

SOIL MAP OF SAN JUAN DE FLORES PROJECT AREA

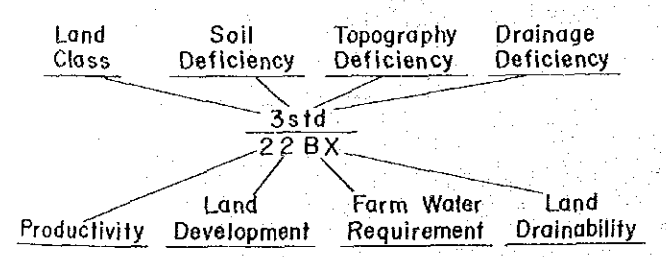
Mapping Symbol	Soil Classification	Area	
		ha	%
(Lit)	Typic Ustifluvents - Entisol	440	23.0
(Pq)	Fluvoquentic Hapustall	1,140	65.5
(Gt)	Aquic Hapustall		
	Udic Paleustalf	200	11.5
(Ch)	Aquic Haplustall		
Total		1,740	100.0

LAND CAPABILITY MAP OF SAN JUAN DE FLORES PROJECT AREA

Mapping Symbol	Land Classification	Area	ha	%
(Solid black)	Class I	340	19.5	
(White)	Class II	640	36.8	
(Diagonal lines)	Class III	760	43.7	
(Dotted)	Class VI	—	—	
Total		1,740	100.0	

LEGEND

EXAMPLE OF STANDARD MAPPING SYMBOL



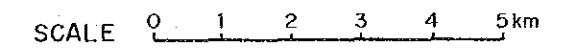
Productivity and Development : 1,2,3,4 or 6 denoting land class level factor, such as : Class 2 productivity, class 2 development cost - "22"

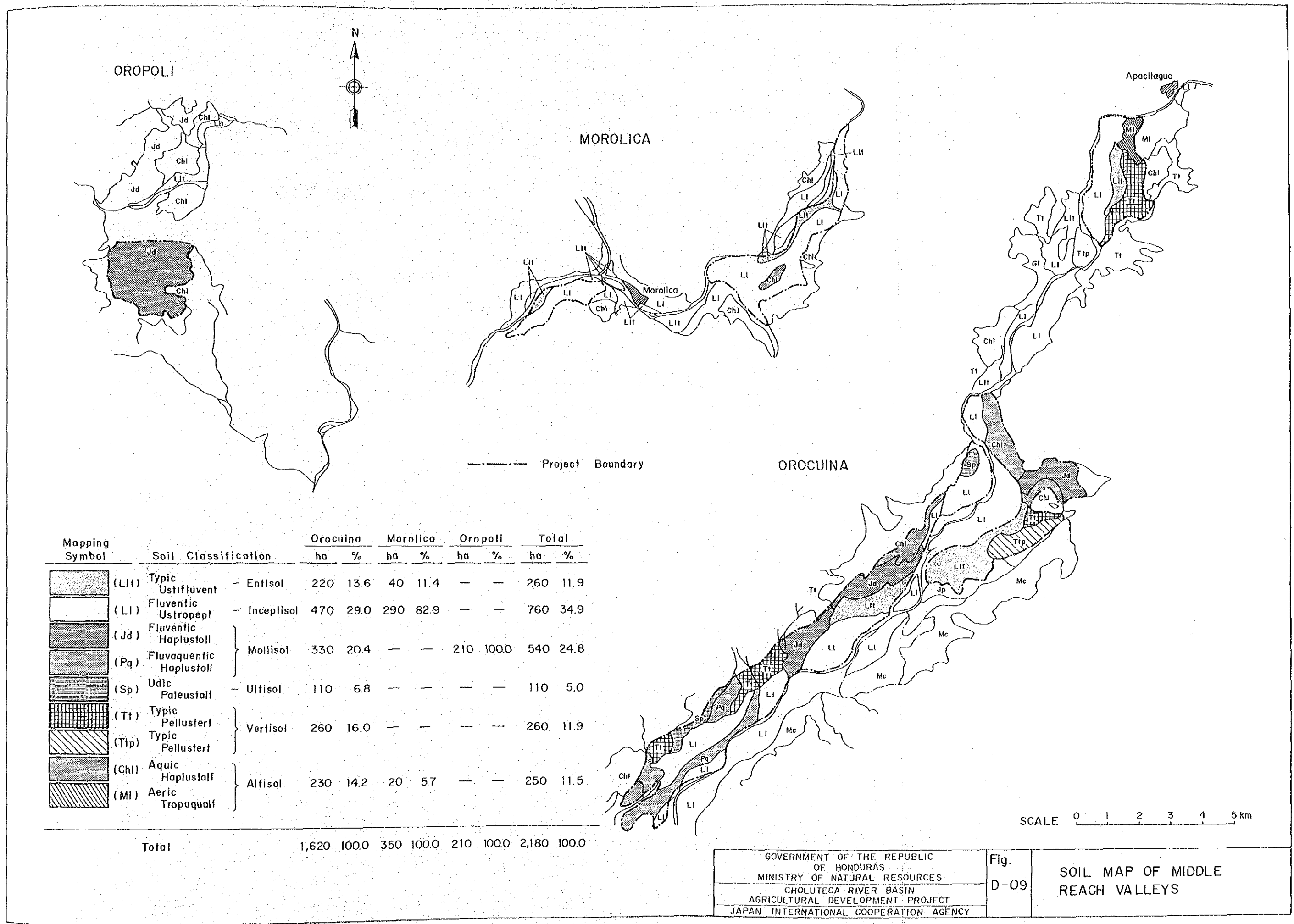
Farm Water Requirement : A - Low, B - Medium, C - High.

Land Drainability : X - Good, Y - Restrict, Z - Poor or negligible.

GOVERNMENT OF THE REPUBLIC OF HONDURAS
 MINISTRY OF NATURAL RESOURCES
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 JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. D-08
 SOIL AND LAND CAPABILITY MAP OF SAN JUAN DE FLORES VALLEY





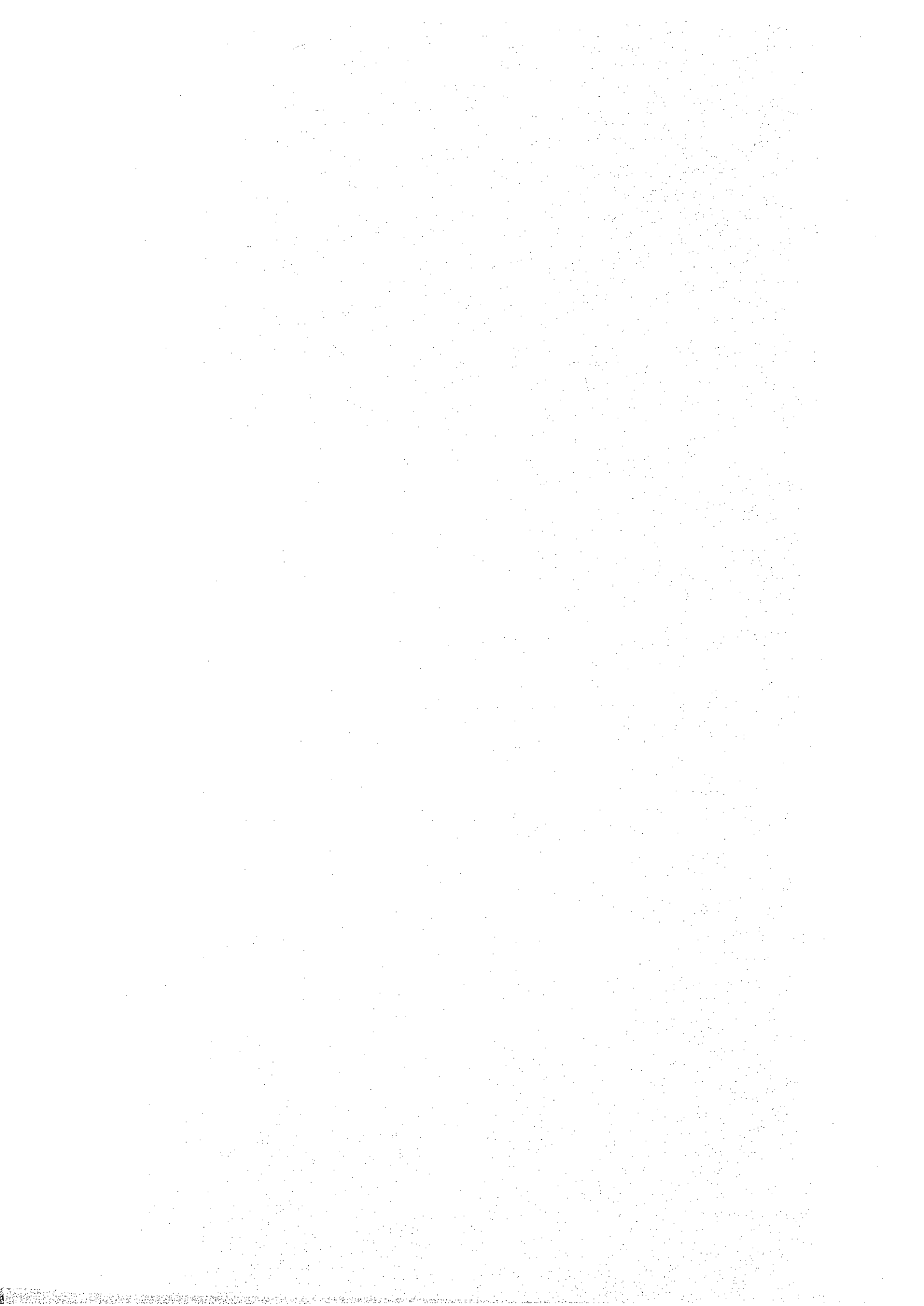
Mapping Symbol	Soil Classification	Oroquieta		Morolica		Oroquieta		Total	
		ha	%	ha	%	ha	%	ha	%
(Lit)	Typic Ustifluvent - Entisol	220	13.6	40	11.4	—	—	260	11.9
(Li)	Fluventic Ustropept - Inceptisol	470	29.0	290	82.9	—	—	760	34.9
(Jd)	Fluventic Haplustoll	330	20.4	—	—	210	100.0	540	24.8
(Pq)	Fluvaquentic Haplustoll								
(Sp)	Udic Paleustalf - Ultisol	110	6.8	—	—	—	—	110	5.0
(Ti)	Typic Pellustert	260	16.0	—	—	—	—	260	11.9
(Ttp)	Typic Pellustert								
(Chl)	Aquic Haplustalf	230	14.2	20	5.7	—	—	250	11.5
(MI)	Aeric Trophaqualf								
Total		1,620	100.0	350	100.0	210	100.0	2,180	100.0

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Fig. D-09

SOIL MAP OF MIDDLE REACH VALLEYS

ANNEX E
PRESENT SITUATION
OF
AGRICULTURE



ANNEX - E

PRESENT SITUATION OF AGRICULTURE

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E. PRESENT SITUATION OF AGRICULTURE

E.1 POPULATION AND LABOR FORCE

E.1.1 Agricultural Population

The study area in the Cholulteca plain is provisionally divided into two areas; one is extended on the right bank of the Cholulteca river (called the Western plain) with a gross acreage of 22,400 ha, and the other is extended on the left bank (called the Eastern plain) with a gross area of 13,600 ha. Eight villages are located on the Western plain, and four villages on the Eastern plain. According to the latest census in 1974, about 16,900 persons lived in the study area (around 13,000 persons on the Western plain and 3,900 persons on the Eastern plain). The total number of household was approximately 3,300 in 1974. (Refer to Table E-01)

The population in 1984 has been estimated on the basis of a presumed annual growth rate of 3% during 1974-84. The present population is thus estimated to be around 22,600 persons in total, or around 17,400 persons on the Western plain and 5,200 persons on the Eastern plain. Density of population is approximately 78 persons/km² on the Western plain and 37 persons/km² on the Eastern plain. The total number of household is also estimated to be around 4,500.

The agricultural population in the area is presumed to be around 84.5% of the total population. Consequently, the farm population is estimated at around 14,700 persons on the Western plain and 4,400 persons on the Eastern plain. The farm household is also estimated at around 2,800 on the Western plain and 1,000 on the Eastern plain. The average family size is approximately 5.3 persons and 4.4 persons on the respective plain. (Refer to Table E-02)

E.1.2 Agricultural Labor Force

The available labor force for farming in the Choloteca plain is estimated on the basis of a preliminary estimate of the population on the plain. The work age population is estimated at around 7,000 persons on the Western plain and 2,100 persons on the Eastern plain. On the assumption that the annual workable days per person is 270 days a year, the Western plain is capable of providing nearly 1.9 million man-days of work force per year or 158,000 man-days per month. The available agricultural work force in the Eastern plain is also estimated at around 567,000 man-days a year or 47,000 man-days a month. (Refer to Table E-02)

In addition to the work force available in the project area, a large number of the population living in the Choloteca urban area will be available for occasional works and the employment in processing, transportation and other agro-related works. The urban population in Choloteca is estimated at around 53,000 in 1984.

E.2 LAND HOLDING, LAND TENURE AND RESETTLEMENT

E.2.1 Land Holding and Land Tenure

The land holding size on the Choluteca plain has been estimated on the basis of cadastral map prepared by Catastro Nacional. On the Western plain, about 390 families are small holders of land (less than 10 ha). They are holding about 1,630 ha in total. Large land holders of more than 100 ha number around 20, and occupy some 4,530 ha or approximately 23% of the farm areas. Cooperatives and resettlement groups hold about 1,980 ha. Two sugar factories have their own estates, totaling 3,530 ha. (Refer to Table E-03)

In the Eastern plain, the land holding size is comparatively larger. About 20 large holders of over 100 ha occupy around 7,530 ha or 64% of the farm land on the Eastern plain. While, the small holders with less than 10 ha of land are about 140 in number and occupy around 710 ha. Land occupied by cooperatives and resettlement groups is limited to 390 ha on the Eastern plain.

According to the Agricultural Census in 1974, the land tenure on the Choluteca plain is clarified into i) privately owned land (66%), ii) national or communal land (12%), iii) rented land (7%), and iv) others (15%). A relatively large number of landless people is found on the Choluteca plain.

The land holding characteristics on the Choluteca plain are shown on a map in Figure E-01. On this map, the location of land expropriated for cooperatives and resettlement groups and estates owned by two sugar factories are illustrated. The lands occupied by large holders over 100 ha are also illustrated on the map.

E.2.2 Resettlement Program

The Ola-Monjaras resettlement project has been promoted by INA on the Choluteca plain and two major resettlement schemes, i.e. Monjaras-Buena Vista and Ola have been implemented under the project.

The Monjaras - Buena Vista scheme was originally envisaged in 1958/59 to involve most areas bounded by the old river course near the Monjaras village in the east and the Gulf of Fonseca in the South and West. (Refer to Figure E-01) The area of the scheme enclosed in the project area is estimated at about 2,850 ha. All the area of the scheme is located in the Western plain. In the area of 2,850 ha, it is also estimated that about 2,300 ha or 80% of the area are settled by 25 groups with 450 families.

The Ola scheme was initiated in 1958 to redistribute 9,240 ha to the north of the Monjaras - Buena Vista area. (Refer to Figure E-01) The area of the scheme enclosed on the project area is about 3,510 ha on the Western plain and 270 ha on the Eastern plain. Little development has been achieved in the Ola scheme and about 1,500 ha or 40% of the area are settled by about 15 groups with 300 families.

