,606	2,000	1,661	1,185	1,605	1,600	1,786
17. Burmese tobacco	"	35	40	49	43	38	40	51	50	32	35	44	58	58
18. Virginia tobacco (Green)	"	13	17	18	13	14	16	18	16	10	19	12	21	24

Note: \*(Provisional Actual) \*\*\*(Provisional) Source: Report to the Pyithu Hluttaw, 1978-79

TABLE C-1-32 INCREASE OF PRODUCTION OF SELECTED CROPS  
(1961 - 62 = 100)

Crops	Unit	(Unit: %)													
		1961 -62	1964 -65	1967 -68	1968 -69	1969 -70	1970 -71	1971 -72	1972 -73	1973 -74	1974 -75	1975 -76	1976 -77	1977 -78	**
1. Paddy	Ton	100	124	114	117	117	119	120	108	126	126	135	136	141	
2. Wheat	"	100	473	333	167	220	260	173	173	160	420	373	500	613	
3. Maize Seeds	"	100	96	116	111	85	85	104	100	111	116	109	104	135	
4. Matpe	"	100	174	96	78	63	78	107	119	89	85	56	44	126	
5. Butter Bean	"	100	250	283	267	217	242	342	300	342	300	283	267	300	
6. Sultapya	"	100	700	800	700	600	850	1,150	1,100	1,150	800	850	1,300	1,500	
7. Peboke (Soya Bean)	"	100	70	100	110	120	130	130	130	120	130	120	160	160	
8. Gram	"	100	120	116	178	133	156	200	133	120	147	149	207	222	
9. Other Pulses	"	100	61	77	95	87	82	72	63	73	29	68	82	80	
10. Groundnut (in shell)	"	100	87	94	101	113	135	124	97	165	118	104	107	118	
11. Sesamum	"	100	132	141	109	138	173	148	92	203	125	176	121	145	
12. Cotton	"	100	323	229	152	162	200	200	205	176	200	176	147	195	
13. Jute	"	100	166	367	350	367	467	1,083	1,467	1,300	650	617	450	912	
14. Rubber	"	100	52	48	48	52	52	56	60	60	60	56	60	60	
15. Sugar Cane	"	100	99	133	120	120	132	150	187	155	111	150	149	167	
16. Burmese Tobacco	"	100	114	140	123	109	114	146	142	91	100	126	167	166	
17. Virginia Tobacco (Green)	"	100	131	138	100	108	123	138	123	77	146	92	162	185	

Note: \* (Provisional Actual) \*\* (Provisional)  
Source: Report to the Pyithu Hluttaw, 1978-79

During the pre-war period between 1936 and 1941, Burma recorded 7.03 million tons of paddy production from the acreage sown in 12.4 million acres which has been expanded in large scale in the Irrawaddy Delta for those years from the end of the nineteenth century to around 1940. At that period, about 70 percent of the total production was exported and the export of rice reached about 3.18 million tons per annum. The country produced 8.45 million tons of rice with 12.8 million acre acreage sown in 1974/75, and in spite of the production scale being larger than that in the pre-war period, the rice export was marked by only 0.44 million tons in that year. The annual average rice export has been less than 0.5 million tons since 1964/65. The major cause that the rice export has been declined to about 1/6 of the amount in the pre-war period is that the production increase has not been able to follow the demand increase by population growth. (Refer to Table C-1-28).

Among the Southeast Asian countries with more than a million hectare lands sown with paddy, Burma is the second-lowest in its paddy yield. Furthermore, the country belongs to the lowest yield group for the major upland crops such as sesame, pulses, groundnut, jute and sugar cane, as compared with those in the Southeast Asian countries. (Refer to Tables C-1-33 and C-1-34).

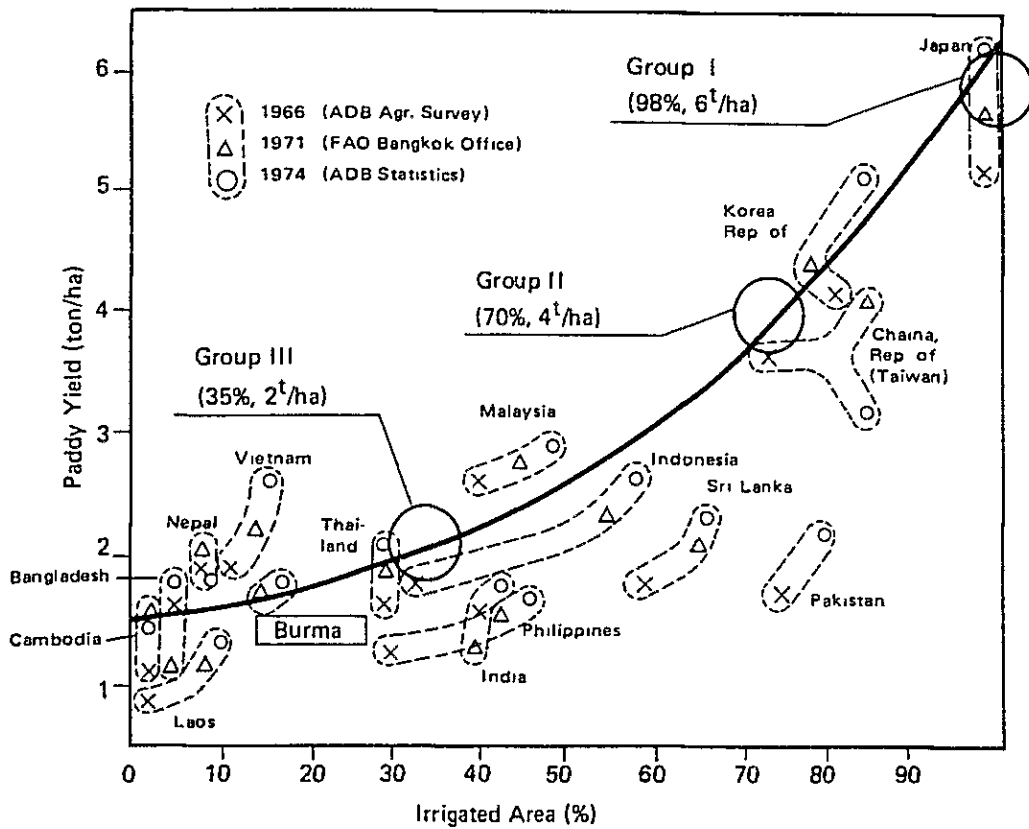
Figure C-1-2 clearly shows the relationship between availability of irrigation facilities and paddy yield, and it is learned that Burma belongs to the group with low yield of paddy among the Asian countries. The low yield of paddy in Burma appears to have resulted mostly from low availability of the irrigation facilities, shortage in supply of fertilizers and agricultural chemicals, delay in application of advanced farming technology, and minus incentive by low government's purchase price of paddy in compulsory system, as compared with the international rice market price. Most of the Southeast Asian countries have increased their paddy yield as the availability of the irrigation facilities have been improved, whereas Burma has still remained low in both its paddy yield and availability of the

TABLE C-1-33 AREA, FIELD, AND PRODUCTION OF PADDY IN SPECIFIED COUNTRIES, AVERAGE 1970-74,

Continent and Country	1975		1976		1975		1976		1975		1976	
	Av. 1970-74 ('000 ha)	1/ ('000 ha)	2/ ('000 ha)	Av. 1970-74 (Met. tons/ha)	1/ (Met. tons/ha)	2/ (Met. tons/ha)	Av. 1970-74 ('000 MT)	1/ ('000 MT)	2/ ('000 MT)	Av. 1970-74 ('000 MT)	1/ ('000 MT)	2/ ('000 MT)
<b>ASIA:</b>												
Afghanistan	204	210	210	1.86	2.15	379	451	457	379	451	457	
Bangladesh	9,684	10,344	10,074	1.68	1.82	16,236	18,806	19,069	16,236	18,806	19,069	
Burma	4,980	5,181	5,208	1.60	1.63	8,175	9,221	9,315	8,175	9,221	9,315	
Cambodia	1,268	1,050	1,400	1.34	1.43	1,697	1,500	1,800	1,697	1,500	1,800	
China, Peoples Rep.	33,020	34,500	35,000	3.40	3.45	112,326	119,000	118,000	112,326	119,000	118,000	
China, Rep. of (Taiwan)	758	790	791	4.33	4.28	3,282	3,382	3,679	3,282	3,382	3,679	
Hong Kong	4	5	5	2.53	2.00	10	10	10	10	10	10	
India	37,642	39,688	38,000	1.66	1.87	62,513	74,260	67,117	62,513	74,260	67,117	
Indonesia	8,254	8,765	8,750	2.49	2.57	20,567	22,560	22,647	20,567	22,560	22,647	
Iran	292	300	365	3.56	3.53	1,040	1,201	1,276	1,040	1,201	1,276	
Iraq	75	33	54	2.63	1.80	196	60	110	196	60	110	
Japan	2,721	2,764	2,779	5.50	5.95	14,977	16,456	14,716	14,977	16,456	14,716	
Korea North	690	740	740	4.55	5.00	3,173	3,700	3,700	3,173	3,700	3,700	
Korea, Rep. of	1,194	1,218	1,219	4.78	5.32	5,709	6,095	7,243	5,709	6,095	7,243	
Laos	660	690	680	1.29	1.30	864	911	940	864	911	940	
Malaysia (Peninsular)	561	595	578	2.99	2.80	1,618	1,717	1,611	1,618	1,717	1,611	
Nepal	1,211	1,240	1,265	1.96	2.10	2,373	2,605	2,650	2,373	2,605	2,650	
Pakistan	1,511	1,710	1,692	2.20	2.30	3,447	3,929	3,660	3,447	3,929	3,660	
Philippines	3,261	3,579	3,600	1.60	1.78	5,216	5,667	6,159	5,216	5,667	6,159	
Sabah	46	50	50	2.32	2.50	108	125	125	108	125	125	
Saravak	121	145	145	1.22	1.03	148	150	150	148	150	150	
Saudi, Arabia	1	1	1	3.00	3.00	3	3	3	3	3	3	
Sri Lanka (Ceylon)	681	525	500	2.12	2.15	1,443	1,129	1,160	1,443	1,129	1,160	
Syria	-	1	1	2.00	5.00	1	5	5	1	5	5	
Thailand	7,481	8,471	8,500	1.83	1.79	13,677	15,200	15,000	13,677	15,200	15,000	
Turkey	61	55	61	3.09	4.20	236	231	252	236	231	252	
Vietnam, Soc. Rep.	2,716	5,310	5,310	2.09	2.04	5,680	10,851	12,480	5,680	10,851	12,480	
Vietnam, So.	2,140	-	-	2.34	-	4,998	-	-	4,998	-	-	
<b>Total:</b>	<b>121,067</b>	<b>127,703</b>	<b>126,949</b>	<b>2.40</b>	<b>2.50</b>	<b>290,094</b>	<b>319,728</b>	<b>313,921</b>	<b>290,094</b>	<b>319,728</b>	<b>313,921</b>	
<b>OCEANIA:</b>												
Australia	54	75	90	6.17	5.57	331	418	490	331	418	490	
<b>Total</b>	<b>54</b>	<b>75</b>	<b>90</b>	<b>6.17</b>	<b>5.57</b>	<b>331</b>	<b>418</b>	<b>490</b>	<b>331</b>	<b>418</b>	<b>490</b>	
<b>World Total</b>	<b>133,244</b>	<b>142,345</b>	<b>141,175</b>	<b>2.37</b>	<b>2.47</b>	<b>316,104</b>	<b>352,257</b>	<b>343,781</b>	<b>316,104</b>	<b>352,257</b>	<b>343,781</b>	

Note: 1/ Preliminary, 2/ Estimate

Source: USDA/FAS, Washington, D.C., April 1977



**FIG. C-1-2 RELATIONSHIP BETWEEN PADDY YIELD AND IRRIGATED AREA**

Source: Journal of the Japanese Society of Irrigation, Drainage and Reclamation Engineering, 1976, No. 44.

TABLE C-1-34 YIELD COMPARISON OF THE CROPS AMONG ASIAN COUNTRIES

	(Unit: kg/ha)							
	<u>Asia</u>	<u>Burma</u>	<u>China</u>	<u>India</u>	<u>Indonesia</u>	<u>Pakistan</u>	<u>Philippines</u>	<u>Thailand</u>
Wheat*	1,335	750	1,270	1,394	-	1,430	-	-
Maize*	1,957	500	2,962	1,133	1,188	1,351	881	1,458
Pulses, total	668	619	1,023	485	502	555	803	665
Sunflower Seed*	946	328	1,250	-	-	-	-	-
Groundnut in Shell*	918	763	1,181	786	1,330	1,421	657	1,344
Sesame Seed	270	181	383	196	313	414	-	893
Sugarcane* (ton/ha)	52.3	34.2	69.6	53.6	83.8	37.3	43.6	53.1
Jute & Substitutes*	1,568	839	3,046	1,181	1,556	882	-	1,201
Seed Cotton*	973	222	1,447	502	938	855	555	1,057

Note: \* Crops proposed for improvement and development under the UNDP/FAO Projects.

