ANNEX C

Soil, Agriculture and Agricultural Extension

THE STUDY ON JALAUR IRRIGATION SYSTEMS AND RURAL AREA DEVELOPMENT PROJECT

ANNEX - C
SOIL, AGRICULTURE AND AGRICULTURAL EXTENSION

Table of Contents

List of Tables

List of Figures

1. INTRODUCTION

This annex report describes on soil, agriculture and agricultural extension services in the project area. The project area covers both existing River Irrigation Systems (RISs) of Jalaur proper and Suague which have been selected as priority National Irrigation System (NIS) for the feasibility study from five RISs for the master plan study conducted by the JICA study team.

The study was carried out various field survey/investigation, data collection and interview survey from/with relevant agencies and organizations, and questionnaire interview survey with farmers on the agricultural sector in the study area for the master plan during the phase I period and the project area for the feasibility study during the phase II periods as follows:

a) Soil survey: Soil survey which was sublet to the local consultant in the Philippines during the Phase I, was carried out aimed at i) identification of soil properties and the distribution pattern and extent on the study area of approximately 36,000 ha, and ii) evaluation of land suitability for irrigated agriculture. The works consist of field survey and laboratory analysis and mapping including 230 soil profile survey (50 test pits and 180 auger borings) and soil analysis of 150 samples,

b) Field investigation for land use and farming practices,

c) Socio-economic survey: Questionnaire interview survey on 300 irrigation beneficiaries random sampled from the five (5) RISs in the master study area was carried out during the phase I,

d) Farm household survey: Questionnaire interview survey on 100 households including farm-workers random sampled in the project area was carried out during the phase II,

e) Consultation meeting with IAs: Interview survey and discussion with members of each 19 IAs in the project area during the phase II,

f) Interview survey with MAOs: Interview survey and discussion with of each seven (7) Municipal Agricultural Offices during the phase II, and

g) PRA and public consultation seminars: The participatory Rural Appraisal (PRA) sessions were held on 19 IAs, and the public consultation seminars were held in each RIS and local government level by the sub-contract with local consultant.

2. SOIL AND LAND SUITABILITY

2.1 Soil Classification

The soils of the project area were divided into two physiographic land forms, e.g. the soils of the lowland, and soils of the residual upland. The soils of the lowland consist of two soil series; Sta. Rita and Umingan series, and the lowland soils are covered by Faraon series.

2.1.1 Sta. Rita Soil Series

The Sta. Rita series is a member of the fine clayey family, Montmorillionitic Isohyperthermic, Typic Epiaquerts. The soils occur on broad alluvial plain, fine clayey, poorly drained that are developed from recent alluvial deposits coming from the surrounding uplands. The area is level to nearly level lands with slope of less than 3.0 % and occupies the biggest lowland covered by the existing Jalaur proper and Suague RISs. The physical characteristics of the soil, it exhibits cracks 2-3.5 cm wide to a depth of one foot at least in one month period during the dry season and closes its cracks when saturated with water. The surface soils are gray to almost black fine clayey about 30 cm, very hard and compact when dry. The subsoils are fine clay with gray to dark gray with brown mottles. The substratum soils below 70 cm are light fine clay of grayish brown color. This soil has moderate to high soil fertility, pH reaction is near neutral range, 6.5 to 7.0. They are utilized for the cultivation of lowland paddy rice.

There are three soil mapping units (SMU) identified in the project area.

SMU	Slope
10A	0 - 3%
10Af3	0 - 3%
10B	3 - 8%

2.1.2 Umingan Soil Series

The Umingan series is a member of the fine loamy family, mixed Isohyperthermic Fluventic Eutropepts. These soils are found along the recent flood plain of the Jalaur River which is subject to seasonal river flooding during the rainy season. The soils are level to nearly level with slopes of less than 3 %, moderately deep, well drained, developed from river sedimentation. The surface are brown to dark brown silty loam 20 to 25 cm thick, underlain with brown to dark brown fine clayey subsoils with few yellowish brown mottles at depth between 30 to 70 cm in thickness, underlain with unconsolidated materials composed of gleyed clay and coarse silty river alluvium with gravel. The soil fertility status of Umingan series is moderately high. Content of organic matter is 1.4 %, pH reaction is near neutral at 6.9. Cation exchange capacity (CEC) is high values of 30 meq/100g, the nutrients availability is 0.06 % nitrogen; 32 ppm available phosphorous representing the surface and subsurface epipedon and about 0.5 meq/100g for available potassium.

These soils are usually cultivated for sugarcane crops. One (1) SMU of 20Af1 was identified in Umingan series.

2.1.3 Faraon Soil Series

The Faraon series is a member of the fine clayey family, that belong to Montmorillionitic Isohyperthermic, Typic Hapludalfs. These soils are very deep, well drained found within the municipality of Barotac Nuevo; with slopes of less than 3 %. The Faraon soils are developed from old marine and limestone sediments. The surface soils about 30 cm thick have clay texture, dark brown to very dark brown matrix color,

subsoils 50-100 cm deep are very pale brown light yellowish brown grayish brown clay with few brownish yellow mottles, substratum below 100 cm are mottled grayish brown. Very pale brown silty clay to silty clay loam. The soil has very high base saturation; fairly high CEC and organic matter. pH reaction ranges from 6.2 to 7.5. The soil nutriment elements are high 0.8 % nitrogen, > 30 ppm available phosphorous; 0.5 ppm available potassium and calcium > 25 meq/100g.

These soils are utilized for cultivation of paddy and sugar cane. One (1) SMU of 30A was identified in the project area.

Soil map is illustrated in Figure C.2.1. Table C.2.1 shows the characteristics of the soils in the project area, and Table C.2.2 presents the typical soil profile descriptions of in the project area. The occupied area of each soil series and SMUs are shown in below table.

RIS	Soil Series	SMU	Area (ha)
Jalaur proper	Sta. Rita	10A	8,240
	Sta. Rita	10Af3	400
	Umingan	20Af1	20
	Faraon	30A	160
	(Subtotal)		8,820
Suague	Sta. Rita	10A	2,840
	Sta. Rita	10B	60
	(Subtotal)		2,900
Total	Sta. Rita	10A	11,080
	Sta. Rita	10Af3	400
	Sta. Rita	10B	60
	Umingan	20Af1	20
	Faraon	30A	160
	Total		11,720

2.2 Land suitability

2.2.1 Suitability Criteria

The land suitability of the study area has been assessed using the NIA classification system applied FAO Framework for Land Evaluation (1976). It is a system of grouping soil units together having similar characteristics, degree of limitations and management requirements. The soil characteristics and land qualities considered in the assessment of suitability classes/subclasses includes slope, erosion hazard, texture, effective soil depth, drainage condition, flooding, presence of coarse fragments/rock outcrops, soil pH, total nitrogen, available phosphorus, and cation exchange capacity.

Wet land rice and diversified crops were assessed of their most performance in each soil mapping units considering their soil requirements and the soil characteristics and limitations for each soil unit. Table C.2.3 presents the soil criteria and class limits used to evaluate soil units for each land utilization types.

Soil suitability order indicates whether the land is suitable or not suitable for the use under consideration. The orders suitable or not suitable are represented by capital letters "S" and "N", respectively. Suitability classes reflect degrees of suitability of soil units within the orders.

Order Suitable (S): Soils on which sustained use of the kind under consideration is expected to yield benefits which

justify the inputs without risk or damage of land resources.

Highly Suitable (S1): Soils having no significant limitation to sustained application of a given use.

Moderately Suitable (S2): Soils having limitation which together are moderately severe for sustained application of a given use; production will be significantly lower and/or inputs significantly higher than S1 land.

Marginally Suitable (S3): Soils with limitations that, in total are severe for sustained application of a given use, production will be so reduced and/or the needed inputs will be so high that the use of this land will only be marginally justified.

Order Not Suitable (N): Soils which have the qualities that appear to preclude sustained use of the kind under consideration. The value of expected benefits does not justify the expected cost of inputs that would be required.

Suitability subclass reflects the kind of limitations or improvement measures required within classes. Major limiting factors of lands are shown below:

Slope (t), Erosion (e), Texture (s), Soil Depth (k), Internal Drainage (d), Flooding (f), Soil pH, Total Nitrogen, Phosphorus, Exchangeable Potassium, and CEC.

2.2.2 Suitability Group

The soil mapping units were used to established land suitability groups to produce land suitability map.

Suitability Group	SMU	Land Suitability		Area (ha)
		Wet land rice	Diversified crops	
A	30A	S1	S1	160
B	20Af1	S2s	S2f	20
C	10A, 10Af3	S1	S3d	11,480
D	10B	S3t	S3d	60
Total				11,720

(1) Group A

This suitability group consist of one soil mapping unit, 30 A. The land is formed on level to nearly level topography. It is characterized by a fine textured soils, with good drainability. The land is classified highly suitable (S1) for all land utilization types; wetland rice and diversified crops.

(2) Group B

The suitability group B embraces only one soil mapping unit, 20Af1 which has moderately deep rooting zone with loamy surface soil underlain with coarse textured substatum and well drained. It is found on a level to very gently sloping of less than 3 % subject to slight seasonal river flooding. This group has soil limitation being loamy surface textured and flooding. The land is classified moderately suitable with soil texture limitation for wetland rice (S2s) and moderately suitable with flooding limitation for diversified crops (S2f).

(3) Group C

Included in this group are soil mapping unit 10 A and 10Af3. The land under this group are classified highly suitable (S1) for wetland rice and marginally suitable for the production of diversified crops (S3) due to its poor drainability.

(4) Group D

This group is composed of soil mapping unit 10B. It occupies the gently sloping land. The soil characteristics are similar to groups 10A except that it has limitation on slopes which would limit its suitability to wetland rice production. The land under this group are classified marginally suitable with limitation of slopes (S3) for wetland rice and marginally suitable for the production of diversified crops (S3) due to its poor drainability.

3. PRESENT CONDITIONS OF AGRICULTURE AND EXTENSION SERVICES

3.1 Review of Irrigation Service Area

NIA has reported that the service areas of Jalaur proper and Suague RISs are 8,826 ha and 2,958 ha, respectively. The current irrigation service area was reviewed through field investigation and interview survey with O&M staff of Jalaur-Suague RIS (JSRIS) Office. The basic documents assessed were the aerial photographs and topographic maps of scale of 1:4,000. The present service areas of the Jalaur proper and Suague RIS were estimated at 8,820 ha and 2,900 ha, respectively.

(Unit: ha)

RIS	NIA reported area	Reviewed area	Balance
Jalaur proper	8,826	8,820	-6
Suague	2,958	2,900	-58
Total	11,784	11,720	-64

Source: Field survey and interview survey with NIA O&M staff

The change on the service area was mainly due to land conversion. The proportions of land being converted are shown in Table C.3.1 and are summarized below:

(a) Change of land use from paddy field to residential and commercial lands mainly around of Pototan and Zarraga town areas,
(b) Change of land use from paddy field to fishpond near the coastal area,
(c) Change of land use from paddy field to waste land by flooding from the Jalaur river,
(d) Reduction of non-irrigable area due to the elevated land comparing with canal facility,
(e) Change of land use from sugarcane land to paddy field which is presently irrigated using canal water, and
(f) Addition of pump irrigation area along the head race of main canals, which is presently irrigated under the agreement between NIA and water users.

Reasons of Change	Jalaur proper	Suague
(a) To Residential/commercial land	-94	-81
(b) To Fishpond	-26	0
(c) To Waste land by flood	-30	0
(d) Elevated land	0	-16
(e) From Sugarcane land	100	0
(f) Pump irrigation area	44	39
Balance	-6	-58
Current Service Area after Review	8,820	2,900

Source: Field survey and interview survey with NIA O&M staff

3.2 Land Tenure and Farm Size

The actual beneficiaries are known using the documents such as the TSA profiles and the Annual Report of Irrigated and Benefited Areas of the JSRIS. However, the documents do not completely cover all farmers in the project area, especially farmers who are presently not getting irrigation water from each system. Total number of potential beneficiaries in the project area is estimated at about 7,850 farmers. About 5,900 farmers are in the Jalaur proper RIS while 1,950 farmers are in the Suague RIS. The non-benefited area has an estimated number of about 1,140 farmers. Table C.3.2

presents the number of all farmers, current beneficiaries and IA members by IAs and divisions.

	Unit	Jalaur proper	Suague	Total
No. of beneficiaries benefited in wet season 1*	No.	4,910	1,802	6,712
Total benefited area reported 1*	ha	6,819	2,544	9,363
Actual benefited area *2	ha	7,501	2,798	10,299
Total service area	ha	8,820	2,900	11,720
Non-benefited area *3	ha	1,319	102	1,421
(ratio to actual benefited area)		0.176	0.036	0.138
Estimated farmers of non-benefited area	No.	990	148	1,138
Estimated total farmers in the project area	No.	5,900	1,950	7,850

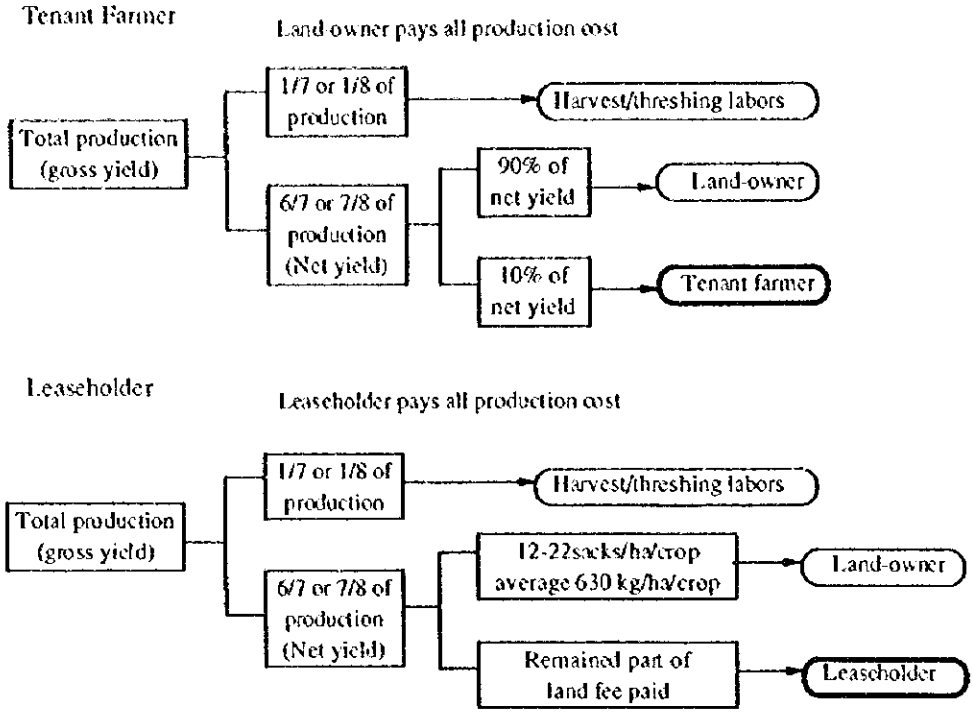
*1: Source: Annual report of irrigated and benefited areas, wet season 1996
*2: Assumed at 110% of reported benefited area considering benefited area discount due to pump irrigation and insufficient water distribution.
*3: Summing up of respective divisions

Table C.3.3 shows the land tenure status and average farm sizes of the beneficiaries. The average farm size was computed at 1.50 ha for both the Jalaur proper and Suague RIS. The median farm sizes were 1.00 and 0.97 ha for Jalaur proper and Suague RIS, respectively. Farmers whose farm sizes range from 0.5 and 2.0 ha represent about 58 % and 64 % of the total farmers, respectively. In terms of occupancy by tenure beside on the TSA profiles, the owner-cultivators, leaseholders and tenant occupy 40.0 %, 28.4 % and 31.6 %, respectively of the project area.

There are about 16,880 households in the 78 barangays comprising the project area. Meanwhile, the number of farm households is estimated at 7,850. Taking into consideration the ratio of households engaged in agriculture estimated at 76 % of the rural population in Iloilo Province, the number of households representing the farm workers is about 4,980.

(a)	Total households of relevant barangays (Population Census, 1995)	16,880
(b)	Ratio of household engaged agricultural sector (Labor force statistics in rural area of Iloilo Province)	76%
(c)	Estimated number of households of agricultural sector (a) x (b)	12,830
(d)	No. of farmer households	7,850
(e)	Estimated households of farm workers (c) - (d)	4,980

The traditional system of land rental is common among tenant farmers in the project area. Tenants receive only 10% of the paddy production. In contrast, the leaseholders pay to the landowner 630 kg/ha per a cropping. Under the Comprehensive Agrarian Reform Program (CARP), the tenancy is illegal. This kind of sharing arrangement should be avoided to protect the welfare of the tenants.



3.3 Cropping Pattern

3.3.1 Typical Cropping pattern

The cropping pattern is significantly dependent on the availability of irrigation water. However, farmers still exert effort to cultivate paddy twice or more per year even under extreme condition of limited supply of irrigation water. This is evidenced by the proliferation of small-sized irrigation pumps numbering more than 1,200 units in both the RISs, and being used by farmers to supplement the limited irrigation water. About 15 % of the beneficiaries have irrigation pumps for supplemental irrigation during critical period of water, e.g. early stage of wet season paddy (May and June) and dry season paddy (December to March).

Some farmers apply the dry seeding method to the wet season in order to advance the planting and harvest the second paddy before the onset of critical water shortage. The seeds are broadcasted in plowed/harrowed dry farm without land soaking before the onset of rainfall in the wet season. After the germination of the paddy, the field is irrigated by water coming from the canal system. It is a water-saving method for land soaking, but the practice is rather risky because the method is generally applied on rainfed paddy area, where the germination of the seeds is dependent on rain.

The farmers in the project area are applying the following cropping patterns:

(a) Paddy (irrigated) - Paddy (irrigated),
(b) Paddy (irrigated) - Fallow,
(c) Paddy (dry seeding/irrigated) - Paddy (irrigated),
(d) Paddy (rainfed) - Paddy (rainfed) or Fallow.

Additionally, third cropping such as cultivation of third paddy, watermelon and mungbean is being practiced in some irrigation areas by the farmers. The extent of practice among farmers is virtually negligible, however. The third paddy is irrigated by shallow tube-wells as well as canal water of irrigation system before the termination of

the regular water distribution. Watermelon is cultivated by manual irrigation using dug-well water in the paddy field. Mungbean is cultivated without plowing using residual soil moisture after harvest of the second paddy.

Pattern (a) is a standard practice prepared by the NIA for irrigation water distribution. Pattern (b) is dominant in downstream areas where there is insufficient water. Pattern (c) is mainly applied in the downstream areas in order to plant paddy twice under condition of water shortage. However, this practice has met little success. Finally, pattern (d) is the practice among the rainfed farmers. Pattern (d) occupies the areas where the irrigation system is virtually non-functional.

As mentioned above, a rather large area of both types of irrigated and rainfed is supplementary irrigated by pumps using shallow tube-wells and creeks/rivers in the critical period of water supply.

3.3.2 Cropped Area

In accordance with NIA JSRIS Office's classification of the cropped area with irrigation, the areas are defined as irrigated and benefited areas. The irrigated area means the actually irrigated area, and the benefited area means the crop area which paddy yields are more than 2 ton/ha/crop in one cropping season. Furthermore, the benefited area is also the basis for the computation and collection of the irrigation service fee (ISF). Hereinafter the irrigated area means the benefited area difined by NIA. The irrigated areas for both systems stood at about 15,440 ha during the last five years (1992 to 1996). The Jalaur proper RIS has an irrigated area of about 11,030 ha while the Suague RIS has about 4,420 ha (Table C.3.4). The average irrigated and service areas are shown below.

RIS		Service	Irrigated Area (ha) *		Cropping Intensity (%)		
	Division	Area (ha)	Wet Season	Dry Season	Wet Season	Dry Season	Total
Jalaur proper							
	1	** 808	700	645	87	80	166
	2	714	622	582	87	82	169
	3	892	807	756	90	85	175
	4	947	874	792	92	84	176
	5	754	433	259	57	34	92
	6	730	671	468	92	64	156
	7	755	485	226	64	30	94
	8	838	591	563	71	67	138
	9	783	355	135	45	17	63
	10	788	341	267	43	34	77
	11	811	243	218	30	27	57
	Total	8,820	6,122	4,909	69	56	125
Suague							
	1	** 995	699	611	70	61	132
	2	660	658	590	100	89	189
	3	543	541	317	100	58	158
	4	702	647	356	92	51	143
	Total	2,900	2,545	1,874	88	65	152

Source : JSRIS Office, NIA
Note * : Average benefited area in recent 5 years (1992 to 1996)
** : Included pump irrigation areas along head-race of main canals, 44 ha for Jalaur proper RIS, and 39 ha for Suague RIS.