In addition to the above two schemes, 25 cooperatives and re-settlement groups are organized with a total member of 343 families as of September 1983. (Refer to Table E-04) The land expropriated by INA and held under the names of cooperatives and resettlement groups is approximately 2,790 ha. (A part of the land, totaling around 280 ha, is located outside the project area.)

The land under the resettlement program is cultivated for such crops as sugar cane, maize, cotton, sesame, melon, water melon, plantain, etc., as well as used for livestock breeding. (Refer to Table E-05) If compared with the land use pattern in 1977, the land cultivated for sugar cane has been substantially expanded, while cultivation of cotton and rice has decreased considerably.

E.3 PRESENT LAND USE AND PRODUCTION

E.3.1 Present Land Use

The present land use on the Cholteca plain has been assessed by utilizing aerial photographs taken in 1982 (1/43,000 scaled) and the orthophoto maps prepared by Catastro Nacional (1/20,000 scaled), as well as through field investigation and interviews with local farmers in August - September 1984. A land use map is compiled as illustrated in Figure E-02.

About 88% of the land on the Western plain (22,400 ha) is classified into agricultural lands. They are used for cultivation of upland crops (11,070 ha) and paddy field (50 ha), as well as for pasture land (6,310 ha) and forest land (2,250 ha). On the Eastern plain, a larger part of the land is used for pasture land (5,250 ha). The land cultivated by upland crops (860 ha) and paddy field (810 ha) is relatively small on the Eastern plain. (Refer to Table E-06)

The net cultivated area on the plain has also been estimated. On the Western plain, about 7,880 ha are cultivated for sugar cane, 1,050 ha for maize, 230 ha for cotton, 150 ha for sesame, 120 ha for sorghum and 40 ha for paddy. The area cultivated for melon has increased to 1,080 ha. On the Eastern plain, about 700 ha are cultivated for paddy, 450 ha for sugar cane, 200 ha for maize and 90 ha for cotton. (Refer to Table E-07)

E.3.2 Present Agricultural Production

Present agricultural production on the Cholteca plain is estimated on the basis of unit yield investigated in the field and the net cultivated area. In general, the productivity of crop still remains relatively low, except for paddy which is cultivated under irrigation. The present yield is estimated at around 78 tons/ha for sugar cane (average of estate farms and outgrowers), 2.3 tons/ha for cotton, 2.0 tons/ha for semi-mechanized maize cultivation, and 0.7 ton/ha for sesame. The yield of irrigated paddy is around 4.5 tons/ha.

The total production on the Choluteca plain is estimated at around 649,300 tons of sugar cane, 740 tons of cotton, 2,330 tons of maize, 6,660 tons of paddy and 5,800 tons of melon. The production of sugar cane has remarkably increased after the ACENSA sugar mill was set up in 1977-78. Production of melon on the Western plain and production of paddy mainly on the Eastern plain have increased more than expected from the previous study in 1977-78 under without-project conditions.

(Refer to Table E-08)

E.4 CROPPING PATTERN AND FARMING PRACTICES

E.4.1 Present Cropping Pattern

As noted in Chapter E.3.1, major crops cultivated on the Choluteca plain are sugar cane and cotton as industrial crops, maize, sesame, sorghum, rice, melon and water melon as food crop, and pasture for cattle breeding. These crops are cultivated seasonally depending on climatic conditions, except for sugar cane and rice which are cultivated throughout the year. Year round cultivation of rice has been made possible by applying irrigation practices. The present cropping pattern of the crops cultivated in the area is illustrated in Figure E-03.

E.4.2 Present Farming Practices

Farming practices on the Choluteca plain are mainly represented by semi-mechanized farming. According to the farm survey, cultivation of sugar cane and cotton is 100% semi-mechanized. 80% of maize and 40% of sorghum cultivation have been semi-mechanized. Mechanized farming has also been carried out for large scale rice cultivation. The farming practices of major crops prevailed in the area are described hereunder in a summarized form.

1) Sugar Cane:

Sugar cane is grown in a net area of 8,330 ha. Major varieties are NC0310, B-54163, B-51415, PR-10-13, MEV57463, etc. NC0310 is tolerant to dryness and most popularly cultivated. The growth period is 13-16 months for plant cane and 11-12 months for ratoon cane. Ratoon is usually practised for 4-6 times, depending on soil conditions. For outgrowers, sugar mills conclude farming contracts of 5 year term. The cropping calendar is generally as follows:

	<u>Plant Cane</u>	<u>Ratoon Cane</u>
Land preparation, planting or ratooning, basic fertilization:	Aug. - Oct.	Nov. - May
Top dressing	Oct. - Dec. or May - Jul.	Dec. - Jun.
Earthing	Oct. - Dec.	
Weeding	May - Nov.	May - Nov.
Harvesting	Nov. - Mar.	Nov. - May

Fertilizers are usually applied at the rate of 110 kg/ha of compound fertilizers and 170 kg/ha of urea. Insect and disease damage is slight, but rat damage is often reported. Estates owned by the two sugar mills have their own irrigation systems, but water is applied inadequately. The average yield is in the range of 60 - 80 tons/ha, but some farms with better soil moisture in the dry season produce more than 140 - 150 tons/ha.

2) Cotton:

Cotton is cultivated by members of Cooperativa Agropecuaria Algodonera del Sur. On the Choluteca plain, the land previously cultivated by cotton was substituted by sugar cane, and cotton land decreased to 320 ha. The main variety is stonville 213. The cropping calendar is as follows:

Land preparation	May - Jun.
Seeding - basic fertilization	Jul. - Aug.
Reseeding & thinning	Aug. - Sep.
Herbicide application	Jul. - Aug.
Top dressing	Aug. - Oct.
Weeding	Aug. - Oct.
Insecticide application	Sep. - Mar.
Harvest	Jan. - Mar.

Basic fertilizers are 150 - 160 kg/ha of compound fertilizer and 120 - 130 kg/ha of urea. Urea of 60 - 70 kg/ha is applied in top-dressing.

Yield is vulnerable to climatic conditions, as it is cultivated under rainfed conditions. Lint produced in the South region is better in quality than in other regions.

3) Maize:

Maize is grown over 1,250 ha on the Choluteca plain as the principal staple crop. Major varieties are HB104 and Santa Rosa. The growing period is 110-120 days. A new variety of ICTA-B5, which has a growing period of 95 days, is being experimented. The first crop is grown in May to September, and the second crop in August-September to December, under rainfed conditions. Few fertilizer is applied. Furadan of 25 kg/ha or Malathion 1:1,000 dilution is applied for insect control.

4) Sorghum:

Sorghum is cultivated widely in the South region, but cultivation in the project area is relatively small in area (120 ha). The variety of CENIAS-1 is mainly used for human consumption, and ICA NATAIMA, E59 Dekalb, E57 Dekalb, etc. are mainly cultivated for industrial use. Sorghum is sown in April-May and harvested in August-October.

5) Rice:

Rice cultivation on the Western plain was considerably reduced and substituted by sugar cane cultivation. On the other hand, a large-scale farm of 700 ha has been developed on the Eastern plain. The farm is irrigated by pumping-up water from the Choluteca river. Double cropping is practised in the irrigated farm, as follows:

	<u>1st Crop</u>	<u>2nd Crop</u>
Land preparation	Jan. - Feb.	Jul. - Aug.
Seeding & fertilization	Feb. - Mar.	Aug. - Sep.
Top dressing	Mar. - Jul.	Sep. - Oct.
Harvest	Jun. - Aug.	Dec. - Feb.

The main variety is CICA-8. At the large-scale farm, direct sowing by aircraft is practised. In other paddy field adjacent to the project area, transplanting by hand is also practised. Basic fertilizers are 130 - 150 kg of compound fertilizer and 40 - 50 kg/ha of urea. Besides, urea of 140 - 150 kg is top-dressed. Herbicides and insecticides are periodically applied. Harvest is done by grain combines.

6) Sesame:

Sesame is grown in 170 ha at present. The main varieties are Instituto 71 and Venezuela 44. Sesame is sown in August - September and harvested in 90 - 110 days. Present yield is substantially low, or around 0.7 ton/ha.

7) Melon:

Melon cultivation has been recently increased in the area. About 1,110 ha was cultivated for melon in 1984. Since the products have to be exported to reach the east coast of USA in December - February and market prices fall in January to February, the cropping season is limited. SJ45 variety is grown in September - October to December - January and Tan Dew variety is grown in October - November to January - February. In general, 80% of products are classified as first class in quality (mainly defined by size) and 20% as second class.

8) Water Melon:

Water melon is mainly cultivated for local market. The main variety is sugar-baby, with about 100 days in growing period. Farming practices are similar to the cultivation of Tan Dew melon, and the harvest season is in January - March.

9) Livestock:

Stock farming is widely executed on the Cholteca plain. About 70% of pasture land are sown with improved pasture grasses such as Estrella Africana, elephant grass, Guinea grass, Jaragua grass, etc. The cattle population is estimated at around 36,000 - 37,000, or approximately

2 heads/ha including calves. Cattles are emaciated in the dry season, though they are mostly transferred to places where grasses are available. Holstein and Guernsey for milk production, Cebuinas and hybrid of Cebuinas with native cattle for meat production, and Brown Zwiss for dual purposes are fed predominantly. The average birth rate and mortality rate is estimated at 60% and 15%, respectively. Yield is estimated at around 190 liters of milk and 130 kg of meat per ha.

E.4.3 Inputs

Input of labor force under present farming practices is preliminarily estimated. A total of 1.36 million man-days of work force is required for cultivation on the Western plain and 163,000 man-days on the Eastern plain per year. (Refer to Table E-09 and E-10). These work forces are locally available as reviewed in Chapter E.1.2. (Refer to Table E-02). Other inputs, like seeds, fertilizers, chemicals and machineries are also estimated as summarized on Table E-11.

E.4.4 Existing Irrigation System

Out of 36,000 ha of the project area on the Choluteca plain, there are several irrigation systems, covering a total area of approximately 4,500 ha. The existing irrigation systems fed by water pumped up from the Choluteca river cover an area of some 3,480 ha. Surface water is also taken from a tributary of the Sampile river for irrigation in the Eastern plain. Groundwater was once developed for irrigation to a certain extent (about 40 tubewells by 1979) but it is at present utilized principally by the two sugar estates for irrigation of 880 ha (20 tubewells). (Refer to Table E-12 and Figure E-04)

Irrigation is applied, in principle, for cultivation of sugar cane and rice. For irrigation of sugar cane, water application is usually limited to the driest months from February to April. Water is rarely applied during the intermediate dry weeks in July-August. For irrigation of paddy fields, water is applied throughout the year for double cropping.

E.5 SUPPORTING SERVICES AND MARKETING

E.5.1 Institutional Supporting Services

As noted on the supporting services on a national level in Annex E.1.4, MRN, INA, BANADESA and IHMA are providing institutional supporting services for farming on the Cholteca plain. The MRN regional office in Cholteca extends technical services for cultivation in the South region, including the project area. Three extension offices (Monjoras, Marcovia and Cholteca) out of 16 offices maintained by MRN Cholteca office are directly involved in the extension services in the project area.

A total of 4 extensionists, 2 experts in cotton and 2 veterinary experts are available for the area. However, the lands attended by the extension services are substantially limited. For instance, maize and bean cultivation in the South region attended by the services was less than 30% of the total cultivated area.

MRN maintains an agricultural experimental station and an agricultural training center, in La Lujosa, located on the northern boundary of the project area. The experimental station has a farm of about 200 ha, of which some 70 ha are provided with irrigation facilities, and various activities for research and seed multiplication are being carried. For instance, 5 ha of land are used for research and 34 ha for seed multiplication of rice. About 55 tons of certified seed of sorghum are produced annually at the station. La Lujosa training center was operated, in 1983, to offer 11 courses (5-12 days a course) at technician level, 12 courses (including 7 weeks and 12 weeks courses) at farmers' level and 2 courses (5 days a course) for resettlement groups. FAO experts and peace-corp members are at times cooperating as Lecturers. The training center has dormitories for 50 trainees.

The MRN's mechanical service center (PROMECA) is also located in Cholteca, equipped with 8-10 tractors, 2 harvesters and other equipment. PROMECA's services, however, are relatively limited, and they covered farming of less than 2,500 ha.

INA extends supporting services for cooperatives and resettlement groups. The services to the Ola - Monjaras resettlement project are extended through INA agent office located in Monjaras town. At times, INA agent office extends technical services and machinery services to the groups.

BANADESA's agricultural credits extended in the area are claimed by farmers to be yet insufficient in quantity and hard in repayment conditions. As noted in Annex B.1.4, about 3,800 credits in the total amount of Lp. 17 million were extended by BANADESA Choluteca office. (Refer to Table B-09) Since cultivation in the area is vulnerable to climatic conditions and subject to risks in earning, the credits are not provided satisfactorily, through preference is accorded in principle to the resettled farmers. BANADESA's services are also extended for purchase of some farm inputs.

E.5.2 Agro-Industries

On the Choluteca plain, there are two sugar factories; one is Azucarera Choluteca S.A. (ACHSA) operated since 1968, and the other is Azucavera Central S.A. (ACENSA) operated since 1977-78. These factories are located in the central part of the plain, on the right bank of Choluteca river. ACHSA increased its milling capacity from 1,300 tons/day to 2,000 tons/day. ACENSA factory has a standard milling capacity of 4,500 tons/day. Both factories are operated for around 150 days (net) a year during the dry season. Average milled cane was around 262,000 tons at ACHSA (118,000 tons in its own estate and 144,000 tons harvested by outgrowers) and around 504,000 tons at ACENSA (165,000 tons in the estate and 339,000 tons by outgrowers). The sugar recovery rate was approximately 7.7%, and a total of 58,800 tons of crude and white sugar has been produced annually. (Refer to Table E-13 to E-15)

A cotton ginnery of the Cooperation Agropecuaria Algodonera del Sur is located at San Lorenzo. The ginning capacity is approximately 20 tons/hour of seed cotton, or 32 packs (222 kg/pack) of cotton fiber

per hour. Cotton fiber was produced at the rate of 36.6 - 36.4% of seed cotton. The ginnery is under-utilized in recent years due to decrease in cotton production. A seed oil factory is also located near the cotton ginnery to process cotton seeds. The processing capacity is 75 tons/day or around 20,000 tons/year. Seed oil is used for production of margarine and soaps. As by-products, linter is exported and protein cakes are utilized for livestock breeding.

A processing plant of sesame has been newly installed near Choluteca. The existing plant is able to process about 9,000 tons/year, and the enterprise is ready to expand its capacity in accordance with the production increase in the area. There are 7 packing plants of melon in the region; 4 plants are operated by Productos Acuaticos y Terrestre S.A. (PATSA), a subsidiary of the United Fruits, and 3 other plants by another enterprise, private farm and cooperative. They are also engaged in export of melon. The packing capacity is, in general, enough to process all the products, and enterprises are ready to increase packing capacity in line with the production increase.

There are two slaughter houses, IGUSA and Carnilandia, in Choluteca. The daily capacity is around 300 heads at IGUSA and 100 heads at Carnilandia, which is much larger than the regional requirement for processing.

E.5.3 Marketing and Prices

MRN supplies seeds of maize, sorghum, beans, rice and sesame. Cotton seeds are supplied through the cooperative. Seed cane is also supplied by sugar factories. Fertilizers and chemicals for these crops are purchased partly through arrangement by BANADESA and partly through tradesmen. For cultivation of melon, seeds and chemical supply is made through packing-exporting enterprises of the product. The prevailing prices of inputs are estimated at farm gate, as summarized on Table E-16.