Source: FAO Production Yearbook, Vol.31, 1977.

irrigation facilities.

In Burma, the sowing rate of HYV in 1977/78 was 15.5 percent of the total paddy sown, which was equivalent to about 21 percent of the total paddy production. (Refer to Table C-1-35). The sown acreage of HYV had been doubled in the period between 1970/71 and 1977/78, while the increase rate in irrigated area had been only 15 percent in that period. It is learned from the above that the HYV has been increasingly introduced in the country.

## 2) Production Constraints

For paddy and other major crops, the unharvested acreages (average 1964/65 through 1976/77) are recorded at 4.6 percent and 14.3 percent of the total acreage sown in two categories of crops, respectively. (Refer to Table C-1-36).

On the other hand, the damaged acreages by flood on paddy and other major crops for three years 1974/75 through 1976/77 were recorded by 543 thousand acres and 400 thousand acres, respectively. These damaged acreages occupy 94 percent for paddy fields and 28 percent of the other crop fields in the unharvested acreages quoted as above. Therefore, the major cause for unharvested paddy cropping seems to be a flood damage and for the other crops seems to be damaged by the causes other than flood.

For the diversified crops, it is considered that the drought damage would seriously affect to cropping due to unstable rainfall in the Upper Burma.

The damages by drought or flood would affect to the crop productions so much in considering the present low availability of the irrigation and drainage facilities in the country. This may be proved by the fact that the national average of paddy yield was very low in 1972/73 when the Lower Burma was attacked by severe drought.

TABLE C-1-35 HIGH YIELD VARIETY PADDY

<u>Variety of Paddy</u>	<u>Year</u>	<u>Sown Acreage</u> ( '000acre)	<u>Matured Acreage</u> ( '000acre)	<u>Yield per Acre</u> (Basket)	<u>Produc- tion</u> ( '000ton)
1. Yagyaw 2 Paddy	1970-71	427	406	55.78	465
	1971-72	364	351	60.58	437
	1972-73	370	358	55.82	411
	1973-74	437	426	59.52	521
	1974-75	585	555	58.75	670
	1975-76	619	605	60.51	752
	1976-77*	632	622	62.63	800
	1977-78**	578	571	62.80	736
2. Ngwetoe Paddy	1970-71	41	39	46.85	37
	1971-72	35	33	48.41	33
	1972-73	37	37	46.03	34
	1973-74	50	49	45.30	46
	1974-75	57	56	46.17	53
	1975-76	71	70	50.34	73
	1976-77*	84	83	55.66	95
	1977-78**	112	109	56.46	127
3. C-4-63 Paddy	1970-71	1	1	42.18	1
	1971-72	62	60	46.17	57
	1972-73	94	87	42.90	76
	1973-74	136	130	48.20	129
	1974-75	166	153	46.90	147
	1975-76	126	116	47.98	114
	1976-77*	92	87	53.01	95
	1977-78**	109	105	54.00	117
4. Other High Yeild Variety	1970-71	469	455	40.71	380
	1971-72	534	526	40.74	440
	1972-73	696	676	43.04	597
	1973-74	789	768	42.09	678
	1974-75	846	822	41.09	693
	1975-76	1,205	1,181	42.88	1,040
	1976-77*	1,013	994	44.94	917
	1977-78**	1,179	1,158	43.81	1,042
Total	1970-71	902	902	46.93	884
	1971-72	966	971	47.67	968
	1972-73	1,199	1,159	46.25	1,120
	1973-74	1,413	1,375	47.85	1,375
	1974-75	1,656	1,587	47.17	1,565
	1975-76	2,022	1,974	48.00	1,981
	1976-77*	1,823	1,788	51.09	1,909
	1977-78**	1,979	1,946	49.77	2,024,538

Note: \* (Provisional Actual) \*\* (Provisional)  
Source: Report to the Pyithu Hluttaw, 1978-79.



TABLE C-1-36 DESTROYED AREA OF PADDY AND OTHER CROPS

Year	Paddy			Other All Crops		
	Sown Area	Destroyed Area		Swon Area	Destroyed Area	
		Area	% of Sown Area		Area	% of Sown Area
1964/65	12,624	328	2.6	9,025	745	8.3
1965/66	12,390	409	3.3	9,294	1,483	16.0
1966/67	12,328	1,168	9.5	9,046	1,486	16.4
1967/68	12,193	565	4.6	9,174	1,128	12.2
1968/69	12,402	631	5.1	9,337	1,271	13.6
1969/70	12,243	700	5.7	9,518	1,284	13.5
1970/71	12,294	411	3.3	10,044	1,174	11.7
1971/72	12,299	527	4.3	10,402	1,453	14.0
1972/73	12,014	825	6.9	10,488	2,062	20.0
1973/74	12,575	518	4.1	10,702	1,627	15.2
1974/75	12,793	724	5.7	10,680	1,028	17.2
1975/76	12,858	332	2.6	10,632	1,426	13.4
1976/77	12,547	296	2.4	N.A	N.A	N.A
Average		572	4.6		1,409	14.3

Source: Report to the Pyithu Hluttaw, 1978-79

## I.6. Agricultural Institutions

### 1) General

The Ministry of Agriculture and Forests (MAF) drafts the agricultural policies and the development plans, which become effective by adoption in the Phittu Hluttaw (People's Congress) after approved by the Ministry of Planning and Finance (MPF), the Central People's Council, and the Council of Minister (Cabinet). The MAF is an executing body of these policies and development plants under the assistance by People's councils concerned and other related agencies.

The major governmental organizations and agencies relating to executing the agricultural development plans and agricultural production are the following 17 organizations, 12 of which belong to the MAF and five of which belong to the organizations or agencies other than the MAF.

- i) Irrigation Department (ID), MAF
- ii) Agricultural Corporation (AC), MAF
- iii) Agricultural Mechanization Department (AMD), MAF
- iv) Veterinary and Animal Husbandry Department (VAHD), MAF
- v) Fisheries Department (Fi D), MAF
- vi) Forest Department (Fo D), MAF
- vii) Myanma Agricultural Bank (MAB)
- viii) Cooperative Department (CD), Ministry of Cooperative
- ix) Settlement and Land Record Department (SLRD), MAF
- x) Survey Department (SD), MAF
- xi) Central Land Committee (CLC), MAF
- xii) Agricultural and Farm Produce Trade Cooperation (AFPTC),  
Trade Ministry
- xiii) Livestock Development and Marketing Coporation (LDMC), MAF
- xiv) Textile Industry Corporation (TIC), Ministry of Industry I
- xv) Timber Corporation (TC), MAF
- xvi) Working People's Settlement Department (WPSD), MAF
- xvii) People's Council

The function discharged by each organization and agency are as follows.

- ID -- to plan the irrigation and drainage projects and to construct the related facilities together with executing O & M of the facilities provided in the projects.
- AC -- to conduct studies and researches on various farming practices and crops, and to render agricultural extension services as well as to supply agricultural inputs.
- AMD -- to render services in farm mechanization.
- VAHD -- to administer the animal husbandry.
- Fid -- to administer the inland fisheries.
- FoD -- to administer the forestries.
- MAB -- to administer the agricultural creditting.
- CD -- to administer agricultural cooperatives' activities.
- SLRD -- to evaluate the tax on lands, to make cadastration and registration, and to treat statistics of land use and farm products.
- SD -- to carry out surveyings.
- CLC -- to administer land reform and distribution of cultivation rights.
- AFPTC -- to administer the paddy purchase on the compulsory quota basis including.
- LDMC -- to administer production and marketing of products of animan husbandry.
- TIC -- to administer collection, processing and marketing of jute and cotton.
- TC -- to administer production and marketing of forestry products.
- WPSD -- to develop the State Farm and to carry out their management.

The Central People's Council is the nucleus of the national people's councils and there are the respective people's councils organized in every administration level of Division or State, Township, Village Tract, and Village. These people's councils execute

their own local administration. The members of the Central People's Council are assigned by election at the Phitu Hluttaw for the recommended candidates by the Burma Socialist Programme Party.

The infrastructural people's councils such as Division or State people's councils, etc. have sub-organizations discharging the regional or local social problems, economical problem as well as administration, justice and security. Especially, the Township People's Councils are organized of Executives, Justice and Inspectors, which take part in planning for executing the 4-year plan as well as its implementation under the cooperation of the government agencies. Such function covers the fields such as planning of annual cropping, organizing farmers for implementation of the cropping plan, arranging the agricultural credit, farm inputs and government's purchase of the farm products.

## 2) Land occupation system

In Burma, the land reform has been executed according to the laws and regulations effectuated from 1953 to 1963. At present, all of the farm lands, excepting the tree crop plantations, have been nationalized. The tenant farming system was abolished and the cultivation rights have been given to those who carry out the farming independently.

The Land Committee have been taking charge of matters concerning cultivation rights, collection of land revenue and treatment and settlement of appeals on the land problems. The Settlement and Land Record Department (SLRD), the MAF, is in charge of these works at the national level. In Division or States, or other infrastructural administration, the local Land Revenue Offices of SLRD are responsible for the said works.

Renting, mortgaging or distraining are forbidden for the lands for which the cultivation right are endowed to certain persons.

The cultivation right cannot be inherited, but usually endowed again to the family members, when those who have the cultivation right die. There is no particular restriction on the acreage of the lands which a person can have the cultivation right for, and such acreage depends on the capacity to cultivate the land.

On the other hand, there are many families which have no cultivation right, and these family members have been working on farm as hired farm labourers. For these families, the cultivation right will be endorsed when they apply to register at the village Land Committee concerned for any idle lands or abandoned lands.

The land reform executed has enabled about 4.4 million families throughout the nation to have the cultivation rights of about 2.19 ha (5.4 ac) lands on an average. (Refer to Table C-1-37)

The number of families which occupy less than 2.02 ha (about 5.0 ac) accounts for 87 percent of the total number of the families in the country, whereas the total acreage of the lands sown by these families occupies only 58 percent of the total acreage of the lands sown in the nation. The average acreage of lands sown by farmers of this class is 1.46 ha (3.6 ac) per family. Therefore, about 13 percent of the families in national total cultivates about 42 percent of the lands in national total. Thereby, the farmers occupying the larger lands than the above class cultivate the lands of about 6.88 ha (about 17 ac) per family.

### 3) Research and extension

#### a) Research

The agricultural Research Institute (ARI) and the Applied Research Division (ARD), both belonging to the AC of MAF are responsible for carrying out the basic and initial researches and applied and adaptive researches respectively. (Refer to Fig. C-1-3)

TABLE C-1-37 POSITION OF PEASANT FAMILIES AND LAND AREA OCCUPIED

Serial No.	Size of holdings	1974/75				1975/76			
		Numbers		Percentage		Numbers		Percentage	
		Peasant families	Acres	Peasant families	Acres	Peasant families	Acres	Peasant families	Acres
1	Unser 5 acres ...	2,708,407	6,073,798	62.55	25.86	2,728,559	6,147,696	62.70	26.11
2	5 to 10 acres ...	1,041,202	7,496,579	24.05	31.91	1,045,623	7,530,374	24.03	31.98
3	10 to 20 acres ...	467,071	6,564,665	10.79	27.95	466,057	6,541,803	10.71	27.79
4	20 to 50 acres ...	111,059	3,067,091	2.56	13.06	109,515	3,034,696	2.51	12.89
5	50 to 100 acres ...	1,847	118,502	0.04	0.50	1,824	117,115	0.04	0.50
6	100 acres and above ...	290	169,146	0.01	0.72	292	170,959	0.01	0.73
	<u>Total ...</u>	<u>4,329,916</u>	<u>23,489,781</u>	<u>100.00</u>	<u>100.00</u>	<u>4,351,870</u>	<u>23,542,643</u>	<u>100.00</u>	<u>100.00</u>

Ave. Size per peasant family 5.4

5.4

POSITION OF PEASANT FAMILIES AND LAND AREA OCCUPIED  
(Continued)

Serial No.	Size of holdings	1976-77 (Provisional Actual)			
		Numbers		Percentage	
		Peasant families	Acres	Peasant families	Acres
1	Under 5 acres ...	2,738,686	6,170,594	62.65	26.16
2	5 to 10 acres ...	1,053,516	7,571,345	24.10	32.09
3	10 to 20 acres ...	469,755	6,593,773	10.75	27.95
4	20 to 50 acres ...	107,101	2,973,450	2.45	12.60
5	50 to 100 acres ...	1,756	110,757	0.04	0.47
6	100 acres and above ...	305	173,036	0.01	0.73
	<u>Total ...</u>	<u>4,371,119</u>	<u>23,592,955</u>	<u>100.00</u>	<u>100.00</u>

Ave. Size per peasant family

5.4

NN Note: Land area occupied by peasant families includes cultivated and fallow lands