It should be noted that the cropping intensity of irrigated paddy in Jalaur proper RIS is about 125 %, while in the Suague RIS, the cropping intensity is slightly higher at 152 %. During the wet season, the proportion of the service area provided with

irrigation in Jalaur proper RIS stands at only 69%. This cropping intensity is relatively lower compared with the 88% posted in the Suague RIS. It is observed that such a low cropping intensity of irrigated paddy in the Jalaur proper RIS is affected by the improper water management on water discharge and time schedule of irrigation water supply which are directly caused by the severely deteriorated irrigation facilities and insufficient water management skills. The cropping intensity in downstream in the RIS systems are lower than in the upper-stream as illustrated in Figure C.3.1.

The current cropping patterns are illustrated in Figure C.3.2. The cropped areas of irrigated, rainfed, and third crop paddy, including their respective cropping intensity are shown below.

Name of RIS	Jalaur Proper	Suague	Total/Average
Service Area	8,820	2,900	11,720
Cropped Area (ha)			
Irrigated paddy			
Wet season	6,120	2,540	8,660
Dry season	4,910	1,870	6,780
Total	11,030	4,410	15,440
Rainfed paddy			0
Wet season	2,600	360	2,960
Dry season	1,940	610	2,550
Total	4,540	970	5,510
Third crops			
Paddy	1,200	50	1,250
Watermelon	100	20	120
Mungbean	600	150	750
Total	1,900	220	2,120
Total	17,470	5,600	23,070
Cropping Intensity (%)			
Irrigated paddy			
Wet season	69	88	74
Dry season	56	64	58
Total	125	152	132
Rainfed paddy	51	33	47
Third crops	22	8	18
Total	198	193	197

Source : JSRIS Office, NIA

3.4 Farming Practices

The common farming practices for paddy, mungbean and watermelon are summarized as follows:

3.4.1 Paddy

Cultivation period: The cropping period of first paddy is from May/Jun. to Aug./Sept., and the second paddy from Sept./Oct. to Dec./Jan., third paddy from Dec./Jan. to May/Apr. The growth period ranges from 95 to 110 days. Farmers in the upstream areas normally advance the planting in order to plant third paddy. Some farmers apply dry seeding before the wet season.

Land preparation: Plowing is generally done by hand-tractor, while leveling is done by carabao or hand tractor.

Major variety: The following varieties being planted include IR 64, RC 14, RC 18, RC 20, RC 10, and IR 72. Almost 100% of the area are planted with high yielding varieties.

Seeding: Direct seeding is practiced by about 85 to 90% of the farmers. The seeding method expanded in 1980s in order to reduce production cost, to seed adjusting with unstable timing of water distribution, and to save limited soaking water. Seeding rate of direct seeding and transplanting are 120 to 200 kg/ha and 80 to 120 kg/ha, respectively. The seeding rates are relatively high compared with the standards of 50 kg for transplanting and 100 kg/ha for direct seeding by MAO recommend. The use of certified seeds is not common, only 10 to 20 % of farmers use certified seeds. This is due to shortage of certified seeds coupled with its prohibitive cost.

Fertilizer: The average fertilization rate is as follows: N: 93 kg/ha, P: 28 kg/ha, K: 13 kg/ha. The amount of fertilizer application, particularly on nitrogen is rather high vis-a-vis present yields. About 70 % of farmers do not apply basal fertilizer. Usually the farmers apply twice, i.e. 15 to 20 days and 45 to 50 days after seeding, side-dressing for vegetative stage and top-dressing for reproductive respectively. Organic manure are seldom used.

Weed control: Herbicide is commonly applied. Manual weeding is not common.

Insect/pest control: Tungro, Grassy stunt, Bacterial leaf blight, Stem borer, Brown plant-hopper and Green rice leaf-hopper are major insects and pests. Spraying is done using nap-sack sprayer. The amount of agro-chemicals and timing of application are believed to be improper due to low knowledge of application method.

Snail and rat control: The damage caused by golden snail and rat appears serious during the past years. Molluscicide for snail is commonly used.

Harvesting: Harvesting is done by hand, while threshing is done by portable engine thresher. Rice straws are generally burned in the paddy field. The farmers sell wet paddy except those left for family consumption

It seems that proper and appropriate farming practices have not become common among the farmers on the yield increase, maximization of profit through minimization of production cost, and production of high quality paddy. Especially, present seeding rate, low using ratio of certified seed, fertilization method, weeding and plant protection should be improved to appropriate farm practices.

3.4.2 Mungbean

Seeding: The seeds are broadcasted without plowing immediately after harvest of paddy using residual soil moisture.

Crop management: Mungbean is cultivated under rainfed condition. The application of fertilizer and agro-chemicals is seldom practiced.

3.4.3 Watermelon

Land preparation: Watermelon is usually planted in seed plots plowed in a one (1) meter-diameter circle by hand from December to early February. This is right after the second paddy cultivation. The timing is to avoid water logging.

Crop management: The land is irrigated every day by hand and bucket using water from dug-wells. The application of fertilizer and agro-chemicals is a common practice.

3.5 Farm Machinery and Labor Force

The use of hand-tractors has become widely used for plowing, harrowing, leveling during land preparation. Plowing and harrowing are mostly done by hand-tractor, while 70% of the leveling works are done by carabao. Threshing is also machine-operated. Seedling, fertilizing, spraying, weeding and harvesting are generally done manually. For chemical spraying of pest and disease control, farmers use the knapsack sprayers. Irrigation pumps that are engine driven with 2 hp are common among farmers for supplemental irrigation. According to the consultation meetings with the IAs, the available number of farm machinery, except irrigation pumps, are presently sufficient.. The number of farm machinery owned by farmers are shown below.

Farm machinery	Total Number of Machinery			Units per 100 ha		
	Jalaur	Suague	Total	Jalaur	Suague	Overall
Hand-tractor	1,400	500	1,900	16	17	16
Tractor	30	15	45	0.34	0.54	0.38
Thresher	850	300	1,150	10	10	10
Irrigation Pump	900	300	1,200	10	10	10

Source: Socio-economic survey and Consultation meeting with IA

The socio-economic survey and the farm household survey reveal that about 50% of farm labor requirement is dependent on hired labor. There are plenty farm workers in the barangays. The farm workers get their income mainly as hired laborers. The available labor force for various farm activities is estimated at 2.0 persons per household assuming at half of available persons on part-time labor force on the basis of the socio-economic survey. It indicates that available labor force for farm activities are 1.22 persons of full-time and 1.57 persons of part-time per household in average. Such condition of labor availability is enough for an average farm size of 1.5 ha. IA board members at the consultation meeting with IAs explained to be sufficient labor force for farm activities in the project area. They also answered that some labors come into the project area from upland area, sugarcane area of Dumangas and Guimaras Island in the peak season of farm works such as harvest and planting.

3.6 Input Supply

The supply of inputs such as fertilizer and agro-chemicals is mainly available from private traders and partly from farmers' cooperatives. The supply is believed sufficient relative to the total requirement of the farmers. The traders and chemical companies work actively in selling their products by regularly conducting demonstration in the farmers' fields.

However, the capability of the farmers to acquire such farm inputs is contingent on their savings. In general, they get the inputs in the form of credit from the private traders and input suppliers with high interest at 8 to 10% per month. Sometimes farmers delay on-time application of inputs or abandon the application due to the financial problem. In the Participatory Rural Appraisal (PRA), high production cost, specially, high price of inputs including certified seed was taken up problems in their crop cultivation.

Certified seeds are produced by seed growers who have been accredited by the Bureau of Plant Industry (BPI). There are 51 seed grower-farmers in the relevant 7

municipalities in the project area. Seed inspectors from the DA and MAO provide technical assistance to seed growers. The seed growers have 430 ha of paddy fields, but the actual seed production area is less than 10% of the total area. It is observed that the available supply of certify seeds are insufficient for the requirement of the project area. Compounding this problem is the prohibitive cost of certified seed at Pesos 15 to 16 per kg. As such, only 10 to 20% of the farmers use certify seeds. Usually farmers replace or renew their seed stocks once in several cropping seasons. It is common to observe a mixture of paddy varieties grown in the project area. The low utilization of certified seed is one of the factors for obtaining low yield of paddy.

Municipality	No. of Seed-growers	Paddy field of Seed-growers (ha)
Pototan	17	142.0
Dingle	3	18.0
Dumangas	15	182.0
Barotac Nuevo	7	56.5
Mina	1	1.5
New Lucena	3	8.0
Zarraga	5	23.0
Total	51	431.0

Source: Iloilo Provincial Agricultural Office

3.7 Agricultural Production

The average yields of paddy during the past five years are shown in Table C.3.5. The yield by cropping season is summarized below.

(Unit: ton/ha)

RIS	Average Yield (5 years)		Range	
	Wet	Dry	Wet	Dry
Jalaur proper	3.40	3.30	2.67 ~ 4.09	2.33 ~ 3.74
Suague	3.64	3.41	2.68 ~ 4.43	2.79 ~ 3.81

Source: JSRIS Office, NIA Region VI

The yield of rainfed paddy including 3rd paddy is estimated at 2.24 tons/ha. On the other hand, the yields of mungbean and watermelon are estimated at 0.4 ton/ha and 4.0 ton/ha, respectively.

Based on the estimated yields mentioned above, the present paddy production in the project area is calculated at 49,870 tons for Jalaur proper RIS, and 17, 910 tons for Suague RIS.

	Irrigated Paddy			Rainfed Paddy/3rd Paddy				Paddy
	Wet	Dry	Subtotal	Wet	Dry	3rd	Subtotal	Total
Jalaur Proper								
Yield (ton/ha)	3.40	3.30	3.36	2.24	2.24	2.24	2.24	2.97
Production (ton)	20,808	16,203	37,011	5,824	4,346	2,688	12,858	49,869
Suague								
Yield (ton/ha)	3.64	3.41	3.54	2.24	2.24	2.24	2.24	3.30
Production (ton)	9,246	6,377	15,622	806	1,366	112	2,285	17,907
Total								
Yield (ton/ha)	3.47	3.33	3.40	2.24	2.24	2.24	2.24	3.05
Production (ton)	30,054	22,580	52,633	6,630	5,712	2,800	15,142	67,776

The production of watermelon and mungbean is respectively estimated at about 480 tons and 300 tons in the RIS areas as shown below.

RIS	Cropped Area (ha)	Average Yield (ton/ha)	Total Production (ton)
Jalaur proper			
Watermelon	100	4.0	400
Mungbean	600	0.4	240
Suague			
Watermelon	20	4.0	80
Mungbean	150	0.4	60
Total			
Watermelon	120	4.0	480
Mungbean	750	0.4	300

3.8 Farm Economy

The production cost for each crop is shown in Table C.3.6. The crop budgets were estimated on the basis of the socio-economic survey. The net profits of the 1st and 2nd irrigated paddy are over 10,300 pesos/ha in both the RIS areas, and the highest net profit of the paddy is about 13,600 pesos/ha of the 1st paddy in the Suague RIS. The net profit of rainfed paddy is estimated at about 6,600 pesos/ha which is nearly 60 % of the irrigated paddy. The net profits of other crops are roughly estimated at about 16,700 pesos/ha for water melon and 6,000 pesos/ha for mungbean. The gross income, production cost and net return per hectare are presented below:

	Qty	Gross Income		Production	Net
		Price	Value	Cost	Profit
	ton	peso/ton	peso	peso	peso
1st Paddy irrigated					
Jalaur proper	3.40	8,580	29,172	17,587	11,585
Suague	3.64	8,580	31,231	17,587	13,644
2nd Paddy irrigated					
Jalaur proper	3.30	8,580	28,314	17,990	10,324
Suague	3.41	8,580	29,258	17,990	11,268
1st paddy rainfed	2.24	8,580	19,219	12,545	6,674
2nd paddy rainfed	2.24	8,580	19,219	12,545	6,674
3rd crops					
3rd paddy	2.24	8,580	19,219	12,738	6,480
Watermelon	4.0	8,000	32,000	15,290	16,710
Mungbean	0.4	25,000	10,000	4,035	5,965

Net income of owner cultivators is roughly estimated at about 28,000 pesos for the Jalaur proper RIS and 32,600 pesos for the Suague RIS, based on the results of farm budget analysis of typical farm size of 1.5 ha.

(Unit: pesos/ha.)

	Farm Size : 1.5 ha			
	Cropped Area (ha)	Gross Income	Production Cost	Net income
Jalaur Proper				
1st Paddy irrigated	1.04	30,363	18,305	12,058
2nd Paddy irrigated	0.84	23,643	15,022	8,621
1st Paddy rainfed	0.44	8,498	5,547	2,951
2nd Paddy rainfed	0.33	6,341	4,139	2,202
3rd Paddy	0.20	3,922	2,600	1,322
Watermelon	0.02	544	260	284
Mungbean rainfed	0.10	1,020	412	609
Total	2.97	74,332	46,285	28,047
Suague				
1st Paddy irrigated	1.31	41,031	23,106	17,925
2nd Paddy irrigated	0.97	28,300	17,401	10,899
1st Paddy rainfed	0.19	3,579	2,336	1,243
2nd Paddy rainfed	0.26	5,070	3,309	1,761
3rd Paddy	0.03	497	329	168
Watermelon	0.01	331	158	173
Mungbean rainfed	0.08	776	313	463
Total	2.84	79,583	46,952	32,631

The net income by tenurial types was roughly estimated on the basis of actual crop sharing system in the project area. Owner-cultivators get an annual farm income from P28,000 to P33,000. Leaseholders, on the other hand, have an average farm income ranging from P12,000 to P16,400. The lowest income is received by the tenants ranging from P6,500 to P7,000. These farm income levels are typical of paddy farming. Tenant farmer and leaseholder are received approximately 22% and 47% of production net profit, respectively.

	Jalaur proper	Suague	Remarks
Owner-cultivator	P28,000	P32,600	
Leaseholder	P11,800	P16,400	Land fee: 630 kg/ha x 2 crops = P16,220
Tenant farmer	P6,500	P7,000	Net income = gross income x 7/8 x 10%

3.9 Livestock

The growing of livestock is a minor economic activity in the project area. However, about 64 % of the respondents are raising livestock or poultry as supplementary source of income and nutrition for the family.

Carabaos are traditionally used as draft animal for paddy cultivation, plowing, harrowing and leveling of paddy field. About 26 % of the farmers are raising carabao. Cattle are raised by 13 % of the farmers. The cattle feeds on grass and rice straw after harvesting of paddy. On the average, a farmer owns roughly 2.0 heads of cattle. Hogs and poultry are popular livestock in the project area. The ratio of farmers raising hogs and chicken is 44 % and 69 %, respectively.

	Ratio of farmer raising livestock (%)	Average No. of livestock in raising farmers
Carabao	26	1.3
Cattle	13	2.0
Hog	44	2.5
Goat	10	2.7
Poultry	69	18.7

Farm compost preparation using livestock manure is recommended by the extension workers of the Municipal Agricultural Offices (MAOs), however it has not become common. NGOs are going to spread into farmers groups organic farming practices using livestock manure.

3.10 Agricultural Research and Extension

3.10.1 Primary Agencies

The Department Agriculture (DA) is primarily responsible for supervising applied research and regulatory services such as quarantine, phyto-sanitary, etc. Agricultural extension is essentially the task of the local government units(LGUs). The Provincial Agricultural Office (PAO) coordinates provincial level agricultural extension activities, while the Municipal Agricultural Office (MAO) is responsible for carrying out municipal level extension activities. The PAO and MAO are part of the LGUs and funding for extension activities come from the internal revenue allotment (IRA) of the concerned LGUs. In the project, the relevant LGUs are the Provincial Government of Iloilo and the seven (7) municipal government units comprising the project area. The organization structure of the relevant agencies are illustrated in Tables from C.3.3 to C.3.6.

The Western Visayas Integrated Agricultural Research Center (WESVIARC), a regional research center under the DA and located in Iloilo city performs basic research and experiment for the Western Visayas Region. The center has technically competent researchers. However, the research activities could not be expanded due to limited budget support. The center has a rice seed processing facility funded under the Japanese Grant Aid Program. The center is expected to be relied upon as a potential source of technical assistance for the project.

3.10.2 Assessment

The transfer of agricultural extension activities from the DA to the LGUs in 1992 has created problems pertaining essentially to logistics such as support for demonstrations farms, propagation of seeds, and conduct of training for farmers. The extension workers has few opportunities to receive new information and to attendant on training. An extension worker has attained annually less than one training course by DA and PAO. MAO also holds only one training session per year for farmers. As regards extension activities for farmers, which focus to farmers groups and farmers cooperatives of barangay, training is held about one time during a year, and there are only 17 plots of demonstration farms including diversified crops in seven municipalities concerned. The current extension workers in the concerned municipalities are shown in Table C.3.6. There are 94 extension workers in the seven municipalities. They generally work three days at the field and two days in the office per week.

Specialty	No. of Technicians
Municipal Agricultural Officer (MAO)	7
Municipal Community Development Officer (MCDO)	5
Crop Technician	56
Livestock Technician	7
Fishery Technician	10
Soil Technician	2
Home Management Technician	7
Total	94

The average budget of the concerned MAOs in 1996 ranged from P61,000 to P91,000 per a extension worker including personal expenses. This amount is sorely

lacking if one considers the magnitude of work of the agricultural extension agents. Such perception is evident in the poor outreach of the agricultural extension agents. The seven MAOs in the relevant municipalities considered the following constraints and problems to their work as shown below:

Constraints/Problems	No. of answers/7 MAOs
- lack of finance for activities	7/7
- lack of information on new technologies	4/7
- Shortage of extension workers	3/7
- lack of transportation facilities for field activities	6/7
- lack of farmers' willingness for production increase and difficulty in organizing farmers groups	2/7

The agricultural extension activities of the MAOs have minimal involvement with the activities of the IAs. Presently, the extension activities by MAO approach directly to farmers' groups in the barangay communities organized by MAOs. MAOs have difficulty in organization of farmers' groups, as a results their activities in the barangay is still low.

About 60% of the respondents of the farm household survey have not felt the activity of the extension worker in the area. The respondents complain of infrequent services, and lack of interest and delay of the services.

- No activity by extension workers:	63%
- Kinds of support services received	
Technical guidance:	25%
Seed/seedling supply:	13%
Fertilizer/chemical supply:	9%
- Complains against support services	
Delay delivery of service/input:	14%
Infrequent services:	35%
Lack of interest of services:	14%

In 1995 DA started the Grain Production Enhancement Program (GPEP, Gintong Ani Program) under the Medium-Term Agricultural Development Plan (MTADP). GPEP aims at improving farm productivity by addressing the utilization of certified seeds, the inadequate irrigation systems and post-harvest equipment and facilities. DA also implements the Integrated Pest Management (IPM) program which aims to provide a scientific control of insects and diseases in farmers' field. However, these programs have also been reported to have a limited outreach on account of budgetary constraint from the MAOs.

3.11 Constraints and Problems

Low productivity of paddy rice, i.e. stagnation of production, is major problem in agriculture in the project are. The low productivity is a cause of financial weakness of the beneficiaries, together with lack of post harvest facilities such as dryer and warehouse, and low profitability of products. Due to the weak financial situation, farmers must usually sell and repay at low price wet paddy without drying for credit with high interest to the trader.

Through the Participatory Rural Appraisal (PRA) sessions the following problems on agriculture were identified:

(i) Shortage of irrigation water due to deterioration of irrigation facilities and inadequate O&M, and damage by flood

(ii) Low agricultural production caused by:

- frequent occurrences of pest and diseases including damage by rat and snail,
- lack of technical support,
- high cost of farm inputs,
- mono-cropping of paddy,
- absence of support institution, and
- lack of information on appropriate and new farming technology.

(iii) Problems on post-harvest and market such as:

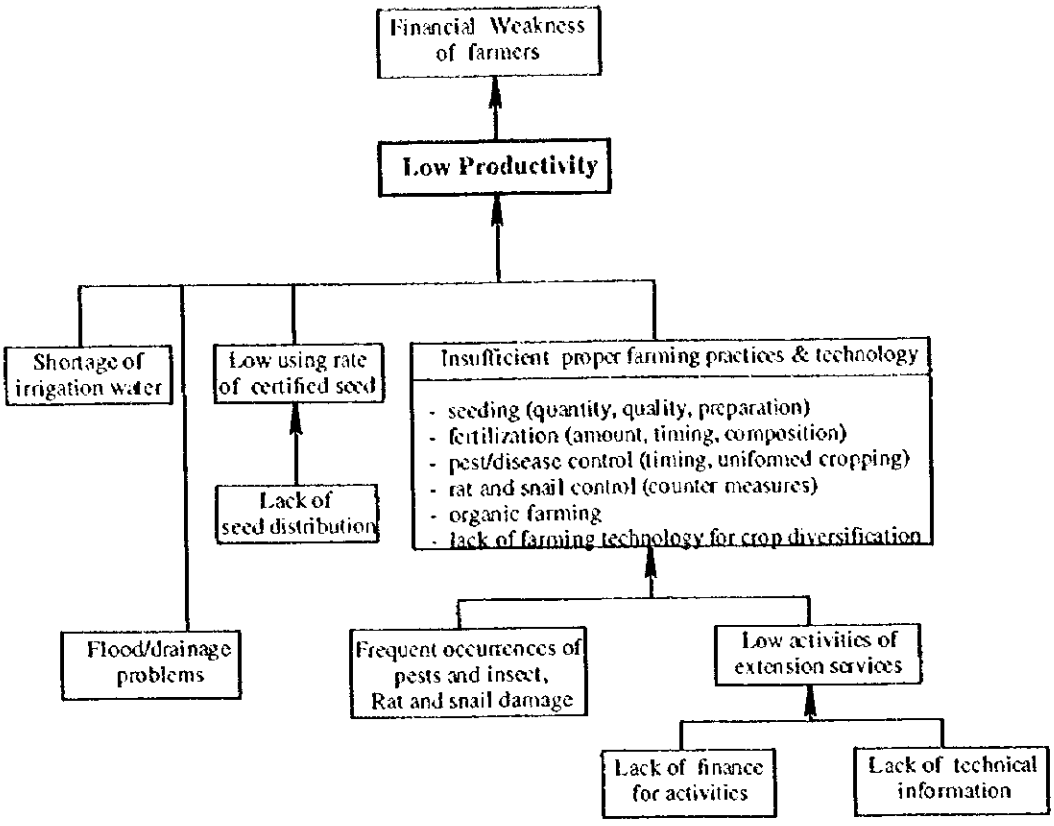
- lack of post-harvest facilities (dryer and warehouse), and
- lack of farm to market roads.