Except for production of maize and beans, almost all the production are marketed. Sugar cane harvested by outgrowers is transported at growers charge to the factories, and the mill gate price of sugar cane was approximately Lp. 31/ton in 1983-84. Around Lp. 3/ton are charged for transport on an average, and the farm gate price of sugar cane is estimated at Lp. 28/ton. The crude and white sugar produced by ACHSA and ACENSA, as well as by other 6 member factories of the Association of Sugar Producers in Honduras, is marketed through BANASUPRO.

Cotton is all processed and exported by the cooperative. In 1983-84, the cooperative paid Lp. 1,256/ton for seed cotton. About 94% of cotton fiber were exported, and the remaining 6% were sold to local textile firms. The export price of cotton fiber was Lp. 3,429/ton in 1983-84. Cotton seeds were sold to the seed oil factory at Lp. 308/ton.

IHMA intervenes in the marketing of basic grain products, as noted in Annex B.1.4. The guaranteed prices at local buying stations are Lp. 352/ton for maize, Lp. 991/ton for red beans, Lp. 325/ton for sorghum and Lp. 485/ton for rice. Sesame is sold to the processing-exporting enterprise at around Lp. 1,035/ton. Melon is sold to the enterprises at around Lp. 675/ton. Packing of melon costs Lp. 6.19 per case (20 - 27 kg/case for SJ45 and 14 - 16 kg/case for Tan Dew). Melon unsuitable for export is marketed locally, and it will amount to around Lp. 850 - 1,000/ha.

On the basis of the market prices for the past 5 years, average prices of each products at local buying stations and at farm gate have been estimated at 1984 constant price as summarized on Table E-17.

E.5.4 Farm Budget

A typical farm budget at present condition on the Cholulteca plain is estimated on the basis of gross income through marketing of products, domestic consumption, farming and living expenses. A budget of typical small farm with a holding size of about 10 ha is estimated as shown on Table E-18. The estimated net return is relatively small, or Ip. 1,152 per year. A typical farm budget of cooperative, with 15 member farmers in 100 ha, is also estimated as shown on Table E-19. The cooperative is presumed to get a net profit for sharing among member farms unless production damage is caused by drought or floods.

E.6 SITUATION WITHOUT PROJECT

E.6.1 Cropping Area and Yield

The future possible cropping area and yield without the project are forecasted as a basis for economic evaluation in terms of "with" and "without" project. In view of the natural conditions on the Choluteca plain, particularly the constraints of rainfall pattern, it is generally forecasted that there will be no substantial change in the cropping area and yield in future under the "without" project conditions. However, some minor change will be expectable as noted hereunder.

The sugar factories have been operated at an average capacity slightly lower than their standard milling capacity. If the net operation period is assumed at 150 days a year, the operation by ACHSA and ACENSA in the last 3 years was 87% and 75% respectively. If the operation is improved to 90%, about 877,500 tons of sugar cane is to be delivered to the mills. Since 117,700 tons of sugar cane are produced outside the project area, the net requirement of cane is estimated at 760,000 tons. In view of the fact that cane yield has not been improved in the past, an average yield of 78 tons/ha is presumed to be continued in future. Consequently, the area cultivated by sugar cane is assumed to increase from 8,330 ha to around 9,700 ha in future.

Cotton has a potential to be developed on the Choluteca plain. It is noted, however, that the profitability of cotton cultivation is presumed to be lower than sugar cane cultivation. A possible expansion of cultivation will be rather limited as it is vulnerable to weather conditions. As a consequence, a slight increase or return to 1977 cultivation level in both Western and Eastern plains is presumed under "without" project condition. Yield of cotton is assumed to remain at the present level. Increase in cotton area, as well as slight expansion of sugar cane area, is supposed to be executed in the area shifted for the present pasture land.

Melon cultivation has favorable market situations at present, and the cropping area may tend to increase. However, the land with favorable soil moisture is not easily available. Consequently, a slight increase in cropping area from 1,080 ha to around 1,200 ha is presumed in the Western plain. The area for other crops, like maize, sorghum, sesame and paddy is assumed to remain more or less at the present level, in view of the major constraints of climatic conditions. The present maize cultivation under traditional farming will be shifted to the semi-mechanized cultivation. (Refer to Table E-21)

E.6.2 Production without Project

Total production of sugar cane is presumed to increase up to 760,000 tons under the "without" project conditions, as noted in the foregoing section. Production of cotton will be expected to increase from 740 tons to 2,050 tons. Maize production will slightly increase to 2,500 tons. Likewise, production of melon is presumed to increase from 5,780 tons to around 6,400 tons under the "without" project condition. Production of other crops is presumed to remain at the present level even under the "without" project condition. (Refer to Table E-22)

E.6.3 Agricultural Return without Project

On the basis of the gross income from production and production cost estimated per hectare for each crop, as well as the net cultivation area under the "without" project condition, the net agricultural return without project on the Choluteca plain is estimated as summarized on Table E-23. The total net return will amount to around Lp. 19.0 million (about 15.4 million in the Western plain and Lp. 3.6 million in the Eastern plain). The net financial return has been calculated by estimating the gross income and such production cost as farm input, hired labor, machinery and interest, as shown on Table E-24 and E-25.

E.7 AGRICULTURE IN MIDDLE REACH VALLEYS

E.7.1 Agricultural Land

The agricultural situation in the middle reaches located between the possible damsite at San Fernando and the project area on the Choluteca plain has been reviewed with the objective to assess the requirement of water to be stored in the San Fernando reservoir.

In the middle reach valley, there are agricultural lands principally in San Juan de Flores valley, Morelica valley, Orocuina valley and the terrace to the north of Choluteca city (Orocuina - Choluteca area). The land in San Juan de Flores valley, Orocuina valley and Orocuina - Choluteca area is presently used for production of crops as sugar cane, maize, sorghum, rice, sesame, melon and livestock. The net area of existing irrigation schemes in these valleys totals around 2,310 ha, including the schemes which will require some improvement works. In addition, rain-fed cultivation is executed in San Juan de Flores valley for sugar cane and maize for 1,050 ha. Consequently, the present agricultural land totals around 3,360 ha, for which priority is to be accorded in storing water in the San Fernando reservoir. (Refer to Table E-26 and E-27).

In addition to the area noted above, there extend some potentially irrigable area in the middle reach valleys. It is preliminarily evaluated that such an irrigable area will be around 300 ha in the Morelica valley and 1,340 ha in the Orocuina valley, totaling 1,640 ha.

E.7.2 Land Use and Production

Present land use in the middle reach valleys is classified into cultivation of sugar cane (around 2,650 ha), rice (350 ha), maize (150 ha), sorghum (15 ha), sesame (10 ha), melon (10 ha) and livestock (175 ha). The present production of major crops in the valleys is estimated at around 152,000 tons of sugar cane (about 58 tons/ha on an average), 3,150 tons of rice and 200 tons of maize. (Refer to Table E-26)

Sugar cane production is carried out for the sugar factory of Azucalera Cantarana S.A. (ACANSA) which is located in the San Juan de Flores valley. The sugar factory was constructed in 1977, with a milling capacity of 2,200 tons/day. According to the operation record of ACANSA, the average tonnage of milled cane (153,000 tons) was equivalent to nearly 47% of the annual milling capacity. Since the land available in the San Juan de Flores valley is limited, it will be required to improve the productivity of sugar cane cultivation to rationalize the factory operation. (Refer to Table E-28)

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TABLES

Table E-01 POPULATION IN CHOLUTECA PLAIN IN 1974

Village	Population	Household
<u>Western Plain</u>		
El Palanque	823	183
La Joyada	947	197
Los Llanitos	1,489	268
Los Mangles	703	127
Monjaras	6,281	1,143
Punta Raton	416	63
San Jose	1,075	206
Santa Cruz	1,254	251
Sub-total	<u>12,988</u>	<u>2,438</u>
<u>Eastern Plain</u>		
El Carrizo	371	94
San Jose de Landa	373	86
Marcovia	2,720	607
Gervasia	461	93
Sub-total	<u>3,925</u>	<u>880</u>
Total	16,913	3,318

Source: Censo Poblacion y Vivienda 1974, DG de Estadistica y Censos.

Table E-02 ESTIMATED POPULATION IN CHOLUTECA PLAIN IN 1984

	Western Plain	Eastern Plain	Total or Average
Population ^{/1} (prs)	17,400	5,200	22,600
Household (nos)	3,300	1,200	4,500
Family size ^{/2} (prs)	5.3	4.5	5.0
Pop. density (prs/km ²)	78	37	62
Farm population ^{/3} (prs)	14,700	4,400	19,100
Farm household (nos)	2,800	1,000	3,800
Work age pop. (prs)	7,000	2,100	9,100
Ave. labor force per farm household (prs)	2.5	2.1	2.4
Available agric. work ^{/4} force: (10 ³ man-days)			
per year	1,890	567	2,457
per month	158	47	205

Note: /1: Estimated at an annual growth rate of 3% in 1974-84
/2: 1974 census average is applied.
/3: Estimated at 84.5% of population
/4: Estimated at 270 workable days a year for the work
age population

Table E-03 HOUSEHOLD AND FARM AREA BY HOLDING SIZE

	<u>Western Plain</u>		<u>Eastern Plain</u>		<u>Total</u>	
	<u>(No.)</u>	<u>(%)</u>	<u>(No.)</u>	<u>(%)</u>		
<u>Household in Number</u>						
Landless	1,670	59.7	660	66.0	2,330	61.3
Coop. member	390	13.9	80	8.0	470	12.4
Less than 5 ha	180	6.4	110	11.0	290	7.6
5 - 10 ha	210	7.5	30	3.0	240	6.3
10 - 50 ha	310	11.1	80	8.0	390	10.3
50 - 100 ha	20	0.7	20	2.0	40	1.1
100 - 200 ha	12	0.4	4	0.4	16	0.4
200 - 300 ha	4	0.1	8	0.8	12	0.3
300 - 500 ha	2	0.1	5	0.5	7	0.2
More than 500 ha	2	0.1	3	0.3	5	0.1
Total	<u>2,800</u>	<u>100.0</u>	<u>1,000</u>	<u>100.0</u>	<u>3,800</u>	<u>100.0</u>
<u>Farm Area in Ha</u>						
Less than 5 ha	370	1.9	150	1.3	520	1.6
5 - 10 ha	1,260	6.3	560	4.8	1,820	5.7
10 - 50 ha	6,630	33.2	1,870	16.0	8,500	26.9
50 - 100 ha	1,650	8.3	1,200	10.3	2,850	9.0
100 - 200 ha	1,700	8.5	520	4.4	2,220	7.0
200 - 300 ha	870	4.4	1,970	16.8	2,840	9.0
300 - 500 ha	740	3.7	1,960	16.8	2,700	8.5
More than 500 ha	1,220	6.1	3,080	26.3	4,300	13.6
Cooperative	1,980	9.9	390	3.3	2,370	7.5
Sugar cane estate	3,530	17.7	-	-	3,530	11.2
Total	<u>19,950</u>	<u>100.0</u>	<u>11,700</u>	<u>100.0</u>	<u>31,650</u>	<u>100.0</u>

Table E-04 OLA-MONJARAS RESETTLEMENT PROJECT^{/1}

Name of Group	Made of Organization	Year of Settlement	Present Members	Land Allocated
1) Los Vencedores	Coop	1975	6	47
2) La Surena	"	1975	21	81
3) Palo Seco	"	1973	12	145
4) Guipo	"	1975	13	87
5) 19 de Julio	"	1973	17	91
6) Monjaras	"	1975	14	98
7) Buena Vista	"	1963	13	127
8) Independencia	"	1963	14	118
9) Fuerzas Unidas	"	1963	12	118
10) Las Conchas	"	1963	9	103
11) Libertador del Sur	"	1974	16	98
12) Los Chachos	"	1979	12	41
13) Buen Agricultor	"	1969	17	172
14) La Nueva	"	1970	26	257
15) El Ojochal	"	1970	26	284
16) Piedra de Agua	"	1970	35	311
17) El Dalenque	"	1971	12	90
18) Jose Carranza	Settl.	1975	17	91
19) Union Delicias	"	1977	12	96
20) Esfuerzo Palenque	"	1973	14	53
21) Brizas del Mar	"	1976	12	58
22) Familias Unidas	"	1977	20	98
23) Vecinos Cedeno	"	1974	10	42
24) Los Micos	"	1973	9	70
25) El Purgatorio	Coop	1982	12	11
Total			381	2,787

Note: ^{/1}: As of December 1983

Source: Directorio de los Grupos Campesinos, INA

Table E-05 CROP CULTIVATED BY OLA-MONJARAS PROJECT^{/1}

Name of Group	Total Cultivated	Cane	Cotton	Maize	Sesame	Melon	Others ^{/2}
1) Los Vencedores	30	30	-	-	-	-	-
2) La Surena	77	42	-	15	-	-	20
3) Palo Seco	92	29	-	-	-	-	63
4) Guipo	64	53	-	-	-	-	11
5) 19 de Julio	84	63	-	-	7	14	-
6) Monjaras	82	70	-	-	-	-	12
7) Buena Vista	127	71	-	6	-	-	50
8) Independencia	112	39	-	-	-	-	73
9) Fuerzas Unidas	118	97	-	-	-	-	21
10) Las Conchas	103	-	-	14	-	-	89
11) Libertador del Sur	92	56	-	4	6	-	26
12) Los Chachos	41	-	-	11	14	-	16
13) Buen Agricultor	150	102	-	4	-	8	36
14) La Nueva	243	62	-	53	-	2	126
15) El Ojochal	262	95	28	6	-	6	127
16) Piedra de Agua	303	42	70	14	-	36	141
17) El Palenque	85	53	-	2	-	4	26
18) Jose Carranza	70	-	-	-	16	-	54
19) Union Delicias	89	20	-	9	-	10	50
20) Esfuerzo Palenque	53	29	-	11	-	7	6
21) Brizas del Mar	25	-	-	-	8	-	17
22) Familias Unidas	80	2	2	-	16	-	60
23) Vecinos Cedeno	32	-	-	-	18	-	14
24) Los Micos	70	-	-	4	-	-	66
25) El Purgatorio	8	-	-	8	-	-	-
Total	2,492	955	100	161	85	87	1,104

Note: ^{/1}: As of December 1983
^{/2}: Including pasture for livestock

Source: INA, Choluteca office

Table E-06 PRESENT LAND USE

Land Capacity	Western Plain		Eastern Plain		Total Area	
	Area (ha)	%	Area (ha)	%	Area (ha)	%
A) <u>Agricultural Land</u>						
A.1) Upland field						
- Sugar cane	9,060	(40.5)	520	(3.8)	9,580	(26.6)
- Cotton	260	(1.2)	100	(0.7)	360	(1.0)
- Rotation of other upland crops	1,750	(7.8)	240	(1.8)	1,990	(5.5)
A.2) Paddy field	50	(0.2)	810	(6.0)	860	(2.4)
A.3) Pasture land	6,310	(28.2)	5,250	(38.6)	11,560	(32.1)
A.4) Forest land	2,250	(10.0)	4,440	(32.7)	6,690	(18.6)
Sub-total	19,680	(87.9)	11,360	(83.5)	31,040	(86.2)
B) <u>Non-agricultural Land</u>						
B.1) Bush and scrub land	270	(1.2)	340	(2.5)	610	(1.7)
B.2) Village yard	430	(1.9)	290	(2.1)	720	(2.0)
B.3) Road/Rivers/Others	2,020	(9.0)	1,610	(11.8)	3,630	(10.0)
Total	22,400	(100.0)	13,600	(100.0)	36,000	(100.0)

Table E-07 CROPPING ACREAGE

(Unit: ha)

Crop	Western Plain	Eastern Plain	Total
1. Sugar cane	<u>7,880</u>	<u>450</u>	<u>8,330</u>
Estate farm	3,180	-	3,180
Outgrowers'	4,700	450	5,150
2. Cotton	<u>230</u>	<u>90</u>	<u>320</u>
3. Maize	<u>1,050</u>	<u>200</u>	<u>1,250</u>
Semi-mechanized ^{/1}	850	160	1,010
Traditional	200	40	240
4. Sorghum	<u>120</u>	<u>-</u>	<u>120</u>
Semi-mechanized ^{/1}	50	-	50
Traditional	70	-	70
5. Paddy ^{/2}	<u>80</u>	<u>1,400</u>	<u>1,480</u>
Wet season	40	700	740
Dry season	40	700	740
6. Sesame	<u>150</u>	<u>20</u>	<u>170</u>
7. Melon ^{/1}	<u>1,080</u>	<u>30</u>	<u>1,110</u>
8. Water melon	<u>70</u>	<u>-</u>	<u>70</u>
9. Pasture/Forest	<u>8,560</u>	<u>9,690</u>	<u>18,250</u>

Note: ^{/1}: Maize and sorghum cultivated under semi-mechanized farming are double cropped with melon.

