

### 3.3 Agriculture

#### 3.3.1 Land Use

Total area of the Study area is approximately 7,100 ha, of which 5,351 ha corresponding to 75% of total area are used for agricultural land. Agricultural land consists of upland field 4,350 ha corresponding to 80% of the area of agricultural land and pasture land 1,000 ha corresponding to 20% of the area of agricultural land.

The land except agricultural land consists of 1,075 ha of forest and field corresponding to 19% of total area, 370 ha of Monjas urban areas and villages corresponding to 5% of total area, 35 ha of lakes and 300 ha of roads etc.

Agricultural land including pasture land is suited for cultivation, and about 350 ha of pasture land, where agricultural land is dotted with pasture lands, are planned to utilize as upland field considering following situations.

- According to the hearing from farmers, they have intention of utilizing pasture land as upland field when water resource is available.
- The efficiency of the use of irrigation facilities is increased by the utilization of pasture land as upland field.
- Pasture land in mountainous area and large-scale pasture land are left unchanged and used as land for animal husbandry.

Judging from topographic relief and soil conditions, fields near mountains to the west of Monjas area are reclaimable and cultivable, and will be established and used as improved pasture when the project will be completed.

#### 3.3.2 Agricultural Production

##### (1) General Description

Agricultural land generally can be divided into upland field and pasture. The upland field is arable ordinary field for basic crops and vegetables. The pasture is divided into two categories such as artificial and natural pasture.

Cultivation is principally carried out during the wet season from May to October. Major crops in this season are maizes, kidney beans which occupy the great part of total cultivated area. Aside from those crops, tomato and tobacco are cultivated partly, too. During the dry season, broccoli, tomato and onion, etc. are principal crops in some areas with irrigation facilities. However, the greater part of cultivated area is not used.

Maize is an important basic crop for people as main food. The cropping acreage and production volume have increased at the rate of 1.3 and 1.9 times, respectively during last 10 years (from 1976/77 to 1985/86) at national level (Tables A.3.3.2-1, -2). In the Study area, this crop shows the major production volume and cropping acreage. Some part of harvest is reserved for family consumption, and the rest is traded to a brokers at farm-yard.

Kidney beans is also basic crop like maize. The cropping acreage and production volume have increased for 1.2 and 2.9 times, respectively, during last 10 years. The cropping acreage of this crop is second biggest after maize in the Study area. Kidney beans is cultivated for family consumption and cash crop which has short cultivation period. Harvest is for family consumption and the excess is traded to a broker at farm-yard.

Tobacco and vegetable such as tomato, broccoli, onion, etc. are commercial crops. Tomato is traded to wholesale transport companies at farm-yard as fresh vegetable or processing material. The 99% of production volume is for export to El Salvador.

Broccoli is cultivated on contract bases with 4 exporting companies. Approximately 80% and 14% of the total production volume are exported to the North America and El Salvador, respectively.

Onion is sold to brokers at farm-yard like tomato. Approximately 12% and 80% of total production volume are exported to North America and El Salvador, respectively.

Tobacco is cultivated on contract bases with 2 tobacco companies. Quota system for cultivation area is employed between farmers and companies. Approximately 80% of total production are exported to the North America.

Consequently, the agriculture in the Study area is characteristic of place of production such as basic crops for domestic consumption, raw material crops for processing and fresh vegetable for exportation.

## (2) Crops and Production

Main crops in the Study area are grains such as maize and kidney beans, vegetables such as tomato, broccoli, onion, etc. and raw materials for processing like tobacco. Maize and kidney beans are widely planted in the Jalapa Department, however, tomato and tobacco are concentrated around Monjas. Therefore, Monjas is widely known as a place of production of tomato and tobacco in the Department.

Recently cultivation of fresh vegetables such as broccoli, onion, and tomato has increased due to adjustment of irrigation facilities such as Hoyo Lake irrigation project and individual groundwater irrigation. Distinctive feature of Monjas as the place of fresh vegetable production has been emphasized.

In the Study area ICTA recommends, as suitable maize varieties, ICTA B-1, ICTA B-5, ICTA T-101, and HB 33. Among these varieties predominantly cultivated is ICTA B-1, which is followed by H3, H5, and Sansareno. Sansareno features a short growth period (about 90 days) and is used for double cropping. For kidney beans recommended are ICTA Quetzal, ICTA Tamazulapa, and ICTA Ostua, and about 50% of farmer cultivate ICTA Quetzal, which is immediately followed by Suchitan.

Tobacco and bloccoli are cultivated under contract and varieties are specified by purchasers; only Virginia for tobacco and only vallant for bloccoli. In tomatoes, UC-32.B (with excellent blight resistance and transport resistance) is predominantly cropped both in the dry season and in the wet season (by about 80% of tomato farmers). Where irrigation is available, prolific Napoli is cultivated together with Rio Grande and Roma. In onions Chata Mexicana is mostly cropped (Table A.3.3.2-3).

Output of each crop in the Study area is as follows. Output of maize in the wet season is 2.7 to 2.9 t/ha, and exceeds the average output in Jalapa Department, 1.6 t/ha. Output in the dry season is about 3.2 t/ha. Output of kidney beans in the wet season is 1.1 to 1.5 t/ha, exceeding the average output in Jalapa Department, 0.8 t/ha. Output in the dry season is 1.4 to 1.5 t/ha. Output of tobacco is 1.4 to 1.8 t/ha; farmer survey indicates that some farmers register an output of 2.1 t/ha. Output of tomatoes is 17 to 24 t/ha in the wet season, and 19 to 26 t/ha in the dry season. Output of broccoli is 8 to 10 t/ha and productive farmers register about 14.6 t/ha. Output of onions is about 8 to 12 t/ha and productive farmers register about 14 t/ha.

Maize, kidney beans, and tomatoes are cultivated in both seasons. The record of output by cropping pattern proves that these crops are more output in the dry season than in the wet season. This is because cropping in the wet season is subject to the distribution of precepitation which varies by year, and is more susceptible to blight and insects than in the dry season (Table A.3.3.2-4, 5).

In the Study area some crops show a few differences in output among areas. The average unit output of maize is high in Los Terrones village including the Hoyo Lake irrigation areas, and is rather high in neighboring Llano Grande village and La Campana village. As compared with these villages, the unit output is low in Los Achiotos and El Salamo situated to the north of the Monjas Basin and in Morazan situated to the west of the Basin. This tendency is in approximate agreement with the soil classification (Fig. 3.3.5-2) of the Study area. On the other hand, broccoli and tobacco show few differences in output among areas. This is because exporters unify varieties and give guidance on cultivation techniques, with the result that personal differences in cultivation techniques of both crops are reduced.

Table 3.4.3-1 shows the deduction of crop productions in the Study area, with the present crop output in the Study area set to the lower limit of output of each crop mentioned above.