(iv) Problems on production cost and credit such as:

- high cost of farm inputs,
- expensive seeds,
- lack of credit facilities,
- poor loan repayment, and
- low paddy price.

It is supposed that low productivity is caused mainly by shortage of irrigation water, insufficiency of adequate and new farming technology, and low using rate of certified seed.

The low productivity of paddy is a major problem in the project area. This is mainly caused by a number of factors, among them; are the shortage of irrigation water; inadequate extension of new and improved farming practices; and low utilization rate of certified seed.



(1) Shortage of irrigation water

The shortage of irrigation water is the most limiting factor to increasing the yield of paddy. As described in section 3.4, the shortage of irrigation water is brought about by the deteriorating condition of the existing irrigation facilities of the Jalaur proper and Suague RIS as well as improper water management. Consequently, the cropping intensity for paddy production is greatly reduced. Even during the wet season, the irrigated service areas of the two systems are greatly affected. During the wet season only 69% to 88 % of the service areas in both RISs are provided with irrigation water, while during the dry season 56% to 64 % of the service areas are irrigated. The remaining paddy field is cultivated under rainfed conditions or fallow.

(2) Inadequate extension of proper farming practices and technology

Proper farming technology is not commonly practiced in the project area as regards the application rate and method of seeding, application and timing of N : P : K fertilization, amount and timing of chemical application for weed and pest control, etc. Damage by snails and rats is also a serious problem. Direct seeding is very common among the farmers. The direct seeding method is believed to be a determinant of low yield. It compounds difficulty in manual weeding, improper germination of seeds, and snail and rat damage.

(3) Low activities of extension services

The week capacity of agricultural extension by the MAO is the other factor. This is mainly affected by:

- lack of finance for the activities,
- lack of information on new technologies, and
- lack of mobility of extension personnel.

(4) Low use of certified seed

Only 10 to 20 % of the farmers use certify seeds. It has been proven that yields can be increased with the use of good seeds. The problem, however, is that there are relatively few seed producers in the project area. Compounding this difficulty is the prohibitive cost of certify seeds. Without the usual financial support to farmers, i.e. access to the government lending program, there is no way the poor paddy farmers can acquire and apply modern and good seeds.

(4) Problem on sustainable agriculture

Rice straw is generally burned in the paddy field after threshing. Organic manure and compost such as rice straw and livestock manure are seldom applied into the farms. Although soils in the project area are relatively fertile for paddy cultivation, the continuos cultivation without application of organic manure would decrease soil fertility.

4 IRRIGATED AGRICULTURE DEVELOPMENT PLAN

4.1 Basic Concept and Approach to Improvement of Irrigated Agriculture

The objectives of agricultural sector in the project are to increase agricultural productivity, especially yields of paddy through the development of irrigated agriculture, and thereby expected to improve the poor financial position of farmers to aim at the final goal of improvement of the rural economy. The project is expected to support the key agricultural development policies defined in the MTPDP.

As clarified in Chapter 3, the low productivity of paddy is one of the major issues of the project area. The issue related to the poor performance of irrigation services. The low yield of paddy can be attributed largely to insufficient supply of irrigation water, improper farming practices brought about by inadequate provision of agricultural extension services, and low use of certified seed.

The irrigated agriculture development is approached through:

(a) to establish the cropping pattern in conformity with effective and maximum use of available water,
(b) to increase paddy yields through the adoption of improved, appropriate and sustainable farming practices, and supply of certified seeds, and

(c) to strengthen agricultural extension activities for achievement of the increase of crop yield.

4.2 Proposed Cropping Pattern

4.2.1 Selection of Crops

The following crops were finally selected and recommended for cultivation in the project area. The overriding considerations for the selection of these crops were technical suitability for soils and climate, markets and profitability and social acceptability among the IAs and farmers. The evaluation on the market potential of these crops is discussed in the Annex G.

(1) Paddy

Paddy is expected to be a major crop given that irrigation is the major investment in the project. There are no major technical, marketing and social constraints foreseen in the cultivation of paddy. It is the basic food staple in the Philippines. The cultivation of paddy in the project area is seen as a national food security measure given that the country still imports an annual average of less than one million ton as a buffer stock.

(2) Mungbean

Mungbean is a major diversified crop in the project area. Presently, mungbean is planted during the third crop after harvest of the second paddy, using residual soil moisture without plowing and irrigation. Under this extensive farming, the yield is very low at 0.4 to 0.7 ton/ha. The yield is expected to increase by applying new intensive farming systems such as row-ridge cultivation, irrigation, fertilizing, etc. Since mungbean is moderately tolerant to drought, the water requirement is relatively small. The cultivation of mungbean as a leguminous plant improves soil fertility by nitrogen fixation.

As regards the market potential of mungbean, the Philippine imports about 70% of the national requirement. This condition makes mungbean as an ideal import

substitute given likewise the recent devaluation of the peso vis-a-vis US dollar. The incremental production of mungbean in the project area which is expected to be significant will form part of the national requirement.

(3) Watermelon and vegetables

Since these crops are highly perishable the cultivation is proposed to be on a small scale. Presently watermelon is one of the major diversified crops after the second cultivation of paddy. The major producers in Iloilo Province are in Aganan and Sta. Barbara RIS areas. The farm-gate prices sometimes drop during peak harvest season. Vegetables such as eggplant, okra, squash, tomato, sweet pepper, chili, ampalaya, stringbean, cabbage, and cucumber are candidates as alternative crops. These vegetables are planted on small scale mainly for local consumption.

It should be mentioned that diversified crops will be introduced only during the dry season. Their cultivation during the wet season is not recommended because of water-logging and high humidity. Soil condition in the project area has limitation on drainability for most diversified crops.

As dry season crops, valuable crops such as watermelon and vegetables are attractive for farmers in the point of high profitability. However the market is still limited in and around the study area, and the farming practices among farmers have been low for the production of marketable quality. In the point of view mentioned above, production increase of valuable crops will not be involved in short-term plan, but for in long-term target, e.g. ten years after commencement of the project implementation, training plan for extension workers and farmers will be required in order to increase of valuable crop production for the achievement of the high income level of farmers.

4.2.2 Cropping Pattern

The proposed cropping pattern is shown in Figure C.4.1. The formulation was based according to the following conditions:

i) Water distribution will be stop for 2 months during the dry season to allow for maintenance works of the irrigation facilities,

ii) Paddy will be planted in the entire service area during the wet season,

iii) Diversified crops will only be introduced during the dry season considering the limited supply of irrigation water, and

iv) The cultivation of third paddy, mungbean and watermelon will assume the same conditions insofar as in present area and yields.

In view of the limited supply of water coming from the Suague RIS during the dry season, rotational cropping system of diversified crop (mungbean) is being recommended. The system is discussed in the Annex D. Overall, the. cropping pattern in the future plan is summarized below:

(Unit: ha)

	Jalaur Proper	Suague	Total
1st Paddy Irrigated	8,820	2,900	11,720
2nd Paddy Irrigated	8,820	1,100	9,920
Mungbean Partially Irrigated	0	1,800	1,800
Subtotal	17,640	5,800	23,440
Cropping Intensity (%)	200	200	200
3rd Crops			
3rd Paddy	1,200	50	1,250
Watermelon	100	20	120
Mungbean Rainfed	600	150	750
Subtotal	1,900	220	2,120
Total	19,540	6,020	25,560
Service area (ha)	8,820	2,900	11,720
Total Cropping Intensity (%)	222	208	218

4.3 Proposed Farming Practices

4.3.1 Paddy

The yield of paddy will be increased by proper application of farm inputs and appropriate farming practices.

(a) Unification of cropping period

Cropping period will be unified through impartial and certain water distribution. Under the unified cropping, farmers will be able to do group spraying for pest and disease. Optimum interval between harvest of wet paddy and planting of dry paddy will reduce occurrences of pest and disease.

(b) Efficient and proper land preparation

To the extent that there are limited supply of draft animals, land preparation will be complemented by available hand-tractors. Land preparation will be done efficiently and properly by the mechanization.

(c) Improvement of fertilization

Crop fertilization will be applied at 100:35:35 kg/ha of N:P:K. All of the P and K, and about 1/3 to 1/4 of N should be applied as basal. Half of the remaining N will be applied six weeks after seeding (2 week after transplanting), and during the panicle initiation stage, side dressing will be recommended. Furthermore, appropriate fertilization will be improved by the analyses of fertilizer cost and yield increase, and recommend system of fertilization rate by quick soil test by extension workers.

(d) Use of certified seed and optimization of seeding rate

The present seeding rates are very high at 120 to 200 kg/ha in direct seeding, and 80 to 120 kg/ha in transplanting, taking into consideration the optimum rate by researches at 60 - 80 kg/ha and 30 - 40 kg/ha to respective methods. The farmers are using much seed against the damage by snail and rat. Optimization of seeding rate and use of certified seed will be recommended in order to reduce seed cost and to increase yield through stimulation of tillering. Taking into consideration the snail and rat damages, the seeding rate will be recommended to be 100 kg/ha on direct seeding and 50 kg/ha on transplanting.

Furthermore, the rate should be optimized through the snail and rat control as well as supplemental replanting to the damage.

(e) Expansion of transplanting practice

Adoption of transplanting method will be recommended in order a) to attain yield increase easily and quickly, b) to increase employment opportunities for farm labor in the project area, c) to save irrigation water by shortening growth period in the paddy field, and d) to carry out proper control of pest, insect, snail and rat, and reduction of seeding rate and herbicide.

The direct seeding method was promoted in the 1980's for double cropping of paddy in the area with water shortage in the early wet season and dry season through seeding in advance of rain or water distribution, since the method can seed simultaneously with rain/water distribution. Some farmers still adopt the dry seeding method in the project area.

The plan envisages that transplanting practice will be expanded from 10 - 15 % at present to 50% of the project area. Presently, relevant MAOs are extending the application of transplanting method in the project area, and the proposed demonstration farms with adopt transplanting method. The demonstration farms are expected to yield an average of 4.8 to 5.5 tons/ha, and more than 6.0 tons/ha under favorable climate condition.

Transplanting method requires more labor force than direct seeding. According to the socio-economic survey, the labor requirement increases by 24 man-days compared with direct seeding (80 man-days for direct seeding and 104 days for transplanting). As discussed in Section 5.2.4, there is surplus labor force in the project area for the proposed cropping pattern/farming practices even in the busiest month of October.

The higher cost (P1,020/ha) for transplanting practice will be adequately compensated by the increase in paddy field to 130 kg/ha. The transplanting method is profitable if the yield increases more than 130 kg/ha, which is equal to only 2.6% of the target yield. The relevant MAOs explain that transplanting method generally gives more than 3 - 5% of yield increase compared with direct seeding.

Comparison of Costs between Direct Seeding and Transplanting (Unit: peso/ha)

Cost	Direct seeding (D)	Transplanting (T)	Balance (D-T)	Remarks
Seed	(100 kg/ha)	(50 kg/ha)	(50 kg/ha)	
	1,600	800	800	P16.0/kg
Herbicide	350	250	100	reduction of herbicide by manual weeding
Labor	(80 man-day/ha)	(104 man-day/ha)	(-24 man-day/ha)	
	6,400	8,320	-1,920	P80/day
Total	8,350	9,370	-1,020	

Presently, direct seeding is adopted by farmers for the following reasons: a) weak financial condition of farmers for labor cost expenses, b) uncertainty of water distribution at required timing for transplanting after the nursery period, c) insufficient activities by MAO (there exist only 14 demonstration plots for paddy in the relevant municipalities), and d) absence of cost-benefit analysis approach to paddy cultivation. The transplanting method would be extended among the farmers through the provision of crop loan, strengthening of extension

services, proper water distribution, and extension activities by the contact farmers.

In the future, mechanical direct seeding will be expanded by reducing labor input for farming activities and hence reducing production cost. Since there is presently sufficient labor force in the project area, and MAOs and research institutes recommend the transplanting method for the farmers, the transplanting method will be disseminated by giving priority to the farmers with sufficient labor force. It will be disseminated through training for farmers and demonstration farms.

(f) Improvement of harvest and post-harvest practices

Harvesting will be done properly at maturing stage in order to minimize losses and inferior quality of paddy. Harvested paddy grain should be dried below 14 % moisture content by sundry or mechanical dryer. Mechanical dryer would be used for drying of paddy harvested during the wet season.

(g) Organic farming

Organic fertilizers, such as crop residues and animal manure will be incorporated into the soil by plowing. Hog manure which are readily available can be used as alternative fertilizer manure.

4.3.2 Mungbean

The farming practices of mungbean will be improved to get better and quality yield. This is the only way the local mungbean can be competitive vis-a-vis imported mungbean.

(a) Practice of row-ridge cultivation method

The row-ridge method will be recommended for land preparation in mungbean in order to furrow irrigation and remove excess water during the typhoon seasons. Plowing, harrowing, and ridging will be done after harvest of the first paddy. Plowing will be made as deep as possible to improve growing germination. Harrowing will done to break up large soil clods. The distance of furrows will be 50 cm apart.

(b) Use of suitable seed and inoculation of rhizobium strain

Common varieties in the area are MG 50-10A, CES 55 & 87, BPI MG-9, Pagasa 5, and IBB M9-9-82. Seed will be treated with liquid chemicals to protect from soil-borne diseases and insects. Seeds will be inoculated with Rhizobium strain intended for mungbean. Seeding rate will be 25 kg/ha, and dibble 2 to 3 seeds/hill spaced at 25 cm between rows and hills.

(c) Supplemental irrigation

Irrigation will be done partially, just after sowing, flowering and pod filling.

(d) Proper fertilization

Fertilizer will be applied as follows: 3 times before planting as basal, and after 3 weeks of germination as side dressing. About two-thirds of the N, P, K ratio of 30 : 30 : 30 kg/ha will be applied as basal and remaining 1/3 for side dressings. Complete fertilizer (14-14-14) will be applied.

(e) Practices of weeding and cultivation

Weeding/cultivation for weed control will be done after four weeks of germination.

(f) Proper harvest and post-harvest practices

Mungbean plants are ready for harvest when pods turn brown or black. After 2 days of sun drying, thresh the pods. Seeds must have a moisture content of 12 % or below for store.

(g) Proper control of pest and disease

Major insects and diseases of mungbean in Philippines are listed below:

Insect: Beanfly, Flea beetle, Cutworm, Leaf-folder, Pod-borer
Disease: Damping-off, Powdery

If necessary, spray appreciate agro-chemicals.

4.4 Labor Requirement and Farm Machinery

The proposed labor requirement is shown below .

(Unit: man-days)

Crop	Proposed	Present
Irrigated Paddy (direct seeding)	80	69 - 71
Irrigated Paddy (transplanting)	104	99
3rd Paddy	* (56)	56
Rainfed Paddy		56
Mungbean (irrigated)	49	
Mungbean (Rainfed)	* (17)	17
Watermelon	* (80)	80

* : Assumed at same as present condition of 3rd crops

On the basis of the above labor requirement and proposed cropping pattern, the total labor requirement and labor balance in the future plan are estimated under the following conditions:

- transplanting method of paddy would increase by 50 % of total area,
- third cropping would assume the same area and farming practices, and
- available labor force for farm activities is estimated at 25,660 persons based on the number of households and farm workers in the project area,

total households in the project area	16,880 (population census 1995)
households of beneficiaries	7,850 (both RIS)
households of farm workers	4,980 (estimated based on the provincial labor statistics)
available on-farm labor force per household	
full-time	1.22 persons (average by socio-economic survey)
part-time	0.78 persons (0.5 x average by socio-economic survey)
total	2.00
total available on-farm labor force	(7,850 + 4,980) x 2 = 25,660

- workable days per month per available labor force 20 days/month
- available labor force per month 25,660 x 20 = 513,200 man-days
- on-farm labor requirement in busiest month (October)
  263,560 man-days (Table C.4.1)

As shown in Table C.4.1 the total labor requirement is estimated at 1,804,700 man-days/year, and 263,560 man-days/month in busiest month at October, which is 51% of the available labor force in month. The figure indicates that labor requirement of the proposed farming practices can be supplied by existing labor force.

Plowing/harrowing and leveling will be done fully by hand-tractor. The available number of hand-tractors can do about 6,000 ha of land preparation per month assuming a 30% working ratio. Given this, the whole service area will be completed in two months.

	Available Number* (unit)	Working Capacity (ha/day/unit)	Working Ratio (%)	Workable Area (ha/month)
Hand-tractor	1,150	0.5	30	5,175
Tractor	45	2.0	30	810
Total				5,985

*: Source : Socio-economic survey and Consultation meeting with IAs

4.5 Anticipated Crop Yield and Production

4.5.1 Anticipated Yield

The future yields of crops were estimated on the basis of the following: results of the socio-economic survey on progressive farmers in well irrigated farm; interview with MAOs of relevant municipalities; data from demonstration farms in Iloilo Province, etc.

Target yield in near future in MAOs of relevant municipalities	5.5 - 6.3 ton/ha
Target yield of irrigated paddy of Gintong Ani Program	5.0 ton/ha
Present average yield in progressive area in Philippines	4.9 to 5.3 ton/ha
Average yield in good year in Iloilo Province (Oct.- Dec., 1993)	4.83 ton/ha
Potential yield of HYV	7.00 ton/ha
Actual yields at demonstration plots (Techno-demo-farm) supervised by MAOs	4.8 - 5.5 ton/ha

The yield of paddy is generally higher during the dry season than in wet season because of higher solar radiation in the dry season. However, the present yield of paddy in the project area is lower during the dry season than in the wet season. This is due to shortage of irrigation water and unfavorable climatic conditions by the typhoon and the solar radiation same as during the wet season (Figure C.4.2). Taking into these conditions, the target yield of paddy is assumed at 5.0 tons/ha during both seasons.

The yield of mungbean is projected at 1.0 ton/ha. To achieve the expected yield, optimum application of farm inputs, appropriate farming practices as well as proper water management will be recommended.

Crop/Condition	Anticipated Yield (ton/ha)
1st paddy irrigated	5.0
2nd paddy irrigated	5.0
Mungbean partially irrigated	1.0

Note: Excluded 3rd crops, 3rd paddy, watermelon and mungbean which are assumed same as present conditions on area and production.

4.5.2 Production

The crop production under the "with project" condition is estimated by multiplying the anticipated yield with the cropped area. Total production of crops is estimated as follows: 111,000 tons of paddy; and 1,860 tons of mungbean. The net

incremental crop production is expected at 43,220 tons of paddy, and 2,100 tons of mungbean. Table C.4.2 shows the future total production of crops in each RIS compared with the present condition, as summarized below:

(Unit: ton)

	Paddy	Mungbean	Watermelon
Jalaur Proper			
Present	49,869	240	400
With Project	90,888	240	400
Increment	41,019	0	0
Suague			
Present	17,907	60	80
With Project	20,112	1,860	80
Increment	2,205	1,800	0
Total			
Present	67,776	300	480
With Project	111,000	2,100	480
Increment	43,224	1,800	0

4.6 Crop Budget and Irrigation Benefit

The project benefit is defined as the difference of the benefits between the "with and "without project" conditions. "Without project" condition was assumed to be same as the present condition. Agricultural production conditions would not change from the present condition if the project would not implemented.

The benefits under the "with project" and "without project" conditions are shown in Tables from C.4.3 to C.4.5, and are summarized as below.