^{/2}: Paddy is double cropped.
Net cultivation area is thus estimated at 18,280 ha in the Western plain and 11,150 ha in the Eastern plain.

Table E-08 PRESENT AGRICULTURAL PRODUCTION

Crop	Average Yield (t/ha)	Western Plain		Eastern Plain		Total Production (ton)
		Area (ha)	Production (ton)	Area (ha)	Production (ton)	
Sugar cane			<u>612,840</u>		<u>36,450</u>	<u>649,290</u>
Estate	73.0	3,180	232,130	-	-	232,140
Outgrowers'	81.0	4,700	380,700	450	36,450	417,150
Cotton	2.3	230	530	90	210	740
Maize			<u>1,960</u>		<u>370</u>	<u>2,330</u>
Semi-mecha.	2.0	850	1,700	160	320	2,020
Traditional	1.3	200	260	40	50	310
Sorghum			<u>170</u>		<u>-</u>	<u>170</u>
Semi-mecha.	1.9	50	100	-	-	100
Traditional	1.0	70	70	-	-	70
Paddy			<u>360</u>		<u>6,300</u>	<u>6,600</u>
Wet season	4.5	40	180	700	3,150	3,330
Dry season	4.5	40	180	700	3,150	3,330
Sesame	0.7	150	110	20	10	120
Melon	5.2	1,080	5,620	30	160	5,780
Water melon	8.0	70	560	-	-	560
Livestock						
Milk	190 ^l	8,560	1,630 ^{kl}	9,690	1,840 ^{kl}	3,470 ^{kl}
Meat	130 ^{kg}	8,560	1,110	9,690	1,260	2,370

Table E-09 ESTIMATED LABOR INPUT

Crop	Labor Input/ ¹ (Man-day/ ha)	Western Plain		Eastern Plain		Total Labor (10 ³ M-D)
		Area (ha)	Labor (10 ³ M-D)	Area (ha)	(10 ³ M-D)	
Sugar Cane:						
Estate: Plant	164	636	104	-	-	104
Ratoon	124	2,544	315	-	-	315
Outgrower: Plant	173	940	163	90	15	178
Ratoon	133	3,760	500	360	48	548
Cotton:	93	230	21	90	8	29
Maize:						
Semi-mechanized	49	850	42	160	8	50
Traditional	51	200	10	40	2	12
Sorghum:						
Semi-mechanized	49	50	2	-	-	2
Traditional	51	70	4	-	-	4
Paddy:	54	80	4	1,400	76	80
Sesame:	47	150	7	20	1	8
Melon:	167	1,080	180	30	5	185
Water melon:	142	70	10	-	-	10
Total			1,362		163	1,525

Note: ¹: Refer to Table E-10

Table E-10(1) PRESENT LABOUR REQUIREMENT

	(Unit: Man-day/ha)									
	Sugar Cane (Estate) Plant Cane		Sugar Cane (Estate) Ratoon Cane		Sugar Cane (Outgrowers') Plant Cane		Sugar Cane (Outgrowers') Ratoon Cane			
	Family Hired Labour	Total	Family Hired Labour	Total	Family Hired Labour	Total	Family Hired Labour	Total	Family Hired Labour	Total
1. Land Preparation	-	26	-	-	26	-	26	-	-	-
2. Seeding or Ratooning	-	23	-	7	14	9	23	7	-	7
3. Fertilization	-	2	-	2	2	-	2	2	-	2
4. Plant Protection	-	2	-	4	2	-	2	4	-	4
5. Field Maintenance	-	7	-	7	7	-	7	7	-	7
6. Weeding	-	10	-	10	10	-	10	10	-	10
7. Irrigating	-	6	-	6	6	-	6	6	-	6
8. Harvesting	-	73	-	73	60	21	81	60	21	81
9. Hauling & Others	-	15	-	15	10	6	16	10	6	16
Total	-	164	-	124	137	36	173	106	27	133

Table E-10 (2) PRESENT LABOUR REQUIREMENT

	(Unit: Man-day/ha)											
	Maize			Maize			Sorghum			Sorghum		
	Semi-mechanized Family Hired Labour	Total Labour	Traditional Family Hired Labour	Semi-mechanized Family Hired Labour	Total Labour	Traditional Family Hired Labour	Semi-mechanized Family Hired Labour	Total Labour	Traditional Family Hired Labour	Semi-mechanized Family Hired Labour	Total Labour	
1. Land Preparation	-	-	10	-	10	-	-	-	10	-	10	
2. Seeding	3	3	3	-	3	3	3	3	3	-	3	
3. Fertilization	3	3	1	-	1	3	-	3	1	-	1	
4. Plant Protection	3	3	-	-	-	3	-	3	-	-	-	
5. Field Maintenance	5	5	5	-	5	5	5	5	5	-	5	
6. Weeding	15	20	20	-	20	15	5	20	20	-	20	
7. Irrigating	-	-	-	-	-	-	-	-	-	-	-	
8. Harvesting	10	13	10	-	10	10	3	13	10	-	10	
9. Hauling & Others	-	2	2	-	2	-	2	2	2	-	2	
Total	39	10	49	51	51	39	10	49	51	-	51	

Table E-10(3) PRESENT LABOUR REQUIREMENT

	(Unit: Man-day/ha)											
	Cotton			Sesame			Paddy			Melon		
	Family Hired Labour	Total	Family Hired Labour	Total	Family Hired Labour	Total	Family Hired Labour	Total	Family Hired Labour	Total		
1. Land Preparation	-	5	5	10	-	10	-	8	8	16	5	21
2. Seeding	-	3	3	3	-	3	-	15	15	20	3	23
3. Fertilization	-	-	-	1	-	1	-	2	2	13	5	18
4. Plant Protection	-	-	-	2	-	2	-	2	2	44	10	54
5. Field Maintenance	-	7	7	5	-	5	-	7	7	15	-	15
6. Weeding	-	23	23	10	10	20	-	9	9	10	8	18
7. Irrigating	-	-	-	-	-	-	-	6	6	-	-	-
8. Harvesting	-	50	50	5	-	5	-	4	4	15	-	15
9. Hauling & Others	-	5	5	1	-	1	-	1	1	3	-	3
Total	-	93	93	37	10	47	-	54	54	136	31	167

Table E-10 (4) PRESENT LABOUR REQUIREMENT

	(Unit: Man-day/ha)		
	Family Labour	Water Melon Hired Labour	Total
1. Land Preparation	16	5	21
2. Seeding	15	3	18
3. Fertilization	9	4	13
4. Plant Protection	30	10	40
5. Field Maintenance	15	-	15
6. Weeding	10	7	17
7. Irrigating	-	-	-
8. Harvesting	15	-	15
9. Hauling & Others	3	-	3
Total	113	29	142

Table E-12 EXISTING IRRIGATION SYSTEMS

Scheme	Irrigable Area (ha)	Irrigation Method	Major Crop
A) Water of Choluteca River			
ACHSA	1,400	Pump-gravity	Sugar cane
ACENSA (R)	900	"	"
ACENSA (L)	300	"	"
Andres Lardizabal	700	"	Rice
Cesar Ortega	70	"	Sugar cane
Leslie Papalo	51	"	Sugar cane & rice
El Papalon	26	"	Sugar cane
Las Gerbaceas	18	"	"
El Septiembre	16	"	"
Sub-total	3,481		
B) Water of Sampile River			
Eco. Macias	105	Pump-gravity	Sugar cane
C) Groundwater			
ACHSA	(500) ^{/1}		Sugar cane
ACENSA	(380) ^{/1}		"
Sub-total	880		
Total	4,466		

Note: ^{/1}: Partically duplicated by surface irrigation system

Table E-13 OPERATION RECORDS OF TWO SUGAR MILLS (AVERAGE)

	ACHSA	ACENSA	Total or Average
Cultivated Area (ha)	3,110	6,740	9,850
Estate	1,460	2,440	3,900
Outgrowers	1,650	4,300	5,950
Harvested Area (ha)	2,920	5,770	8,690
Estate	1,320	2,020	3,340
Outgrowers	1,600	3,750	5,350
Rate of Harvested Area (%)	94	86	88
Estate	90	83	86
Outgrowers	97	87	90
Cane Milled (tons)	262,120	503,920	766,050
Estate	117,930	165,370	283,300
Outgrowers	144,190	338,560	482,750
Yield/Cultial Area (t/ha)	84	75	78
Estate	81	68	73
Outgrowers	87	79	81
Sugar Produced (tons)	20,110	38,690	58,800
Sugar Recovery Rate (%)	7.7	7.7	7.7

Table E-14 OPERATION RECORD OF ACHSA

	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83	Average*
1. Cultivated Area (ha)	2,800	2,480	2,350	3,100	3,160	3,080	3,110
Estate farm	1,410	1,400	1,230	1,450	1,520	1,420	1,460
Outgrowers	1,390	1,080	1,120	1,650	1,640	1,660	1,650
2. Harvested Area (ha)	2,390	2,390	1,930	3,010	2,900	2,860	2,920
Estate farm	1,190	1,400	700	1,450	1,280	1,250	1,320
Outgrowers	1,200	990	1,230	1,560	1,620	1,610	1,600
3. Rate of Harve. Area (%)	85	96	82	97	92	93	94
Estate farm	84	100	60	100	84	88	90
Outgrowers	86	92	110	95	99	97	97
4. Cane Milled (tons)	237,910	234,440	171,800	260,610	278,150	247,610	262,120
Estate farm	121,430	127,660	71,520	122,620	116,700	114,460	117,930
Outgrowers	116,480	106,780	100,280	137,990	161,450	133,150	144,190
5. Yield/Culti. Area (t/ha)	85	95	73	84	88	80	84
Estate farm	86	91	58	85	77	81	81
Outgrowers	84	99	90	84	98	80	87
6. Sugar Produced (tons)	19,750	18,210	13,280	19,970	18,880	21,490	20,110
7. Sugar Recovery Rate (%)	8.3	7.8	7.7	7.7	6.8	8.7	7.7

Note: ACHSA increased the milling capacity from 1,300 tons/day to 2,000 tons/day in 1979/80.
An average is calculated for the period from 1980/81 to 1982/83.

Source: Association de Productores de Azucar de Honduras
ACHSA

Table E-15 OPERATION RECORD OF ACENSA

	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83	Average ¹
1. Cultivated Area (ha)							
Estate farm	1,800	3,440	6,100	6,720	6,870	6,630	6,740
Outgrowers	1,400	1,640	2,350	2,460	2,480	2,370	2,440
	400	1,800	3,750	4,260	4,390	4,290	4,300
2. Harvested Area (ha)							
Estate farm	290	2,890	5,140	6,080	5,450	5,780	5,770
Outgrowers	290	1,450	2,080	2,280	1,780	1,990	2,020
	-	1,440	3,060	3,800	3,670	3,790	3,750
3. Rate of Harve. Area (%)							
Estate farm	16	84	84	90	79	87	86
Outgrowers	16	88	89	93	72	84	83
	-	90	82	89	84	89	87
4. Cane Milled (tons)							
Estate farm	32,680	298,850	527,250	553,120	504,330	454,340	503,930
Outgrowers	32,680	154,220	221,520	209,150	155,820	131,130	165,370
	-	144,630	305,730	343,970	348,510	323,210	338,560
5. Yield/Culti. Area (t/ha)							
Estate farm	18	89	86	82	73	69	75
Outgrowers	23	94	94	85	63	55	68
	-	80	82	81	79	76	79
6. Sugar Produced (tons)	310	17,870	42,400	40,070	38,370	37,640	38,690
7. Sugar Recovery Rate (%)	0.9	6.0	8.0	7.2	7.6	8.3	7.7

Note: ¹/: ACENSA started the operation in 1977/78. The period from 1977/78 to 1979/80 is excluded from the calculation of average figures.

Source: Asociacion de Productores de Azucar de Honduras
ACENSA

Table E-16 FARM GATE PRICE OF FARM INPUT

(Unit: Lp.)			
Item	Price	Item	Price
<u>1. Seeds/Seedlings</u>			
Sugar cane	25.00/ha	<u>5. Harbicides</u>	
Cotton seed	0.88/kg	Gesarim 80	15.13/kg
Maize	1.10/kg	2-4-D-4	5.80/lt.
Sorghum	1.70/kg	<u>6. Rodenticides</u>	
Beans	1.98/kg	Zinc phosphate	9.40/kg
Sesame	3.30/kg	<u>7. Farm Machinery</u>	
Paddy	1.32/kg	Subsoiling	75.00/ha
Melon	48.50/kg	Plowing	53.00/ha
Water melon	38.50/kg	Harrowing	30.00/ha
Vegetables/1	76.00/kg	Ridging	40.00/ha
<u>2. Fertilizers</u>		Seeding	27.00/ha
Urea	0.65/kg	Cultivating	27.00/ha
12-24-12	0.67/kg	Mulching	27.00/ha
15-15-15	0.68/kg	Irrigating	35.00/ha/month
<u>3. Insecticides</u>		Fertilizer app.	22.00/ha
Furadan 10%	7.78/kg	Chemical app.	26.00/ha
Tamaron 600	32.92/kg	Ratooning	40.00/ha
Dipterex	18.82/kg	Harvesting	66.00/ton
Orthene 95%	35.00/kg	(combine)	
Lannate 90%	67.57/kg	Threshing	25.00/ton
Malathion 4%	4.32/kg	<u>8. Chemical Application</u>	
<u>4. Fungicides</u>		by Airplane	242.00/ton
Daconil	34.04/kg	<u>9. Labour</u>	
Dithane	14.36/kg		5.00/man-day
Benlate	40.31/kg		
Poliran combi	13.25/kg		

Note: /1: Tomatoes assumed

Source: MRN (Information and Statistic Department) and BANADESA

Table E-17 FARM-GATE PRICE OF FARM PRODUCT

(Unit: Lp.)