### (3) Cropping system

The cropping pattern by area and the cropping system in the Study area are shown in Table 3.4.3-1 and Fig. 3.4.3-1, respectively.

In the non-irrigation area the cropping system is divided into 2 basic categories: one is single cropping which once crops maize of a growth period of about 120 days between May and December, and the other is double cropping which cultivates kidney beans, tomatoes, and tobacco with a growth period of about 90 days between May and September, and precocious maize of a growth period of about 90 days or tomatoes in succession. The rate of introduction of these cropping patterns is about 68% in single cropping of maize, about 4% in double cropping of kidney beans - tobacco - tomatoes and maize, and about 7% in double cropping of kidney beans and tomatoes. The cropping rate in the wet season is about 110%. No cropping is made in the dry season.

Take a typical example of the cropping system of the Study area from the Hoyo Lake irrigation project area.

In the wet season, the single cropping of maize accounts for about 56%, double cropping of kidney beans - tobacco - tomatoes and maize 4%, 5%, and 3% in that order, and single cropping of tobacco 4%. About 15% of cultivated land is left unused and the cropping rate is about 85% in the wet season.

In the dry season, cropped in succession are vegetables such as tomatoes (about 40%), broccoli (about 36%), and onions (about 24%), kidney beans (about 84%), and maize (about 2%), all of which cover the total cultivated land owing to irrigation water (Table A.3.3.2-6). As a result, the cropping rate in the irrigation area is 95% in the wet season, 111% in the dry season, and 206% in total. This proves that cultivated land is by far more intensively utilized in the irrigation area than in the non-irrigation area. In the Study area the annual cropping rate is about 129%, including the irrigation area.

#### (4) Cultivation Techniques

##### 1) Maize

The seeding time for the wet season cropping is between middle in May and early in June and the seeding time for second crop is usually between August and September. The amount of planting seed ranges from 16 to 20 kg/ha. Row width ranges from 80 to 90 cm, interrow spacing ranges from 45 to 55 cm and 2 to 3 seeds are seeded per a stub.

Seeding and fertilizer work depend solely on manpower. Prior to seeding, rows are made with a row tiller driven by 2 oxen. One or two workers follow to put fertilizer into rows, and are further followed by two or three other workers who plant seeds. In the case of double cropping, tilling is not performed after the preceding crop is harvested but a bar (with a metal head) called 'Macana' is used in place. Using the Macana, workers make holes about 10 cm at regular intervals into which seeds and fertilizer are dropped. The Macana system is a conventional agricultural system to effectively utilize a short period during the wet season.

In case of inter-cropping of kidney beans, row width will be extended ranging from 120 to 150 cm and 2 to 3 rows of kidney beans will be set in between rows of maize. At the pediments in the Study area, intercropping of kidney beans is found however, the greater part of the Area is monoculture of maize.

Mainly chemical fertilizer is manured at the same time of seeding. The proportion of nitrogen (N), phosphorus (P) and potassium (K), so called N-K-P ratio, are 16-20-0 or 15-15-15. After one or two month of first manuring, area is manured additionally.

Both basic fertilizer and additional fertilizer are manured in an amount of about 130 kg per ha.

For insect control, Volaton and Lannate are applied during the wet season however, few farms carry out insect pest control during the dry season.

When maize is matured 90 to 120 days after seeding, maize has the stem folded down at the lower part of the pistillate spike, and is dried in fields, with the pair kept. The pistillate spike is manually harvested after being well dried, and brought to a shed for storage. The pistillate spike is threshed by a threshing machine, packed in a 45 kg bag, and sold to a broker. Small-scale farmers with no threshing machine thresh maize on commission (Q1.0/45 kg).

Leaves and stems of maize are utilized for feed by farms who own livestock or plowed-in to the field by using tractor in large-scale farms. Small-scale farms incinerate those leaves and stems after stems.

## 2) Kidney beans

The seeding time for the wet season is between May and June. The amount of planting seed depends on cultivation system. According to the farm household survey, the amount of planting seed ranges from 38 to 65 Kg/ha. The row width ranges from 30 to 40 cm and about 10 particles will be seeded within 1.0 m.

At the same time of seeding, chemical fertilizer of 130 Kg/ha is manured in a portion of N-K-P ratio 15-20-0 or 15-15-15. A top dressing is not practiced.

For control of insect pest which transmits virus, Folidol and Lannate are commonly used in the wet season however, no disease and insect pest control are practiced in the dry season.

Regarding with the dry season cropping, kidney beans is cultivated in a part of the area where irrigation facilities are available. The seeding time is December or January. There is not much difference in cultivation technique between dry and wet season cropping.

Kidney beans are harvested after the stem and pod and dried in fields to a certain extent, and brought back to the farmyard when harvested in a small amount. When harvested in a large amount, kidney beans are piled up at a corner of the field until they are fully dried, and put in a special-purpose threshing stand (wooden), on which kidney beans are beaten with a bar. The residue of harvest is burnt out, and is scarcely returned to the field as organic fertilizer.

### 3) Tomato

The wet season cropping is double cropping of which first planting are from May to June and September.

The amount of seeding is about 330 g/ha and transferred to main field after 30 days' raising of seeding

To transfer the seedling, one or 2 workers make planting holes in rows with 'Macana', other one or 2 workers apply fertilizer to plant holes, and other one or 2 workers place seedlings near plant holes. Two to 4 workers plant the seedlings in plant holes. Usually, a team of 5 to 10 workers is formed for transfer work. One to three seedlings are planted for each stub. In the dry season, interrow irrigation is thoroughly performed before fixed planting.

The planting density is row width ranging from 90 to 120 cm, intrarow spacing ranging from 40 to 60 cm. The cultivation method which has supporting pole has become popular recently.

Antracol, Ridomil and Trimitox are applied for disease injury and Tamaron and Lannate for insect preventing from eating damage.

### 4) Tobacco

About 43 g/ha of the tobacco seed is placed on a seeding bed (not covered) provided at a corner of the field, where seedlings are brought up for about 30 days before being transferred to the field between May and July.

After 30 day's raising of seeding, young plants are transferred to main fields on June. The planting density is 1.0m row width and intrarow spacing from 44 to 55 cm. Transplanting stubs one by one to planting pits is common method of cultivation.

Before transplanting or after 10 days of transplanting chemical fertilizer which constituent rate is  $P_2O_5$ -18,  $K_2O$ -12,  $MgO$ -4 and  $S$ -5 is manured. After 40 days of transplanting top dressing which contain  $N$ -13,  $K_2O$ -44.5 is manured.

Control of insect pest which is transmitted by virus is very important. Contract companies present several kinds of pesticide, however, farmers have few knowledge of application.

Harvesting will start after 90 days of fix planting. Harvested leaves are tied up a wooden pole which length is about 1.5m, then usually hanged in the curing barn, however, some are hanged for drying with stem under the leaves. After curing, tobacco is classified into 6 classes based on colour for deciding prices.