(Unit: peso/ha)

	With Project			Without Project		
	Gross Income	Production Cost	Net Profit	Gross Income	Production Cost	Net Profit
1st Paddy irrigated *	42,900	* 19,411	23,489	29,172 ~ 31,231	17,587	11,585 ~ 13,644
2nd Paddy irrigated *	42,900	* 19,811	23,089	28,314 ~ 29,258	17,991	10,323 ~ 11,267
1st paddy rainfed				19,219	12,545	6,674
2nd paddy rainfed				19,219	12,545	6,674
Mungbean partially irrigated	25,000	10,653	14,347			
3rd paddy	19,219	12,739	6,480	19,219	12,739	6,480
Mungbean rainfed, 3rd crop	10,000	4,035	5,965	10,000	4,035	5,965
Watermelon	32,000	15,290	16,710	32,000	15,290	16,710

Note *: Average of direct seed and transplanting

The incremental benefit at full development is estimated at P288 million for both RISs. About P234.6 million is the benefit from the Jalaur proper RIS, and P53.3 million for Suague RIS as shown in Table C.4.6.

4.7 Projected Farm Budget

The projected farm budget at full development is estimated assuming an average farm size of 1.5 ha per household. The net income of Jalaur proper and Suague RISs

will increase from the present levels of P28,050 and 32,630 to P72,080 and 62,530 respectively.

(Unit: Peso)

	Farm Size: 1.5 ha			
	Cropped Area (ha)	Gross Income	Production Cost	Net Income
Jalaur Proper				
1st Paddy irrigated	1.50	64,350	29,117	35,233
2nd Paddy irrigated	1.50	64,350	29,717	34,633
3rd Paddy	0.20	3,922	2,600	1,322
Watermelon	0.02	544	260	284
Mungbean rainfed	0.10	1,020	412	608
Total	3.32	134,186	62,106	72,080
Suague				
1st Paddy irrigated	1.50	64,350	29,117	35,233
2nd Paddy irrigated	0.57	24,409	11,272	13,137
Mungbean partially irrigated	0.93	23,276	9,918	13,358
3rd Paddy	0.03	497	329	168
Watermelon	0.01	331	158	173
Mungbean rainfed	0.08	776	313	463
Total	3.12	113,639	51,107	62,532

The net income per household at 1.5 ha farm-size will also increase.

(Unit: pesos/h.h.)

	Jalaur proper	Suague	Note
Present			
Owner-cultivator	28,047	32,631	
Leaseholder:	11,831	16,415	Land fee: 30 sacks/ha/year
Tenant farmer	6,504	6,964	Given 10% of net production
Prospective			
Owner-cultivator	72,080	62,532	
Leaseholder:	54,060	46,899	Land fee: 25% of net income
Tenant farmer	36,040	31,266	Land fee: 50% of net income

5. IMPROVEMENT PLAN OF AGRICULTURAL SUPPORT SERVICES

5.1 Basic Approach

Agricultural extension activities will be strongly activated to realize rapidly and surely the objectives of the agricultural development plan through improvement of extension system. The relevant agencies will be encouraged to support farming practices appropriate to the needs of the farmers. The basic approach to the strengthening of extension service are:

(i) Field training and extension of new farming technologies to contact farmers through the development of demonstration plots (techno-demo farms),
(ii) Farmer-to-farmer technology dissemination by contact farmers,
(iii) Training of extension workers of the MAOs,
(iv) Standardization of appropriate farming practices, and its dissemination
(v) Improvement of certified seed production / distribution system

The present extension system will be principally used in the improvement plan. The present extension services should be activated and be substantial in order to realize the irrigated agriculture development plan. MAO is the main agency to implement the plan of agricultural extension services. DA, PAO and research institute will technically support the activities of MAO.

5.2 Improvement of Extension Service System

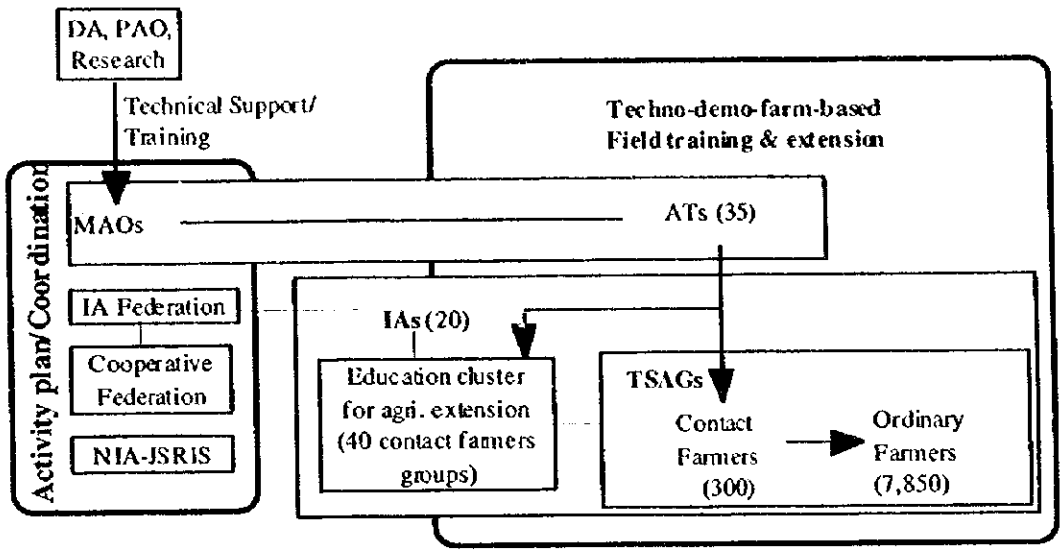
The improvement plan of extension system will focus the extension services on the turnout service area group (TSAG) under the IA, and not on the farmers' groups or cooperatives in the barangay at present. Presently, there are 271 TSAGs under the 20 IAs, 7,850 farmer-beneficiaries and additional 4,980 farm workers in the project area. Assuming that the TSAGs will increase to about 300 under the Project, the average number of beneficiaries per TSAG will be 25 farmers (40 households including farm-workers). The group size is believed to be the optimum size for faster adoption of new and better technologies. The extension activities will be based on each TSAG as a smallest farmers group in order to disseminate appropriate farming practices to all farmers.

Ninety four (94) agricultural technicians (ATs) are presently employed by concerned MAOs in the project area. Of these, 70 ATs are engaged in extension activities for crop and organization development. It is assumed that about 30 to 35 ATs will be able to be engaged in agricultural extension activities in the project area based on the ratio of total barangays (78) in the project area against total number of barangays (about 170) under concerned MAOs except non-agricultural barangays such as town, proper and fishing areas. One AT will cover 0.5 IA or 10 TSAGs in average, and work for three days per week in the field.

Participatory extension system will be adopted by the contact farmer through farmer-to-farmer technology dissemination, which has been adopted in the UNDP and FAO projects. The extension system is believed to supplement shortage of MAO staff to disseminate improved/proper farming technologies to all farmers. One contact farmer per TSAG, or 300 contact farmers in total in the project area, will be selected from progressive average farmers with high leadership potential. A contact farmers' group with 7 to 8 members / group (2 groups per IA), will perform as an education cluster for farming technology under the membership, education and training committee of IA. They will be trained on new/proper farming technology and extension activity by MAO in group, and attend to extension activity in close cooperation with each other under the assistance by ATs. Every contact farmer will be directly and continuously in-charge of extension activity in his respective TSAG members. The contact farmer works

voluntarily as an agricultural technician for farmer-to-farmers technology dissemination at the field level, and will receive incentive in terms of intensive training and supply of free farm inputs to his techno-demo farm as mentioned below.

The techno-demo farm will be established at the farmers' farm land for demonstration and verification of proper farming practices as well as training for farmers and varietal trials on paddy and mungbean, and valuable crops if farmers require. The farm is a venue for the activities of ATs and contact farmers. The techno-demo farm will be set up two plots (one plot per a contact farmers' group) in each IA with an area of 0.5 to 1.0 ha every cropping season. The sites of the techno-demo farms should be located along main road and sufficient water area in order to show the effective to the farmers. The location of the techno-demo farms will be rotated every cropping season or year to be able to expand as quickly as possible their outreach services. This is also essential to cover as many farmers as possible. The techno-demo farms which are principally accredited in the contact farmers farm will be supplied free with the required inputs such as seed, fertilizer and agro-chemicals. The techno-demo farms of 40 plots will be set up in every cropping season, or a total of 360 plots during 4.5 years (9 cropping season). The flow of the proposed extension system is as follows.



5.3 Production and Distribution of Certified Paddy Seed

Certified seed is in short supply and financially prohibitive for most farmers. In the project area, the projected seed requirement is approximately 810 tons per year at full development stage assuming that transplanting method would be adopted in 50% of the area. Thus, an area of 200 ha will be required for production of registered seed estimated at 10 tons as shown below.

Total paddy cropping area		21,640 ha/year
Seeding rate	Transplanting	50 kg/ha
	Direct seeding	100 kg/ha
Total seed requirement		1,620 ton
Replace period of certified seed		2 cropping
Certified seed requirement		810 ton
Unit yield of certified seed		4 to 5 ton/ha
Requirement of paddy field for seed production		200 ha
Requirement of registered seed		10 ton

The required certified seed will be produced in the project area and distributed through the farmers cooperative. Seed growers' group will be formed in the farmers cooperatives in order to establish a business function of the cooperative. The farmers cooperative will provide credit to the seed growers' group for the purchase of required inputs such as registered seed, fertilizer and agro-chemicals, and will distribute the produced certified seed to the members through farmers cooperative at a lower price using credit system.

The seed growers will be selected and trained from the members under the technical guidance by BPI, PAO and MAO. Approximately 80 seed growers will be trained including existing seed growers in the project area. BPI will accredit seed growers, and supply registered seed through Western Visayas Integrated Agricultural Research Center (WESVIARC). MAOs will provide technical services to seed growers, and inspect the produced seed. PAO and WESVIARC will provide technical training to ATs of MAO on farming practices, drying, seed processing and seed inspection. The seed processing will be done by using facilities attached to the WESVIARC.

5.4 Training Plan

The training plan is designed to ensure the effective dissemination of proper farming practices through strengthening extension services and certified seed production. Training of ATs, contact farmers, seed growers and ordinary farmers will be provided for effective dissemination of proper farming practices and technologies. The training courses will be provided on farming practices and technologies, extension activities, and seed production for each target trainee. Seven training sessions will be provided for 5 years from the second year of the Project period to one year after completion of the construction stage.

Training Course		Trainer	method/location
	trainee (No.)		Frequency
Farming practices & technology	ATs (80), Agriculturist of NIA	DA, PAO, Researches Consultant(s)	Seminar, Field, Training center Demo farm, 2 times/cropping season
	Contact farmers (300)	DA, PAO, Researches Consultant(s), ATs	Seminar, Field, Training center Demo farm, 2 times/cropping season
	Ordinary farmers (7,850)	ATs, Contact farmers	Field, Techno-demo farm, Every 2 weeks
Extension activities	ATs (80), Agriculturist of NIA	DA, PAO, Researches Consultant(s)	Seminar, Field, Training center Demo farm, 2 times/year
	Contact farmers (300)	DA, PAO, Researches Consultant(s), ATs	Seminar, Field, Training center Demo farm, 2 times/year
Seed Production	ATs (30)	DA, PAO, Researches Consultant(s), ATs	Seminar, Field, Training center 2 times/year
	Seed growers (80)	ATs	Seminar, Field, Training center 2 times/year

The training courses on the farming practices and technology put emphasis on fertilization, reduction of seeding rate, transplanting method, and control of pest/insect, snail and rat, and cover the whole farming and post-harvest practices for paddy and mungbean cultivation. The training on monitoring and evaluation of farming and seed production will be additionally provided for the ATs and contact farmers. The training for the ordinary farmers will be carried out in the field school, and farmers' group discussions at techno-demo farms.

The course on extension activities will provide training on the activity method, leadership and document preparation in crop farming and activities for the ATs and contact farmers.

The course on seed production will provide training on seed multiplication for the seed growers, and on inspection, distribution and management of seed for the ATs.

MAOs and agriculturist of JARIS office will plan the training sessions in cooperation with DA VI and PAO. Trainers will be requested specialists of DA and relevant researches, consultants and MAOs themselves.

Table C.5.1 identifies the training needs of the various staff of the MAOs, and contact farmers.

(a) Training on farming practices and technologies

ATs training
No. of Trainee: 80, twice per cropping season (before season and after harvest), seminar/workshop, in the training center and techno-demo farms, during 5 years,

Contact farmers
No. of trainees: 300, twice per cropping season (before season and after harvest), seminar/workshop, in the training center and techno-demo farms, during 4.5 years.

Ordinary farmers
No. of trainees: 7,850, once per two weeks, field school and field discussion at the techno-demo farm or barangay facilities by contact farmers and ATs, during four (4) years.

(b) Training on extension activity

ATs training
No. of Trainee: 80, once per cropping season, seminar/workshop and in the training center and techno-demo farms, during 4 years.

Contact farmers
No. of trainees: 300, once per cropping season, seminar/workshop, in the training center and techno-demo farms, during 4 years.

(c) Training on seed production

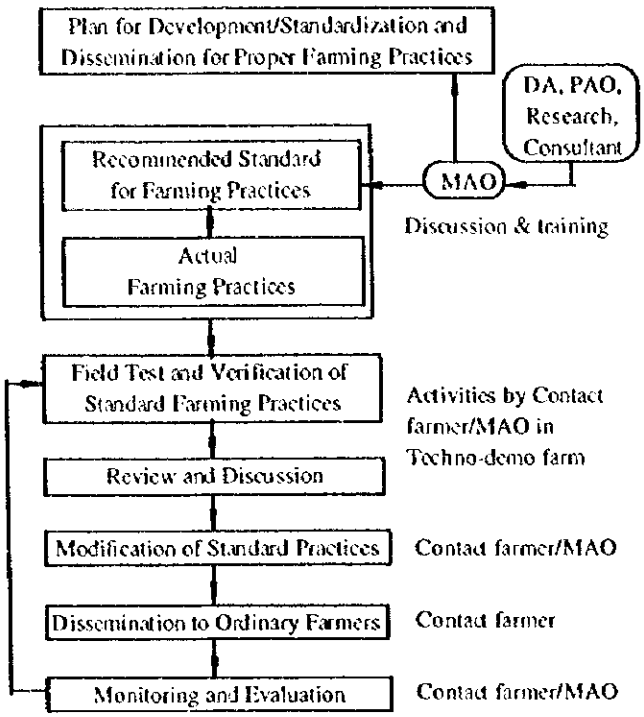
ATs (technical support and Training)
No. of Trainee: 30, once per cropping season, seminar/workshop, in the training center and field, during 4 years.

Seed-grower Training
No. of Trainee: 80, once per cropping season, seminar/workshop, in the training center and field, during 4 years.

5.5 Procedure of Development, Standardization and Dissemination of New/proper Farming Technologies

The proposed farming practices mentioned in Section 4.3 have been mostly verified as appropriately recommendable in the project area as shown in Table C.5.2. The proposed farming practices and technology will be disseminated among the farmers in the project area by standardization through demonstration, verification and comparative field tests in the techno-demo farm. ATs and contact farmers will be the leading implementors for village-level extension services. DA, PAO and concerned research institutes will technically support MAO and contact farmer on newly developed

technologies and integration of farming technology, and will provide training to ATs and contact farmers. The cooperatives will support the dissemination of proper farming practices by providing agricultural inputs through group buying and crop loan The procedure of dissemination of improved farming practices at the field level is as follows:



The differences between the recommended farming practices by MAO/DA and actual farming practices by farmers will be discussed and clarified by ATs and contact farmers through the training for initial standardization of farming practices. The initial standard will be practiced at techno-demo farms in order to demonstrate, verify and field trial. Through evaluation of the results of the techno-demo farm by ATs and contact farmers, the recommended standard farming practices will be prepared for dissemination among ordinary farmers. The recommended standard farming practices will be improved through the monitoring and evaluation on the progress of the technology dissemination.

The recommended standard farming practices will be prepared by MAOs and contact farmers with technical assistance of DA, PAO and concerned research institutes. The techno-demo farms will be the venue for the training and dissemination of improved farming practices to ordinary farmers.

MAO will prepare simple pamphlets and guidebooks on new/improved farming practices and technologies for dissemination among the farmers in cooperation with specialists from PAO, DA and research institutes. The documents will be used for training of contact farmers and farmers group discussion in the field, and distributed it to all farmers. It will be gradually revised to substantially reflect the farmers' needs and technical advancement. The documents will be prepared on the following:

- Guideline on paddy and mungbean cultivation,
- Pamphlets on priority extension items to be improved, and
- Evaluation results on field-tested farming technologies.

5.6 Provision of Goods and Equipment for Extension Activities and Employment of Consultant

The following goods and equipment will be provided for improvement of extension services:

Portable audio set for field activities	14 units
White-board	14 units
Camera set	7 units
Soil quick test kit	20 units
Cereal moisture meter	15 units
Motor-cycle for field activities	35 units

The required inputs such as seeds, fertilizer and agro-chemicals for the techno-demo farms will be supplied in kind from the project through the farmers cooperative with the appropriate guidance of MAO. The total area of techno-demo farms will be 360 ha for 4.5 years.

Consultant(s) will be recruited by the project to render technical advice and training to MAOs, contact farmers and seed growers in the area of agricultural development and strengthening of extension services for a total period of 60 man-months.

Tables

Table C.2.1 Soils in the Project Area

Land forms	Physiographic Unit	Soil Series (Symbol)	Soil Texture	Drainage	Slope (%)	Parent Material	Soil Taxonomy	Area (ha)
Alluvial Lowland								
	Level to very gently sloping	Sta. Rita (10A)	Silty clay Clay	Poorly drained	0 - 3	Silt & clayey alluvium	Fine clayey, Montmorillionitic Isohypherthermic, Typic Epiaquerts	11,080
	do	Sta. Rita (10Af3)	Silty clay Clay	Very poorly drained	0 - 3	do	Fine clayey, Montmorillionitic Isohypherthermic, Typic Epiaquerts	400
	Slightly elevated and terrace, gently sloping to undulating	Sta. Rita (10B)	Silty clay Clay	poorly drained	3 - 8	do	Fine clayey, Montmorillionitic Isohypherthermic, Typic Epiaquerts	60
	Level to very gentle sloping, recent flood plain	Umingan (20Af1)	Sandy clay loam Clay loam/Loam	Well drained	0 - 3	Recent river sediments	Fine loamy, Mixed Isohypherthermic Fluventic Eutropepts	20
Residual Upland								
	Level to very gently sloping plain	Faraon (30A)	Clay Silty clay	Well drained	0 - 3	Limestone residuum	Fine clayey, Montmorillionitic Isohypherthermic, Typic Hapludalfs	160
Total								11,720

Table C.2.2 Typical Soil Profiles Description (1/4 Sta. Rita Series: 10A)

Pit No. :	30
Location :	Brgy. Amamaron, Pototan
Soil Series Name :	Sta. Rita
Soil Mapping Unit :	10A
Taxonomy Classification :	Fine clayey over loamy Typic Epiaquerts
Land Form :	
a) Physiography :	alluvial
b) Surrounding Landform :	nearly level
Slope :	1%A
Land Use/Vegetation :	pri
Drainage :	poor
Moisture Regime :	Udic
Flooding :	none
Erosion :	none
Elevation :	20 m asl
Depth of Water Table :	not encountered
Remarks :	with soil cracks with - 1-2 cm depth -15 cm
Date :	2-5-97

Horizon	Depth (cm)	Description
Ap	0 - 19	Dark grayish brown (10YR 4/2) dry, clay ; few fine distinct strong brown (7.5Y 5/8) root stain; strong medium and coarse angular to subangular blocky structure ; sticky, plastic, hard, firm when moist; few fine tubular pores ; common fine roots; clear smooth boundary.
Bw	19 - 67	Light olive gray (5Y 6/2) moist, clay ; no mottles ; moderate medium angular to subangular blocky structure ; sticky, plastic, firm ; slightly hard when dry ; very few very fine roots; clear smooth boundary.
BC1	67 - 94	Pale olive (5Y 6/3) moist, sandy loam ; no mottles ; fine breaking to granular structure ; non-sticky, non-plastic, friable ; gradual smooth boundary.
BC2	94 - 102	Light yellowish brown (2.5Y 6/4) moist, silt loam - silty clay loam ; weak fine breaking to subangular blocky structure ; slightly sticky, slightly plastic, friable ; presence of few gravels and stones ; clear smooth boundary.
C	102 - 150	Brown to dark brown (10YR 4/3) moist, silt loam ; no mottles ; weak fine breaking to granular structure ; non-sticky, non-plastic, loose.