Products	Unit	1979/ 80	1980/ 81	1981/ 82	1982/ 83	1983/ 84	<u>/4, /5,</u> <u>/6, /7,</u> <u>/8, /9</u>	Transport. Cost (Lps.)	Farm- Gate Price
Sugar cane ^{/5}	A ^{/3}	ton	25	31	26	28	31		
	B ^{/3}	ton	31	35	28	29	31	31	28
Seed cotton ^{/6}	A	ton	1,092	1,254	925	997	1,256		
	B	ton	1,349	1,422	990	1,018	1,256	1,207	1,197
Paddy ^{/7}	A	ton	507	507	558	558	457		
	B	ton	626	575	597	570	457	565	555
Maize ^{/7}	A	ton	303	308	352	352	352		
	B	ton	374	349	377	359	352	362	355
Sorghum ^{/7}	A	ton	264	281	325	325	325		
	B	ton	326	319	348	332	325	331	324
Beans ^{/7}	A	ton	837	859	1,184	1,074	1,074		
	B	ton	1,034	974	1,268	1,097	1,074	1,089	1,082
Sesame ^{/8}	A	ton	n.a.	n.a.	n.a.	n.a.	1,035		
	B	ton	-	-	-	-	1,035	1,035	1,028
Melon ^{/9}	A	ton	n.a.	n.a.	n.a.	n.a.	675		
	B	ton	-	-	-	-	675	675	668
Water melon ^{/4}	A	ton	176	181	199	204	200		
	B	ton	217	205	213	208	200	209	(7) 209
Vegetables ^{/1}	A	ton	124	128	132	121	125		
	B	ton	153	145	141	124	125	138	(7) 138
Milk ^{/8}	A	kg	n.a.	n.a.	n.a.	n.a.	380		
	B	kg	-	-	-	-	380	380	10 370
Cattle ^{/2, /8}	A	ton	n.a.	n.a.	n.a.	n.a.	1,100		
	B	ton	-	-	-	-	1,100	1,110	- 1,110

Note: ^{/1}: Tomatoes assumed
^{/2}: Live weight
^{/3}: A=at current price
B=at 1984 constant price

Source: ^{/4}: Central Bank of Honduras (farm-gate price)
^{/5}: ACENSA and ACHSA (mill-gate price)
^{/6}: Cooperative Agropecuaria del Sur, Limitada (mill-gate price)
^{/7}: IHMA (price at local buying station)
^{/8}: Field survey (price at local buying station)
^{/9}: MRN, Choluteca Office (price at packing center)

Table E-18 TYPICAL FARM BUDGET AT PRESENT CONDITION

Small Farm (Holding size: 10 ha)

A) Gross Income

	Area (ha)	Gross Return ^{/1} (Lp./ha)	Total Return (Lps.)
Sugar cane	2.0	2,268	4,536
Maize	1.3	462	601
Sesame	0.2	720	144
Melon	0.5	3,474	1,737
Pasture	6.0	213	1,278
Total			<u>8,296</u>

B) Gross Outgo

	Area (ha)	Production ^{/1} Cost (Lp./ha)	Total Pro. Cost (Lps.)
1) Production Cost			
Sugar cane	2.0	661	1,322
Maize	1.3	310	403
Sesame	0.2	397	79
Melon	0.5	2,352	1,176
Pasture	6.0	81	486
Sub-total			3,466
2) Domestic Consumption of Maize			
		0.5t/family x Lp.355	178
3) Livint Expenses			
			3,500
Total			<u>7,144</u>
C) Net Reserve (A - B)			<u>1,152</u>

Note: ^{/1}: Refer to Table E-20 and E-25

Table E-19 TYPICAL FARM BUDGET AT PRESENT CONDITION

Cooperative (15 members with 100 ha)

A) Gross Income

	Area (ha)	Gross Return ^{/1} (Ip./ha)	Total Return (Ips.)
Sugar cane	38	2,268	86,184
Maize	10	710	7,100
Sesame	3	720	2,160
Melon	2	3,474	6,948
Pasture	47	213	10,011
Total	100		112,403

B) Gross Outgo

	Area (ha)	Production ^{/1} Cost (Ip./ha)	Total Pro. Cost (Ips.)
1) Production Cost			
Sugar cane	38	661	25,118
Maize	10	470	4,700
Sesame	3	397	1,191
Melon	2	2,352	4,704
Pasture	47	81	3,807
Labour ^{/2}	4.384 M/D x Ips. 5.00		21,920
Sub-total			61,440
2) Domestic Consumption of Maize			
		0.5t/family x 15 families x Ip. 355	2,663
3) Management Cost (20% of A-B.1-B.2)			
			9,660
Total			73,763

C) Net Profit (A-B)

(Profit sharing per family) 38,640
(2,576)

Note: /1: Refer to Table E-20 and E-25

/2: Instead of hired labour, member farmers support the field works at the rate of Ips. 5.00 per day.

Table E-20 SUMMARY OF FINANCIAL BALANCE OF CROP PRODUCTION AT PRESENT CONDITION

Crop	(Unit: Lps./ha)		
	Gross/ <u>1</u> Income	Production/ <u>1</u> Cost	Net/ <u>1</u> Return
Sugar cane (average)			
- Estate farm	2,044	<u>1,262</u> ^{/2}	782
(Plant cane)		(2,480)	
(Ratoon cane)		(1,271)	
- Outgrowers farm	2,268	<u>661</u> ^{/2}	1,607
(Plant cane)		(1,643)	
(Ratoon cane)		(597)	
Cotton	2,753	2,025	728
Maize			
- Semi-mechanized	710	470	240
- Traditional	462	310	152
Sorghum			
- Semi-mechanized	616	460	156
- Traditional	324	263	61
Paddy	2,498	1,501	997
Sesame	720	397	323
Melon	3,474	2,352	1,122
Water melon	1,672	811	861
Pasture/Forest	213	81	132

Note: /1: Refer to Table E-25(1) to E-25(14)

/2: Weighed average of 1-Plant cane, 5-Ratoon cane and 1-Fallow

Table E-21 CROPPING ACREAGE UNDER "WITHOUT" PROJECT

(Unit: ha)

Crop	Western Plain	Eastern Plain	Total
1. Sugar cane	<u>9,250</u>	<u>450</u>	<u>9,700</u>
Estate farm	3,180	-	3,180
Outgrowers'	6,070	450	6,520
2. Cotton	<u>740</u>	<u>150</u>	<u>890</u>
3. Maize ^{/1}	<u>1,050</u>	<u>200</u>	<u>1,250</u>
Semi-mechanized	1,050	200	1,250
Traditional	-	-	-
4. Sorghum ^{/1}	<u>120</u>	<u>-</u>	<u>120</u>
Semi-mechanized	120	-	120
Traditional	-	-	-
5. Paddy ^{/2}	<u>80</u>	<u>1,400</u>	<u>1,480</u>
Wet season	40	700	740
Dry season	40	700	740
6. Sesame	<u>150</u>	<u>20</u>	<u>170</u>
7. Melon ^{/1}	<u>1,200</u>	<u>30</u>	<u>1,230</u>
8. Water melon	<u>70</u>	<u>-</u>	<u>70</u>
9. Pasture/Forest	<u>6,830</u>	<u>9,630</u>	<u>16,460</u>

Note: ^{/1}: Maize and sorghum are double cropped with melon.

^{/2}: Paddy is double cropped.

Net cultivation area is thus 18,280 ha in the western plain and 11,150 ha in the Eastern plain.

Table E-22 PRODUCTION UNDER "WITHOUT" PROJECT

Crop	Average Yield (t/ha)	Western Plain		Eastern Plain		Total (ton)
		Area (ha)	Production (ton)	Area (ha)	Production (ton)	
Sugar Cane			723,810			760,260
Estate	73	3,180	232,140	-	-	232,140
Outgrowers	81	6,070	491,670	450	36,450	528,120
Cotton	2.3	740	1,700	150	350	2,050
Maize						
Semi-mechan.	2.0	1,050	2,100	200	400	2,500
Sorghum						
Semi-mechan.	1.9	120	230	-	-	230
Paddy	4.5	80	360	1,400	6,300	6,660
Sesame	0.7	150	110	20	10	120
Melon	5.2	1,200	6,240	30	160	6,400
Water melon	8.0	70	560	-	-	560
Livestock						
Meat	130kg	6,830	890	9,630	1,250	2,140
Milk	190k	6,830	1,300k	9,630	1,830k	3,130k

Table E-23 ESTIMATED RETURN FROM AGRICULTURAL PRODUCTION
(WITHOUT PROJECT)

Crop	Net/1 Return (Lp./ha)	Western Plain		Eastern Plain		Total Return (10 ³ Lp.)
		Area/2 (ha)	Return (10 ³ Lp.)	Area/2 (ha)	Return (10 ³ Lp.)	
Sugar cane						
Estate	782	3,180	2,487	-	-	2,487
Outgrower	1,607	6,070	9,754	450	723	10,477
Cotton	723	740	539	150	109	648
Maize						
Semi-mech.	240	1,050	252	200	48	300
Traditional	-	-	-	-	-	-
Sorghum						
Semi-mech.	156	120	19	-	-	19
Traditional	-	-	-	-	-	-
Paddy	997	80	80	1,400	1,396	1,476
Sesame	323	150	48	20	6	54
Melon	1,122	1,200	1,346	30	34	1,380
Water melon	861	70	60	-	-	60
Livestock	132	6,830	902	9,630	1,271	2,173
TOTAL			15,487		3,587	19,074

Note: /1: Refer to Table E-24

/2: Refer to Table E-21

Table E-24. SUMMARY OF FINANCIAL BALANCE OF CROP PRODUCTION WITHOUT PROJECT

Crop	(Unit: Lps./ha)		
	Gross/ <u>1</u> Income	Production/ <u>1</u> Cost	Net/ <u>1</u> Return
Sugar cane			
- Estate farm	2,044	1,262 ^{/2}	782
Plant cane		(2,480)	
Ratoon cane		(1,271)	
- Outgrowers' farm	2,268	661 ^{/2}	1,607
Plant cane		(1,643)	
Ratoon cane		(597)	
Cotton	2,753	2,025	728
Maize	710	470	240
Sorghum	616	460	156
Paddy	2,498	1,501	997
Sesame	720	397	323
Melon	3,474	2,352	1,122
Water melon	1,672	811	861
Pasture/Forest	213	81	132

Note: /1: Refer to Table E-25(1) to E-25(14)

/2: Weighted average of 1-Plant cane, 5-Ratoon cane and 1-Fallow

Table E-25(1) FINANCIAL BALANCE OF CROP PRODUCTION PER HECTARE
WITHOUT PROJECT AND PRESENT CONDITION

(1) SUGAR CANE: ESTATE FARM(PLANT CANE)

DESCRIPTION	UNIT	Q'TY	UNIT PRICE (LPS)	AMOUNT (LPS)
A) GROSS INCOME				
-AVERAGE YIELD	(T/HA)	73.00	28.00	2044
B) PRODUCTION COST				
1) FARM INPUT				
-SEED	(TON)	10.00	25.00	250
-UREA	(KG)	170.00	0.65	111
-12-24-12	(KG)	-	0.67	0
-15-15-15	(KG)	110.00	0.68	75
-INSECTICIDES	(KG)	-	35.00	0
-FUNGICIDES	(KG)	12.00	34.04	408
-HERBICIDES	(KG)	4.00	15.13	61
-RODENTICIDES	(KG)	2.00	9.40	19
2) LABOR				
-FAMILY LABOR	(M/D)	-	-	0
-HIRED LABOR	(M/D)	164.00	5.00	820
3) MACHINERY				
-SUBSOILING	(TIMES)	1	75.00	75
-PLOWING	(TIMES)	1	53.00	53
-HARROWING	(TIMES)	2	30.00	60
-FERTILIZING	(TIMES)	-	22.00	0
-RIDGING	(TIMES)	1	40.00	40
-SEEDING	(TIMES)	-	27.00	0
-CULTIVATING	(TIMES)	1	27.00	27
-MULTING	(TIMES)	1	27.00	27
-IRRIGATING	(MONTHS)	4	35.00	140
-CHEMICAL APP	(TIMES)	1	26.00	26
-RATCOONING	(TIMES)	-	40.00	0
-HARVESTING	(TONS)	-	66.00	0
-THRESHING	(TONS)	-	25.00	0
4) MISCELLANEOUS	(5%)			110
5) INTEREST *				178
TOTAL				2480
C) NET RETURN (A-B)				-436

NOTE *: (COSTS OF FARM INPUTS + MACHINERY) * INTEREST (13%)

Table E-25(2) FINANCIAL BALANCE OF CROP PRODUCTION PER HECTARE
WITHOUT PROJECT AND PRESENT CONDITION

(2) SUGER CANE: ESTATE FARM(RATOON CANE)

DESCRIPTION	UNIT	Q'TY	UNIT PRICE (LPS)	AMOUNT (LPS)
A) GROSS INCOME				
-AVERAGE YIELD	(T/HA)	73.00	28.00	2044
B) PRODUCTION COST				
1) FARM INPUT				
-SEED	(TON)	-	25.00	0
-UREA	(KG)	170.00	0.65	111
-12-24-12	(KG)	-	0.67	0
-15-15-15	(KG)	110.00	0.68	75
-INSECTICIDES	(KG)	-	35.00	0
-FUNGICIDES	(KG)	-	34.04	0
-HERBICIDES	(KG)	4.00	15.13	61
-RODENTICIDES	(KG)	2.00	9.40	19
2) LABOR				
-FAMILY LABOR	(M/D)	-	-	0
-HIRED LABOR	(M/D)	124.00	5.00	620
3) MACHINERY				
-SUBSOILING	(TIMES)	-	75.00	0
-PLOWING	(TIMES)	-	53.00	0
-HARROWING	(TIMES)	-	30.00	0
-FERTILIZING	(TIMES)	-	22.00	0
-RIDGING	(TIMES)	-	40.00	0
-SEEDING	(TIMES)	-	27.00	0
-CULTIVATING	(TIMES)	-	27.00	0
-MULTING	(TIMES)	2	27.00	54
-IRRIGATING	(MONTHS)	4	35.00	140
-CHEMICAL APP	(TIMES)	1	26.00	26
-RATOONING	(TIMES)	1	40.00	40
-HARVESTING	(TONS)	-	66.00	0
-THRESHING	(TONS)	-	25.00	0
4) MISCELLANEOUS	(5%)			57
5) INTEREST *				68
TOTAL				1271
C) NET RETURN (A-B)				773

NOTE *: (COSTS OF FARM INPUTS + MACHINERY) * INTEREST (13%)

Table E-25(3) FINANCIAL BALANCE OF CROP PRODUCTION PER HECTARE
WITHOUT PROJECT AND PRESENT CONDITION

(3) SUGER CANE: OUTGROWERS FARM (PLANT CANE)

DESCRIPTION	UNIT	Q'TY	UNIT PRICE (LPS)	AMOUNT (LPS)
A) GROSS INCOME				
-AVERAGE YIELD	(T/HA)	81.00	28.00	2268
B) PRODUCTION COST				
1) FARM INPUT				
-SEED	(TON)	10.00	25.00	250
-UREA	(KG)	170.00	0.65	111
-12-24-12	(KG)	-	0.67	0
-15-15-15	(KG)	110.00	0.68	75
-INSECTICIDES	(KG)	-	35.00	0
-FUNGICIDES	(KG)	12.00	34.04	408
-HERBICIDES	(KG)	4.00	15.13	61
-RODENTICIDES	(KG)	2.00	9.40	19
2) LABOR				
-FAMILY LABOR	(M/D)	137.00	-	0
-HIRED LABOR	(M/D)	36.00	5.00	180
3) MACHINERY				
-SUBSOILING	(TIMES)	1	75.00	75
-PLOWING	(TIMES)	1	53.00	53
-HARROWING	(TIMES)	2	30.00	60
-FERTILIZING	(TIMES)	-	22.00	0
-RIDGING	(TIMES)	1	40.00	40
-SEEDING	(TIMES)	-	27.00	0
-CULTIVATING	(TIMES)	1	27.00	27
-MULTING	(TIMES)	1	27.00	27
-IRRIGATING	(MONTHS)	-	35.00	0
-CHEMICAL APP	(TIMES)	1	26.00	26
-RATOONING	(TIMES)	-	40.00	0
-HARVESTING	(TONS)	-	66.00	0
-THRESHING	(TONS)	-	25.00	0
4) MISCELLANEOUS	(5%)			71
5) INTEREST *				160
TOTAL				1643
C) NET RETURN (A-B)				625