Source: Report to the Pyithu Hluttaw, 1978/79

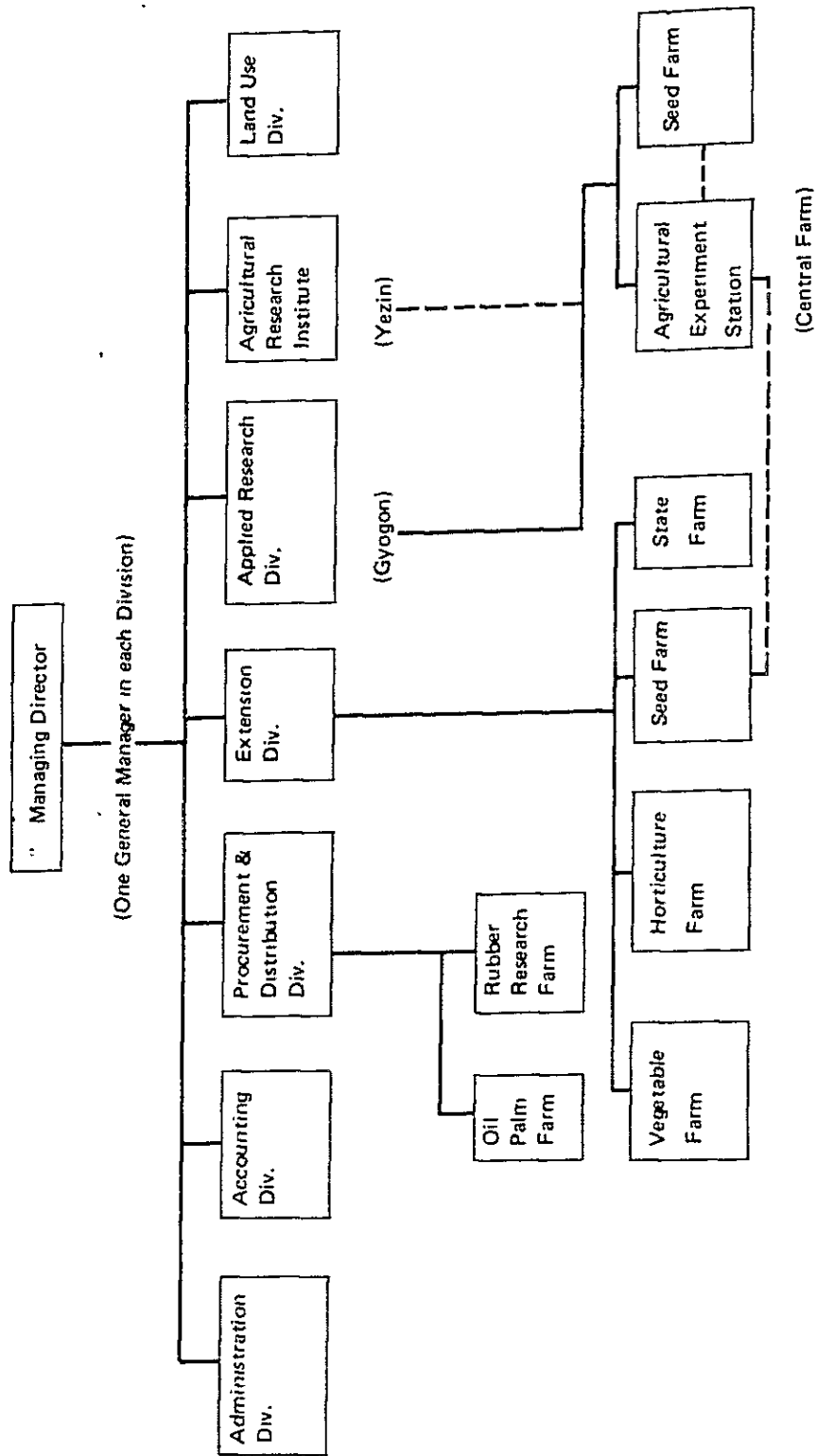


FIGURE C-1-3 ORGANIZATION OF AGRICULTURE CORPORATION



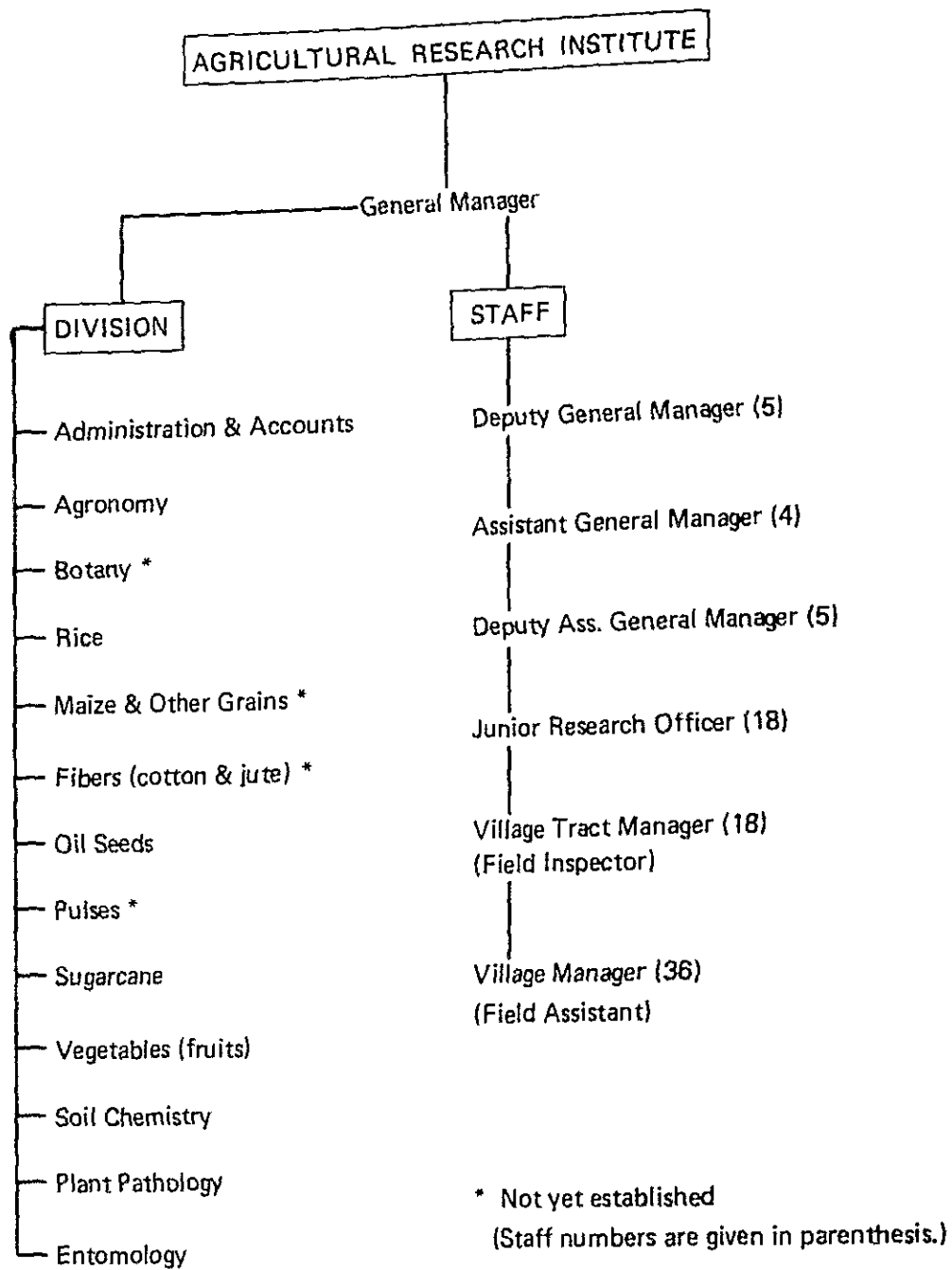
The ARI has moved to Yegin under the research strengthening project by UNDP (1974-78) and resumed researches there. The researches now carried out by eight sections will be expanded to those covered by 12 sections. The four sections in charge of rice, agronomy, plant pathology and oil seeds are adequately staffed but other four of sugar cane, vegetables, soil chemistry and entomology are not. It is urgently required to supply personnel in the field of the latter four sections to strengthen of ARI organization. (Refer to Fig. C-1-4)

The Crop Development Project under UNDP has been undertaken since 1978 for breeding and improvement of cultivation of the major upland crops of wheat, corn, sugarcane, and sunflower, groundnut, excepting for cotton. In this project implementation, the UNDP has dispatched the experts in the respective fields to conduct the basic researches and give guidance to the Burmese officials concerned.

The ARD provide 16 local experimental stations called "Central Farm", carrying out the following subjected matters: i) breeding of major crops at the regional level, ii) testing the seeds of promising strains and varieties, iii) conducting trials for farming practices and fertilization, iv) keeping O & M of foundation seed farms and breeding of foundation seeds, and v) giving training and education to the extension officers and farmers.

Most of the Central Farms, however, lack the necessary facilities and staff. Furthermore, most of the experimental farms have been provided with no irrigation facilities, and breeding and farming techniques for irrigated agriculture have not been advanced.

On the other hand, the Central Farms are located concentratively to a certain region in the country. For instance, there are six Central Farms out of 16 in the Mandalay Division, whereas no Central Farms in the Pegu Division. (Refer to Table C-1-38). The Government,



**FIGURE C-4 DIVISION AND STAFF OF ARI**

TABLE C-1-38 ACREAGE AND CROPS OF CENTRAL FARMS UNDER ARD

Sr. No.	Name of Central Farm	Township	Division /State	Year of Establishment	Total Area of Farm (ac)	Cultivated Area (ac)			Total	Others (ac)	Main Crop
						Paddy Land	Upland				
1	Mandalay*	Mandalay	Mandalay	1907	431	286	22	308	123	Paddy	
2	Kyaukse	Kyaukse	-do-	1957	101	64	9	73	28	Paddy	
3	Mahlaing*	Mahlaing	-do-	1920	251	-	211	211	40	Short Staple Cotton, Butter, Bean, Sultani	
4	Hlaing Dat	Thazi	-do-	1957	1,500	-	1,200	1,200	300	Long Staple Cotton	
5	Tatkon	Tatkon	-do-	1914	120	-	89	89	31	Maize	
6	Pyinmana	Pyinmana	-do-	1925	78	5	60	65	13	Sugarcane	
7	Magwe #	Magwe	Magwe	1946	200	-	162	162	38	Groundnut	
8	Hmawbi #	Hmawbi	Rangoon	1908	454	342	-	342	112	Paddy	
9	Myaungmya	Myaungmya	Irrawaddy	1926	86	58	-	58	28	Paddy	
10	Mudon	Mudon	Mon	1926	206	107	-	107	99	Paddy	
11	Akyab	Akyab	Arakan	1923	79	52	-	52	27	Paddy	
12	Paan	Paan	Karen	1957	140	45	5	50	90	Paddy	
13	Banyin	Sisaing	Shan	1959	2,963	12	700	712	2,251	Wheat, Soybean, Maize, Upland Paddy	
14	Nankwe	Myit-kyina	Kachin	1970	500	-	370	370	130	Sugarcane, Upland Paddy	
15	Ranthilo	Falam	Chin	1966	274	-	54	54	220	Terrace Cultivation, Horticulture	
16	Baw Khwe	Mindat	Chin	1966	550	-	32	32	518	Ibid	
	<u>Total</u>				<u>7,933</u>	<u>971</u>	<u>2,914</u>	<u>3,885</u>	<u>4,048</u>		

Note: \* Scheduled for development under UNDP/FAD Seed Development Project (1978-1981)

therefore, has planned to provide the new Central Farms in South Nawin (Pegu Division), Schwelaung (Irrawaddy Division) and Henzada (Irrawaddy Division) to cover the regions blanked with the Central Farms.

The FAO UNDP Seed Development Project (1978-1981) has been promoting improvement of the Central Farms with improving experimental farms, seed farms, necessary buildings and equipment for breeding and propagating seeds of paddy, cotton and groundnut, at the central Farms in Hmawbi, Mandalay, Magwe, and Mahlaing.

As an administrative organization of research activities, the country has the Research Policy Direction Board (RPDB), which, consisting of one Chairman - AC managing director - and the respective representatives from the MFP, AHD, MTI and related agricultural universities, discusses the general direction of the research and study. Along with directions prepared by RPDB, the Research Coordination Committee (RCCO consisting of the representatives from ARD, ARI and Extension Division, formulate the plan of the researches and studies to be conducted.

For programme preparation of the Seed Development Project, the National Research Coordination Committee (NRCC), composed of the RCC members plus the representative from planning and Statistic Department, is organized for successful execution of the said project under the cooperation of the experts dispatched by UNDP. (Refer to Fig. C-1-5)

#### b) Extension Services

The Extension Division of AC is staffed with 5,367 personnel for headquarters, Division/State offices, township offices, village tract offices and village offices. The total number of village tract managers and village managers is 5,082 persons and their responsible number of households and acreage to be covered are about 860 households and 3,800 ac per person respectively.