Table C.2.2 Typical Soil Profiles Description (2/4 Sta. Rita Series: 10Af3)

Pit No. :	34
Location :	Brgy. Cayos, Dumangas
Soil Series Name :	Sta. Rita
Soil Mapping Unit :	10Af3
Taxonomy Classification :	Fine, Clayey, Typic Epiaquetts
Land Form :	
a) Physiography :	alluvium plain
b) Surrounding Landform :	flat to level
Slope :	1%A
Parent Material :	
Land Use/Vegetation :	pri/watermelon
Drainage :	poor
Moisture Regime :	Aquic
Flooding :	severe
Erosion :	none
Elevation :	5 m asl.
Depth of Water Table :	not encountered
Remarks :	soil cracks width 3-10 cm, depth 48 cm.
Date : 2-6-97	

Horizon	Depth (cm)	Description
Ap	0 - 22	Very dark gray (10YR 3/1) dry, clay ; few to common medium distinct strong brown (7.5YR 4/6) root stain ; strong medium angular to subangular blocky structure ; very sticky, very plastic, very hard ; firm when moist ; common fine and few medium roots ; clear wavy boundary.
Bw1	22 - 61	Black (10YR 2/1) moist, clay ; few fine faint diffuse light brownish gray (2.5Y 6/2) mottles ; moderate angular to subangular blocky structure ; very sticky, very plastic, firm, slightly hard when dry ; few thin patchy clay cutans on ped faces ; few fine roots ; gradual smooth boundary.
Bw2	61 - 91	Very dark gray (2.5Y N3/) moist, clay ; many fine distinct clear olive brown (2.5Y 4/4) mottles ; moderate fine angular to subangular blocky structure ; very sticky, very plastic, very firm ; many thin and common thick clay cutans on ped faces ; gradual smooth boundary.
C	91 - 150	Mottled light olive brown (2.5Y 5/4) brown (7.5YR 5/8) and gray (2.5Y N5/) moist, clay ; moderate fine subangular blocky structure, very sticky, very plastic, firm.

Table C.2.2 Typical Soil Profiles Description (3/4 Umingan Series)

Pit No. :	45
Location :	Matanghanon, Dingle
Soil Series Name :	Umingan Series
Soil Mapping Unit :	20Af2
Taxonomy Classification :	Fine loamy, Fluventic Eutropepts
Land Form :	
a) Physiography :	alluvium plain
b) Surrounding Landform :	nearly level
Slope :	1%A
Parent Material :	alluvium
Land Use/Vegetation :	sugarcane
Drainage :	well drained
Moisture Regime :	Udic
Flooding :	slight to moderate
Erosion :	none
Elevation :	<20 m asl.
Depth of Water Table :	not encountered
Rremarks :	
Date :	2-7-97

Horizon	Depth (cm)	Description
Ap	0 - 24	Light yellowish brown (10YR 6/4) moist, silt loam ; no mottles ; weak fine breaking to granular structure ; non-sticky, non-plastic, friable, loose when dry ; few fine roots ; clear smooth boundary.
B	24 - 63	Yellowish brown (10YR 5/6) moist, silty clay loam ; no mottles; weak fine subangular blocky structure ; slightly sticky, slightly plastic, slightly firm ; very few very fine roots ; clear smooth boundary.
BC	63 - 81	Yellowish brown (10YR 5/4) moist, silt loam ; no mottles ; weak fine breaking to granular structure ; non-sticky, non plastic, friable ; gradual smooth boundary.
C	81 - 150	Mottled olive brown (2.5Y 4/4), brownish yellow (10YR 6/6) and grayish brown (2.5Y 5/2) moist, sandy loam ; loose medium breaking to granular structure ; non-sticky, non plastic, friable.

Table C.2.2 Typical Soil Profiles Description (4/4 Faraon Series)

Pit No. :	42
Location :	Agcayawan, Kalsada, Barotoc Nuevo
Soil Series Name :	Faraon
Soil Mapping Unit :	30A
Taxonomy Classification :	Fine, Clayey, Vertic Hapludalfs
Land Form :	
a) Physiography :	alluvium plain
b) Surrounding Landform :	level nearly level
Slope :	1%A
Parent Material :	
Land Use/Vegetation :	sugarcane
Drainage :	moderately well
Moisture Regime :	Udic
Flooding :	none
Erosion :	none
Elevation :	<10 m asl.
Depth of Water Table :	not encountered
Remarks :	with surface cracks
Date :	2-7-97

Horizon	Depth (cm)	Description
Ap	0 - 28	Black (2.5Y N2/) dry ; clay, no mottles ; strong medium angular to subangular blocky structure ; sticky, plastic, hard, firm when moist ; common fine roots ; clear wavy boundary.
Bc1	28 - 57	Very dark gray (10YR 3/1) moist, clay ; few fine distinct clear pale yellow (2.5Y 5/4) mottles ; moderate fine angular to subangular blocky structure ; very sticky, very plastic, firm ; very few very fine roots ; gradual wavy boundary.
Bc2	57 - 97	Very pale brown (10YR 7/4) moist, clay, common fine distinct clear very dark gray (7.5YR N3/) mottles ; moderate fine subangular blocky structure ; sticky, plastic, firm ; few fine tubular pores ; clear smooth boundary.
BC	97 - 110	Grayish brown (2.5Y 4/4) moist, clay ; few fine distinct clear brownish yellow (10YR 6/6) mottles ; moderate fine subangular blocky structure ; very sticky, very plastic, very firm ; few fine tubular pores ; gradual smooth boundary.
C	110 - 150	Mottled grayish brown (2.5Y 5/2) and yellowish brown (10YR 4/6) moist, silty clay ; moderate subangular blocky structure, sticky, plastic, firm.

Table C.2.3 Criteria for Land Suitability Classification by NIA

Land Use	S1	S2	S3	N
	Limitation: Drainage Classes (USDA Drainage Classes)			
DC, TC	Well	Not used	Imperfectly drained	Poor, Excessive
WR	Poor - well	Not used	Not used	Excessive
	Limitation: Rooting Zone Depth (cm)			
DC	> 75	75 - 50	50 - 25	< 25
TC	> 150	150 - 100	100 - 50	< 50
WR	> 50	40 - 50	20 - 40	< 20
	Limitation: Dominant Texture in Rooting Zone (FAO Texture)			
DC, TC	Fine - Medium fine	Not used	Coarse	Very coarse
WR	Fine	Medium	Moderate coarse	Coarse
	Limitation: Flooding (apply only from June to Mid October)			
DC, TC	None	None	Slight	Moderate
WR	Not used	Slight	Moderate	High
	Limitation: Slope (%)			
DC	0 - 5	5 - 15	15 - 20	> 20
TC	0 - 8	8 - 15	15 - 25	> 25
WR	0 - 3	3 - 5	5 - 8	> 8
	Limitation : Erosion (FAO Classes)			
DC, TC	Non - Slight	Sheet	Sheet - Rill	Sheet - Gully
WR	Not used	Not used	Not used	Not used
	Limitation : CEC (pH 7) of Dominant Mineral Subsoil			
DC, TC	> 24	16 - 24	< 16	Not used
WR	> 24	16 - 24	< 16	Not used
	Limitation : Total P (25%) of Dominant Subsoil (ppm)			
DC, TC	> 300	100 - 300	< 100	Not used
WR	> 200	50 - 200	< 50	Not used
	Limitation : pH (H2O) of Dominant Subsoil			
DC, TC	5.0 - 7.0	4.5 - 5.5, 7.0 - 8.0	4.0 - 4.5	< 4.0, > 8.0
WR	5.0 - 7.5	4.5 - 5.0	4.0 - 4.5	< 4.0, > 7.5
	Limitation : Total Nitrogen %			
DC, TC	Medium	Low	Very low	-
WR	Medium	Low	Very low	-
	Limitation : Rock Outcrops (% in surface)			
DC, TC	Non	< 1	< 2	> 2
WR	Non	< 1	< 2	> 2

Note : Flooding limitation apply only from June to Mid October
DC : Diversified crop, TC : Tree crops, WR : Wet land rice (Lowland rice)

Table C.3.1 Review of Irrigation Service Area

RIS Division	Service Area (ha)				Remarks
	Original plan	Revised in 1989	Reviewed by the team	Balance	
Jalaur Proper RIS					
1	764	764	808	44	Included pump irrigation area along main canal
2	731	731	714	-17	To residential/commercial land
3	900	892	892	0	
4	963	947	947	0	
5	781	780	754	-26	To fishpond
6	760	750	730	-20	To residential/commercial land
7	820	812	755	-57	To residential/commercial land
8	744	738	838	100	From sugarcane to paddy field
9	816	813	783	-30	To waste land by flooding
10	788	788	788	0	
11	817	811	811	0	
Subtotal	8,884	8,826	8,820	-6	-94 ha: to residential/commercial land, -26 ha: to fishpond, -30 ha: to waste land by flooding, +100 ha: from sugarcane land, +44 ha: included pump irrigation area
Suague RIS					
1	962	956	995	39	Included pump irrigation area along main canal
2	669	660	660	0	
3	641	640	543	-97	To residential/commercial land (81 ha), elevated land (16 ha)
4	714	702	702	0	
Subtotal	2,986	2,958	2,900	-58	-81 ha: to residential/commercial land, -16 ha: reeducated elevated land, 39 ha: included pump irrigation area
Total	11,870	11,784	11,720	-64	

Table C.3.2 Number of Farmers, Direct Beneficiaries and IA Members

RIS Division / IA	Service Area (ha)	(a) Estimated Total Farmers Number	(b) Direct Beneficiaries Number	(c) IA Registered Members Number	(d)=(b)/(a) Ratio to Total farmers Dirct. beneficiaris (%)	(e)=(c)/(a) Ratio to Total farmers Registd. members (%)	(f)=(c)/(b) Registd. Member to Direct Benefit (%)	Average Farm Size (ha/h.h.)
Jalaur Proper								
1	808	750	642	441	85.6	54.6	68.7	1.08
SISADA	296	270	225	143	83.3	48.3	63.6	1.10
BAPZAT	512	480	417	298	86.9	58.2	71.5	1.07
2 JP-2	714	610	395	333	64.8	46.6	84.3	1.17
3 IP-3	892	460	424	199	92.2	22.3	46.9	1.94
4	947	520	460	261	88.5	27.6	56.7	1.82
JADD	572	310	280	204	90.3	35.7	72.9	
J-JIN	375	210	180	57	85.7	15.2	31.7	
5	754	460	256	159	55.7	21.1	62.1	1.64
POZA	594	360	170	116	47.2	19.5	68.2	1.65
JABAFA	160	100	86	43	86.0	26.9	50.0	1.60
6 CIDD	730	420	315	181	75.0	24.8	57.5	1.74
7 LOJAFRO	755	450	232	104	51.6	13.8	44.8	1.68
8 CAMP	838	390	348	253	89.2	30.2	72.7	2.15
9	783	580	268	167	46.2	21.3	62.3	1.35
BAMAPA	373	240	113	77	47.1	20.6	68.1	1.55
MACAPA	410	340	155	90	45.6	22.0	58.1	1.21
10 CANROSCA	788	630	215	177	34.1	22.5	82.3	1.25
11 PAGKAPUSDU	811	630	162	132	25.7	16.3	81.5	1.29
Total	8,820	5,900	3,717	2,407	63.0	27.3	64.8	1.49
Suague								
1	995	720						1.38
2	660	430						1.53
3	543	440						1.23
4	702	360						1.95
Total	2,900	1,950	1,663	1,378	85.3	47.5	82.9	1.49
SMEWBAT	587	440	437	361	99.3	61.5	82.6	1.33
JEBADA	608	410	382	297	93.2	48.8	77.7	1.48
AGDABASICA	593	370	233	207	63.0	34.9	88.8	1.60
SUAGUE 3	543	440	402	330	91.4	60.8	82.1	1.23
DIV. 4	569	290	209	183	72.1	32.2	87.6	1.96
Total	2,900	1,950	1,663	1,378	85.3	47.5	82.9	1.49
Grand Total	11,720	7,850	5,380	3,785	68.5	32.3	70.4	1.49

Table C.3.3 Land Tenure and Farm Size by Sample Survey

Number of farmers by Land Tenure Situation

Farm Size	Owner-Cultivator	Lease-holder	Tenant	Total
< 0.25 ha	18	3	18	39
0.25 - 0.49	72	22	57	151
0.50 - 0.99	134	95	136	365
1.00 - 1.49	117	150	114	381
1.50 - 1.99	68	74	57	199
2.00 - 2.99	123	92	88	303
3.00 - 4.99	86	39	57	182
5.00 - 7.49	35	6	8	49
7.50 - 9.99	17	1	1	19
10.0 ha and more	11	1	1	13
Total	681	483	537	1,701
Ratio (%)	**40.0**	**28.4**	**31.6**	**100.0**

Sample Survey on 7 IAs which have registered including tenant farmers
Source: TSA profile prepared by IDOs

Number of Farmers by Farm Size

Farm Size	Jalaur proper		Suague	
	No. of farmers	%	No. of farmers	%
< 0.25 ha	135	7.0	20	7
0.25 - 0.49	255	13.2	56	19
0.50 - 0.99	525	27.2	92	32
1.00 - 1.49	403	20.9	75	26
1.50 - 1.99	192	10.0	21	7
2.00 - 2.99	257	13.3	14	5
3.00 - 4.99	110	5.7	8	3
5.00 - 9.99	39	2.0	4	1
10.0 ha and more	12	0.6	1	0
Total	1,928	100.0	291	100

Source: Annual Report of Irrigated and Benefited Areas 1996

Average Farm Size (Unit: ha)

Farm Size	Jalaur proper	Suague
< 0.25 ha	0.23	0.22
0.25 - 0.49	0.37	0.38
0.50 - 0.99	0.73	0.73
1.00 - 1.49	1.14	1.15
1.50 - 1.99	1.65	1.67
2.00 - 2.99	2.23	2.45
3.00 - 4.99	3.50	3.71
5.00 - 9.99	6.76	6.09
10.0 ha and more	15.60	1.00
Average Farm Size	1.48	1.41
Median Farm Size	1.00	0.97

Source: Annual Report of Irrigated and Benefited Areas 1996

Table C.3.4 Irrigated Area by Irrigation Divisions

Irrigated Area (Unit: ha)

Div.	Service Area	1992		1993		1994		1995		1996		Average		
		Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Total
Jalaur Proper RIS														
1	808	713	721	692	709	476	723	632	625	713	722	645	700	1,345
2	714	627	637	611	643	620	591	515	541	537	700	582	622	1,204
3	892	769	821	784	869	752	780	755	735	719	830	756	807	1,563
4	947	813	807	803	910	817	934	687	872	838	847	792	874	1,666
5	754	245	409	286	395	266	461	268	421	228	480	259	433	692
6	730	507	696	517	690	592	688	312	632	410	650	468	671	1,139
7	755	294	482	240	439	263	568	103	386	228	550	226	485	711
8	838	547	554	571	554	591	508	507	627	598	710	563	591	1,153
9	783	96	444	153	329	159	309	121	255	148	440	135	355	491
10	788	179	210	407	399	398	273	178	261	172	560	267	341	607
11	811	133	125	250	453	315	148	163	157	227	330	218	243	460
Subtotal	8,820	4,923	5,906	5,314	6,390	5,249	5,983	4,241	5,512	4,818	6,819	4,909	6,122	11,031
Suague RIS														
1	995	745	638	462	724	707	653	437	732	703	750	611	699	1,310
2	660	602	662	655	649	656	657	424	660	613	660	590	658	1,248
3	543	375	566	254	544	384	523	193	539	379	534	317	541	858
4	702	359	685	318	609	510	648	313	693	282	600	356	647	1,003
Subtotal	2,900	2,081	2,551	1,689	2,526	2,257	2,481	1,367	2,624	1,977	2,544	1,874	2,545	4,419
Total	11,720	7,004	8,457	7,003	8,916	7,506	8,464	5,608	8,136	6,795	9,363	6,783	8,667	15,450

Source : Benefited area by JSRIS Office

Ratio of Irrigated Area to Service Area (Unit: %)

Div.	Service Area (ha	1992		1993		1994		1995		1996		Average		
		Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Total
Jalaur Proper RIS														
1	808	88	89	86	88	59	89	78	77	88	89	80	87	166
2	714	88	89	86	90	87	83	72	76	75	98	82	87	169
3	892	86	92	88	97	84	87	85	82	81	93	85	90	175
4	947	86	85	85	96	86	99	73	92	88	89	84	92	176
5	754	32	54	38	52	35	61	36	56	30	64	34	57	92
6	730	69	95	71	95	81	94	43	87	56	89	64	92	156
7	755	39	64	32	58	35	75	14	51	30	73	30	64	94
8	838	65	66	68	66	71	61	61	75	71	85	67	70	138
9	783	12	57	20	42	20	39	15	33	19	56	17	45	63
10	788	23	27	52	51	51	35	23	33	22	71	34	43	77
11	811	16	15	31	56	39	18	20	19	28	41	27	30	57
Overall	8,820	56	67	60	72	60	68	48	62	55	77	56	69	125
Suague RIS														
1	995	75	64	46	73	71	66	44	74	71	75	61	70	132
2	660	91	100	99	98	99	100	64	100	93	100	89	100	189
3	543	69	104	47	100	71	96	36	99	70	98	58	100	158
4	702	51	98	45	87	73	92	45	99	40	85	51	92	143
Overall	2,900	72	88	58	87	78	86	47	90	68	88	65	88	152
Overall	11,720	60	72	60	76	64	72	48	69	58	80	58	74	132

Source: JSRIS Office

Table C.3.5 Average Unit Yields of Paddy Rice in Irrigated Area

(Unit: ton/ha)

RIS & Division	1992		1993		1994		1995		1996		Average	
	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Jalaur Proper												
1	3.38	3.56	3.45	3.50	3.25	3.27	3.39	2.94	3.44	3.43	3.38	3.34
2	3.35	3.62	3.40	3.55	3.41	3.36	3.24	3.35	3.41	2.95	3.36	3.37
3	3.73	3.86	3.64	3.72	3.74	4.09	3.32	3.61	3.48	3.33	3.58	3.72
4	3.33	3.47	3.44	3.51	3.35	3.10	3.34	3.28	3.29	3.30	3.35	3.33
5	3.25	3.54	3.40	3.59	3.38	3.25	3.28	3.47	3.03	3.42	3.27	3.45
6	2.64	3.35	3.20	3.59	3.37	3.34	3.34	3.36	2.63	3.68	3.03	3.46
7	3.06	3.25	3.09	3.23	3.11	2.67	3.20	3.24	3.13	3.07	3.12	3.09
8	3.39	3.34	3.40	3.34	3.30	3.43	3.25	3.32	3.51	3.31	3.37	3.35
9	2.86	3.74	3.25	4.04	3.47	3.60	3.59	3.37	3.64	3.27	3.36	3.61
10	3.41	3.30	3.22	3.35	3.05	3.23	3.33	3.32	3.19	3.13	3.24	3.27
11	3.05	3.39	3.69	3.57	2.33	3.60	3.43	3.26	3.49	3.45	3.20	3.45
Average	3.22	3.49	3.38	3.54	3.25	3.36	3.34	3.32	3.29	3.31	3.30	3.40
Suague												
1	3.57	3.81	3.68	3.87	3.49	3.69	3.51	4.11	3.81	4.07	3.61	3.91
2	3.44	4.08	3.41	4.10	3.37	3.44	3.62	4.43	3.33	3.70	3.43	3.95
3	3.44	3.62	3.44	3.66	3.51	3.52	3.40	3.64	3.49	3.47	3.45	3.58
4	3.31	2.68	3.16	3.39	3.34	3.22	2.79	3.04	3.11	3.22	3.14	3.11
Average	3.44	3.55	3.42	3.76	3.43	3.47	3.33	3.80	3.43	3.62	3.41	3.64

Average yields are computed at 42 kg per sack

Source : JSRIS Office, NIA Region VI

Table C.3.6 Production Cost of Present Condition

	Unit	1st Paddy Irrigated			2nd Paddy Irrigated			Paddy Irrigated (transplant)			3rd Paddy			Paddy Rainfed			Watermelon			Mungbean Rainfed		
		Qty	Price	Value	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value
		Palay	peso	peso	Palay	peso	peso	Palay	peso	peso	Palay	peso	peso	Palay	peso	peso		peso	peso			
Production Cost																						
Seeds	kg	140	11	1,540	140	11	1,540	100	11	1,100	140	11	1,540	140	11	1,540	4	800	3,200	25	30	750
Fertilizer																						
N	kg	93	17	1,581	93	17	1,581	93	17	1,581	60	17	1,020	60	17	1,020	50	17	850	30	17	510
P2O5	kg	28	22	616	28	22	616	28	22	616	14	22	308	14	22	308	14	22	308	0	22	0
K2O	kg	13	11	143	13	11	143	13	11	143	7	11	77	10	11	110	14	11	154	0	11	0
Chemicals																						
Herbicide	l	1	350	350	1	350	350	0.5	350	175	0.5	350	175	0.5	350	175	1	400	400		0	0
Incecticide	l	1	500	500	1	500	500	1	500	500	1	500	500	1	500	500	1	500	500		0	0
Fungicide	l	0.5	500	250	0.5	500	250	0.5	500	250	0	500	0	0	500	0	1	500	500		0	0
Rodenticide				100			100			100			100			100						
Moluicide		1	400	400	1	400	400	0.5	400	200	0	400	0	0	400	0					0	0
Others				150			150			150			150			150			100			
Labor		69			71			99			56			56			80			17		
Hired	man-day	35	80	2,800	36	80	2,880	50	80	4,000	28	80	2,240	28	80	2,240	40	80	3,200	9	80	720
Family	man-day	34	0	0	35	0	0	49	0	0	28	0	0	28	0	0	40	0	0	8	0	0
Machine/Tool/Animal																						
Handtractor/Tractor	day			1,400			1,400			1,400			1,400			1,400			0			0
Carabao	day			200			200			200			200			200			0			0
Thresher	day			400			400			400			350			350			0			150
Blower	day			200			200			200			180			180			0			100
Pump				100			200			200			250			100			100			0
Other				150			150			150			150			150			100			50
Fuel/Oil				50			150			150			150			100			200			0
(subtotal)				10,930			11,210			11,515			8,790			8,623			9,612			2,280
Irrigation Service Fee *	peso			800			1,200			1,200			0			0			0			0
Harveste'sr Share **	peso			3,968			3,647			3,647			2,402			2,402			4,000			1,250
Land Lease	peso																					
Land Tax	peso			140			140			140			140			140			140			140
Interest ***	Peso			1,749			1,794			1,842			1,406			1,380			1,538			365
Total	Peso			17,587			17,991			18,344			12,738			12,545			15,290			4,035