NOTE *: (COSTS OF FARM INPUTS + MACHINERY) * INTEREST (13%)

Table E-25(4) FINANCIAL BALANCE OF CROP PRODUCTION PER HECTARE
WITHOUT PROJECT AND PRESENT CONDITION

(4) SUGER CANE: OUTGROWERS FARM (RATOON CANE)

DESCRIPTION	UNIT	Q'TY	UNIT PRICE (LPS)	AMOUNT (LPS)
A) GROSS INCOME				
-AVERAGE YIELD	(T/HA)	81.00	28.00	2268
B) PRODUCTION COST				
1) FARM INPUT				
-SEED	(TON)	-	25.00	0
-UREA	(KG)	170.00	0.65	111
-12-24-12	(KG)	-	0.67	0
-15-15-15	(KG)	110.00	0.68	75
-INSECTICIDES	(KG)	-	35.00	0
-FUNGICIDES	(KG)	-	34.04	0
-HERBICIDES	(KG)	4.00	15.13	61
-RODENTICIDES	(KG)	2.00	9.40	19
2) LABOR				
-FAMILY LABOR	(M/D)	106.00	-	0
-HIRED LABOR	(M/D)	27.00	5.00	135
3) MACHINERY				
-PLOWING	(TIMES)	-	75.00	0
-HARROWING	(TIMES)	-	53.00	0
-FERTILIZING	(TIMES)	-	30.00	0
-RIDGING	(TIMES)	-	22.00	0
-SEEDING	(TIMES)	-	40.00	0
-CULTIVATING	(TIMES)	-	27.00	0
-MULTING	(TIMES)	2	27.00	54
-IRRIGATING	(MONTHS)	-	35.00	0
-CHEMICAL APP	(TIMES)	1	26.00	26
-RATOONING	(TIMES)	1	40.00	40
-HARVESTING	(TONS)	-	66.00	0
-THRESHING	(TONS)	-	25.00	0
4) MISCELLANEOUS	(5%)			26
5) INTEREST *				50
TOTAL				597
C) NET RETURN (A-B)				1671

NOTE *: (COSTS OF FARM INPUTS + MACHINERY) * INTEREST (13%)

Table E-25(5) FINANCIAL BALANCE OF CROP PRODUCTION PER HECTARE
WITHOUT PROJECT AND PRESENT CONDITION

(5) MAIZE: SEMI-MECHANIZED FARMING

DESCRIPTION	UNIT	Q'TY	UNIT PRICE (LPS)	AMOUNT (LPS)
A) GROSS INCOME				
-AVERAGE YIELD	(T/HA)	2.00	355.00	710
B) PRODUCTION COST				
1) FARM INPUT				
-SEED	(KG)	16.00	1.10	18
-UREA	(KG)	80.00	0.65	52
-12-24-12	(KG)	90.00	0.67	60
-15-15-15	(KG)	-	0.68	0
-INSECTICIDES	(KG)	1.00	35.00	35
-FUNGICIDES	(KG)	-	34.04	0
-HERBICIDES	(KG)	-	15.13	0
-RODENTICIDES	(KG)	-	9.40	0
2) LABOR				
-FAMILY LABOR	(M/D)	39.00	-	0
-HIRED LABOR	(M/D)	10.00	5.00	50
3) MACHINERY				
-SUBSOILING	(TIMES)	-	75.00	0
-PLOWING	(TIMES)	1	53.00	53
-HARROWING	(TIMES)	2	30.00	60
-FERTILIZING	(TIMES)	-	22.00	0
-RIDGING	(TIMES)	-	40.00	0
-SEEDING	(TIMES)	-	27.00	0
-CULTIVATING	(TIMES)	-	27.00	0
-MULTING	(TIMES)	-	27.00	0
-IRRIGATING	(MONTHS)	-	35.00	0
-CHEMICAL APP	(TIMES)	1	26.00	26
-RATOONING	(TIMES)	-	40.00	0
-HARVESTING	(TONS)	-	66.00	0
-THRESHING	(TONS)	2	25.00	50
4) MISCELLANEOUS	(5%)			20
5) INTEREST *				46
TOTAL				470
C) NET RETURN (A-B)				240

NOTE *: (COSTS OF FARM INPUTS + MACHINERY) * INTEREST(13%)

Table E-25(6) FINANCIAL BALANCE OF CROP PRODUCTION PER HECTARE
WITHOUT PROJECT AND PRESENT CONDITION

(6) MAIZE: TRADITIONAL FARMING

DESCRIPTION	UNIT	Q'TY	UNIT PRICE (LPS)	AMOUNT (LPS)
A) GROSS INCOME				
-AVERAGE YIELD	(T/HA)	1.30	355.00	462
B) PRODUCTION COST				
1) FARM INPUT				
-SEED	(KG)	16.00	1.10	18
-UREA	(KG)	100.00	0.65	65
-12-24-12	(KG)	-	0.67	0
-15-15-15	(KG)	-	0.68	0
-INSECTICIDES	(KG)	1.00	35.00	35
-FUNGICIDES	(KG)	-	34.04	0
-HERBICIDES	(KG)	-	15.13	0
-RODENTICIDES	(KG)	-	9.40	0
2) LABOR				
-FAMILY LABOR	(M/D)	51.00	-	0
-HIRED LABOR	(M/D)	-	5.00	0
3) MACHINERY				
-SUBSOILING	(TIMES)	-	75.00	0
-PLOWING **	(TIMES)	.8	53.00	42
-HARROWING **	(TIMES)	1.6	30.00	48
-FERTILIZING	(TIMES)	-	22.00	0
-RIDGING	(TIMES)	-	40.00	0
-SEEDING	(TIMES)	-	27.00	0
-CULTIVATING **	(TIMES)	.8	27.00	22
-MULTING	(TIMES)	-	27.00	0
-IRRIGATING	(MONTHS)	-	35.00	0
-CHEMICAL APP	(TIMES)	-	26.00	0
-RATOONING	(TIMES)	-	40.00	0
-HARVESTING	(TONS)	-	66.00	0
-THRESHING	(TONS)	1.3	25.00	33
4) MISCELLANEOUS	(%)			13
5) INTEREST *				34
TOTAL				310
C) NET RETURN (A-B)				152

NOTE *: (COSTS OF FARM INPUTS + MACHINERY) * INTEREST(13%)

** : ALL THESE WORKES ARE ASSUMED TO BE DONE BY ANIMAL POWER AT THE COSTS OF 80% OF THE MACHINERY WORKES.

Table E-25(7) FINANCIAL BALANCE OF CROP PRODUCTION PER HECTARE
WITHOUT PROJECT AND PRESENT CONDITION

(7) SORGHUM: SEMI-MECHANIZED FARMING

DESCRIPTION	UNIT	Q'TY	UNIT PRICE (LPS)	AMOUNT (LPS)
A) GROSS INCOME				
-AVERAGE YIELD	(T/HA)	1.90	324.00	616
B) PRODUCTION COST				
1) FARM INPUT				
-SEED	(KG)	10.00	1.70	17
-UREA	(KG)	80.00	0.65	52
-12-24-12	(KG)	80.00	0.67	54
-15-15-15	(KG)	-	0.68	0
-INSECTICIDES	(KG)	1.00	35.00	35
-FUNGICIDES	(KG)	-	34.04	0
-HERBICIDES	(KG)	-	15.13	0
-RODENTICIDES	(KG)	-	9.40	0
2) LABOR				
-FAMILY LABOR	(M/D)	39.00	-	0
-HIRED LABOR	(M/D)	10.00	5.00	50
3) MACHINERY				
-SUBSOILING	(TIMES)	-	75.00	0
-PLOWING	(TIMES)	1	53.00	53
-HARROWING	(TIMES)	2	30.00	60
-FERTILIZING	(TIMES)	-	22.00	0
-RIDGING	(TIMES)	-	40.00	0
-SEEDING	(TIMES)	-	27.00	0
-CULTIVATING	(TIMES)	-	27.00	0
-MULTING	(TIMES)	-	27.00	0
-IRRIGATING	(MONTHS)	-	35.00	0
-CHEMICAL APP	(TIMES)	1	26.00	26
-RATOONING	(TIMES)	-	40.00	0
-HARVESTING	(TONS)	-	66.00	0
-THRESHING	(TONS)	1.9	25.00	48
4) MISCELLANEOUS	(5%)			20
5) INTEREST *				45
TOTAL				460
C) NET RETURN (A-B)				156

NOTE *: (COSTS OF FARM INPUTS + MACHINERY) * INTEREST (13%)

Table E-25(8) FINANCIAL BALANCE OF CROP PRODUCTION PER HECTARE
WITHOUT PROJECT AND PRESENT CONDITION

(8) SORGHUM: TRADITIONAL FARMING

DESCRIPTION	UNIT	Q'TY	UNIT PRICE (LPS)	AMOUNT (LPS)
A) GROSS INCOME				
-AVERAGE YIELD	(T/HA)	1.00	324.00	324
B) PRODUCTION COST				
1) FARM INPUT				
-SEED	(KG)	16.00	1.70	27
-UREA	(KG)	90.00	0.65	59
-12-24-12	(KG)	-	0.67	0
-15-15-15	(KG)	-	0.68	0
-INSECTICIDES	(KG)	-	35.00	0
-FUNGICIDES	(KG)	-	34.04	0
-HERBICIDES	(KG)	-	15.13	0
-RODENTICIDES	(KG)	-	9.40	0
2) LABOR				
-FAMILY LABOR	(M/D)	51.00	-	0
-HIRED LABOR	(M/D)	-	5.00	0
3) MACHINERY				
-SUBSOILING	(TIMES)	-	75.00	0
-PLOWING **	(TIMES)	.8	53.00	42
-HARROWING **	(TIMES)	1.6	30.00	48
-FERTILIZING	(TIMES)	-	22.00	0
-RIDGING	(TIMES)	-	40.00	0
-SEEDING	(TIMES)	-	27.00	0
-CULTIVATING **	(TIMES)	.8	27.00	22
-MULTING	(TIMES)	-	27.00	0
-IRRIGATING	(MONTHS)	-	35.00	0
-CHEMICAL APP	(TIMES)	-	26.00	0
-RATOONING	(TIMES)	-	40.00	0
-HARVESTING	(TONS)	-	66.00	0
-THRESHING	(TONS)	1	25.00	25
4) MISCELLANEOUS	(5%)			11
5) INTEREST *				29
TOTAL				263
C) NET RETURN (A-B)				61

NOTE *: (COSTS OF FARM INPUTS + MACHINERY) * INTEREST (13%)

** : ALL THESE WORKS ARE ASSUMED TO BE DONE BY ANIMAL POWER AT THE COST OF 80% OF THE MACHINERY WORKS.

Table E-25(9)

FINANCIAL BALANCE OF CROP PRODUCTION PER HECTARE
WITHOUT PROJECT AND PRESENT CONDITION

(9) PADDY

DESCRIPTION	UNIT	Q'TY	UNIT PRICE (LPS)	AMOUNT (LPS)
A) GROSS INCOME				
-AVERAGE YIELD	(T/HA)	4.50	555.00	2498
B) PRODUCTION COST				
1) FARM INPUT				
-SEED	(KG)	70.00	1.32	92
-UREA	(KG)	190.00	0.65	124
-12-24-12	(KG)	130.00	0.67	87
-15-15-15	(KG)	-	0.68	0
-INSECTICIDES	(KG)	1.00	35.00	35
-FUNGICIDES	(KG)	-	34.04	0
-HERBICIDES	(KG)	4.00	15.13	61
-RODENTICIDES	(KG)	-	9.40	0
2) LABOR				
-FAMILY LABOR	(M/D)	-	-	0
-HIRED LABOR	(M/D)	54.00	5.00	270
3) MACHINERY				
-SUBSOILING	(TIMES)	-	75.00	0
-PLOWING	(TIMES)	1	53.00	53
-HARROWING	(TIMES)	3	30.00	90
-FERTILIZING	(TIMES)	-	22.00	0
-RIDGING	(TIMES)	-	40.00	0
-SEEDING	(TIMES)	1	27.00	27
-CULTIVATING	(TIMES)	-	27.00	0
-MULTING	(TIMES)	-	27.00	0
-IRRIGATING	(MONTHS)	4	35.00	140
-CHEMICAL APP	(TIMES)	1	26.00	26
-RATOONING	(TIMES)	-	40.00	0
-HARVESTING	(TONS)	4.5	66.00	297
-THRESHING	(TONS)	-	25.00	0
4) MISCELLANEOUS	(5%)			65
5) INTEREST *				134
TOTAL				1501
C) NET RETURN (A-B)				997

NOTE *: (COSTS OF FARM INPUTS + MACHINERY) * INTEREST (13%)

Table E-25(10) FINANCIAL BALANCE OF CROP PRODUCTION PER HECTARE
WITHOUT PROJECT AND PRESENT CONDITION

(10) COTTON

DESCRIPTION	UNIT	Q'TY	UNIT PRICE (LPS)	AMOUNT (LPS)
A) GROSS INCOME				
-AVERAGE YIELD	(T/HA)	2.30	1197.00	2753
B) PRODUCTION COST				
1) FARM INPUT				
-SEED	(KG)	25.00	0.88	22
-UREA	(KG)	130.00	0.65	85
-12-24-12	(KG)	160.00	0.67	107
-15-15-15	(KG)	-	0.68	0
-INSECTICIDES	(KG)	16.00	35.00	560
-FUNGICIDES	(KG)	-	34.04	0
-HERBICIDES	(KG)	3.80	15.13	57
-RODENTICIDES	(KG)	-	9.40	0
2) LABOR				
-FAMILY LABOR	(M/D)	-	-	0
-HIRED LABOR	(M/D)	93.00	5.00	465
3) MACHINERY				
-SUBSOILING	(TIMES)	1	75.00	75
-PLOWING	(TIMES)	1	53.00	53
-HARROWING	(TIMES)	2	30.00	60
-FERTILIZING	(TIMES)	1	22.00	22
-RIDGING	(TIMES)	-	40.00	0
-SEEDING	(TIMES)	1	27.00	27
-CULTIVATING	(TIMES)	1	27.00	27
-MULTING	(TIMES)	-	27.00	0
-IRRIGATING	(MONTHS)	-	35.00	0
-CHEMICAL APP	(TIMES)	8	26.00	208
-RATOONING	(TIMES)	-	40.00	0
-HARVESTING	(TONS)	-	66.00	0
-THRESHING	(TONS)	-	25.00	0
4) MISCELLANEOUS	(5%)			88
5) INTEREST *				169
TOTAL				2025
C) NET RETURN (A-B)				728

NOTE *: (COSTS OF FARM INPUTS + MACHINERY) * INTEREST (13%)