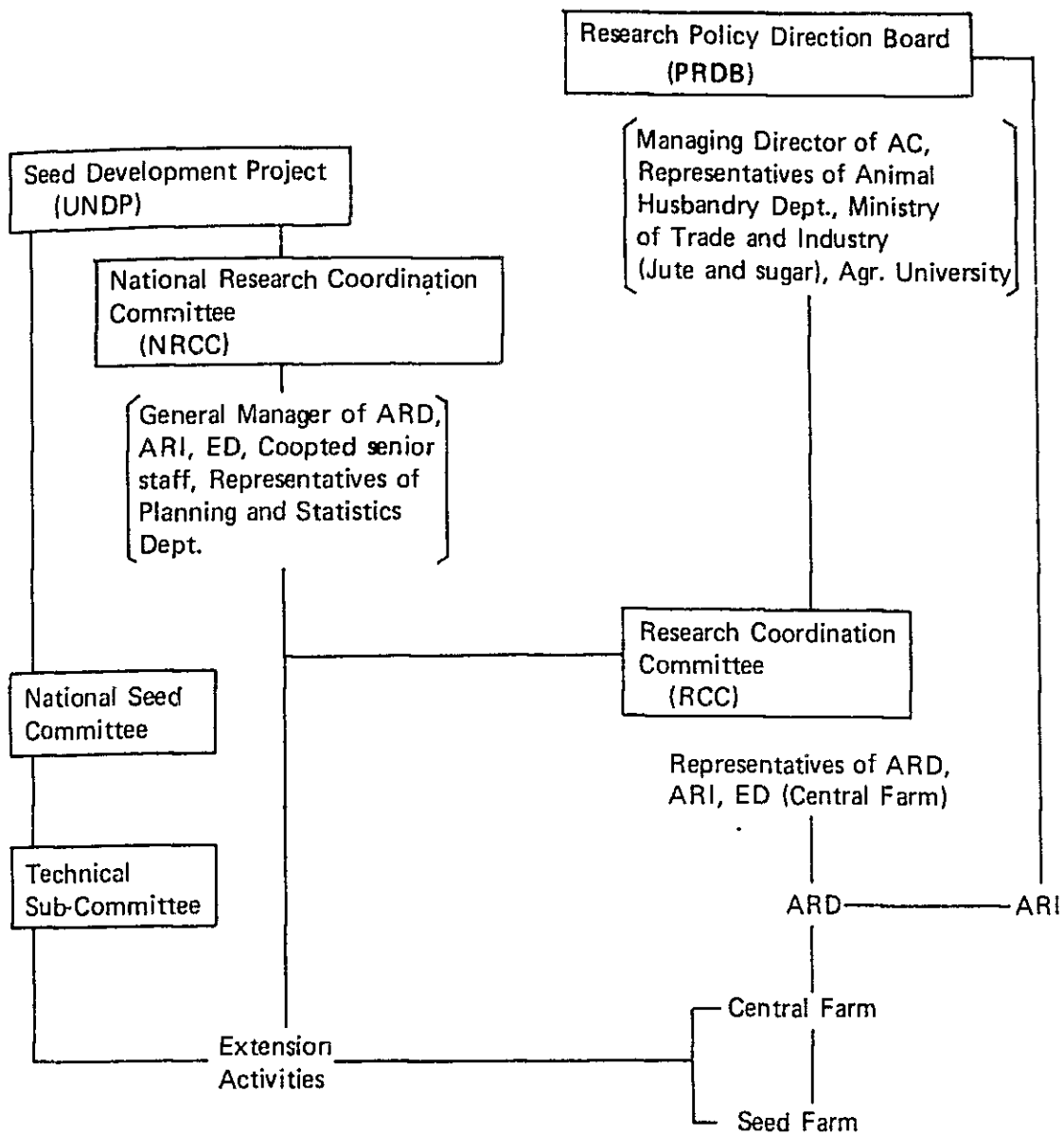


FIG. C-1-5 PLANNING PROCESS OF AGRICULTURAL RESEARCH

Shortage in number of the staff forces them to often cover more than one village or village tracts. In addition to the routine service, the village managers and village tract managers extension officers should be busy with assisting SLRD officers in their measurement of yield, and AFPTC officers in purchasing paddy, in crediting and collecting the advance payment to farmers. Furthermore, since the extension officers spare a great deal of time for preparing statistics for reporting, accounting, and taking part in various meeting for village council, peasant's council, local Land Committee, etc., they have only a little time to devote themselves to their original assignment of extension and guidance to the farmers.

On the other hand, they have no office spaces to station in the villages or village tracts, and no vehicles nor audio-visual education equipment, etc. for their activities.

The extension officers in Division or State agencies, township managers, village managers, and village tract managers are organized as staff of the AC local offices, and the relevant organization is shown as below.

<u>Level</u>	<u>Arrangement of Local Extension Officers</u>
Division	A Divisional Manager and two Deputy Manager (one for procurement and one for extension)
Township	A Township Manager and two Deputy Manager same as division level.
Village/ Village Tract	A dual purpose Village Tract or Village Manager

The township managers are generally occupied by those who have qualification of Diploma, or bachelors of agricultural college (BAG). At present, the Diplomas are positioned mainly as township managers. The village managers and the village tract managers are occupied by

high school graduates or graduates of higher grading schools. Recently, rising demand for extension workers has been increasing the number of Diploma or BAG who are assigned to the village or village tract managers.

The Burmese authorities concerned have provided system to give one month training to Diploma and BAG assigned as extension officers and 10-month training to those high-school graduates, and besides the above, the AC has given training to AC staff, farmers and soldiers at the Central Farms in the respective regions in the country. The educational equipment such as audio-visual instrument and necessary farming equipment are inadequately provided at present.

Some farmers have been specially trained as key farmers through whom the extension services have been rendered. As mentioned previously, however, the extension officers cannot spare sufficient time to devote themselves to original assignment of extension services, including upbringing of the key farmers. Therefore, the key farmers have not been effectively organized, excepting for those farmers who produce the seeds for distribution.

Instead of the farmers' organization made up by extension officers, the Party Unit, people's council, peasant council have established powerful organizations up to the village levels. These organizations have encouraged farmers to raise farm production according to the Four-year plan in supporting the extension activities. As mentioned above, there are so many points to be improved in extension activities, and upgrading and improvement in this field will result in successful farm production increase. For instance, the Whole Township Paddy Development Project started in 1975 in Taikkyi Township has proved that thicker staffing of extension officers, more intensified extension services and more adequate application of farm input have resulted in doubling the paddy yield within two years. In this Project, several camps have been placed in the township and the standardized farming works have





TABLE C-1-39 SEED FARM UNDER AGRICULTURE CORPORATION

<u>Division/ State</u>	<u>ll</u>	<u>Township</u>	<u>Name of Farm</u>	<u>Total Area (acre)</u>	<u>Remarks</u>
Sagaing Division		Moywa	Kyenone	300	Pulses, Sunflower
		Moywa	Zaloke	240	Wheat
		Shwebo	Chipa	106	Paddy
		Ye-u	Magyetaw	100	Paddy
		Sagaing	Padu	96	Paddy
		Sagaing	Chayataw	376	Cotton
		Kalay	Kalay	59	Pulses, Paddy
		Kandi	Kandi	48	Paddy
		Homeline	Homeline	100	Paddy
		Mow like	Mow like	50	Paddy
		Phoung Pyin	Phoung Pyin	106	Paddy
		Tamue	Pantha	320	Paddy
Mandalay Division		Maymyo	Maymyo	22	Wheat
		Sinkking	Sinkking	100	Paddy
		Meiktila	Meiktila	24	Pulses, Cotton
		Kyaukse	Lyonkyaw	5,106	Cotton, Sugarcane
		Lawai	Pantın	215	Sugarcane
		Myingyan	Myingyan	130	Pulses, Cotton
Magwe Division		Pakokku	Pakokku	215	Grd/nut, Pulses, Cotton
		Pwintpyu	Pwintpyu	161	Paddy
		Aunglan	Aunglan	145	Grd/nut, Sesame, S/F
		Thayat	Sarai	12	Groundnut
Pegu Division		Letpadan	Letpadan	82	Paddy, Sunflower, Paddy
		Paungde	Paungde	62	Paddy
		Pyu	Nyaungbintha	1,067	Sugarcane
		Pyu	Oakpyut	146	Sugarcane
		Pegu	Pegu	176	Paddy, Pulses
		Yetashe	Katumati	128	Sugarcane
		Yetashe	Sepinaye	473	Sugarcane

(Continued)

<u>Division/ State</u>	<u>Township</u>	<u>Name of Farm</u>	<u>Total Area (acre)</u>	<u>Remarks</u>
Rangoon Division	Thonegwa	Thonegwa	138	Paddy
Irrawaddy Division	Bassein	Thayoungchaung	150	Paddy
	Henzada	Takhontai	127	Paddy, Pulses
	Maunin	Panthaput	42	Paddy, Pulses
	Pyanpon	Outkuingyi	184	Paddy
Mon State	Thaton	Myenigone	110	Paddy
	Belin	Aninepon	418	Sugarcane
	Belin	Zokethoke	135	Sugarcane
	Kyikehto	Kamate	152	Sugarcane
	Kyikehto	Ava	188	Sugarcane
Chin State	Hakha	Hakha	90	Paddy
	Mintark	Kangyi	44	Paddy
	Palatwa	Palatwa	14	Paddy
Kachin State	Moenyin	Moenyin	51	Paddy
	Moenyin	Nanpoke	200	Sugarcane
	Putao	Putao	12	Paddy
	Myirkyina	Nankyin	200	Sugarcane
	Myirkyina	Nanmondane	173	Sugarcane
Shan State	Lashio	Napha	163	Paddy
	Kyaukme	Kyaukme	200	Sunflower, Maize
	Kalaw	Heho	217	Paddy, Pulses,
	Pintaya	Thapyaykone	54	Paddy
	Loilin	Pinlon	100	Paddy
	Taunggyi	Tayaw	53	Paddy
Kayah State	Loikaw	Loikaw	116	Paddy, Maize

Source: Agriculture Corporation

The trusted seed farmers are controlled by ARD of AC or Extension Division, and the supply or registered seeds to seed farmers and the purchase of propagated seeds from the said farmers are carried out by village managers. The distribution to the individual farmers also is carried out by village managers.

b) Supply of other inputs

At present, application of fertilizers and agri-chemicals is limited to those croppings of HYV paddy, jute, cotton, sugarcane and tobacco because the supply of these inputs is limited. Among the above two inputs, the agri-chemicals are supplied less than the fertilizers.

As the irrigated agriculture is developed in future, the demand for farm inputs will be largely increased. Therefore, it is quite necessary to firmly establish the input supply system including construction of plants of fertilizers and agri-chemicals to cope with the advancing situation.

5) Farm Mechanization Services

Farm mechanization services are being executed by AMD, of which details are referred to "Present Farm Mechanization" of II-6 in this Annex.

6) Agricultural Credit Supply System

The principal institution for agricultural credit at present is the Myanma Agricultural Bank (MAB). Some credit is also provided by the Agricultural Corporation in respect of industrial crops such as jute, cotton and sugar cane and by the Agricultural Produce Trade Corporation in the form of advance purchase system in respect of paddy.

Until 1953 Government extended loans to cultivators through Cooperatives societies and where these societies did not exist direct to cultivators. Since the repayment of loans extended through co-operatives was not satisfactory, the State Agricultural Bank was formed in 1953.

The State Agricultural Bank provide funds through cooperatives and its own village banks. Financing through cooperatives was discontinued in 1958.

The village banks are farmers' associations administered by the MAB. Each village bank covers a village tract and is managed by a locally appointed committee. The banks have no paid staff and their accounts are maintained by branch offices of MAB. The number of village banks has increased from 208 in 1955 to 11,226 in 1976. Since there are about 14,000 village tracts the number covered by village banks is considerable.

Loans are advanced to village banks at 6 percent interest and the village banks on-lend to farmers at 12 percent. The difference of 6% is received by the village banks as profit which is deposited in a profit deposit account. There is also savings deposit account to accumulate savings through a compulsory system of collecting one percent from each borrower at the time of repayment of loans. Village banks have been created not only as a machinery for providing loans to farmers on a collective basis, but also to accumulate capital and savings with a view to making them financially autonomous eventually. The total amount to the credit of village banks stands at K.107 million as at end September 1976.

Table C-1-40 shows the position of agricultural loans for the period ending September 1977. And the agricultural loans by crops are shown in Table C-1-4.

While it is difficult to assess the demand for credit by farmers for development needs such as tractors, implements, cattle and water pumps, the policy at present is to provide small farmers to meet cultivation expenses up to a certain extent. Total credit to each farmer has been limited to kyats 2,400 and it is estimated that the village bank crop loans for paddy, at K.70 per acre, would cover only half or less of the estimated cash costs required. It should also be noted that only farmers who have no over due loans are eligible for new loans. Medium term credit is not available in large amounts, and only a few loans have been granted for purposes such as cattle purchases.