* Pesos 8,000 for wet season paddy, Pesos12,000 for dry season, free for 3rd and rainfed paddy

** Applied 1/8 (12.5) of gross yield for all crops

*** Cash expences x 0.5 x 4 months x 8% interest/month = 16 % x subtotal

Table C.3.7 Agricultural Extension Personnel of Relevant Municipalities

	MAO	MCDO	Crops	Livestock	Fishery	Soil	HMT	Total
1 Barotac Nuevo	1	1	9	1	6	0	0	18
2 Dingle	1	0	8	0	0	0	0	9
3 Dumangas	1	1	6	1	4	1	1	15
4 Mina	1	0	4	1	0	0	1	7
5 New Lucena	1	1	10	1	0	0	1	14
6 Pototan	1	1	9	2	0	1	3	17
7 Zarraga	1	1	10	1	0	0	1	14
Total	7	5	56	7	10	2	7	94

Agricultural technicians simteimes concurrently hold two or more specialties

MAO: Municipal Agricultural Officer

MCDO: Municipal Community Development Officer

HMT: Home Management Technician

Source: Municipal Agricultural Offices

Table C.4.1 Labor Requirement for Proposed Cropping Pattern

	Planted	Labor Requirement (man-day/ha)												
	Area (ha)	Total	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Jalaur Proper														
1st Paddy	8,820	86	0	0	0	0	4	12	16	15	15	16	7	0
2nd Paddy	8,820	86	15	16	7	0	0	0	0	0	5	12	15	15
3rd Paddy *	1,200	66	3	13	13	23	13	0	0	0	0	0	0	0
Watermelon (3rd crop) *	100	80	12	20	24	16	8	0	0	0	0	0	0	0
Mungbean (rainfed, 3rd crop)*	600	17	5	1	1	7	3	0	0	0	0	0	0	0
Suague														
1st Paddy	2,900	86	0	0	0	0	4	12	16	15	15	16	7	0
2nd Paddy	1,100	86	15	16	7	0	0	0	0	0	5	12	15	15
Mungbean	1,800	49	10	13	8	0	0	0	0	0	0	0	6	11
3rd Paddy *	50	66	3	13	13	23	13	0	0	0	0	0	0	0
Watermelon (3rd crop) *	20	80	12	20	24	16	8	0	0	0	0	0	0	0
Mungbean (rainfed, 3rd crop)*	150	17	5	1	1	7	3	0	0	0	0	0	0	0

	Planted	Total Labor Requirement (man-day)												
	Area (ha)	Total	Jan.	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Jalaur Proper														
1st Paddy	8,820	758,520	0	0	0	0	37,926	106,193	144,119	136,534	128,948	144,119	60,682	0
2nd Paddy	8,820	758,520	128,948	144,119	60,682	0	0	0	0	0	45,511	106,193	136,534	136,534
3rd Paddy *	1,200	79,200	3,960	15,840	15,840	27,720	15,840	0	0	0	0	0	0	0
Watermelon (3rd crop) *	100	8,000	1,200	2,000	2,400	1,600	800	0	0	0	0	0	0	0
Mungbean (rainfed, 3rd crop)*	600	10,200	3,060	510	510	4,080	2,040	0	0	0	0	0	0	0
Total	19,540	1,614,440	137,168	162,469	79,432	33,400	56,606	106,193	144,119	136,534	174,460	250,312	197,215	136,534
Suague														
1st Paddy	2,900	249,400	0	0	0	0	12,470	34,916	47,386	44,892	42,398	47,386	19,952	0
2nd Paddy	1,100	94,600	16,082	17,974	7,568	0	0	0	0	0	5,676	13,244	17,028	17,028
Mungbean	1,800	88,200	17,640	23,814	14,994	0	0	0	0	0	0	0	11,466	20,286
3rd Paddy *	50	3,300	165	660	660	1,155	660	0	0	0	0	0	0	0
Watermelon (3rd crop) *	20	1,600	240	400	480	320	160	0	0	0	0	0	0	0
Mungbean (rainfed, 3rd crop)*	150	2,550	765	128	128	1,020	510	0	0	0	0	0	0	0
Total	6,020	190,250	34,892	42,976	23,830	2,495	1,330	0	0	0	5,676	13,244	28,494	37,314
Total Labor Requirement (man-days)	25,560	1,804,690	172,060	205,444	103,261	35,895	57,936	106,193	144,119	136,534	180,136	263,556	225,709	173,848
Available Labor Force **														
(persons)		25,660	25,660	25,660	25,660	25,660	25,660	25,660	25,660	25,660	25,660	25,660	25,660	25,660
(man-days) ***		6,158,400	513,200	513,200	513,200	513,200	513,200	513,200	513,200	513,200	513,200	513,200	513,200	513,200
Labor Balance (%) ****		29	34	40	20	7	11	21	28	27	35	51	44	34

Note
* : Assumed at same conditions of area and farming practices
** : Total labor force = (Households of beneficiaries and Farm-workers) x 2 persons = (6,350 + 6,480) x 2
*** : Workable days = 20 days/month
**** : Total Labor Requirement/Available Labor Force

Table C.4.2 Agricultural Production under With-project and Without-project Conditions

	With-Project			Without-Project			Increment		
	Area (ha)	Yield (ton/ha)	Production (ton)	Area (ha)	Yield (ton/ha)	Production (ton)	Area (ha)	Yield (ton/ha)	Production (ton)
Jalaur Proper									
1st Paddy irrigated	8,820	5.00	44,100	6,120	3.40	20,808	2,700	1.69	23,292
2nd Paddy irrigated	8,820	5.00	44,100	4,910	3.30	16,203	3,910	1.70	27,897
(Irrigated Total)	17,640	5.00	88,200	11,030	3.36	37,011	6,610	1.64	51,189
1st Paddy rainfed	0		0	2,600	2.24	5,824	-2,600		-5,824
2nd Paddy rainfed	0		0	1,940	2.24	4,346	-1,940		-4,346
3rd Paddy	1,200	2.24	2,688	1,200	2.24	2,688	0	0.00	0
(Paddy Total)	18,840	4.82	90,888	16,770	2.24	49,869	2,070	2.58	41,019
Watermelon	100	4.00	400	100	4.00	400	0	0.00	0
Mungbean rainfed	600	0.40	240	600	0.40	240	0	0.00	0
Total	19,540			17,470			2,070		
Suague									
1st Paddy irrigated	2,900	5.00	14,500	2,540	3.64	9,246	360	1.36	5,254
2nd Paddy irrigated	1,100	5.00	5,500	1,870	3.41	6,377	-770	1.59	-877
Mungbean partially irrigated	1,800	1.00	1,800	0		0	1,800	1.00	1,800
(Irrigated Total)	5,800			4,410			1,390		
1st Paddy rainfed	0		0	360	2.24	806	-360		-806
2nd Paddy rainfed	0		0	610	2.24	1,366	-610		-1,366
3rd Paddy	50	2.24	112	50	2.24	112	0	0.00	0
(Paddy Total)	4,050	4.97	20,112	5,430	3.30	17,907	-1,380	1.67	2,205
Watermelon	20	4.00	80	20	4.00	80	0	0.00	0
Mungbean rainfed	150	0.40	60	150	0.40	60	0	0.00	0
Total	6,020			5,600			420		
Total									
1st Paddy irrigated	11,720	5.00	58,600	8,660	3.47	30,054	3,060	1.53	28,546
2nd Paddy irrigated	9,920	5.00	49,600	6,780	3.33	22,580	3,140	1.67	27,020
Mungbean partially irrigated	1,800	1.00	1,800	0		0	1,800	1.00	1,800
(Irrigated Total)	23,440			15,440			8,000		
1st Paddy rainfed	0			2,960	2.24	6,630	-2,960	-2.24	-6,630
2nd Paddy rainfed	0			2,550	2.24	5,712	-2,550	-2.24	-5,712
3rd Paddy	1,250	2.24	2,800	1,250	2.24	2,800	0	0.00	0
(Paddy Total)	22,890	4.85	111,000	22,200	3.05	67,776	690	1.80	43,224
Watermelon	120	4.00	480	120	4.00	480	0	0.00	0
Mungbean rainfed	750	0.40	300	750	0.40	300	0	0.00	0
Total	25,560			23,070			2,490		

Table C.4.3 Production Cost under With-project Conditions

	Unit	1st Paddy Irrigated (direct seeding)			1st Paddy Irrigated (transplanting)			2nd Paddy Irrigated (direct seeding)			2nd Paddy Irrigated (transplanting)			Mungbean Irrigated		
		Qty	Price	Value	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value
		Paddy	peso	peso	Paddy	peso	peso	Paddy	peso	peso	Paddy	peso	peso		peso	peso
Production Cost																
Seeds	kg	100	16	1,600	50	16	800	100	16	1,600	50	16	800	25	30	750
Fertilizer																
N	kg	100	17	1,700	100	17	1,700	100	17	1,700	100	17	1,700	30	17	510
P2O5	kg	35	22	770	35	22	770	35	22	770	35	22	770	30	22	660
K2O	kg	35	11	385	35	11	385	35	11	385	35	11	385	30	11	330
Chemicals																
Herbicide	l	1.0	350	350	1.0	350	350	1.0	350	350	1.0	350	350	0.5	400	200
Invecticide	l	1.5	500	750	1.5	500	750	1.5	500	750	1.5	500	750	0.5	500	250
Fungicide	l	1.0	500	500	1.0	500	500	1.0	500	500	1.0	500	500	0.5	500	250
Rodenticide				150			150			150			150			
Mollsisade		1.0	400	400	1.0	400	400	1.0	400	400	1.0	400	400			
Others				200			200			200			200			100
Labor Total requirement		80			80			80			104			49		
Hired	man-day	40	80	3,200	52	80	4,160	40	80	3,200	52	80	4,160	25	80	2,000
Family	man-day	40	0	0	52	0	0	40	0	0	52	0	0	24	0	0
Machine/Tool/Animal																
Handtractor/Tractor				1,600			1,600			1,600			1,600			1,600
Cambao				0			0			0			0			0
Thresher				500			500			500			500			200
Blower				250			250			250			250			100
Pump																0
Other				150			150			150			150			100
Fuel/Oil				100			100			100			100			100
Subtotal				12,605			12,765			12,605			12,765			7,150
Irrigation Service Fee *1	peso			800			800			1,200			1,200			0
Harveste'sr Share *2	peso			5,363			5,363			5,363			5,363			3,125
Land Lease	sacks															
Land Tax	peso			140			140			140			140			140
Interest *3	Peso			420			425			420			425			238
Total				19,328			19,493			19,728			19,893			10,653
Average of Paddy *5		(1st Paddy)			19,411			(2nd Paddy)			19,811					
Family Labor *4	Peso	40	80	3,200	52	80	4,160	40	80	3,200	52	80	4,160	24	80	1,920
Total	Peso			22,528			23,653			22,928			24,053			12,573
Average of Paddy *5	Peso	(1st Paddy)			23,091			(2nd Paddy)			23,491					

*1 Pesos 800 for wet season paddy, Pesos1,200 for dry season, free for 3rd and rainfed paddy

*2 Applied 1/8 (12.5) of gross yield for all crops

*3 Cash expences x 0.5 x 4/12 year x 20% interest/year = 3.33 % x subtotal

*4 Family labor cost is assumed at P80/day taking consideration of employment opportunities of other jobs

*5 Assumed that transplanting method will be increase by 50% of paddy area

Table C.4.4 Production Cost under Without-project Conditions

	Unit	1st Paddy Irrigated			2nd Paddy Irrigated			Paddy Irrigated (transplant)			3rd Paddy			Paddy Rainfed			Watermelon			Mungbean Rainfed		
		Qty	Price	Value	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value	Qty	Price	Value
		Palay	peso	peso	Palay	peso	peso	Palay	peso	peso	Palay	peso	peso	Palay	peso	peso		peso	peso			
Production Cost																						
Seeds	kg	140	11	1,540	140	11	1,540	100	11	1,100	140	11	1,540	140	11	1,540	4	800	3,200	25	30	750
Fertilizer																						
N	kg	93	17	1,581	93	17	1,581	93	17	1,581	60	17	1,020	60	17	1,020	50	17	850	30	17	510
P2O5	kg	28	22	616	28	22	616	28	22	616	14	22	308	14	22	308	14	22	308	0	22	0
K2O	kg	13	11	143	13	11	143	13	11	143	7	11	77	10	11	110	14	11	154	0	11	0
Chemicals																						
Herbicide	l	1	350	350	1	350	350	0.5	350	175	0.5	350	175	0.5	350	175	1	400	400		0	0
Incecticide	l	1	500	500	1	500	500	1	500	500	1	500	500	1	500	500	1	500	500		0	0
Fungicide	l	0.5	500	250	0.5	500	250	0.5	500	250	0	500	0	0	500	0	1	500	500		0	0
Rodenticide				100			100			100			100			100						
Moluicide		1	400	400	1	400	400	0.5	400	200	0	400	0	0	400	0					0	0
Others				150			150			150			150			150			100			
Labor		69			71			99			56			56			80			17		
Hired	man-day	35	80	2,800	36	80	2,880	50	80	4,000	28	80	2,240	28	80	2,240	40	80	3,200	9	80	720
Family	man-day	34	0	0	35	0	0	49	0	0	28	0	0	28	0	0	40	0	0	8	0	0
Machine/Tool/Animal																						
Handtractor/Tractor	day			1,400			1,400			1,400			1,400			1,400			0			0
Carabao	day			200			200			200			200			200			0			0
Thresher	day			400			400			400			350			350			0			150
Blower	day			200			200			200			180			180			0			100
Pump				100			200			200			250			100			100			0
Other				150			150			150			150			150			100			50
Fuel/Oil				50			150			150			150			100			200			0
(subtotal)				10,930			11,210			11,515			8,790			8,623			9,612			2,280
Irrigation Service Fee *1	peso			800			1,200			1,200			0			0			0			0
Harveste'sr Share *2	peso			3,968			3,647			3,647			2,402			2,402			4,000			1,250
Land Lease	peso																					
Land Tax	peso			140			140			140			140			140			140			140
Interest *3	Peso			1,749			1,794			1,842			1,406			1,380			1,538			365
Total	Peso			17,587			17,991			18,344			12,738			12,545			15,290			4,035
Family Labor *4	Peso	34	80	2,720	35	80	2,800	49	80	3,920	28	80	2,240	28	80	2,240	40	80	3,200	8	80	640
Total	Peso			20,307			20,791			22,264			14,978			14,785			18,490			4,675

*1 Pesos 8,000 for wet season paddy, Pesos12,000 for dry season, free for 3rd and rainfed paddy

*2 Applied 1/8 (12.5) of gross yield for all crops

*3 Cash expences x 0.5 x 4 months x 8% interest/month = 16 % x subtotal

*4 Family labor cost is assumed at P80/day taking consideration of employment opportunities of other jobs

Table C.4.5 Profit per Hectare With Project and Without Project Conditions

	With Project						Without Project					
	Output				Production	Net	Output				Production	Net
	Output	Qty ton	Price peso/ton	Value peso	Cost peso	Profit peso	Output	Qty ton	Price peso/ton	Value peso	Cost peso	Profit peso
1st Paddy irrigated **												
Jalaur proper	Paddy	5.0	8,580	42,900	23,091	19,809	Paddy	3.40	8,580	29,172	20,307	8,865
					19,411 *	23,489 *					17,587 *	11,585 *
Suague	Paddy	5.0	8,580	42,900	23,091	19,809	Paddy	3.64	8,580	31,231	20,307	10,924
					19,411 *	23,489 *					17,587 *	13,644 *
2nd Paddy irrigated **												
Jalaur proper	Paddy	5.0	8,580	42,900	23,491	19,409	Paddy	3.30	8,580	28,314	20,791	7,523
					19,811 *	23,089 *					17,991 *	10,323 *
Suague	Paddy	5.0	8,580	42,900	23,491	19,409	Paddy	3.41	8,580	29,258	20,791	8,467
					19,811 *	23,089 *					17,991 *	11,267 *
1st paddy rainfed	Paddy						Paddy	2.24	8,580	19,219	14,785	4,434
											12,545 *	6,674 *
2nd paddy rainfed	Paddy						Paddy	2.24	8,580	19,219	14,785	4,434
											12,545 *	6,674 *
Mungbean partially irrigated	Dry bean	1.0	25,000	25,000	12,573	12,427						
					10,653 *	14,347 *						
3rd crops ***												
3rd paddy	Paddy	2.24	8,580	19,219	14,978	4,241	Paddy	2.24	8,580	19,219	14,978	4,241
					12,738 *	6,481 *					12,738 *	6,481 *
Watermelon	Fruits	4.0	8,000	32,000	18,490	13,510	Fruits	4.0	8,000	32,000	18,490	13,510
					15,290 *	16,710 *					15,290 *	16,710 *
Mungbean	Dry bean	0.4	25,000	10,000	4,675	5,325	Dry bean	0.4	25,000	10,000	4,675	5,325
					4,035 *	5,965 *					4,035 *	5,965 *

* : Production cost and net profit are excluded family labor.