Table E-25(11) FINANCIAL BALANCE OF CROP PRODUCTION PER HECTARE
WITHOUT PROJECT AND PRESENT CONDITION

(11) SESAME

DESCRIPTION	UNIT	Q'TY	UNIT PRICE (LPS)	AMOUNT (LPS)
A) GROSS INCOME				
-AVERAGE YIELD	(T/HA)	0.70	1028.00	720
B) PRODUCTION COST				
1) FARM INPUT				
-SEED	(KG)	3.20	3.30	11
-UREA	(KG)	80.00	0.65	52
-12-24-12	(KG)	-	0.67	0
-15-15-15	(KG)	-	0.68	0
-INSECTICIDES	(KG)	1.00	35.00	35
-FUNGICIDES	(KG)	-	34.04	0
-HERBICIDES	(KG)	-	15.13	0
-RODENTICIDES	(KG)	-	9.40	0
2) LABOR				
-FAMILY LABOR	(M/D)	37.00	-	0
-HIRED LABOR	(M/D)	10.00	5.00	50
3) MACHINERY				
-SUBSOILING	(TIMES)	-	75.00	0
-PLOWING	(TIMES)	1	53.00	53
-HARROWING	(TIMES)	2	30.00	60
-FERTILIZING	(TIMES)	-	22.00	0
-RIDGING	(TIMES)	-	40.00	0
-SEEDING	(TIMES)	1	27.00	27
-CULTIVATING	(TIMES)	2	27.00	54
-MULTING	(TIMES)	-	27.00	0
-IRRIGATING	(MONTHS)	-	35.00	0
-CHEMICAL APP	(TIMES)	-	26.00	0
-RATOONING	(TIMES)	-	40.00	0
-HARVESTING	(TONS)	-	66.00	0
-THRESHING	(TONS)	-	25.00	0
4) MISCELLANEOUS	(5%)			17
5) INTEREST				38
TOTAL				397
C) NET RETURN (A-B)				323

NOTE *: (COSTS OF FARM INPUTS + MACHINERY) * INTEREST (13%)

Table E-25(12) FINANCIAL BALANCE OF CROP PRODUCTION PER HECTARE
WITHOUT PROJECT AND PRESENT CONDITION

(12) MELON

DESCRIPTION	UNIT	Q'TY	UNIT PRICE (LPS)	AMOUNT (LPS)
A) GROSS INCOME				
-AVERAGE YIELD	(T/HA)	5.20	668.00	3474
B) PRODUCTION COST				
1) FARM INPUT				
-SEED	(KG)	1.60	48.50	78
-UREA	(KG)	130.00	0.65	85
-12-24-12	(KG)	190.00	0.67	127
-15-15-15	(KG)	-	0.68	0
-INSECTICIDES	(KG)	12.00	35.00	420
-FUNGICIDES	(KG)	22.70	34.04	773
-HERBICIDES	(KG)	3.00	15.13	45
-RODENTICIDES	(KG)	-	9.40	0
2) LABOR				
-FAMILY LABOR	(M/D)	136.00	-	0
-HIRED LABOR	(M/D)	31.00	5.00	155
3) MACHINERY				
-SUBSOILING	(TIMES)	-	75.00	0
-PLOWING	(TIMES)	1	53.00	53
-HARROWING	(TIMES)	3	30.00	90
-FERTILIZING	(TIMES)	-	22.00	0
-RIDGING	(TIMES)	-	40.00	0
-SEEDING	(TIMES)	-	27.00	0
-CULTIVATING	(TIMES)	2	27.00	54
-MULTING	(TIMES)	-	27.00	0
-IRRIGATING	(MONTHS)	-	35.00	0
-CHEMICAL APP	(TIMES)	5	26.00	130
-RATOONING	(TIMES)	-	40.00	0
-HARVESTING	(TONS)	-	66.00	0
-THRESHING	(TONS)	-	25.00	0
4) MISCELLANEOUS	(5%)			101
5) INTEREST *				241
TOTAL				2352
C) NET RETURN (A-B)				1122

NOTE *: (COSTS OF FARM INPUTS + MACHINERY) * INTEREST (13%)

Table E-25(13) FINANCIAL BALANCE OF CROP PRODUCTION PER HECTARE
WITHOUT PROJECT AND PRESENT CONDITION

(13) WATER MELON

DESCRIPTION	UNIT	Q'TY	UNIT PRICE (LPS)	AMOUNT (LPS)
A) GROSS INCOME				
-AVERAGE YIELD	(T/HA)	8.00	209.00	1672
B) PRODUCTION COST				
1) FARM INPUT				
-SEED	(KG)	1.00	38.50	39
-UREA	(KG)	65.00	0.65	42
-12-24-12	(KG)	-	0.67	0
-15-15-15	(KG)	65.00	0.68	44
-INSECTICIDES	(KG)	5.50	35.00	193
-FUNGICIDES	(KG)	1.40	34.04	48
-HERBICIDES	(KG)	-	15.13	0
-RODENTICIDES	(KG)	-	9.40	0
2) LABOR				
-FAMILY LABOR	(M/D)	113.00	-	0
-HIRED LABOR	(M/D)	29.00	5.00	145
3) MACHINERY				
-SUBSOILING	(TIMES)	-	75.00	0
-PLOWING	(TIMES)	1	53.00	53
-HARROWING	(TIMES)	2	30.00	60
-FERTILIZING	(TIMES)	-	22.00	0
-RIDGING	(TIMES)	-	40.00	0
-SEEDING	(TIMES)	-	27.00	0
-CULTIVATING	(TIMES)	1	27.00	27
-MULTING	(TIMES)	-	27.00	0
-IRRIGATING	(MONTHS)	-	35.00	0
-CHEMICAL APP	(TIMES)	2	26.00	52
-RATOONING	(TIMES)	-	40.00	0
-HARVESTING	(TONS)	-	66.00	0
-THRESHING	(TONS)	-	25.00	0
4) MISCELLANEOUS	(5%)			35
5) INTEREST *				73
TOTAL				811
C) NET RETURN (A-B)				861

NOTE *: (COSTS OF FARM INPUTS + MACHINERY) * INTEREST (13%)

Table E-25(14) FINANCIAL BALANCE OF CROP PRODUCTION PER HECTARE
WITHOUT PROJECT AND PRESENT CONDITION

(14) PASTURE/FOREST (CATTLE RAISING)

DESCRIPTION	UNIT	Q'TY	UNIT PRICE (LPS)	AMOUNT (LPS)
A) GROSS INCOME				
-BEEF	(KG)	130.00	1.10	143
-MILK	(LT.)	190.00	0.37	70
TOTAL				213
B) PRODUCTION COST				
1) RECOVERY OF INITIAL INVESTMENT *				
-CULTIVATED PASTURE (70%)				29**
-NATURAL PASTURE (30%)				6***
2) RAISING COST				
-LABOUR COST	****			37
(A*B*C)				
A	(HEAD/HA)	2.00		
B	(MAN/HEAD)	0.01		
C	(LPS/MAN/YEAR)	1850.00		
-VETERINARY COST				5
(A*B)				
A	(HEAD)	2.00		
B	(LPS/HEAD)	2.40		
4) MISCELLANEOUS (5%)				
TOTAL				81
C) NET RETURN (A-B)				132

NOTE * : ABOUT 70% OF PASTURE LAND IS CULTIVATED BY IMPROVED PASTURE GRASSES AND REMAINING 30% IS NATURAL PASTURE.

** : CULTIVATED PASTURE

-LAND PREPARATION

BY MACHINERY

LPS/HA 113.00

-SEEDING BY MACHINERY

LPS/HA 27.00

-SEED

LPS/HA 55.00

-FENCES

LPS/HA 150.00

-MISCELLANEOUS

LPS/HA 70.00

(INCLUDING MAINTENANCE)

TOTAL

LPS/HA 415.00

-USEFUL LIFE

YEARS. 10

ANNUAL RECOVERY OF INITIAL INVESTMENT

LPS/HA 41.5

*** : NATURAL PASTURE

ESTIMATED AT ABOUT LPS.20.00/HA

**** : OPPORTUNITY COST IS NOT APPLIED FOR COWBOYS.

Table E-26 PRESENT LAND USE AND PRODUCTION
IN MIDDLE REACH VALLEYS/1

	Area (Net) (ha)	Yield (ton/ha)	Production (t)
1) San Juan de Flores:			
Sugar cane			
Irrigated	1,630	6.0	97,800
Non-irrigated	1,020/2	5.3	54,100
Maize	30/2	1.3	40
2) Orocuina:			
(Irrigated)			
Sorghum	15	2.0	30
Sesame	10	0.7	10
Melon	10	5.2	50
(Non-irrigated)			
Maize	120	1.3	160
Livestock: beaf milk	175	0.13 0.19k/	20 30k/
3) Orocuina-Cholulteca			
Rice	700	4.5	3,150
4) Total			
Sugar cane	2,650	5.8	151,900
Maize	150	1.3	200
Sorghum	15	2.0	30
Rice	700	4.5	3,150
Sesame	10	0.7	10
Melon	10	5.2	50
Livestock: beaf milk	175	0.13 0.19k/	20 30k/

Note: /1: Area of existing irrigation schemes and possible irrigable area in San Juan de Flores.

/2: A total land of 1,050 ha is divided into 700 ha on the right bank and 350 ha on the left bank.

Table E-27 IRRIGATION SCHEME IN MIDDLE REACH VALLEYS

(Unit: ha)				
Area/Scheme	Existing Area (Net)	Irrigable Area (Net)	Total Area (Net)	Irrigation Method
1) <u>San Juan de Flores</u>				
Weir-system	1,140	-	1,140	main-gravity
Pump-system:				
Right bank	490	700	1,190	pump-gravity
Left bank	-	350	350	"
(Sub-total)	(1,630)	(1,050)	(2,680)	
2) <u>Morolica</u>				
Morolica C	-	210	210	pump-gravity
Morolica D	-	90	90	"
(Sub-total)	-	(300)	(300)	
3) <u>Orocuina</u>				
Los Sabilas	230 (-)	-	230	pump-gravity
La Trinidad	17 (10) <u>/1</u>	-	17	"
San Rafael	18 (9) <u>/1</u>	-	18	"
El Brasil	45 (16) <u>/1</u>	-	45	"
Los Limones	20 (-)	-	20	"
Orocuina E		150	150	pump-gravity
Orocuina F		250	250	"
Orocuina G		100	100	"
Orocuina H		540	540	"
(Sub-total)	(330) (25)	(1,340)	(1,670)	
4) <u>Orocuina - Cholteca</u>				
J. Midence	350	-	350	pump-gravity
TOTAL	2,310	2,690	5,000	

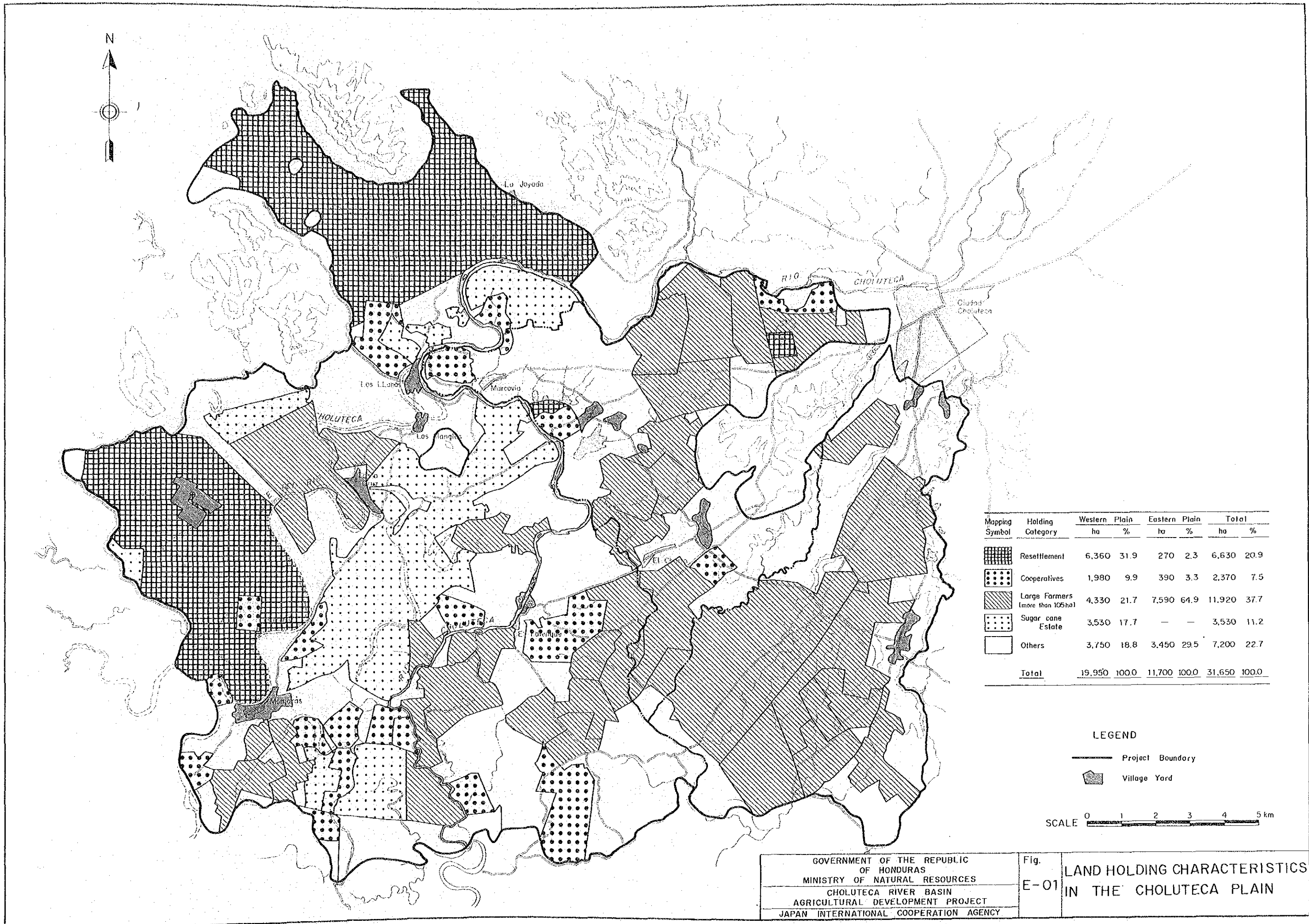
Note: /1: Figures in parenthesis indicate the net area presently operated.