Main work is carried out under instructions and guidance given by contracted tobacco companies. Tobacco companies furnish farmers with seeds, fertilizer, and agricultural chemicals at the time of contract, and recover the cost of them when products are delivered from farmers. Two tobacco companies are engaged in contract cultivation in the Study area: Tobacalera Centro Americana Sociedad Anonima (TACASA) and Nacional Guatemala.

#### 5) Broccoli

Like tobacco, broccoli is cropped under contract between exporters and farmers. The broccoli exporter makes a delivery plan, which governs seedling and fix planting periods.

Seeding to nursery bed start usually on October. After 25 days of seeding, seedling is transplanted to main field.

Fix planting follows row tilling (high row) and the subsequent through interrow irrigation, and is carried out in the same way as stated on tomatoes.

After 10 days of fix planting, the first fertilizer which N-P-K ratio is 16-20-0 is manured. After 30 days of fix planting area is manured as top dressing. In order to prevent from a physiological disorder caused by boron deficiency, occasionally boron powder is mixed at the first manuring.

It is very important to control insect pests in the nursery beds and main fields. Various kinds of pesticide such as Belmark, Tamaron, Metacistox, etc. are applied.

Harvest starts 50 days after fix planting. On the day of harvest, the contracted company despatches a specialist who checks a harvest for quality and rejects the harvest beyond the company standard. Usually, about 10% of harvested leaves are rejected. In the top harvest season, a refrigerating truck visits farmers in turn to receive harvest. Small amount of harvest is put into a plastic box provided by the company, and delivered by the farmer to the regional stock yard specified by the company.

Contracted companies in the Study area are Alcosa, Verudufex, Servicios Consolidados, Melcantil Cluza (These 4 companies are in Guatemala), and Quality Food (El Salvador). They do not necessarily offer the same contract conditions. Take 2 examples of contract conditions in 1987 and 1988. In the case of Alcosa, the seed costs 220 Q/kg fertilizer of 15-15-15 0.57 Q/t (26 Q/qq), and urea 46 Q/kg (21 Q/qq), with no agricultural chemicals furnished. Products are bought at 506.6 Q/t (23 Q/qq).

In the case of Verdufex, the seed costs 550.7 Q/kg (250 Q/qq), with neither fertilizer nor agricultural chemicals furnished. Products are bought at 588.6 Q/t (24 Q/qq).

#### 6) Onions

In the wet season onions are produced at the pediment in Jalapa Department and the surrounding area of Volcan Suchitan and Progreso in Jutiapa Department. Therefore, Monjas Sector is oriented to cropping in the dry season to avoid competition.

In accordance with practice in Hoyo irrigation project area, raising of seeding is carried out between October and December and plants are fixed between November and January. Shipment is between February and April after 90 days of transplanting.

Fertilizer which N-P-K ratio 16-20-0 or 15-15-15 are manured after 10 or 15 days of the fix planting and urea is manured as top dressing after 20 or 30 days of the fix planting.

For disease control, Agallol is applied in the nursery bed and Tamaron, Antracol and Bayfolan are applied in the main field.

Harvests are selected in two types depending on size of the bulb. Twenty bulbes are bundled, with leaves kept as they stands. Thus, onions are sold to brokers at the farm yard by the unit of 50 bundles.

### 3.3.3 Livestock Production

#### (1) General Description

Livestock production in the Study area emphasizes beef and dairy cattle raising. Other small farm animals such as swine, chicken, sheep and goat are for self-sustenance and account for quite few of farm household economy.

Beef and dairy cattle raisings in the Jalapa Department where the Study area is located are not major production. Number of farm and livestock animals are only 1.6%, 0.7% of national level (Table A.3.3.3-1).

The feeding type is pasturing. Approximately 20% of the pasture is improved pasture and common species of grasses are Pangola, Jaragua, Grama and Estella, etc. During the dry season from March to May, the pasture becomes refined, therefore the greater part of cattles is transported to the pacific coastal region for better breeding.

The small-scale farmers principally operate dairy cattle breeding. As farm size become large, beef and dairy cattle breeding are combined.

The daily milk production in Jalapa Department accounts only for about 0.8% of the national milk production which that in Monjas Municipality about 0.7% (Table A.3.3.3-2).



Beef cattle breeding itself is not employed in the Study area due to the lack of pasture during the dry season. As production of beef cattle, the condition of site is not suitable.

The draft animal plays an important role in this Area. Cattle serves to agricultural work and transport of material and harvest, while horses to material transport and traffic.

Agricultural survey has proven that large-scale cattle raising farmers (about 100) account for about 12% of total farmers in the Study area and that a raising farmer breeds 6.5 milk cows (including 3.5 dry cows), 0.4 seed bulls, 13 breeding calves, and 2 draft bulls.

## (2) Dairy cattle

Predominating stock of dairy cattle is a cross bred of Cebu and Brown Swiss. Holstein is kept by a few farmers.

Raising is principally pasturing feeding. Manual milking is carried out in the farm yard after collecting herd. The milking volume is about 3 l/head/day in the dry season and about 5 l/head/day in the wet season.

Large-scale farmers with irrigation facilities irrigate pasture and milk cows even in the dry season, but farmers with no irrigation facilities have to remove their cattle (dry cows and breeding calves) to farms in mountains in Jalapa Department or farms along Pacific Coast (mainly Chiquimulilla, Nueva, Concepcion, Tiquisate, etc.) because pasture grass fades away in the dry season. The rent of pasture is Q25 per 0.7 ha per month on condition that the milk cow owner keeps their own cows under control.

Milk is sold to the surroundings in the forms of raw or processing milk. The selling volume per head and day increases corresponding to feeding magnitudes (Table A.3.3.3-2).

The survey indicates that all small-scale farmers distinate producing milk to self-sustenance.

Price of milk varies between 0.4 - 0.6 Q/l at farm yard and its seasonal variation is a little. Selling price of dairy cattle ranges from Q900 to Q2,000 per head corresponding to weight and milking capacity. Old dairy cattles are sold at the price of Q1.9 to 2.8/kg without category.

Farmer survey shows that external parasites are exterminated by about 60% of small-scale farmers and by about 80% of large-scale farmers, and that internal parasites are exterminated about 20% of small-scale farmers and about 60% of large-scale farmers.

Vaccination against diseases is carried out by all large-scale farmers but by only 50% of small-scale farmers and 70% of middle-scale farmers.

### 3.3.4 Agricultural Management

#### (1) Number of farmers and working labor

There exist 604 small-scale farmers, 103 middle-scale farmers, and 28 large-scale farmers in the Study area. In addition about 50 extremely small-scale farmers own only about 0.3% of the total agricultural land, but they cannot shoulder the responsibility of the local farmer.