** : Average of direct seeding and transplanting

*** : With-project is assumed to be same as without project

Table C.4.6 Financial Production Value and Incremental Benefit

(Unit: million pesos)

	With Project				Without Project				Increment		
	Cropped Area (ha)	Gross Income	Production Cost	Net Profit	Cropped Area (ha)	Gross Income	Production Cost	Net Profit	Gross Income	Production Cost	Net Profit
Jalaur Proper											
1st Paddy irrigated	8,820	378.4	203.7	174.7	6,120	178.5	124.3	54.3	199.8	79.4	120.5
2nd Paddy irrigated	8,820	378.4	207.2	171.2	4,910	139.0	102.1	36.9	239.4	105.1	134.2
1st Paddy rainfed	0	0.0	0.0	0.0	2,600	50.0	38.4	11.5	-50.0	-38.4	-11.5
2nd Paddy rainfed	0	0.0	0.0	0.0	1,940	37.3	28.7	8.6	-37.3	-28.7	-8.6
3rd Paddy	1,200	23.1	18.0	5.1	1,200	23.1	18.0	5.1	0.0	0.0	0.0
Watermelon	100	3.2	1.8	1.4	100	3.2	1.8	1.4	0.0	0.0	0.0
Mungbean rainfed	600	6.0	2.8	3.2	600	6.0	2.8	3.2	0.0	0.0	0.0
Total	19,540	789	433	356	17,470	437	316	121	351.9	117.4	234.6
Suague											
1st Paddy irrigated	2,900	124.4	67.0	57.4	2,540	79.3	51.6	27.7	45.1	15.4	29.7
2nd Paddy irrigated	1,100	47.2	25.8	21.3	1,870	54.7	38.9	15.8	-7.5	-13.0	5.5
Mungbean partially irrigated	1,800	45.0	22.6	22.4	0	0.0	0.0	0.0	45.0	22.6	22.4
1st Paddy rainfed	0	0.0	0.0	0.0	360	6.9	5.3	1.6	-6.9	-5.3	-1.6
2nd Paddy rainfed	0	0.0	0.0	0.0	510	11.7	9.0	2.7	-11.7	-9.0	-2.7
3rd Paddy	50	1.0	0.7	0.2	50	1.0	0.7	0.2	0.0	0.0	0.0
Watermelon	20	0.6	0.4	0.3	20	0.6	0.4	0.3	0.0	0.0	0.0
Mungbean rainfed	150	1.5	0.7	0.8	150	1.5	0.7	0.8	0.0	0.0	0.0
Total	6,020	220	117	102	5,500	156	107	49	63.9	10.6	53.3
Total											
1st Paddy irrigated	11,720	503	271	232	8,660	258	176	82	244.9	94.8	150.2
2nd Paddy irrigated	9,920	426	233	193	6,780	194	141	53	231.8	92.1	139.8
Mungbean partially irrigated	1,800	45	23	22	0	0	0	0	45.0	22.6	22.4
1st Paddy rainfed	0	0	0	0	2,960	57	44	13	-56.9	-43.8	-13.1
2nd Paddy rainfed	0	0	0	0	2,450	49	38	11	-49.0	-37.7	-11.3
3rd Paddy	1,250	24	19	5	1,250	24	19	5	0.0	0.0	0.0
Watermelon	120	4	2	2	120	4	2	2	0.0	0.0	0.0
Mungbean rainfed	750	8	4	4	750	8	4	4	0.0	0.0	0.0
Total	25,560	1,009	551	458	22,970	593	423	170	415.9	128.0	287.9

Table C.5.1 Training Plan for Agricultural Development and Extension

				Location		Year 1 2 3 4 5 6 7 8 9 10
Project Implementation	Period I (Design & Tender Administration) Period II (Construction Period) Period III (Sustainability)					
Training for Agricultural Sector	(I) Development and built-up stage for activation of extension services (II) Self-operation stage					
	Preparation of Training and Monitoring/Evaluation Manual Staff and Farmers Training Monitoring/Evaluation					
Consultant	Assignment Period of Consultant(s) (Agricultural Expert)					
Training Program	Trainee (number of trainee)	Trainer	Method/Process	Training center	Field	
1 Farming Technology Paddy rice Crop diversification Land preparation	ATs of MAO (80) Agriculturist of NGO and NIA	Specialists of DA/PAO and research, Consultant(s)	Seminar, Workshop, Research farm, Techno-demo farm	x	x	
Seed treatment/Seedling Fertilization Pest/disease control Weed control	Contact Farmers (300)	Specialists of DA/PAO and research, Consultant(s)	Seminar, Workshop, Research farm, Techno-demo farm	x	x	
Snail and Rat control Farm mechanization Organic farming Post-harvest Monitoring/Evaluation	Ordinary farmers (6,400)	ATs of MAO, Contact farmers	Techno-demo farm Field school Field tour Group discussion		x	
2 Extension Activity Group organizing Leadership	ATs of MAO (80)	Specialists of DA/PAO and research, Consultant(s)	Seminar, Workshop,	x	x	
Pamphlets Preparing	Contact Farmers (300)	ATs of MAO	Seminar, Workshop,	x	x	
3 Seed Production Technical service Seed inspection	ATs of MAO (30)	Specialists of DA/PAO and research, Consultant(s)	Seminar, Workshop, Research farm,	x	x	
Seed distribution	Seed Grower (80)	ATs of MAO	Seminar, Workshop, Research farm,	x	x	
Implementation of Improved Extension Services						
1 Training to ATs, contact farmers and seed growers						Sustainability stage
2 Activities by MAO						
3 Provision of techno-demo farms		360 plots during 4.5 years (9 cropping season)				
4 Activities by contact farmers						
5 Seed production						
6 Documentation and dissemination of improved farming practices						
7 Provision of facilities and equipment						
Audio set		14 unit				
Soil test kit		20 unit				
White board with pens		14 unit				
Camera set		7 unit				
Cereal moisture meter		15 unit				
Motorcycle		35 unit				
Input supply for techno-demo farms		360 ha in total				

Table C.5.2 Procedure for Improvement of Farming Practices

Items for improvement of farming practices	Procedure class *	Procedure and conditions of dissemination of proper farming practices
Paddy		
Unification of Cropping Schedule	A	Coordination with water distribution through IA and TSAG
Land Preparation	A	Training to farmers having hand-tractor
Fertilization (rate and timing)	A	Group buying for inputs, Training at techno-demo farm
Use of Certified Seed	B	Production and distribution of certified seed, Verification at techno-demo farm
Reduction of Seeding Rate	A	Training and verification at techno-demo farm
Expansion of Transplanting Method	A	Training and verification at techno-demo farm
Pest and Insect Control		
Proper Use of Agro-chemicals	A	Group buying of inputs, Training and verification at techno-demo farm
Group Spraying	B	Enlightenment of farmers through TSAG activities and training
Ecological Control	C	Research and adaptation test, Demonstration at techno-demo farm
Snail Control		
Spawn Elimination, Proper Use of Chemicals	A	Enlightenment of farmers through TSAG activities and training
Proper Use of Agro-chemicals	A	Group buying of inputs, Training at techno-demo farm
Ecological Control	C	Research and adaptation test, Demonstration at techno-demo farm
Rat Control		
Proper Use of Agro-chemicals and Trap	A	Group buying of inputs, Training at techno-demo farm
Ecological Control	C	Research and adaptation test, Demonstration at techno-demo farm
Weeding		
Proper Use of Agro-chemicals	A	Group buying of inputs, Training at techno-demo farm
Manual Weeding	A	Training at techno-demo farm
Ecological Control	C	Research and adaptation test, Demonstration at techno-demo farm
On-farm Water Management	B	Training for ATs, Training at techno-demo farm
Paddy Drying	A	Use of existing drying facilities
Certified Seed Production		
Encouragement of Seed Growers	B	Training, Technical support by ATs
Control Seed Farms and Seed Inspection	B	Training for ATs, Support by research institutes
Seed Distribution	B	Support by cooperatives, IAs
Use of Rice Straw and Animal Manure	C	Use of animal manure, Diffusion of small-scale transportation equipment
Farming Mechanization	B	Training on mechanical works and mechanical maintenance
Mungbean		
Row-ridge Method	B	Row-ridge practices by hand-tractor
Seed Treatment	B	Standardization of seed treatment by chemicals
Inoculation of Rhizobium Strain	C	Distribution of adaptable strain, Training
Fertilization	A	Standardization of fertilization, Training at techno-demo farm
Cultivation and Weeding	A	Standardization of practices, Training at techno-demo farm
Supplement Irrigation	B	Standardization of irrigation method, Training at techno-demo farm
Harvest and Drying	A	Training and use of existing drying facilities
Introduction of High-profitable Crops	C	Small-scaled field test, Seed supply, Marketing

Note

A: To be disseminated at early stage by present recommendation

B: To be disseminated compounding with financial and/or technical supports

C: To be disseminated after technical development and adoption test under supports research and DA

Figures

Figure C.2.1 Soil and Land Suitability Map

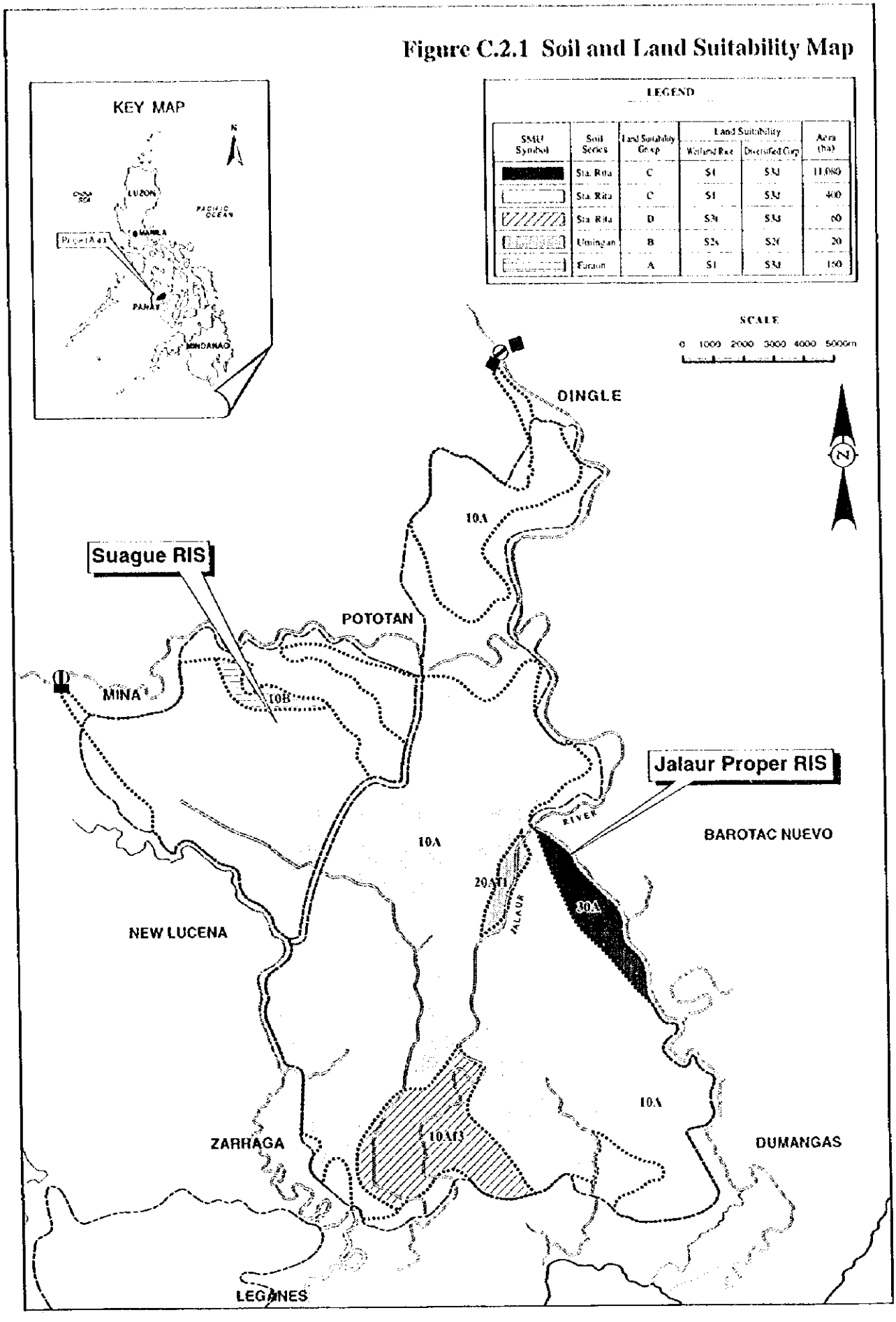
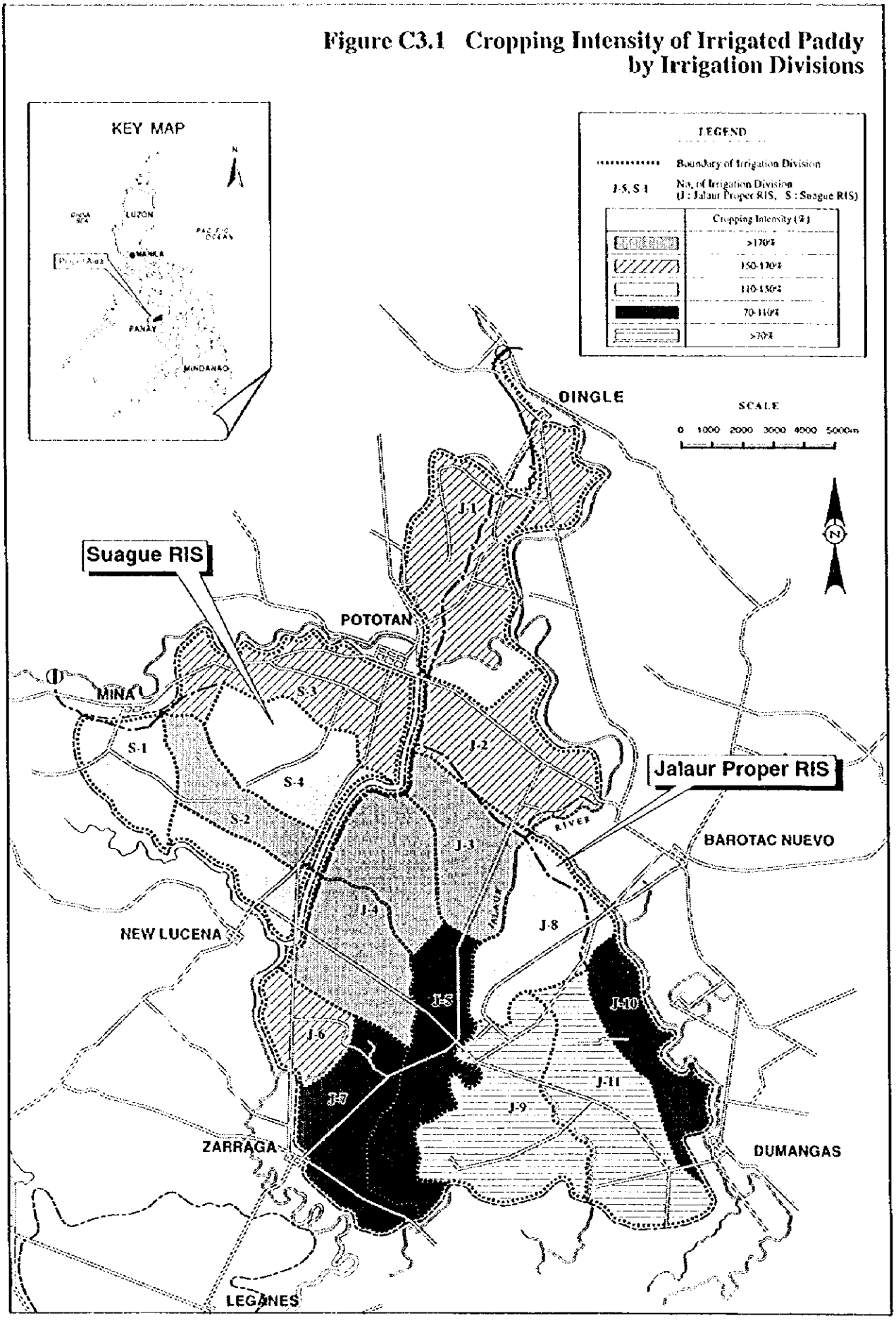
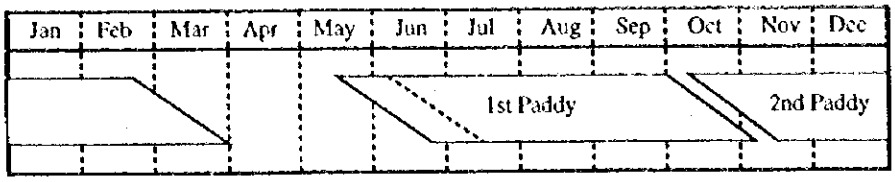


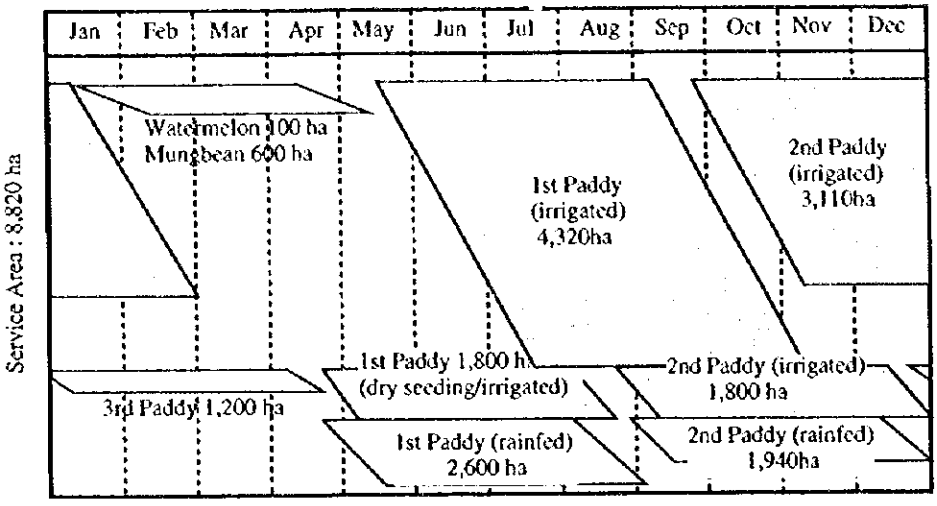
Figure C3.1 Cropping Intensity of Irrigated Paddy by Irrigation Divisions



Jalaur Proper RIS

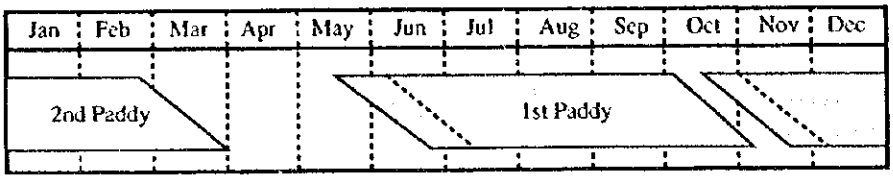


Cropping Calender prepared by NIA

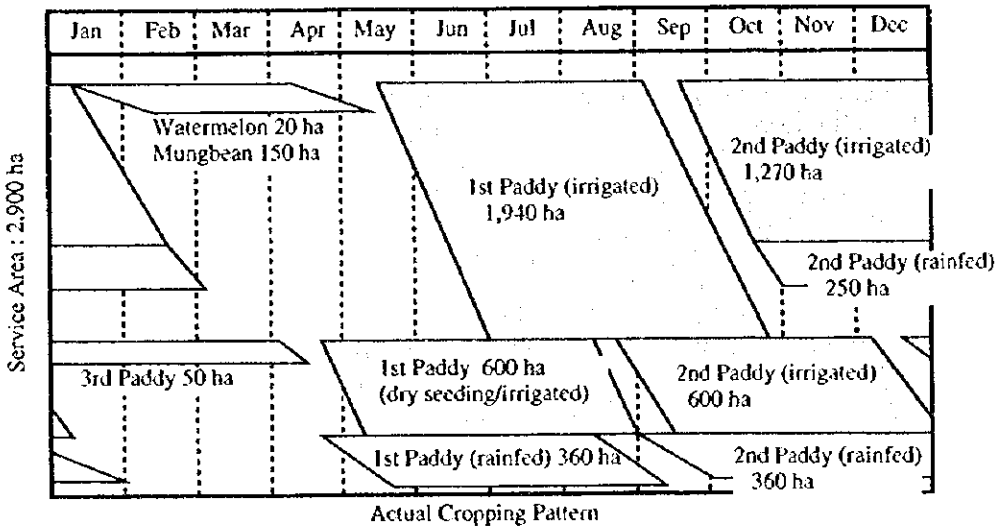


Actual Cropping Pattern

Suague RIS

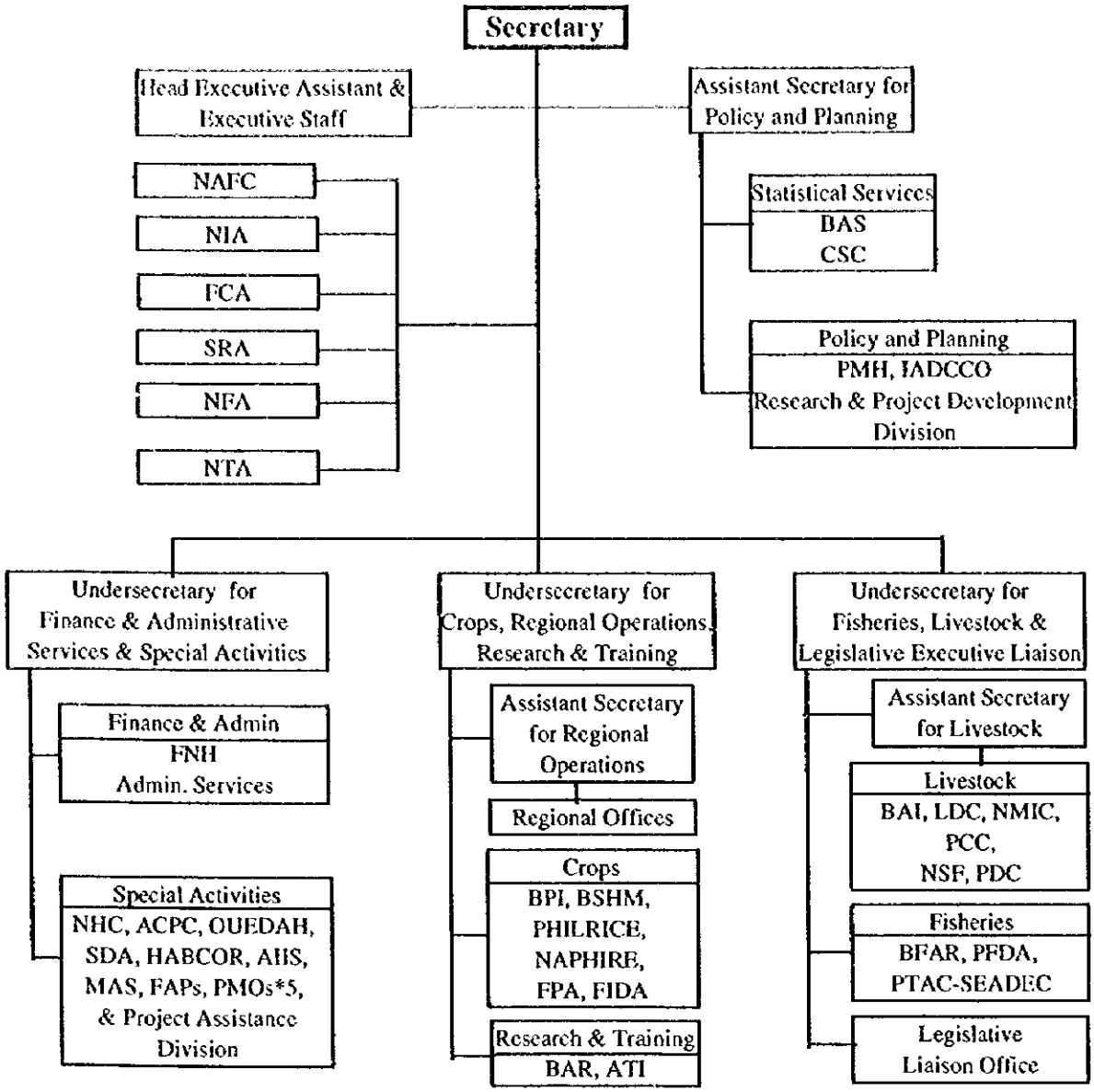


Cropping Calender prepared by NIA



Actual Cropping Pattern

Figure C.3.2 Present Cropping Patttern



ACP Agricultural Credit Policy Council
ATI Agricultural Training Institute
AIIS Agribusiness Investment Information Service
BAI Bureau of Animal Industry
BAR Bureau of Agricultural Research
BAS Bureau of Agricultural Statistics
BFAR Bureau of Fisheres and Aquatic Resouces
BPI Bureau of Plant Industry
BSWM Bureau of Soils and Water Management
CSC Computer Service Center
FIDA Fiber Industry Development Authority
FMS Finance and Management Service
FPA Fertilizer and Pesticide Authority
IADCCD International Agricultural Affairs Division
LDC Livestock Development Council
LLO Legislative Liaison Office
MAS Marketing Assistance Service
NABCOR National Agribusiness Corporation
NAFC National Agriculture abd Fishery Council
NAPHIRE National Post-harvest Institute for Research and Extension
NFA National Food Authority
NIA National Irrigation Administration
NMIC National Meet Inspection Commission
NNC National Nutrition Council
NSF National Stud farm
NTA National Tobacco Administration
PAD-SCO Project Assistance Division-special Concerns Office
PCA Philippine Coconut Authority
PDC Philippine Dairy Corporation
PFDA Philippine Fisheries Development Authority
PHLLOTTON Philippine Cotton Authority
PHILRICE Philippine Rice Research Institute
PMS Planing and Monitoring Service
PTAC-SEAFDEC Southeast Asian Fisheries Development Center
QRCGB Quedan and Rural Credit Quarantee Corporation
SACOBIA Sacobia Development Authority
SRA Sugar Regulatory Administration