As credit provided by existing institutions is mainly for seasonal needs and entirely in local currency, there is scope and need for international financial institutions to assist in the promotion of more widespread availability of agricultural credit.

TABLE C-1-40 AGRICULTURAL LOANS BY CROPS

(Unit: Kyat thousand)

<u>Crops</u>	<u>1974/75</u>	<u>1975/76</u>	<u>1976/77</u>	<u>1977/78</u>
Paddy	1,135	1,399	1,650	3,806
Wheat	2,573	3,172	4,548	4,812
Maize	838	1,060	1,227	2,418
Ground-nut	16,018	22,263	37,870	61,797
Sesamum	2,606	3,679	4,788	11,616
Ma'pe	146	160	302	503
Pedisein	229	286	345	747
Butter bean	507	650	1,067	1,993
Bocate	9	9	22	22
Sultani	94	86	154	272
Sultapya	337	442	701	1,225
Soya beans	54	48	155	176
Gram	567	663	1,494	1,643
Pelun	79	92	113	226
Pesingon	383	478	552	1,351
Peyin	51	54	76	139
Pebyugale	6	8	16	19
Peyi	213	279	456	820
Pegya	11	13	30	86
Sadawpe	231	228	504	552
Peyaza	39	11	23	33
Penauk	54	54	56	147
Chillies	1,923	2,820	3,182	3,170
Onions	1,406	1,716	1,937	2,100
Garlic	423	580	551	699
Potatoes	579	543	601	637
Virginia tobacco	470	547	-	-
Burmese tobacco	1,840	2,511	2,980	3,027
Sunflower oil	-	-	-	716
Mustard	-	-	-	100
<u>Total</u>	<u>32,821</u>	<u>43,860</u>	<u>65,400</u>	<u>104,852</u>

Source: Report to the Pyithu Hluttaw 1978/79

## II. AGRICULTURAL SITUATION IN THE MASTER PLAN SURVEY AREA

### II.1. General Description

The objective area of the Master Plan Survey (Survey Area) covers about 7,135 thousand acres (about 2.9 million hectares), and there are considerable differences in natural conditions such as rainfalls, etc. between the northern part and the southern part. Therefore, the Master Plan Study has grouped 26 townships in the objective area into eight (8) blocks according to different conditions of nature, geography and socio-economy.

The total acreage sown in the Area is about 2,909 thousand acres (about 1.2 million hectares), which is equivalent to about 41 percent of the gross acreage of the Area. The paddy fields occupy about 85 percent of the total acreage sown (about 2,471 thousand acres or about 1.0 million hectares), and the Kaing-land and the garden lands occupy most of the remaining 15 percent (about 438 thousand acres).

The objective area has population of about 3,342 thousand and household of about 668 thousand in number. The number of total farm households having their operating lands amounts 586 thousand, which is equivalent to about 87 percent of the total number of households in the Area. Hence, the net area sown per family was estimated at 4.7 acres, which is less than the national average of 5.4 acres per farm family.

The farm households holding less than 5.0 acres of their operating lands occupy about 64 percent of the total number of farm households.

The acreage of cultivable waste lands in the Area, 599 thousand acres is equivalent to about 21 percent against the acreage sown. Most of the cultivable waste lands are located in the high

lands suffering from frequent water shortage and the low-lying areas damaged by yearly floodings. So the water shortage and floodings have prevented these lands from cultivation.

The multiple cropping ratio - total sown area divided by net area sown - is 109 percent, which is smaller than the national average of 117 percent. In all the blocks specified into eight, the acreage sown with paddy occupies the largest portion of the total acreage sown. The acreage was about 2,200 thousand acres in 1976/77, which was equivalent to about 82 percent of the total net area sown in the period. The average paddy yield from 1970/71 to 1977/78 in the Area on the matured and planted area basis was 41.1 baskets/acre and 39.6 baskets/acre respectively. The total production amounted to 87,056 thousand baskets per year in the period.

Major crops other than paddy are pulses, groundnut, jute and sesame, the acreage sown with which were 204 thousand acres, 137 thousand acres, 55 thousand acres, and 42 thousand acres, respectively. These crops except for jute, are grown mainly in the Kaing-lands from the end of the rainy season or in the paddy fields after harvesting of the rainy season paddy.

The existing irrigated fields occupy only 3.7 percent of the total net area sown. Therefore, almost all crops, including the upland crops after rainy season have been grown without irrigation. Furthermore, insufficiency in provision of flood control and drainage facilities has caused the crop yield to be low and unstable. In other words, the frequent water shortage and floodings have resulted in poor harvest or sometimes no harvest and prevented the stable production according to the annual cropping calendar. These factors are one of the causes to compel the agriculture in the Project Area to remain in extensive farming.



## II.2. Farm Size and Land Tenure

### 1) Population, Farm Families and Farm Labor

The Project Area has a population of 3,342 thousand, out of which group aged under 18 years occupies about 42 percent of the total and the remainder of 58 percent is a group aged more than 18 years. (Refer to Table C-2-1). On the assumption that one family is composed of five members<sup>/1</sup>, the total number of the family in the Project Area would be estimated at 668 thousand.

The number of farm families holding their own operating lands, which was estimated at 586 thousand in 1975/76, occupies 87.7 percent of the total number of the families in the Project Area. (Refer to Table C-2-2). Hence, the remaining 12.3 percent (82 thousand families) would be non-farm families or farm families holding no operating lands.

Since no data are obtained on breakdown of the families in the Project Area, the following assumption is made to estimate the labor force available in the Area. That is, in taking the labor force per family by 3.2<sup>/1</sup> person and the number of families holding no operating lands by 82,000, the estimated farm labor force in the Project Area is 2,138,000 persons [(586,000 families + 82,000 families) x 3.2 person.]

### 2) Farm Size

The average acreage of the land holding per farm family was 4.7 acres (excluding the fallow lands) in 1977/78, which was slightly less than the national average of 5.4 acres in 1975/76. The block-wise average acreage sown is 7.0 acres for the capital zone, 3.6 acres for the Padaung block, 3.7 acres for the Bassein block, and 4.7 acres for the other blocks. (Refer to Table C-2-2).

The study on distribution of farm families in the Project Area by sown acreages (the farm families holding their own operating lands and the same is to be used in the following paragraphs as well) revealed that about 63 percent of the total farm households in the

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<sup>/1</sup>-- The estimation of the average family members and labor force per family was made in reference to the figure quoted in the World Bank Appraisal Report for Paddy Land Development Project.

TABLE C-2-1 POPULATION IN THE MASTER PLAN SURVEY AREA (1977/78)

Sr. No.	Township	No. of Ward & Village Tract	Population		
			Under 18 yrs	18 yrs & Over	Total
1	Paukkaung	58	33,791	40,513	74,304
2	Prome	47	68,473	82,335	150,808
3	Padaung	43	43,593	63,761	107,354
4	Paungde	54	45,438	61,684	107,122
5	Thegon	47	46,019	62,601	108,620
6	Shwedaung	51	43,353	65,050	108,403
7	Nattalin	82	54,778	78,711	133,489
8	Zigon	34	25,204	34,326	59,530
9	Gyobingauk	59	37,872	57,324	95,196
10	Monyo	42	42,546	62,098	104,644
11	Okpo	60	39,661	54,950	94,611
12	Minhla	63	39,745	58,896	98,641
13	Letpadan	53	58,732	82,945	141,677
14	Tharrawaddy	69	48,318	70,618	118,936
	<u>Sub-total</u>	<u>762</u>	<u>627,523</u>	<u>875,812</u>	<u>1,503,335</u>
15	Taikkyi	8	62,136	79,466	141,602
16	Hlegu	5	68,879	73,805	142,684
17	Hmawbi	4	49,079	53,662	102,741
	<u>Sub-total</u>	<u>17</u>	<u>180,094</u>	<u>206,933</u>	<u>387,027</u>
18	Kyangin	33	29,371	44,244	7,677
19	Myanaung	96	76,126	114,211	190,337
20	Ingabu	76	73,825	116,872	190,697
21	Lemyethna	44	36,456	52,068	88,524
22	Yegyi	99	66,984	93,090	160,074
23	Henzada	123	115,312	168,555	283,867
24	Zalun	81	61,504	86,975	148,479
25	Kyonpyaw	51	76,372	96,999	173,371
26	Danubyu	63	58,258	84,380	142,638
	<u>Sub-total</u>	<u>666</u>	<u>594,208</u>	<u>857,394</u>	<u>1,451,602</u>
	<u>Total</u>	<u>1,445</u>	<u>1,401,825</u>	<u>1,940,139</u>	<u>3,341,964</u>

TABLE C-2 -2 NUMBER OF FARM FAMILIES, OCCUPIED AREA AND AVERAGE FARM SIZE

Block	All Farm Families		Farm Families, Only Paddy Cultivation	
	Farm Families 1/ Occupied Area (acre)	Farm Size 2/ Ave. (acre)	Farm Families 1/ Occupied Area (acre)	Farm Size 2/ Ave. (acre)
Prome	71,172	4.7	35,652	5.2
Padaung	32,595	3.4	16,154	4.0
Myitmaka, Upper	106,538	3.8	63,364	5.1
Myitmaka, Middle	76,717	5.0	58,201	6.1
Capital	43,143	9.2	31,187	11.5
Bassein	131,419	4.1	76,868	5.6
Delta	124,227	4.7	67,542	7.0
<u>Total</u>	<u>585,811</u>	<u>4.7</u>	<u>348,968</u>	<u>6.3</u>

Note: 1/ Farm families who hold cultivated lands under land use rights

2/ Including fallow lands, but excluding the cultivated lands in the state farms and cooperative societies farms

Source: AC

Area has operated the sown acreage below 5.0 acres and the average acreage sown per farmer was estimated at only 2.1 acres. The total acreages sown by these average farmers occupies about 28 percent of the grand total sown acre of the Area. (Refer to Table C-2-3).

On the other hand, the farmers operating more than 5.0 acres lands occupy the remaining 37 percent and the total acreage of their lands was estimated at 72 percent of the grand total sown acreage of the Area. The study found that the farmers more than 60 percent in the Project Area operate the lands less than the average.

### 3) Farm Families by Farming Types

The farming type-wise distribution of number of farmers in the Irrawaddy and the Pegu Division, is shown in Table C-2-4. The farmers cropping paddy only occupy 68 percent of the total farmers, those cropping vegetables and fruit-trees occupy 17 percent, those cropping upland crops in Kang-land occupy nine percent, those cropping paddy and upland crops occupy one percent, and those cropping in other type occupy five percent. Furthermore, the sown acreage operated by the farmers who grow only paddy account for 88 percent of the total sown acreage and the other type of farmers cover the remaining 12 percent. These facts suggest that the farmers cropping only paddy are larger in the farming size than the farmers in other types of farming.

In the whole Project Area, the farmers who grow only paddy occupy about 60 percent of the total farmers with average 6.3 acres of the sown acreage. The size is larger than the average of the sown acreage in the Project Area. (Refer to Table C-2-5). The block-wise average sown acreage by the farmers cropping only paddy is that the largest one is 11.5 acres in capital block, and the larger acreages are seen in the downstream blocks of the Irrawaddy River than those in the upper stream blocks.