Farm survey proves that a small scale farmer has 6.5 families, middle-scale farmer 7.1 families, and large-scale farmers 8.4 families. In brief, the larger the management scale, the more the number of families. On the other hand, number of working laborers per farm increases in proportion of the management scale: 2.4 with the small-scale farm (about one is employed in a place other than its own cultivated land), 2.8 with the middle-scale farmer, and 3.8 with the large-scale farmer (Table A.3.3.4-1).

#### (2) Agricultural management scale

In the Study area, the area of management land is about 4,350 ha of the field, about 1,000 ha of pasture, and about 160 ha of housing land and agricultural facility land, amounting to about 5,500 ha in total. As to the area of management land by scale, the small-scale farmer has 2.5 ha, middle-scale farmer 16.2 ha, and large-scale farmer 84.9 ha.

As to the average area of cultivated land per farmer, the small-scale farmer has about 2.2 ha, middle-scale farmer about 14.9 ha, and large-scale farmer about 53.1 ha.

Owned pasture increases in proportion to the farm scale. The rate of pasture to management area is about 2% in the small-scale farmer, about 6% in the middle-scale farmer, and about 37% in the large-scale farmer (Table A.3.3.4-2).

#### (3) Agricultural work system

In the Study area agricultural work depends for the main motive power on draft bulls and tractors. Draft bulls are used for cultivation, row tilling, middle cultivation weeding, transportation of harvest and materials, etc. Tractors are used mainly for cultivating and grading and, in the case of cattle breeding farmers, also for control work of pasture. The tractor is sometimes used as motive power to pump up irrigation water from the irrigation canal or to drive a threshing machine.

The large-scale farmer owns 60 HP class tractors in average, while few middle-scale and small-scale farmers have tractors. Therefore, farmers with no tractor have their cultivated land cultivated and graded, by tractor owners under rental cultivation contract per ha. At present the rent of cultivation is about Q86 per ha. (60 Q/MZ). Rows are formed with a row tiller driven by 2 draft oxes, which is leased at Q86 per ha. (20 Q/MZ). Agricultural work subsequent to row tilling depends mostly on manpower, irrespective of the management scale.

(4) Agricultural production material

Table A.3.3.4-3 to 7 shows market price of input materials, and cost of agricultural production materials in the Study area.

Some farmers collect their crop seeds from their own fields but almost all farmers purchase seeds from outside sources every year. Seeds of vegetables other than tobacco and broccoli cultivated under contract, fertilizer and agricultural chemicals are supplied by 3 retailers in Monjas urban area, a retailer in La Campana village, and another retailer at El Progreso about 16 km away from Monjas urban area.

(5) Agricultural labor

In the light of labor requirements per unit area for each crop in the Study area, each crop is a labor intensive crop. Vegetables and tobacco require more laborers than grain. In particular, onions require as many as 253 laborers, and are immediately followed by tobacco which requires 192 laborers.

As compared with cropping in the wet season, cropping in the dry season requires additional labor put in irrigation (Table A.3.3.4-8). Most of pasture is natural grass and kept under labor extensive control. Pasture requires as few laborers as 12 per unit area (Table A.3.2.4-9).

Table A.3.2.4-10 shows demand for labor by month in the Study area. About 4180 laborers (about 80% of population of economical activities) live in the Study area. These laborers are translated into about 104,500 potential laborers per month. However, only about 77,000 laborers are actually demanded even in August, when most laborers are required in the year as a result, not a few laborers are obliged to find their jobs outside the Study area.

(6) Production cost and Productions

Table A.3.3.4-11 shows production cost per unit area of main agricultural products and pastage produced in the Study area, while Tables A.3.3.4-12 and -13 shows unit output, producer price (farm yard price), and productions.

Of direct production cost, fixed expenses are the land rent, cultivating and grading charges, row tilling charges, and water utilization charges in the dry season, all of which are more expensive for vegetables and tobacco than for grain. In Hoyo Lake irrigation project area water utilization charges are imposed for each crop. They are most expensive for tobacco, which is followed by vegetables and pasture, and least expensive for grain. However, a water utilization charge of 100 Q/ha is uniformly applied to any crop in and after 1988/1989. The water utilization in the dry season before implementation of the present project is estimated on the basis of said uniform water utilization charge.

Of indirect production cost control expenses are estimated at 5%, reserves at 10%, and interest at 8%, which is the present interest rate of BANDESA. Of main agricultural products, grain requires less production cost than vegetables. The rate of wages to production cost ranges from 30% to 65%. The rate is as high as 65% for tobacco, and 51% for onions. In crops cultivated in both dry season and wet season, the rate of wages to production is higher in the dry season than in the wet season because cropping in the dry season requires additional labor for irrigation.

On the other hand, the rate of material cost to production cost ranges from 19% to 37%. The rate of vegetables is higher than the rate of grain.

The net production value per unit area of tomatoes in the dry season is about 2400 Q/ha, highest of all crops, and is followed by that of vegetable cropped in both seasons such tomatoes, onions, and broccoli. The rate of tobacco and grain is lower than that of vegetables.

The production cost of pasture is about 380 Q/ha and by far lower than that of grain and vegetables but the net production value is about 90 Q/ha because of small gross production; the net production is a little larger than that of maize.

Table A.3.3.4-14 shows net production value in the Study area.

### 3.3.5 Marketing and Processing of Agricultural Products

#### (1) Marketing channel

Agricultural products produced in Monjas Basin are maize, kidney beans, tomatoes, onions, broccoli, and tobacco.

Table A.3.3.5-1 shows the marketing system of these agricultural products while Fig. A.3.3.5-1 shows the marketing channel.

Marketing of agricultural products is totally assigned to private traders, except where INDECA intervenes in the market when the price of main grain such as maize and kidney beans varies in excess of certain upper and lower limits.

In marketing of agricultural products, finance authorities collect the market place tax and agricultural product delivery tax.

Fig. A.3.3.5-2 shows the price of maize and kidney beans in which INDECA is involved in 1987. At present INDECA owns silos with a total capacity of 69,484 tons and storages with a total capacity of 15,400 tons, and the total capacity is 84,884 tons. In Monjas INDECA has 3 silos (354 tons) and a storage (133 tons).

#### (2) Export clients and exports

Table A.3.3.5-2 shows export clients and exports of tomatoes, broccoli, onions, and tobacco in 1985, 1986, and 1987 (from January to November). Most tomatoes are exported to El Salvador, broccoli mainly to the USA, and onions to El Salvador, Mexico, etc.

Table A.3.3.5-3 shows exports of 4 main products: tomatoes, broccoli, onions, and tobacco. Although tobacco registers large exports, local research does not indicate growing exports of tobacco.

### (3) Processing of agricultural products

The present condition of facilities to process agricultural products and livestock in the Study area is as shown below. The location map is shown in Fig. A.3.3.5-3.

#### a. Tobacco Curing Barn

- i. Executing body: Farmers
- ii. Processing: Primary drying
- iii. Capacity of facility: 1.5 ton/time
- iv. Management:  
Fifty seven curing barns operated fully in the Study area, accordingly total capacity of tobacco produce is estimated as below:

Total capacity  $1.5 \text{ t} \times 57 \text{ barn} \times 4 \text{ time} \times 2 \text{ season} = 684 \text{ tons}$

On the other hand, 816 tons of tobacco are produced in Monjas.