Figure C.3.3 Organization Chart of Department Agriculture

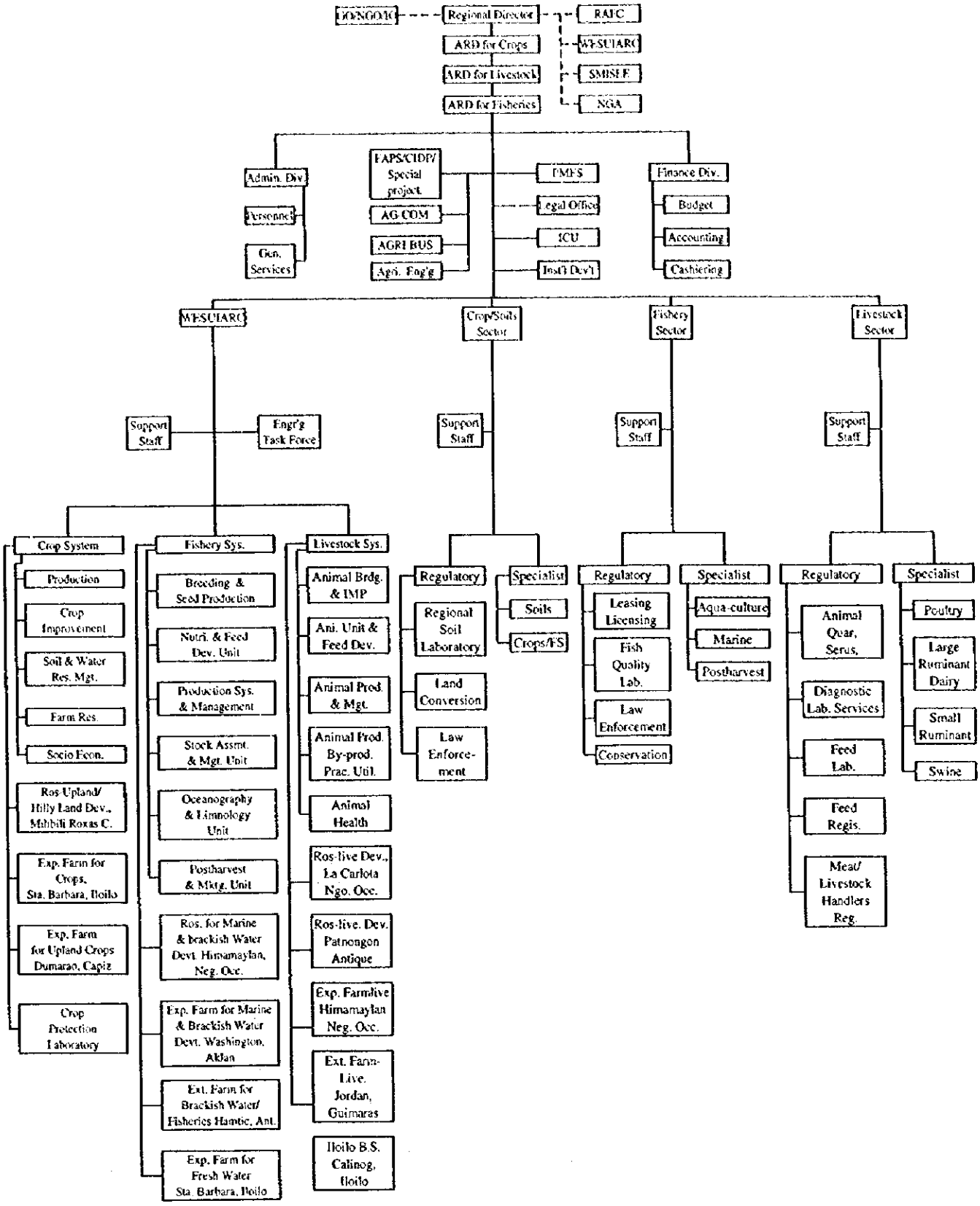


Figure C.3.4 Organization Chart of DA Region VI

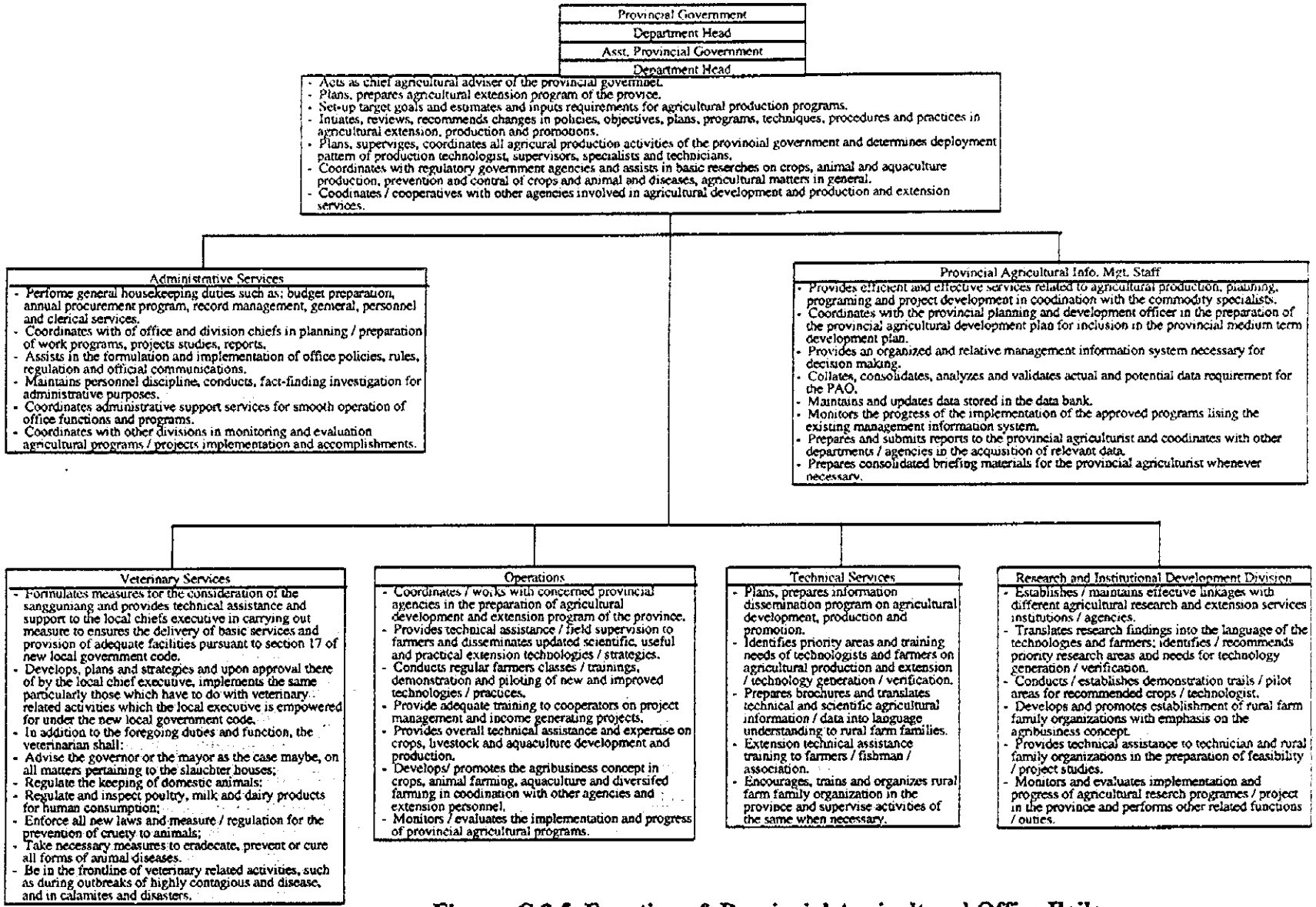


Figure C.3.5 Function of Provincial Agricultural Office Iloilo

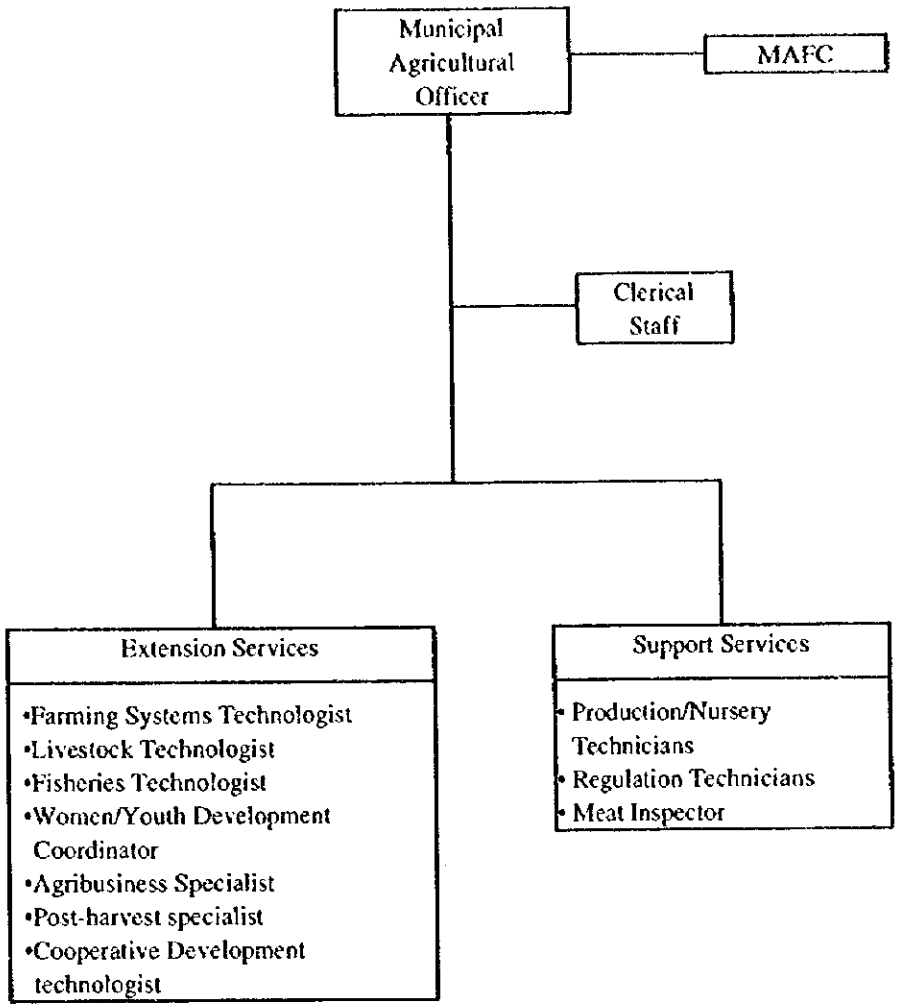


Figure C.3.6 Typical Organization Chart of Municipal Agricultural Office

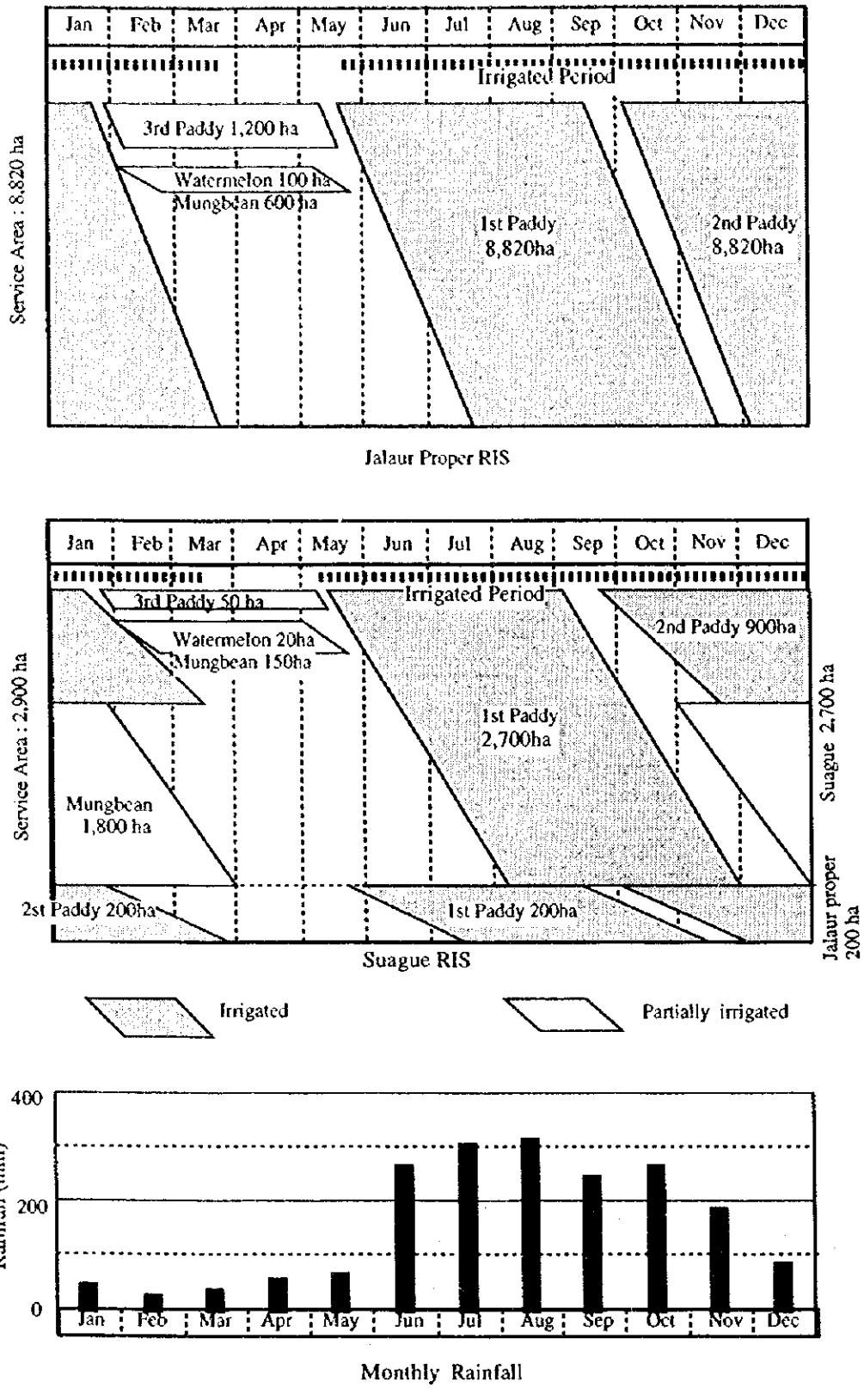
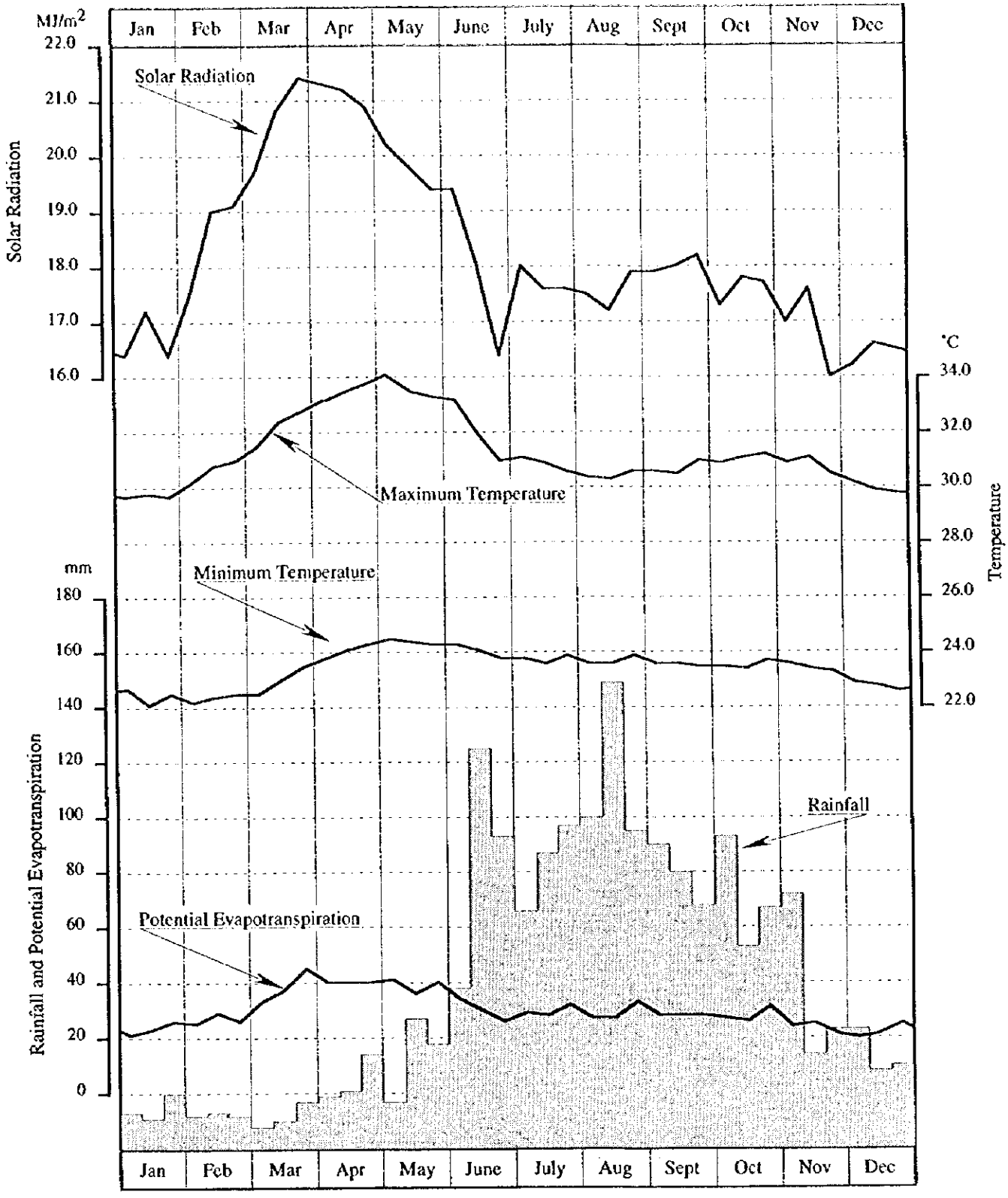


Figure C.4.1 Proposed Cropping Pattern



Souce: IRRI Station at Hamungaya in Jaro, 12 km northwest of Iloilo City
Data are mean values between 1975 to 1995

Figure C.4.2 Agro-climatic Condition of the Project Area