TABLE C-2-3 POSITION OF FARM FAMILIES AND LAND AREA OCCUPIED (1977/78)  
ALL FARM FAMILIES

(Unit: family, acre)

Zone	Under 5 acres		5-10 acres		10-20 acres		20-50 acres		50-100 acres		Over 100 acres		Total <sup>1/</sup>	Acre per Family
	F		A		F		A		F		A			
	F	A	F	A	F	A	F	A	F	A	F	A		
Prome	(64.5)	(37.8)	(30.0)	(43.4)	(6.1)	(16.9)	(0.4)	(1.9)	(-)	(-)	(-)	(-)	(100.0)	(100.0)
	46,094	124,853	20,684	143,238	4,346	55,935	261	6,367	-	-	-	-	71,385	330,393
Padaung	(75.6)	(50.9)	(22.1)	(40.7)	(2.2)	(7.9)	(0.1)	(0.5)	(-)	(-)	(-)	(-)	(100.0)	(100.0)
	23,686	57,980	6,918	46,273	691	8,952	26	602	-	-	-	-	31,321	113,807
Myitnaka, Upper	(64.0)	(23.7)	(30.2)	(49.0)	(4.6)	(16.9)	(0.1)	(0.7)	(-)	(-)	(-)	(-)	(100.0)	(100.0)
	59,310	140,964	28,044	207,266	5,248	71,426	127	3,055	-	-	-	-	92,729	422,711
Myitnaka, Middle	(52.7)	(19.2)	(6.7)	(48.5)	(10.7)	(25.0)	(0.8)	(7.2)	(0.0)	(-)	(-)	(-)	(100.0)	(100.0)
	39,442	77,308	26,814	194,905	8,073	100,605	590	28,813	2	12	-	-	74,871	401,653
Capital	(38.5)	(10.9)	(25.3)	(21.9)	(31.0)	(42.3)	(2.7)	(9.7)	(2.5)	(14.8)	(0.0)	(0.3)	(100.0)	(100.0)
	16,869	33,502	11,077	67,079	13,589	129,595	1,145	29,707	1,047	45,382	2	1,003	43,769	306,268
Bassein	(70.5)	(35.1)	(20.9)	(40.0)	(7.0)	(18.4)	(1.0)	(6.6)	(0.0)	(0.1)	(-)	(-)	(100.0)	(100.0)
	94,816	176,156	28,136	199,685	10,244	92,594	1,305	33,218	6	342	-	-	134,512	501,985
Salta	(62.4)	(24.0)	(25.3)	(39.3)	(11.0)	(29.6)	(1.3)	(6.9)	(0.0)	(0.1)	(-)	(-)	(100.0)	(100.0)
	77,621	142,400	31,513	232,613	13,631	175,622	1,616	41,216	10	516	-	-	124,391	592,367
<b>Total</b>	(62.5)	(28.2)	(26.7)	(40.9)	(9.7)	(23.8)	(8.8)	(5.4)	(0.2)	(1.7)	(0.0)	(0.0)	(100.0)	(100.0)
	357,838	753,163	159,186	1,091,059	55,777	634,719	5,070	142,978	1,105	46,252	2	1,003	572,978	2,669,174
<b>Total Union (x 1000)</b>	(62.2)	(26.1)	(24.0)	(32.0)	(10.7)	(27.8)	(2.5)	(12.9)	(0.0)	(0.1)	(0.0)	(0.1)	(100.0)	(100.0)
	2,729	6,148	1,046	7,530	406	6,542	110	3,035	2	117	0	171	4,352	23,543

Note: (1) F: Farm Family, A: Occupied Area

(2) The figures in parenthesis show percent of total farm families or total occupied area

(3) In case of total union is for the data in 1975/76

<sup>1/</sup> There are some differences on numbers of farm families between the figures in this table and those in Table C-2-2 because of different data sources

Source: See table

TABLE C-2-4 NUMBERS OF FARM FAMILY AND CULTIVATED AREA  
BY CROPPING PATTERN (1970/71)

(unit: %)

Cropping Pattern Region	Paddy only	Up- land Paddy only	Paddy+ Diver- sified Crops	Kaing Land	Orchard/ Vegetables	Rubber	Others	Total
1. Numbers of Farm Families								
a) Lower Burma	67.5	1.7	0.9	8.6	16.6	-	4.7	100.0
-Irrawaddy Div.	66.6	0.5	-	9.5	19.1	-	4.3	100.0
-Pegu Div.	68.7	3.2	1.9	7.6	13.5	-	5.1	100.0
b) Upper Burma	25.9	34.2	21.1	13.0	0.6	-	5.2	100.0
-Mandalay Div.	26.8	40.0	22.5	8.4	1.0	-	1.3	100.0
-Magwe Div.	15.6	37.1	23.1	16.0	0.2	-	8.0	100.0
-Sagaing Div.	36.0	25.8	17.6	14.1	0.6	-	5.9	100.0
c) Others	46.4	14.9	1.5	2.6	16.4	1.2	17.0	100.0
<u>Total</u>	<u>44.1</u>	<u>18.8</u>	<u>8.7</u>	<u>8.1</u>	<u>10.5</u>	<u>0.4</u>	<u>9.4</u>	<u>100.0</u>
2. Cultivated Area <sup>1/</sup>								
a) Lower Burma	86.6	0.7	0.7	4.4	3.7	0.2	3.7	100.0
-Irrawaddy Div.	87.3	0.3	-	4.9	4.7	-	2.8	100.0
-Pegu Div.	85.7	1.2	1.5	3.8	2.3	0.6	4.9	100.0
b) Upper Burma	23.8	37.5	27.8	7.3	0.2	-	3.4	100.0
-Mandalay Div.	23.7	37.9	33.2	4.1	0.3	-	0.8	100.0
-Magwe Div.	13.6	47.1	24.9	8.1	0.1	-	6.2	100.0
-Sagaing Div.	30.9	30.6	24.9	9.7	0.2	-	3.8	100.0
c) Others	60.4	13.0	1.9	1.3	5.8	3.0	14.6	100.0
<u>Total</u>	<u>53.2</u>	<u>19.3</u>	<u>11.9</u>	<u>4.6</u>	<u>3.0</u>	<u>1.0</u>	<u>7.0</u>	<u>100.0</u>

Note ; <sup>1/</sup>... Including fallow area

Source ; AC.

TABLE C-2-5 POSITIONS OF FARM FAMILIES AND LAND AREA OCCUPIED BY ZONE (1975/76).  
FARM FAMILIES MANAGING ONLY PADDY CULTIVATION

Zone	Nos. of Farm Family					Occupied Area					Ave. Area		
	0-5	5-10	10-20	20-50	over 50	Total	0-5	5-10	10-20	20-50	over 50	Total	per Family
Prome	(59.7)	(33.3)	(6.8)	(0.2)		(100.0)	(35.6)	(44.1)	(18.3)	(2.0)		(100.0)	
	21,268	11,860	2,419	65		35,612	66,036	81,777	33,997	3,647		185,457	5.2
Padaung	(69.2)	(28.4)	(2.0)	(0.4)		(100.0)	(42.8)	(47.2)	(9.5)	(0.5)		(100.0)	
	11,183	4,583	323	65		16,154	28,000	30,868	6,240	253		65,361	4.0
Myitaka, Upper	(55.3)	(37.9)	(6.8)			(100.0)	(29.6)	(52.2)	(17.8)	(0.4)		(100.0)	
	35,033	24,020	4,311			63,364	95,754	168,472	57,484	1,249		322,959	5.1
Myitaka, Middle	(40.8)	(45.0)	(13.6)	(0.6)		(100.0)	(15.4)	(52.8)	(27.4)	(4.4)		(100.0)	
	23,735	26,207	7,903	356		58,201	54,551	186,687	96,770	15,438		353,446	6.1
Capital	(16.1)	(32.0)	(42.0)	(9.6)	(0.3)	(100.0)	(4.3)	(21.7)	(51.2)	(21.5)	(1.3)	(100.0)	
	5,017	9,987	13,085	2,982	116	31,187	15,476	77,900	184,140	77,266	4,754	359,536	11.5
Bassein	(54.2)	(21.4)	(12.5)	(1.9)		(100.0)	(24.3)	(39.4)	(29.1)	(7.1)	(0.1)	(100.0)	
	41,875	24,168	9,586	1,439		76,868	105,250	171,046	126,441	30,678	583	433,998	5.6
Delta	(38.3)	(40.3)	(19.4)	(2.0)		(100.0)	(12.7)	(43.1)	(35.5)	(8.7)		(100.0)	
	25,873	27,201	13,116	1,332		67,522	59,839	202,175	166,558	40,832	5,887	469,504	7.0
Total	(46.9)	(36.7)	(14.5)	(1.8)	(0.1)	(100.0)	(19.4)	(42.0)	(30.7)	(7.7)	(0.2)	(100.0)	
	163,784	128,026	50,743	6,239	116	348,908	424,906	918,925	671,730	169,363	5,337	2,190,261	6.3

Note: The figures in the parenthesis show the percentages of total family or total area occupied  
Source: AC

### II.3. Present Land Use and Cropping Pattern

#### 1) Present Land Use

The Study Area has a total of 2,909 thousand acres of the cultivated acreage, which includes the current fallow acreage, and the cultivated acreage ratio to the total Project Area is about 41 percent. (Refer to Table C-2-6). About 2,470 acres of cultivated acreage, 85 percent of the total cultivated acreage are paddy fields, while about 438 thousand acres, 15 percent of the total, are Kaing-lands, garden lands, Ya-lands, shifting lands, and Dani-lands, the respective ratios to the total cultivated acreage are 7.4 percent, 6.1 percent, 1.0 percent, 0.4 percent and 0.2 percent. In every block, the paddy fields occupy about 80 percent of the total cultivated acreage, and Kaing-lands, Ya-lands and garden lands equally share in the remaining acreage of about 20 percent in the Prome and the Padung blocks, while Kaing land and garden lands cover most of the remaining 20 percent in the downstream blocks along the Irrawaddy River. In comparison, the occupying ratio of Kaing-lands and garden lands in downstream blocks, the Kaing-lands exceeds the garden lands in the Myitnaka upper blocks, the garden lands exceed the Kaing-lands in the Capital block, and the Kaing-land and the garden lands share equally in the Bassein and the Delta blocks. (Refer to Table C-2-7).

In the Survey Area, there are about 75 thousand acres of grazing lands which supply the feeds mainly in the dry season for cattle breeding. On the Table C-2-6, the other lands include the grazing lands.

In the Survey Area, there are about 600 thousand acres of cultivable waste lands, being equivalent to about 21 percent of the total cultivated acreage; those in the Prome block is equivalent to about 69 percent of the total cultivated acreage in the block, and those in other blocks range from 3.2 to 27.7 percent of the total cultivated acreage in the respective blocks. The main reason why these lands are yet uncultivated seems that the cultivable waste



TABLE C-2-6 PRESENT LAND USE (1976/77)

(unit: 1,000ac)

Land Category	Promo	Padaung	Myitmaka		Capital	Bassein	Delta	Total
			Upper	Middle				
1 Net Sown Area <sup>1/</sup>								
(a) Paddy	269.8	83.1	340.6	345.7	357.7	426.3	462.8	2,186.0
(b) Ya	14.3	7.8	2.5	1.8	-	2.8	-	29.2
(c) Kaing	14.9	8.2	31.5	18.6	1.0	62.8	56.3	193.3
(d) Garden	14.3	8.8	15.6	6.8	28.1	34.3	55.2	163.1
(e) Dani	-	-	-	-	3.0	-	-	3.0
(f) Shifting	6.9	0.4	3.0	1.1	-	-	-	11.4
<u>Total</u>	<u>320.2</u>	<u>108.3</u>	<u>393.2</u>	<u>374.0</u>	<u>389.8</u>	<u>526.2</u>	<u>574.3</u>	<u>2,686.0</u>
2 Current Fallow								
(a) Paddy	11.3	2.0	18.1	25.0	54.2	27.4	47.2	184.7
(b) Ya	0.4	0.1	0.0	0.4	-	0.1	-	1.0
(c) Kaing	0.2	0.0	7.6	6.1	0.1	4.7	4.0	22.7
(d) Garden	0.4	0.4	0.1	0.1	3.5	9.0	0.6	14.1
(e) Dani	-	-	-	-	0.4	-	-	0.4
(f) Shifting	-	-	-	-	-	-	-	-
<u>Total</u>	<u>12.3</u>	<u>2.5</u>	<u>25.8</u>	<u>31.6</u>	<u>58.2</u>	<u>41.2</u>	<u>51.8</u>	<u>223.4</u>
3 Cultivated Area (1+2)								
(a) Paddy	281.1	85.1	358.7	370.7	411.9	453.7	510.0	2,470.7
(b) Ya	14.7	7.9	2.5	2.2	-	2.9	-	30.2
(c) Kaing	15.1	8.2	39.1	24.7	1.1	67.5	60.3	216.0
(d) Garden	14.7	9.2	15.7	6.9	31.6	43.3	55.2	177.2
(e) Dani	-	-	-	-	3.4	-	-	3.4
(f) Shifting	6.9	0.4	3.0	1.1	-	-	-	11.4
<u>Total</u>	<u>332.5</u>	<u>110.8</u>	<u>419.0</u>	<u>405.6</u>	<u>448.0</u>	<u>567.4</u>	<u>626.1</u>	<u>2,909.4</u>
4 Un-cultivated Area								
(a) Reserved Forest	249.1	506.1	339.5	418.9	288.7	471.7	-	2,274.0
(b) Un-reserved Forest	72.4	20.7	33.6	74.8	17.5	57.9	-	276.9
(c) Culturable Wastes	229.6	3.5	68.8	49.4	124.2	88.8	34.6	598.9
(d) Others	156.2	262.9	115.3	98.8	114.6	172.0	155.9	1,075.7
<u>Total</u>	<u>707.3</u>	<u>793.2</u>	<u>557.2</u>	<u>641.9</u>	<u>545.0</u>	<u>790.4</u>	<u>190.5</u>	<u>4,225.5</u>
5 <u>Ground Total</u> <u>1,039.8</u> <u>904.0</u> <u>976.2</u> <u>1,047.5</u> <u>993.0</u> <u>1,357.8</u> <u>816.6</u> <u>7,134.9</u>								

Note 1/ Including the area cultivated within the reserved forest and demarcated grazing lands

Source: Settlement and Land Record Department

TABLE C-2-7 CULTIVATED AREA BY LAND CATEGORY AND BLOCK (1976/77)

Land Category	Prome	Padaung	Myitnaka, Myitnaka,			Capital	Bassein	Delta	Total
			Upper	Middle	Delta				
(a) Paddy	84.5	76.8	85.6	91.4	91.9	80.0	81.5	84.9	
(b) Ya	4.4	7.1	0.6	0.5	-	0.5	-	1.0	
(c) Kaing	4.5	7.4	9.3	6.1	0.2	11.9	9.6	7.4	
(d) Garden	4.4	8.3	3.7	1.7	7.1	7.6	8.8	6.1	
(e) Danj	-	-	-	-	0.8	-	-	0.2	
(f) Shifting	2.1	0.4	0.7	0.3	-	-	-	0.4	
<u>Total</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	

(Unit: %)

Source: Settlement and Land Record Department

lands in the upper stream blocks such as the Prome block have suffered from drought damages in high lands, and those in the down-stream blocks extend in the frequent flooding areas.