#### b. Dairy Processing Factory

- i. Executing body: Private company
- ii. Products: Cheese, Butter, Cream
- iii. Capacity of factory:
  - Dairy raw milk: 300 l/day
  - Processing method: Traditional method
  - Production:
    - a. Cheese 49.3 kg/day
    - b. Butter 6.8 kg/day
    - c. Cream 20 l/day

- iv. Management:  
Markets of the products are Jalapa, Jutiapa and Guatemala city.

#### c. Slaughter House

One municipal slaughter house (40 m<sup>2</sup>) exists in Monjas, which is not operated at present.

Two butcher stores are slaughtering two cattles (about 330 kg) per week and marketing to the Monjas area.

#### d. Vegetable Processing Factory

A vegetable processing factory is located at 1.2 km northwest of Monjas.

The factory was established in 1983 for exporting tomato, broccoli, and onion to USA. However, the factory has not been operated since 1984, because of bankruptcy of owner.

### 3.3.6 Related Agricultural Institution

#### (1) Supporting Organization

The whole country of Guatemala is divided into eight Regions, and Sub-Regions were organized under each Region (Fig. A.3.3.6-1).

Ministry of Agriculture, Cattle and Food Resources was reorganized in 1982, and the administration system was divided into three levels; Supreme level, Central level and Regional level (Fig. A.3.3.6-2).

Supreme level: executes the planning of national development, and coordination of development sector, and general administration, distribution of budget to sectors.

Central level: executes the work for the basic program of Ministry proper, and each branch office within the Regional level.

#### 1) Agricultural research, test, and extension organizations

ICTA is engaged in research and test services, and has a substructure named Jutiapa test farm in this Area. In addition, DIGESA has competence of a local extension organization located in Jalapa.

A relationship of Jutiapa test farm and the extension organization with agricultural village sites is shown in Figs. A.3.3.6-3 and -4.

#### 2) Other Supporting Services

##### a. National Institute of Forestry (INAFOR)

Ten technicians perform Jalapa Department; re-forestation, forest conservation, etc.

##### b. General Direction of Livestock Services (DIGESEPE)

Four technicians mainly perform prevention of livestock diseases and technical instruction of cattle raising.

##### c. Technical Direction of Irrigation and Drainage (DIRYA)

DIRYA executes the management for promotion of irrigation project.

In the 1960's, planning, execution, and management for the Hoyo Irrigation Project were done by DIRYA in the Study area.

Hoyo irrigation office is under the DIGESA, but technical side is under the DIRYA.

Organization of Hoyo Lake irrigation project office and operation system are shown in Fig. A.3.3.6-5 and -6, respectively.

Main tasks of O/M work are as below:

- Distribution of irrigation water
- Transfer of irrigation technique
- Operation of water resource facilities
- O/M of irrigation facilities

d. National Agricultural Development Bank (BANDESA)

Loans provided in 1986 are shown in Table A.3.3.6-1.

(2) Farmers' organization

Table A.3.3.6-2 to 5 shows the organized condition of the farmers' organization and the reaction of farmers with the farmers' organization and proves that agricultural cooperatives are predominant in number of cooperatives but small in scale as shown by about 110 members per cooperative. Number of cooperatives in Jalapa Department is 21 in average, and proves that the rate of organization by agricultural cooperatives is still low in Jutiapa Department and Jalapa Department. It may not be said that local farmers show must interest in organization of the agricultural cooperative.

Table A.3.3.2-1 Harvested Area of Main Crops

(Unit : 1,000 ha)

Year	Maize	Rice	Kidney beans	Wheat	Sorghum
1976 / 77	515.2	10.9	138.6	44.9	61.1
1977 / 78	499.9	10.7	134.5	26.7	50.5
1978 / 79	591.9	11.5	94.9	36.1	42.9
1979 / 80	609.1	18.3	88.0	31.5	41.1
1980 / 81	658.8	12.6	64.6	31.5	34.8
1981 / 82	681.5	15.4	82.0	31.5	40.7
1982 / 83	668.6	17.4	101.7	29.6	30.7
1983 / 84	569.7	12.3	115.4	33.2	47.8
1984 / 85	691.3	16.0	166.6	32.2	65.3
1985 / 86	659.6	14.6	170.2	31.5	66.6

Source : Informe de Produccion, Exportacion, Importacion, Precio Y Caracteristicas de los Principales Productos Agropecuarios, Banco de Guatemala, 1986

Table A.3.3.2-2 Production of Main Crops

(Unit : 1,000 t)

Year	Maize	Rice	Kidney beans	Wheat	Sorghum
1976 / 77	562.5	10.3	40.6	57.7	95.7
1977 / 78	580.6	17.5	35.6	36.2	75.7
1978 / 79	363.5	26.3	80.5	55.2	64.7
1979 / 80	1,043.0	24.5	85.7	58.0	71.2
1980 / 81	902.4	27.5	57.9	46.0	78.3
1981 / 82	997.5	33.7	92.9	42.1	86.2
1982 / 83	1,099.8	50.1	101.7	42.6	77.1
1983 / 84	988.2	45.8	89.4	55.2	81.6
1984 / 85	1,198.0	45.1	111.2	50.6	88.7
1985 / 86	1,088.4	38.4	117.6	52.9	101.2

Source : Informe de Produccion, Exportacion, Importacion, Precio Y Caracteristicas de los Principales Productos Agropecuarios, Banco de Guatemala, 1986



Table A.3.3.2-3 Cultivated Varieties in the Study Area

Crops	Varieties	
Maize	ICTA • B-1	※
	ICTA • B-5	※
	ICTA T-101	※
	H3	
	H5	
	HB • 83	※
	Sansareno	
	Arequin	
Kidney beans	ICTA • Quetzal	※
	ICTA • Tamazulapa	※
	ICTA • Ostua	※
	Santa Rosa	
	Suchitan	
	Vain Morada	
	Arbolito	
Tobacco	Virginia	
Tomato	UC 82 • B	※
	Napoli	※
	Rio Grande	
	Roma	
	Santa Cluz	
	Roforto	
Broccoli	Green Valiant	
Onion	Chata Mexicana	※

Note : ※ Recommended Varieties

Source : 1. Sector Publico Agropecuario y de Alimentacion  
Equipo de Prueba de Tecnologia, Sub-Region VI-2,  
Jalapa, ICTA, 1987  
2. Recomendaciones Agronomicas, Sub-Region VI-2,  
ICTA

Table A.3.3.2-4 Yield of Main Crops

(Unit : t/ha)