Table E-28 OPERATION RECORD OF ACANSA

	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83	Average ¹
1. Cultivated Area (ha)	1,140	2,150	2,160	3,180	3,220	2,560	2,650
Estate farm	-	70	140	140	150	160	130
Outgrowers	-	2,080	2,020	3,040	3,070	2,400	2,520
2. Harvested Area (ha)	780	1,460	2,000	2,430	2,760	1,990	2,130
Estate farm	30	70	140	140	130	140	120
Outgrowers	750	1,390	1,860	2,290	2,630	1,850	2,010
3. Rate of Harve. Area (%)	68	70	93	76	86	78	80
Estate farm	-	100	100	100	87	88	92
Outgrowers	-	67	92	75	86	77	80
4. Cane Milled (tons)	32,670	109,120	185,510	167,530	185,610	120,760	153,710
Estate farm	1,500	6,200	14,700	11,210	11,550	9,050	10,540
Outgrowers	31,170	102,920	170,810	156,320	174,060	111,710	143,170
5. Yield/Culti. Area (t/ha)	29	51	86	53	58	47	58
Estate farm	-	89	105	80	77	57	81
Outgrowers	-	49	85	51	57	47	57

Note: ¹ Five years average from 1978/79 to 1982/83

FIGURES



Mapping Symbol	Holding Category	Western Plain		Eastern Plain		Total	
		ha	%	ha	%	ha	%
	Resettlement	6,360	31.9	270	2.3	6,630	20.9
	Cooperatives	1,980	9.9	390	3.3	2,370	7.5
	Large Farmers (more than 105ha)	4,330	21.7	7,590	64.9	11,920	37.7
	Sugar cane Estate	3,530	17.7	—	—	3,530	11.2
	Others	3,750	18.8	3,450	29.5	7,200	22.7
Total		19,950	100.0	11,700	100.0	31,650	100.0

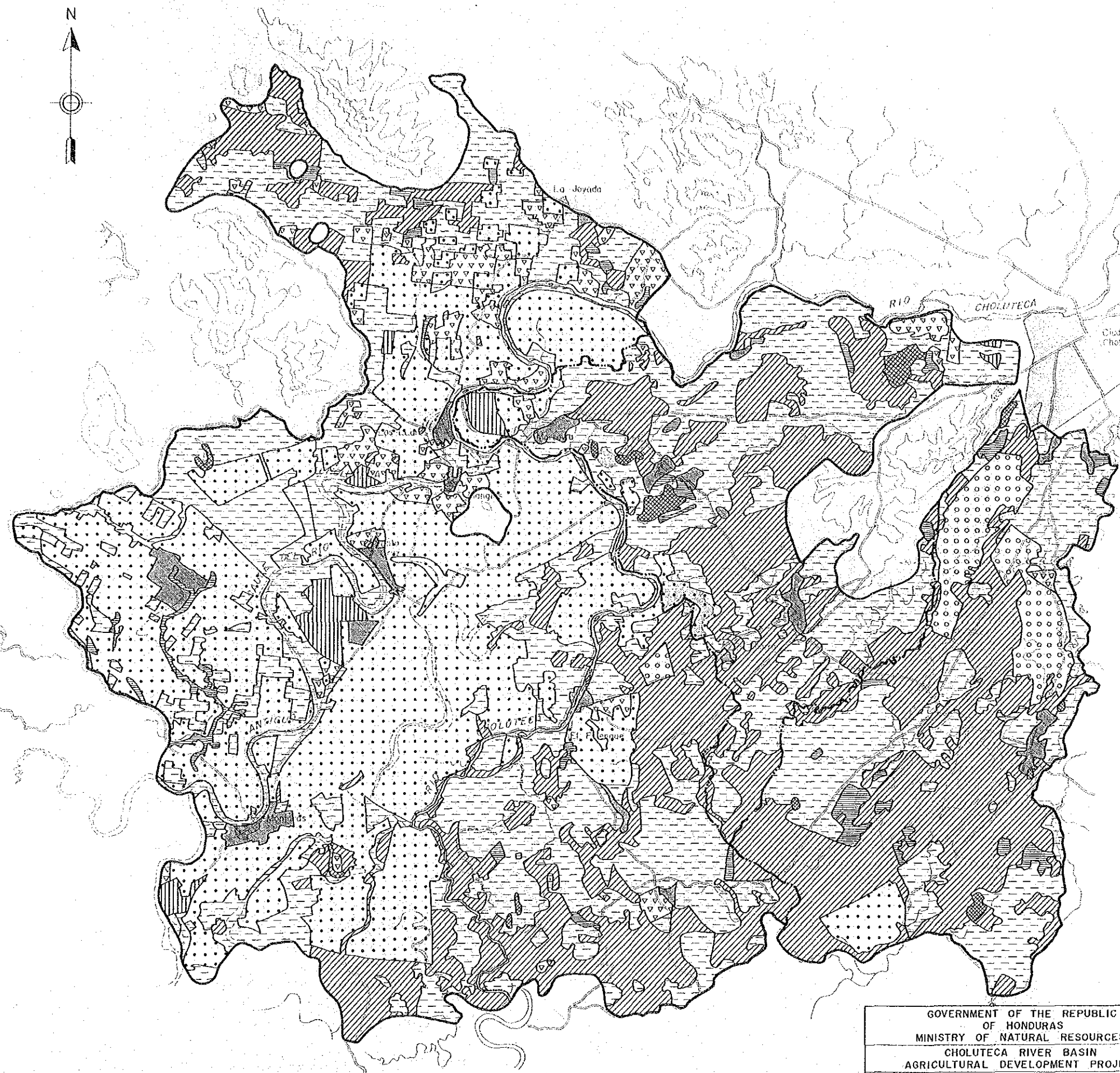
LEGEND

- Project Boundary
- Village Yard

SCALE 0 1 2 3 4 5 km

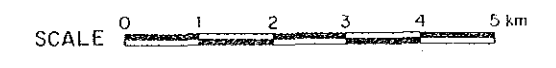
GOVERNMENT OF THE REPUBLIC OF HONDURAS
 MINISTRY OF NATURAL RESOURCES
 CHOLUTECA RIVER BASIN
 AGRICULTURAL DEVELOPMENT PROJECT
 JAPAN INTERNATIONAL COOPERATION AGENCY

Fig. E-01 LAND HOLDING CHARACTERISTICS IN THE CHOLUTECA PLAIN



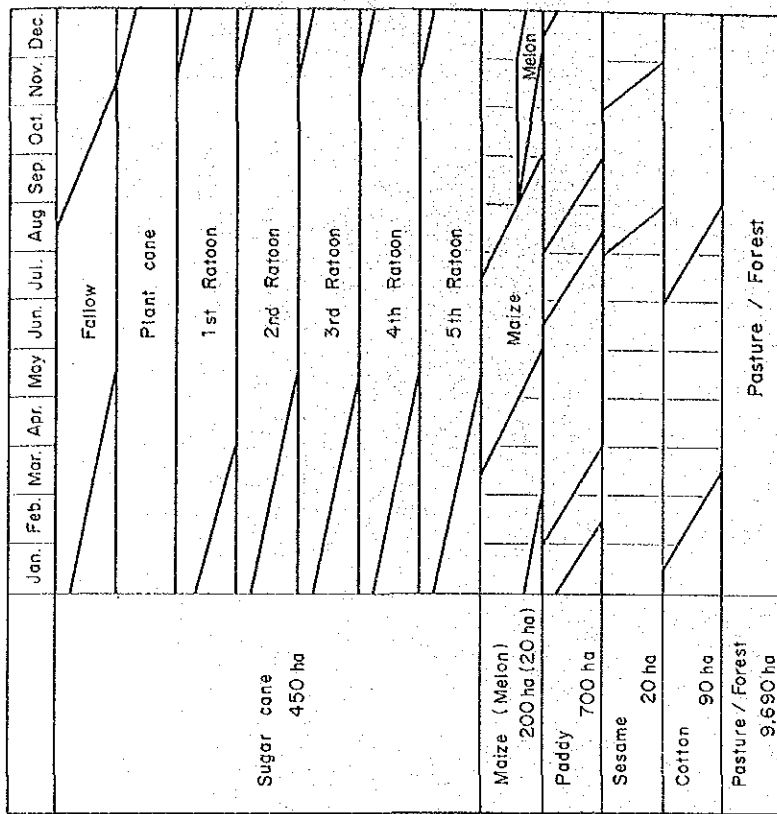
Mapping Symbol	Land Category	Western Plain		Eastern Plain		Total	
		ha	%	ha	%	ha	%
	Sugar cane	9,060	(40.5)	520	(3.8)	9,580	(26.6)
	Cotton	260	(1.2)	100	(0.7)	360	(1.0)
	Other upland crops	1,750	(7.8)	240	(1.8)	1,990	(5.5)
	Paddy	50	(0.2)	810	(6.0)	860	(2.4)
	Posture	6,310	(28.2)	5,250	(38.6)	11,560	(32.1)
	Forest	2,250	(10.0)	4,440	(32.7)	6,690	(18.6)
	Bush/Scrub	270	(1.2)	340	(2.5)	610	(1.7)
	Village	430	(1.9)	290	(2.1)	720	(2.0)
	Road/Rivers/Others	2,020	(9.0)	1,610	(11.8)	3,630	(10.0)
Total		22,400	(100.0)	13,600	(100.0)	36,000	(100.0)

— Project Boundary

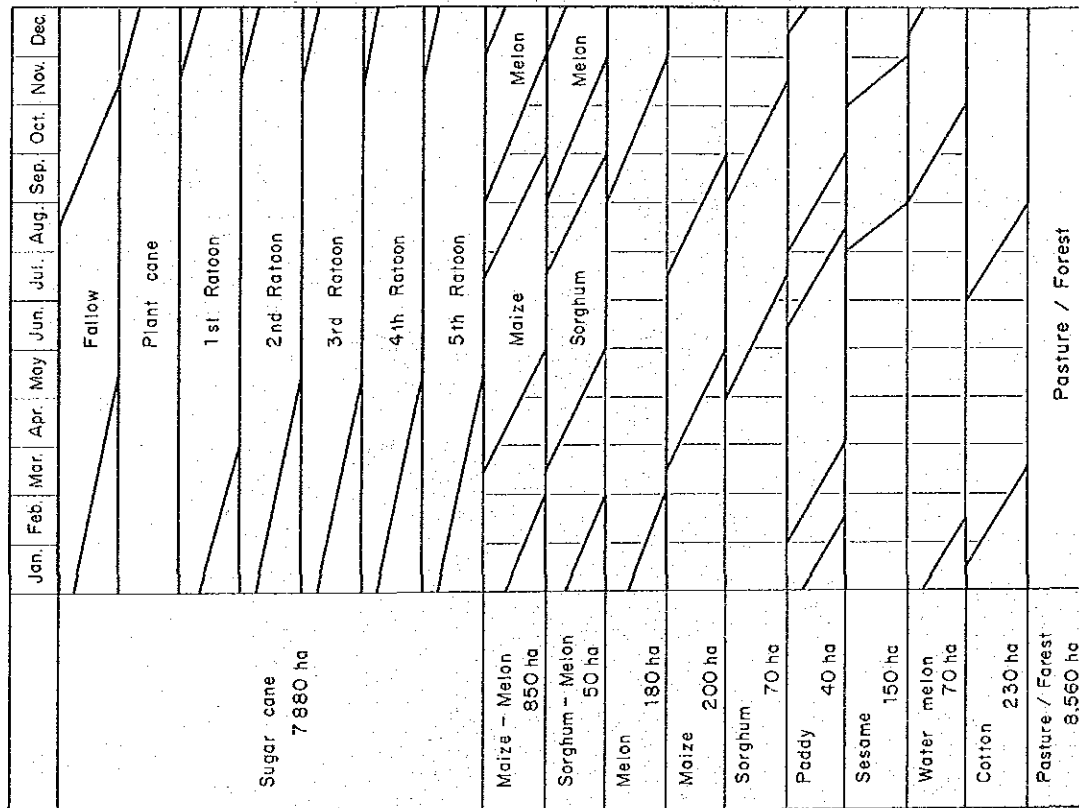


GOVERNMENT OF THE REPUBLIC OF HONDURAS MINISTRY OF NATURAL RESOURCES CHOLUTECA RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT JAPAN INTERNATIONAL COOPERATION AGENCY	Fig. E-02	LAND USE MAP
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- EASTERN PLAIN -

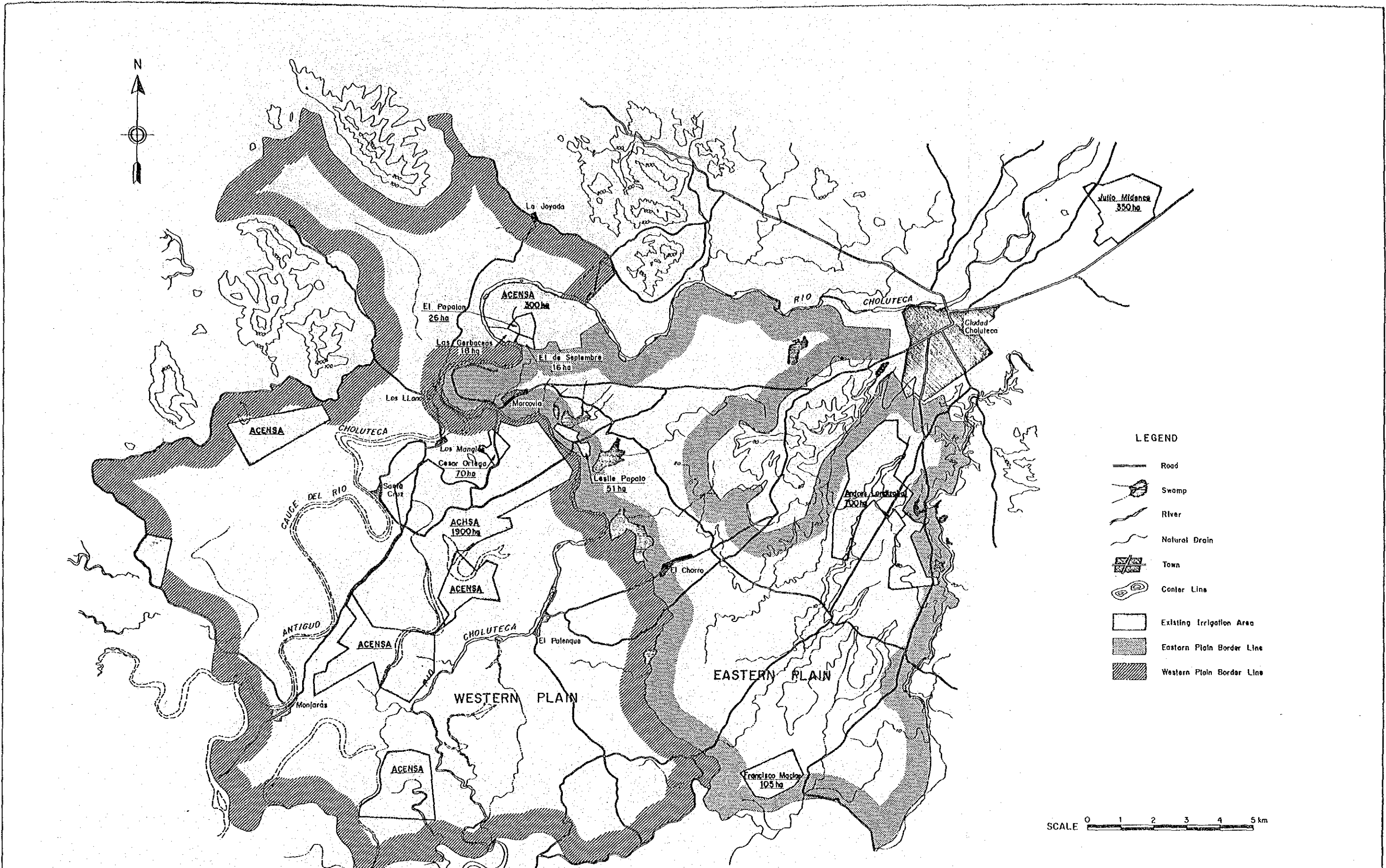


- WESTERN PLAIN -



GOVERNMENT OF THE REPUBLIC OF HONDURAS MINISTRY OF NATURAL RESOURCES CHOLUTECA RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT JAPAN INTERNATIONAL COOPERATION AGENCY	Fig.	PRESENT CROPPING PATTERN
	E-03	





Note: Total area of ACENSA RIGHT BANK IS 1700ha

GOVERNMENT OF THE REPUBLIC OF HONDURAS MINISTRY OF NATURAL RESOURCES	Fig.	EXISTING IRRIGATION AREA
CHOLUTECA RIVER BASIN AGRICULTURAL DEVELOPMENT PROJECT	E-04	
JAPAN INTERNATIONAL COOPERATION AGENCY		

ANNEX F

PROPOSED AGRICULTURE

ANNEX - F

PROPOSED AGRICULTURE

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