## 2) Present Cropping Pattern

### a) Sown Area

In 1976/77, about 2,686 thousand acres (about 92%) out of the whole cultivated acreage of 2,909 thousand acres in the Survey Area were cropped and the gross sown area in the year was estimated at about 2,920 acres. (Refer to Tables C-2-8 and C-2-9). The cropping intensity - the ratio of gross sown area to the net area sown - was estimated at about 109 percent which has not reached the national average of 117 percent.

In the same year, the acreage sown with paddy was 2,200 thousand acres, which occupied about 82 percent of the net area sown in the Survey Area, while the acreage sown with crops other than paddy was about 720 thousand acres which occupied only 28 percent of the net area sown. The diversified crops grown in the Survey Area were pulses with cropping ratio of 7.6 percent of the net area sown, groundnut with 5.1 percent, jute with 2.0 percent, sesame with 1.6 percent, cotton with 0.3 percent and other crops with 10.2 percent, respectively. The above "other crops" include various kinds of crops such as vegetables, maize, cassava, sugar cane, fruit-trees, nippa, rubber plants, and so forth. (Refer to Table C-2-8 and Table C-2-9).

The Myitmaka Middle, the Capital and the Delta blocks have comparatively higher cropping intensity of 111.1 percent, 114.8 percent and 109 percent than those of the other blocks in the Survey Area. These blocks with high cropping intensity have a larger amount of rainfall than the blocks located in the upper stream of the Irrawaddy River have. As shown in the following table, very few year-round irrigation facilities available in the Survey Area have forced the multiple cropping to be carried in the very limited areas.

TABLE C-2-8 SOWN AREA BY CROP AND BLOCK (1976/77)

(unit: 1,000 acre)

Item	Prome	Padaung	Myitmaka		Capital	Bassein	Delta	Total
			Upper	Middle				
1 Sown Area								
(a) Paddy								
-HYV <sup>1/</sup>	7.7	1.3	18.7	51.8	50.9	38.1	49.7	218.2
-Others	250.9	80.7	291.0	284.5	301.6	383.6	389.8	1,982.1
<u>Total</u>	<u>258.6</u>	<u>82.0</u>	<u>309.7</u>	<u>336.3</u>	<u>352.5</u>	<u>421.7</u>	<u>439.5</u>	<u>2,200.3</u>
(b) Jute								
-Pre-monsoon	0.0	0.1	0.4	0.8	2.3	3.5	16.9	24.0
-Monsoon	1.0	1.5	18.8	1.9	0.7	2.4	4.7	31.0
<u>Total</u>	<u>1.0</u>	<u>1.6</u>	<u>19.2</u>	<u>2.7</u>	<u>3.0</u>	<u>5.9</u>	<u>21.6</u>	<u>55.0</u>
(c) Groundnut								
-Rain	4.9	1.2	1.3	1.3	0.1	4.7	0.1	13.6
-Winter	11.1	8.8	10.9	20.2	6.5	36.7	29.3	123.5
<u>Total</u>	<u>16.0</u>	<u>10.0</u>	<u>12.2</u>	<u>21.5</u>	<u>6.6</u>	<u>41.4</u>	<u>29.4</u>	<u>137.1</u>
(d) Sesame								
-Early	13.3	1.3	5.4	-	-	-	-	20.0
-Late	1.3	0.9	3.0	4.2	3.7	5.3	3.5	21.9
<u>Total</u>	<u>14.6</u>	<u>2.2</u>	<u>8.4</u>	<u>4.2</u>	<u>3.7</u>	<u>5.3</u>	<u>3.5</u>	<u>41.9</u>
(e) Pulses								
-Matpe	0.0	0.0	0.3	0.4	0.9	2.9	39.7	44.2
-Bocate	0.5	0.2	2.2	6.1	0.4	2.4	7.6	19.4
-Pelum	0.2	0.2	0.6	1.2	0.1	1.7	6.7	10.7
-Others <sup>2/</sup>	8.4	2.6	58.4	5.4	2.3	22.5	30.3	129.4
<u>Total</u> <sup>2/</sup>	<u>9.1</u>	<u>3.0</u>	<u>61.5</u>	<u>13.1</u>	<u>3.7</u>	<u>29.5</u>	<u>84.3</u>	<u>204.2</u>
(f) Cotton								
-L.S.C.	0.1	0.0	0.0	-	-	-	-	0.1
-Others	5.7	0.5	2.0	-	-	-	-	8.2
<u>Total</u>	<u>5.8</u>	<u>0.5</u>	<u>2.0</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>8.3</u>
(g) Others	27.4	11.6	6.1	37.9	78.3	63.6	47.9	272.8
<u>Grand Total</u>	<u>332.5</u>	<u>110.9</u>	<u>419.1</u>	<u>415.7</u>	<u>447.8</u>	<u>587.4</u>	<u>626.2</u>	<u>2,919.6</u>
2 Net Sown Area	<u>320.2</u>	<u>108.3</u>	<u>393.2</u>	<u>374.0</u>	<u>389.8</u>	<u>526.2</u>	<u>574.4</u>	<u>2,686.1</u>

Note <sup>1/</sup> In the year of 1977/78<sup>2/</sup> In the year of 1975/76

TABLE C-2-9 PERCENTAGE OF SOWN AREA BY CROP AND BLOCK (1976/77)

(unit: %)

Land Category	Prome	Padaung	Myitmaka		Capital	Bassein	Delta	Total
			Upper	Middle				
1 Sown Area								
(a) Paddy								
-HYV <sup>1/</sup>	2.4	1.2	4.8	13.9	13.1	7.2	8.7	8.1
-Others	78.4	74.5	74.0	7.6	77.3	72.9	67.8	73.8
<u>Total</u>	<u>80.8</u>	<u>75.7</u>	<u>78.8</u>	<u>89.9</u>	<u>90.4</u>	<u>80.1</u>	<u>76.5</u>	<u>81.9</u>
(b) Jute								
-Pre-monsoon	0.0	0.1	0.1	0.2	0.6	0.7	2.9	0.9
-Monsoon	0.3	1.4	4.8	0.5	0.2	0.4	0.9	1.1
<u>Total</u>	<u>0.3</u>	<u>1.5</u>	<u>4.9</u>	<u>0.7</u>	<u>0.8</u>	<u>1.1</u>	<u>3.8</u>	<u>2.0</u>
(c) Groundnut								
-Rain	1.5	1.1	0.3	0.3	0.0	0.2	0.0	0.5
-Winter	3.5	8.1	2.8	5.4	1.7	7.7	5.1	4.6
<u>Total</u>	<u>5.0</u>	<u>9.2</u>	<u>3.1</u>	<u>5.7</u>	<u>1.7</u>	<u>7.9</u>	<u>5.1</u>	<u>5.1</u>
(d) Sesame								
-Early	4.1	1.2	1.4	-	-	-	-	0.7
-Late	0.5	0.8	0.7	1.1	0.9	1.0	0.6	0.9
<u>Total</u>	<u>4.6</u>	<u>2.0</u>	<u>2.1</u>	<u>1.1</u>	<u>0.9</u>	<u>1.0</u>	<u>0.6</u>	<u>1.6</u>
(e) Pulses								
-Matpe	0.0	0.0	0.1	0.1	0.2	0.6	6.9	1.6
-Bocate	0.2	0.2	0.6	1.6	0.1	0.5	1.3	0.7
-Pelun	0.1	0.2	0.2	0.3	0.0	0.3	1.2	0.4
-Others <sup>2/</sup>	2.5	2.4	14.7	1.5	0.6	4.2	5.3	4.9
<u>Total<sup>2/</sup></u>	<u>2.8</u>	<u>2.8</u>	<u>15.6</u>	<u>3.5</u>	<u>0.9</u>	<u>5.6</u>	<u>14.7</u>	<u>7.6</u>
(f) Cotton								
-L.S.C.	0.0	0.0	0.0	-	-	-	-	0.0
-Others	1.8	0.5	0.5	-	-	-	-	0.3
<u>Total</u>	<u>1.8</u>	<u>0.5</u>	<u>0.5</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>0.3</u>
(g) Others	8.6	10.7	1.6	10.1	20.1	12.1	8.3	10.2
<u>Grand Total</u>	<u>103.9</u>	<u>102.4</u>	<u>106.6</u>	<u>111.1</u>	<u>114.8</u>	<u>107.8</u>	<u>109.0</u>	<u>108.7</u>
2 Net Sown Area								
Area	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>

Note <sup>1/</sup> In the year of 1977/78

<sup>2/</sup> In the year of 1975/76

b) Sown Area under Irrigation

The total of net irrigated sown acreage in the Survey Area was 99 thousand acres in 1976/77, which accounted for only 3.7 percent of the net sown area. About 53 percent of irrigated fields is concentratively located in the Prome and the Padaung blocks and the irrigation ratio to the total sown acreage in the respective blocks is 14.8 percent and 4.8 percent. The irrigation ratio to the total sown area in the Delta and the Bassein blocks is 3.3 percent and 2.7 percent, respectively, and all of the blocks other than the above four are below two percent. (Refer to Table C-2-10).

The irrigated area under multiple cropping occupies only four percent of the total irrigated acreage, and about 95 percent of the total cropping area under irrigation are occupied with paddy and jute. (Refer to Table C-2-11).

The irrigated paddy cropping has been carried out mainly in three blocks of Prome, Padaung and Myitmaka Upper. The irrigation facilities provided in the said three blocks function only to supplement the water for rainy season paddy cropping. The Irrigation ratio in paddy cropping, however, occupies only about 18 percent, six percent and two percent, respectively, even in these blocks where there are a little rainfall. In other blocks in the downstream area, every block has the irrigation ratio in paddy cropping is below two percent.

The irrigated areas for jute cropping is almost equal to the pre-monsoon sown area in total; the jute growing has been carried out mainly in the blocks located downstream of the Myitmaka Middle block. The irrigation for jute cropping has been made by small size pumps from February or March through the beginning of the rainy season.

TABLE C-2-10 IRRIGATION AREA BY VARIOUS MEANS, ZONE (1976/77)

<u>Block</u>	<u>Irrigation Area by Various Means acre(acre)</u>						<u>Net Area Sown(xl,000) (2)</u>	<u>Percnet of Irrigation Area (1)/1,000÷(2) x100</u>
	<u>Canal &amp; Tanks</u>	<u>Wells</u>	<u>Pumps</u>	<u>Others</u>	<u>Total (1)</u>	<u>Net Area Sown(xl,000) Area (1)/1,000÷(2)</u>		
Prome	45,323	273	71	1,695	47,362	320.2	14.8	
Padaung	5,086	-	130	28	5,236	108.3	4.8	
Myitmaka, Upper	5,139	81	277	-	5,497	393.2	1.4	
Myitmaka, Middle	-	-	1,055	456	1,511	374.0	0.4	
Capital	-	484	2,599	260	3,343	389.8	0.8	
Bassein	-	1,254	10,646	2,102	14,002	526.2	2.7	
Delta	-	632	19,634	1,574	21,840	574.4	3.8	
<u>Total</u>	<u>55,548</u>	<u>2,724</u>	<u>34,412</u>	<u>6,115</u>	<u>98,791</u>	<u>2,686.1</u>	<u>3.7</u>	
Percent of Total	(56.2)	(2.8)	(34.8)	(6.2)	(100.0)			

TABLE C-2-11 ACREAGE SOWN UNDER IRRIGATION BY CROP, ZONE (1976/77)

Block	Net Area Sown Under Irrigation (1)	Acreage Sown under Irrigation by Crop							Total (2)	Multiple Cropping Ratio (2)/(1) x 100	
		Paddy	Jute	Pulses	Cotton	Sugar-cane	Vegetables	Other Edibles			Non-Edibles
Prome	47,362	47,199	20	-	8	-	1,272	15	497	49,011	103.5
Padaung	5,246	5,086	122	-	-	46	-	-	-	5,254	100.3
Myitmaka, Upper	5,497	5,139	277	-	-	-	110	-	-	5,526	100.5
Myitmaka, Middle	1,511	295	845	-	-	-	332	-	39	1,511	100.0
Capital	3,343	587	2,272	359	-	-	-	-	125	3,343	100.0
Bassein	14,002	10,020	3,478	-	-	304	1,003	15	220	15,040	107.4
Delta	21,840	5,692	16,694	-	-	567	342	-	59	23,354	106.9
<b>Total</b>	<b>98,791</b>	<b>74,018</b>	<b>23,708</b>	<b>359</b>	<b>8</b>	<b>917</b>	<b>3,059</b>	<b>30</b>	<b>940</b>	<b>103,039</b>	<b>104.3</b>
(% of Total)		(71.8)	(23.0)	(0.3)	(0.0)	(0.9)	(3.1)	(0.0)	(0.9)	(100.0)	

Source: AC



c) Cropping Patterns

The estimated cropping areas by land categories and by seasons are shown in Table C-2-12.