Crops	Guatemala	Jalapa	Monjas
Maize	1.7 1)	1.5	2.7
Kidney bean	0.7 1)	0.8	1.1
Tobacco	—	1.4	1.4
Tomato	25.9 2)	17.1	23.8
Broccoli	8.1 2)	8.2	8.3
Onion	12.0 2)		

- Source : 1) Estadísticas de Productos Agropecuarios, 1972~1988. Banco de Guatemala, 1987
- 2) Costos Estimados de Producción de los Principales Productos Agrícolas, 1987 ~1988 Banco de Guatemala, 1987
- 3) Diagnostico de la Sub-Region VI-2, DIGESA, Region VI-2, 1986

Table A.3.3.2-5 Yield of Main Crops in the Study Area

(Unit : t/ha)

Crops	1 1)	2 2)	3 3)
Maize	W 4)	3.1	2.9
	D 4)	3.3	—
Kidney bean	W	1.1	1.5
	D	1.4	—
Tobacco	W	1.7	1.8
	D	17.0	—
Tomato	W	17.0	18.5
	D	18.6	—
Broccoli	D	10.0	—
Onion	D	14.0	—

- Source : 1) Tabla de Investigación de Producción Costs, Oficina de Unidad de Riego Laguna del Hojo, DIRYA, 1983 /84~ 1986 /87
- 2) Investigación de Campo, Oficina de Unidad de Riego Laguna del Hojo, DIRYA, 1986 ~'87
- 3) Field Survey, 1987

Note : 4) W : Wet Season D : Dry Season

Table A.3.3.2-6 Present Condition of Cultivation in  
Hoyo Lake Irrigation Project Area

Crops	Planted Area (ha)		Percentage of Planted Area	
	Wet Season	Dry Season	Wet Season	Dry Season
Maize	265.65	8.19	68.1	2.1
Tobacco	34.23	—	8.8	—
Kidney bean	14.12	29.31	3.6	7.5
Tomato	12.82	141.00	3.3	36.2
Rice	5.03	—	1.3	—
Cucumber	0.77	—	0.2	—
Sorghum	0.38	—	0.1	—
Onion	0.19	84.41	0.1	21.6
Broccoli	—	126.72	—	32.5
Non Cultivated	56.81	0.81	14.5	0.1
Total	390.00	390.00	100	100

Source: Oficina de Unidad de Riego "Laguna del Hojo", 1987

Table A.3.3.3-1 Present Cattle Raising

	Farm Size	Beef Cattle		Dairy Cattle		Beef - Dairy Cattle		Hog		Domestic Fowls	
		Farm	No. of Head	Farm	No. of Head	Farm	No. of Head	Farm	No. of Head	Farm	No. of Head
Guatemala	Under 0.7 ha	1,508	2,471	523	1,680	11,877	28,307	57,814	122,457	112,261	1,236,500
	0.7 ~ 6.9 ha	5,239	11,729	2,281	10,042	47,732	186,778	139,474	394,627	247,877	8,469,393
	7.0 ~ 44.7 ha	1,483	14,853	1,221	19,525	18,975	272,753	26,755	132,313	42,634	4,742,976
	44.8 ~ 895.9 ha	746	240,984	243	30,431	6,523	644,374	5,470	42,584	8,901	2,389,174
	more 896 ha	118	234,975	9	4,428	192	171,619	70	1,348	144	19,074
	Total	9,094	505,012	4,277	66,106	85,299	1,303,831	229,987	693,329	411,835	16,857,617
Jalapa	Under 0.7 ha	-	-	2	4	35	166	607	1,383	394	5,293
	0.7 ~ 6.9 ha	8	26	66	233	1,148	4,238	6,279	18,255	3,959	73,566
	7.0 ~ 44.7 ha	2	5	12	90	243	2,036	906	3,455	325	9,221
	44.8 ~ 895.9 ha	3	676	7	372	77	4,515	178	958	70	2,597
	more 896 ha	-	-	-	-	-	-	1	1	1	80
	Total	13	707	87	699	1,504	11,005	7,971	24,052	4,749	90,757
Monjas	Under 0.7 ha	1	1	-	-	12	44	26	193	47	676
	0.7 ~ 6.9 ha	2	3	2	6	159	1,252	225	1,906	322	13,601
	7.0 ~ 44.7 ha	-	-	1	139	63	1,521	60	685	78	2,276
	44.8 ~ 895.9 ha	2	33	-	-	34	2,633	18	247	26	1,001
	more 896 ha	-	-	-	-	1	200	-	-	-	-
	Total	5	37	3	145	269	5,650	324	3,031	478	17,554

Source : Direccion General de Estadistica, Ministerio de Economia, Republica de Guatemala, 1979.

Table A.3.3.3-2 Milk Production

	Farm Size	Number of Milking		Total <sup>1)</sup>	Marketing	Processing
		Farm	Cow			
Guatemala	Under 0.7 ha	3,756	5,417	16,206	6,896	9,310
	0.7 ~ 6.9 ha	16,308	30,090	80,519	29,142	51,377
	7.0 ~ 44.7 ha	9,663	50,294	145,890	85,015	60,875
	44.8 ~ 895.9 ha	3,882	69,738	225,993	160,813	64,280
	more 896 ha	156	11,739	45,128	37,180	7,948
	Total	33,756	167,273	512,836	319,046	198,790
Jalapa	Under 0.7 ha	11	18	34	2	32
	0.7 ~ 6.9 ha	484	817	1,970	327	1,643
	7.0 ~ 44.7 ha	131	318	669	130	539
	44.8 ~ 895.9 ha	45	574	1,671	782	884
	more 896 ha	-	-	-	-	-
	Total	671	1,727	4,344	1,241	3,098
Monjas	Under 0.7 ha	8	15	32	15	17
	0.7 ~ 6.9 ha	48	114	300	75	225
	7.0 ~ 44.7 ha	37	359	994	862	132
	44.8 ~ 895.9 ha	19	600	2,109	1,019	1,090
	more 896 ha	-	-	-	-	-
	Total	112	1,088	3,435	1,971	1,464

Note: 1) Amount of lactation per day

Source: Direccion General de Estadistica, Ministerio de Economia, Republica de Guatemala, 1979

Table A.3.3.4-1 Number of Household and Family

Farm Size (ha)	3) Number of Household		Number of Family (average)	2) Family Members Engage in farm ( number/farm )		Family Members Engage out of farm ( number/farm )	
	1)	2)		1)	2)	1)	2)
0.7 ~ 8.9	604		6.5	1.6	0.8		
7.0 ~ 44.7	103		7.1	2.8	0		
44.8 ~ 895.9	28		8.4	3.8	0		