The multiple cropping in the Survey Area has been carried out in the double cropping type. And it seems that very few multiple cropping have been carried out in the fields other than paddy fields.

The double cropping in the paddy fields have been practiced in either pattern of "jute followed by paddy" or "paddy followed by upland crops" in total areas of 219 thousand acres consisting of 55 thousand acres for the former pattern and 164 thousand acres for the latter pattern. The above quoted 219 thousand acres occupy about 10 percent of the total acreage of paddy fields in the Survey Area in exceeding the national average of multiple cropping ratio in paddy fields by one percent as shown in Table C-2-12.

The representative upland crops grown as the second crops of the paddy cropping are groundnut and pulses. The irrigation for the crops other than paddy has been carried for only 29 thousand acres (refer to Table C-2-1), out of which the acreage covered by pre-monsoon jute cropping occupies 23 thousand acres. Thereby, most of the upland crops after paddy harvests appear to be grown without irrigation; by the soil moisture retained after rainy season. The current multiple cropping by the above pattern involves other problems that the cropping acreages would be limited by difficulty in supply of sufficient labor force required concentratively in the short period between paddy harvest and preparation of upland crops, growing as well as farm production has not been stable yet under no irrigation.

In such farm lands other than paddy fields as Kaing-land, Ya-land and garden lands, single cropping of upland crops or year-round growing of perennial crops has been prevailing. Namely, Ya-land, distributed in the upland area in the upstream areas, has been extensively

TABLE C-2-12 ESTIMATED CROPPING AREA BY LAND CATEGORY (1976/77)

Land Category	Net Sown Area(A)	Net Season Crops			Through-out-year Crop	Grand Total (B)	(B)÷(A) x 100
		Paddy	Upland Crops	Dry Season Crops			
Paddy	2,286	2,200	55	2,255	164	2,505	109.6
Ya	29	-	-	29	15	44	150.0
Kaing	193	-	-	-	193	193	100.0
Garden	163	-	-	-	-	163	100.0
Dani	3	-	-	-	-	3	100.0
Shifting	12	-	-	12	-	12	100.0
<u>Total</u>	<u>2,686</u>	<u>2,200</u>	<u>55</u>	<u>2,296</u>	<u>372</u>	<u>2,920</u>	<u>108.7</u>

cropped with single cropping or double cropping per annum without irrigation facilities. The Dani-land and the garden land have been cropped year-round with perennial crops such as tree crops or nippa.

The present cropping pattern in the Project Area is shown in Fig. C-2-1. The general cropping pattern prevailing in the Project Area at present is the single rainy season paddy cropping in the paddy fields and single cropping of the other crops in the other fields, which have been practised in the area of about 91 percent of the total net area sown.

#### II.4. Crop Production

##### 1) Paddy

##### a) Progress in Sown Area, Yield and Production

The paddy cropping areas in the Survey Area amount to 22,000 thousand acres occupying about 82 percent of the net area sown, out of which 218 thousand acres, or about 10 percent of the sown area, are cropped with HYV and the remaining 1,982 thousand acres, or about 90 percent of the sown area, are cropped with local varieties. (Refer to Table C-2-8).

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There has been little change in the sown area with paddy for these eight years since 1970/71. (Refer to Table C-2-13). However, the share of paddy cropping acreage in the Survey Area has been decreased by one percent for the national figures in total, from 18 percent in 1970/71 to 17 percent in 1977/78.

The share of paddy production in the Survey Area has been decreased by two percent for the national figures in total from 22.9 percent in 1970/71 to 19.8 percent in 1977/78, while the annual average yield during the same period was 41.1 basket per acre which was about 19 percent higher than the national average of 34.4 BKT/acre. The total paddy production in the Survey Area has increased by only four percent for these eight years from 88 million baskets to 92 mil-

FIGURE C-2-1 PRESENT CROPPING PATTERN

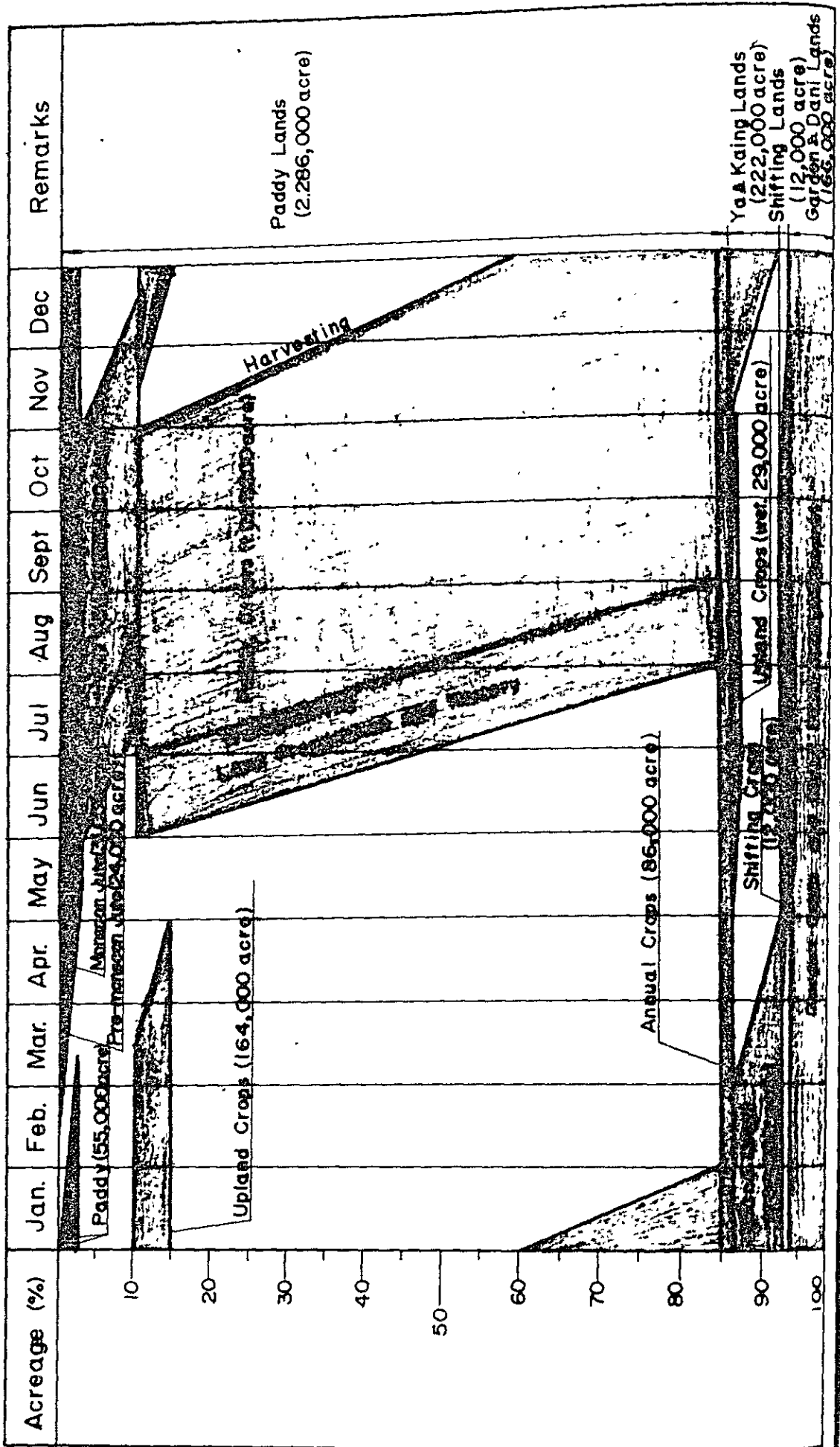


TABLE C-2-13 CROP PRODUCTION DATA, PADDY

Item	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	Mean
<u>I. Sown Area</u>									
<u>A. M/P Area by Block</u>									
1. Prome	264	264	218	260	259	261	259	256	255
2. Padaung	85	84	77	83	83	83	82	81	82
3. Myitmaka, Upper	318	309	303	309	316	315	310	304	311
4. Myitmaka, Middle	338	336	333	334	336	338	336	333	335
5. Capital	342	374	340	342	348	353	352	355	351
6. Bassein	424	418	402	419	428	426	422	421	420
7. Delta	447	443	443	441	446	442	439	442	443
<u>Total</u>	<u>2,218</u>	<u>2,228</u>	<u>2,116</u>	<u>2,188</u>	<u>2,216</u>	<u>2,218</u>	<u>2,200</u>	<u>2,122</u>	<u>2,197</u>
(% of Total Union)	(18)	(18)	(17)	(17)	(17)	(17)	(17)	(17)	(17)
<u>B. Total Union</u>	<u>12,294</u>	<u>12,299</u>	<u>12,014</u>	<u>12,575</u>	<u>12,793</u>	<u>12,858</u>	<u>12,547</u>	<u>12,736</u>	<u>12,515</u>
<u>2. Matured Area</u>									
<u>A. M/P Area by Block</u>									
1. Prome	263.7	259.4	186.4	257.9	252.3	257.5	256.6	224.6	244.8
2. Padaung	84.9	82.8	74.9	82.7	82.0	82.5	81.8	74.1	80.7
3. Myitmaka, Upper	310.9	298.9	298.9	304.8	297.1	311.6	306.6	292.8	302.7
4. Myitmaka, Middle	326.3	328.6	331.1	325.6	289.6	336.1	331.9	320.6	323.7
5. Capital	335.5	336.2	337.2	329.8	331.5	348.5	350.0	345.8	339.3
6. Bassein	410.0	409.3	396.6	400.8	398.0	420.1	406.2	395.6	404.6
7. Delta	437.9	426.5	431.4	402.4	374.1	434.8	431.0	434.5	421.6
<u>Total</u>	<u>2,169.2</u>	<u>2,141.7</u>	<u>2,056.5</u>	<u>2,104.0</u>	<u>2,024.6</u>	<u>2,191.1</u>	<u>2,164.1</u>	<u>2,088.0</u>	<u>2,117.4</u>

( Cont'd )

TABLE C-2-13 CROP PRODUCTION DATA, PADDY

Item	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77	1977/78	Mean
<b>3. Yield</b>									
<b>A. M/P Area by Block</b>									
(basket/ac)									
1. Prome	40.9	41.1	20.2	41.3	40.8	41.2	42.2	39.5	38.4
2. Padaung	41.0	39.7	26.6	43.3	42.5	44.1	44.3	38.8	40.0
3. Myitmaka, Upper	46.0	46.2	38.8	47.3	46.4	46.6	48.6	46.1	45.8
4. Myitmaka, Middle	47.0	47.0	45.2	47.7	44.8	47.8	48.7	48.1	47.0
5. Capital	31.5	34.5	31.9	33.2	32.8	34.2	37.1	41.9	34.6
6. Bassein	38.4	38.2	33.9	39.8	40.1	41.4	42.4	39.9	39.3
7. Delta	40.9	40.8	38.5	41.6	41.4	42.0	43.1	43.9	41.5
Total	40.6	41.0	35.6	41.7	40.9	42.2	43.6	43.1	41.1
(% of Total Union)	(120.7)	(118.3)	(109.8)	(117.3)	(119.9)	(117.5)	(118.5)	(116.2)	(117.3)
<b>B. Total Union</b>									
	32.9	33.3	31.5	34.2	34.1	35.5	36.8	37.1	34.4
<b>4. Production</b>									
<b>A. M/P Area by Block</b>									
(1,000 basket)									
1. Prome	10,777	10,670	3,771	10,651	10,300	10,615	10,819	8,873	9,560
2. Padaung	3,484	3,285	1,993	3,578	3,486	3,637	3,623	2,875	3,245
3. Myitmaka, Upper	14,302	13,818	11,609	14,417	13,785	14,527	14,888	13,487	13,854
4. Myitmaka, Middle	15,349	15,451	14,961	15,521	12,981	16,080	16,160	15,425	15,241
5. Capital	10,568	11,591	10,743	10,940	10,865	11,930	12,979	14,487	11,763
6. Bassein	15,736	15,616	13,444	15,948	15,951	17,385	17,242	15,778	15,887
7. Delta	17,903	17,380	16,622	16,753	15,483	18,273	18,577	19,056	17,506
Total	88,119	87,811	73,143	87,808	82,851	92,447	94,288	89,982	87,056
(% of Total Union)	(23)	(22)	(21)	(21)	(20)	(21)	(21)	(20)	(22)
<b>B. Total Union</b>									
	384,354	384,976	346,411	405,072	404,211	433,589	439,483	454,672	404,596

Note: One basket = 46 lbs. Source: LRSD