Source : 1) Catastro de Monjas, DIRVA, 1987 Note : 3) 0.7 ~ 6.9 ha : Small Size

2) According to field survey, 1987

7.0 ~ 44.7 : Medium Size  
44.8 ~ 895.9 : Large Size

Table A.3.3.4-2 Cultivated Area by Each Farm Size

Farm Size	Operated Area		Cultivated land		Pasture		Home Stead	
	Area (ha)	per Household (ha)	Area (ha)	per Household (ha)	Area (ha)	per Household (ha)	Area (ha)	per Household (ha)
Small	1,452	2.5	1,313	2.2	23	0.1	116	0.2
Medium	1,663	16.2	1,535	14.9	101	1.0	27	0.3
Large	2,377	84.9	1,486	53.1	876	31.3	15	0.5

Source : Catastro de Monjas, DIRVA, 1987

Table A.3.3.4-3 Input Materials per Unit Area

Input Materials	Unit	Maize		Kidney bean		Tobacco		Tomato		Broccoli		Onion	
		Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry
1. Seeds	kg	17	17	49	49	0.043		0.32	0.32	0.69		3.22	
2. Fertilizer													
16-20-0	kg	138	161	138	156			184	184			506	
15-15-15	kg									552			
20-20-0	kg					322							
15-10-20	kg					598							
46-0-0	kg	138	138	---	---	---		184	184	396		322	
3. Insecticides													
Lannate	kg					3		1.4	1.4			0.7	
Volaton	kg	13	13										
Folidol	Q			1.4		4						4	
Metasistox	Q									3			
Tamaron	Q							4.5	4.5	3			
Belmark	Q									3			
4. Fungicides													
Antracol	kg							5.7	5.7			5.1	
Trimitox	kg											1.5	
5. Herbicides													
Hedonal Amin	Q					6							
Hedonal Ester	Q					3							

Table A.3.3.4-4 Total Input Materials

Input Materials	Unit	Maize		Kidney bean		Tobacco		Tomato		Broccoli		Onion		Sub Total		Total
		Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	
Seeds	(Area)ha	3,110	24	600	57	480	610	259	340	130	4,800	810	5,610			
Fertilizer	t	52.9	0.41	29.4	2.8	0.02	0.20	0.08	0.24	0.42	82.5	3.95	86.45			
16-20-0	t	429.2	3.9	82.8	8.9		112.2	47.7		65.8	624.2	126.3	750.5			
15-15-15	t								187.7				187.7			
20-20-0	t					154.6					154.6		154.6			
15-10-20	t					287.0					287.0		287.0			
46-0-0	t	429.2	3.3				112.2	47.7	134.6	41.9	541.4	227.5	768.9			
Insecticides																
Lannate	t					1.4	0.9	0.4		0.09	2.3	0.49	2.79			
Volaton	t	40.4	0.3								40.4	0.3	40.7			
Follicol	Q			840		1,920				520	2,760	520	3,280			
Metasistox	Q									1,020		1,020	1,020			
Tamaron	Q						2,745	1,166	1,020		2,745	2,186	4,931			
Belmark	Q								1,020			1,020	1,020			
Fungicides																
Antracol	t						3.5	1.5		0.7	3.5	2.2	5.7			
Trimilttox	t									0.2		0.2	0.2			
Herbicides																
Hedonal Amin	Q					2,880					2,880		2,880			
Hedonal Ester	Q					1,440					1,440		1,440			



Table A.3.3.4-5 Retail Price of Input Materials

(Unit : Q)

Input Materials			Monjas	Municipio	EL Progreso
			1 1)	2 2)	
1. Seeds	Maize	kg		1.19	0.9
	Kidney bean	kg		1.1	1.3
	Tobacco	kg		90	
	Tomato	kg	139		143.2
	Broccoli	kg		220	
	Onion	kg		54.3	55.1
	2. Fertilizer	16-20-0	kg	0.51	
15-15-15		kg	0.51		0.62
20-20-0		kg		0.52	
15-10-20		kg		0.52	
46-0-0		kg	0.42		0.40
Boron		kg		3.8	
3. Insecticides	Lannate	kg	96.9		94.7
	Volaton	kg	2.6		2.6
	Folidol	Q	13		14
	Metasistox	Q	36		42
	Tomaron	Q	21		21
	Belmark	Q	30		26
4. Fungicides	Antracol	kg	14.6		13.8
	Trimiltox	kg	16.0		14.3
5. Herbicides	Gesaprin	kg	12.5		
	Gramoxon	Q	12		
	Hedonal Amin	Q	6.5		
	Hedonal Ester	Q	9.5		
	Trifluralin	Q		12.0 3)	
6. Parasiticides	Asuntol	Q		153.33	
	Catosol	Q		440.0	
7. Injection	Triple	Q		100.0	
8. Feed	Salt	kg		0.44	

Note : 1) Average price of four retail shops

2) According to field survey

3) Estimated price

Table A.3.3.4-6 Total Cost of Input Materials

(Unit : Q)

Input Materials	Maize		Kidney bean		Tobacco		Tomato		Broccoli		Onion		Sub Total		Total
	W	D	W	D	W	D	W	D	W	D	W	D	W	D	
Seeds	62.950	490	32.340	3.080	1.800	11.120	27.800	11.120	52.870	22.810	124.890	90.370	215.260		
Fertilizer															
16-20-0	223.180	2.030	43.060	4.630		24.800	53.340	24.800		34.220	324.580	85.680	390.260		
15-15-15					80.390				99.480			99.480	99.480		
20-20-0					149.240						80.390		80.390		
15-10-20											149.240		149.240		
46-0-0	184.560	1.420				20.510	48.250	20.510	57.880	18.020	232.810	97.830	330.640		
Sub Total											787.020	262.990	1.050.010		
Insecticides															
Lannate					135.800	33.800	87.300	33.800		8.730	223.100	47.530	270.630		
Volaton	105.040	780									105.040	780	105.820		
Folidol			11.760		26.880					7.280	38.840	7.280	45.920		
Metasistox									36.720			36.720	36.720		
Tamaron						24.490	57.650	24.490	21.420		57.650	45.910	103.560		
Belmark									30.600			30.600	30.600		
Sub Total											424.430	168.820	593.250		
Fungicides															
Antracol						21.900	51.100	21.900		10.220	51.100	32.120	83.220		
Trimiltox										3.200		3.200	3.200		
Sub Total											51.100	35.320	86.420		
Herbicides															
Heclonal Amin					18.720						18.720		18.720		
Heclonal Ester					13.680						13.680		13.680		
Sub Total					32.400						32.400		32.400		
Total	575.730	4.720	87.160	7.710	426.510	330.440	330.440	141.620	298.970	104.480	1.387.440	589.900	1.977.340		

Table A.3.3.4-7 Volume and Cost of Input Materials for Pasture

Item	Unit	Input Volume		C o s t T o t a l (Q)
		Per Hectare	Total	
Fertilizer	kg	91	91,000	47,320
Herbicide	Q	1	1,000	12,000
Ectoparasite	Q	0.015	15	2,300
Endoparasite	Q	0.020	20	8,800
Preventive injection	Q	0.005	5	500
Salt	kg	76	76,000	33,440

\* Source : Table A.3.3.4-2, A.3.3.4-5

Table A.3.3.4-9 Labour Requirement for Pasture

(Unit : man-day/ha)

Operation	Quantity
Fertilizer Application	2
Spraying	
a. Herbicides	4
b. Ectoparasite	2
Endoparasite	2
Weeding	2
T o t a l	12

Source : According to field survey, 1987

Table A.3.3.4-8 Labour Requirement for Cropping

(Unit : man - day/ha)

Operation	Maize		Kidney bean		Tobacco		Tomato		Broccoli		Onion	
	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry
1. Sowing/Transplanting	4	4	5	5	11	12	12	12	11	68		
2. Fertilizer Application												
a. Basal Application	2	2	3	3	5	4	4	4	7	3		
b. Top dressing	1	1	-	-	5	4	4	4	7	3		
Sub Total	3	3	3	3	10	8	8	8	14	6		
3. Weeding												
a. 1st weeding	12	10	14	10	11	10	10	8	16	26		
b. 2nd weeding	11	8	-	-	11	10	10	8	-	26		
Sub Total	23	18	14	10	22	20	20	16	16	52		
4. Spraying												
a. Insecticides	2	2	1	-	23	8	8	10	20	13		
b. Fungicides	-	-	-	-	23	8	8	10	-	13		
c. Herbicides	-	-	-	-	3	-	-	-	-	-		
Sub Total	2	2	1	-	49	16	16	20	20	26		
5. Irrigation	-	37	-	30	-	-	-	34	38	51		
6. Harvesting	23	16	16	20	75	65	65	70	30	50		
7. Transporting	2	2	1	1	21							
8. Packing					4							
Total	57	82	40	69	192	121	121	160	129	253		

Source : Oficina de Unidad de Riego "Laguna de Ilojo", 1987

Table A.3.3.4-10 Monthly Labour Requirement

(Unit : man-day/month)

Crops	Area	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	Total
Maize	3,134 <sup>ha</sup>													
W 1 <sup>st</sup> 2 <sup>d</sup>	2,950	5,930	31,505	31,446	25,518		24,603	24,574	24,574					168,150
W • 2nd 2 <sup>d</sup>	160				213	1,869	2,931	1,440	2,667					9,120
D 1 <sup>d</sup>	24							210	386	394	504	330	144	1,968
Kidney bean	657													
W • 1st	600	2,400	6,600	4,500	5,400	5,100								24,000
D	57	600								655	940	712	1,026	3,933
Tobacco														
W	480	9,120	12,000	12,960	33,120	23,040								90,240
Tomato	869													
W • 1st	320	2,064	4,125	5,404	10,884	9,862	6,931							38,720
W • 2nd	290				1,160	6,091	5,607	9,667	12,565					35,090
D	259							2,538	5,388	6,165	9,919	12,898	4,532	41,440
Broccoli														
D	340							4,222	11,853	11,965	9,020	6,800		43,860
Onion														
D	130							4,619	6,489	7,913	6,787	4,966	2,166	32,890
Pasture														
W ~ D	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	12,000
Total	6,610	21,114	55,230	55,310	77,255	46,452	41,072	48,270	64,872	28,092	28,170	26,706	8,868	501,411

Note : 1) W ..... Wet Season, D ..... Dry Season. 2) 1st : first cropping, 2nd : Second cropping

Table A.3.3.4-11 Unit Production Cost

(1.) Maize in Wet Season (Present)

Item	Unit	Quantity	Unit Cost	Total Cost
1. Direct Cost				
A. Fixed Cost				
Land Rental Cost	ha	1	285.71	285.71
Plowing, Harrowing	ha	1	85.71	85.71
Ridging	ha	1	28.57	28.57
Sub Total				399.99
B. Variable Cost				
Seeds	kg	17	1.19	20.22
Insecticides	kg	13	2.60	33.80
Fertilizer	kg	138	0.52	71.76
Fertilizer	kg	138	0.43	59.34
Sub Total				185.13
C. Labour Cost				
Sowing	man/day	4	5.00	20.00
Weeding				
a. 1st Weeding	man/day	12	5.00	60.00
b. 2nd Weeding	man/day	11	5.00	55.00
Spraying				
a. Insecticides	man/day	2	5.00	10.00
Fertilizer Application				
a. Basal Application	man/day	2	5.00	10.00
b. Top Dressing	man/day	1	5.00	5.00
Harvesting	man/day	23	5.00	115.00
Transporting	man/day	2	5.00	10.00
Sub Total				285.00
Total				870.12
2. Indirect Cost				
Administrative Expense	5 %			43.51
Physical Contingency	10 %			87.01
Interest	8 %	4 month		23.20
Total				153.72
Grand Total				1,023.84

## (2.) Maize in Dry Season (Present))

Item	Unit	Quantity	Unit Cost	Total Cost
1. Direct Cost				
A. Fixed Cost				
Land Rental Cost	ha	1	285.71	285.71
Plowing, Harrowing	ha	1	85.71	85.71
Ridging	ha	1	28.57	28.57
Irrigation Cost	ha	1	21.43	21.43
Sub Total				421.42
B. Variable Cost				
Seeds	kg	17	1.19	20.23
Insecticides	kg	13	2.60	33.80
Fertilizer	kg	161	0.52	83.72
Fertilizer	kg	138	0.43	59.34
Sub Total				197.09
C. Labour Cost				
Sowing	man/day	4	5.00	20.00
Weeding				
a. 1st Weeding	man/day	10	5.00	50.00
b. 2nd Weeding	man/day	8	5.00	40.00
Spraying				
a. Insecticides	man/day	2	5.00	10.00
Fertilizer Application				
a. Basal Application	man/day	2	5.00	10.00
b. Top Dressing	man/day	1	5.00	5.00
Irrigation	man/day	37	5.00	185.00
Harvesting	man/day	16	5.00	80.00
Transporting	man/day	2	5.00	10.00
Sub Total				410.00
Total				1,028.51
2. Indirect Cost				
Administrative Expense	5 %			51.43
Physical Contingency	10 %			102.85
Interest	8 %	4 month		27.43
Total				181.72
Grand Total				1,210.22

## (3.) Kidney bean in Wet Season (Present)

Item	Unit	Quantity	Unit Cost	Total Cost
1. Direct Cost				
A. Fixed Cost				
Land Rental Cost	ha	1	285.71	285.71
Plowing, Harrowing	ha	1	42.86	42.86
Ridging	ha	1	28.57	28.57
Sub Total				357.14
B. Variable Cost				
Seeds	kg	49	1.10	53.90
Insecticides	kg	1.4	14.00	19.60
Fertilizer	kg	138	0.52	71.76
Sub Total				145.26
C. Labour Cost				
Sowing	man/day	5	5.00	25.00
Weeding	man/day	14	5.00	70.00
Fertilizer Application	man/day	3	5.00	15.00
Harvesting	man/day	16	5.00	80.00
Transporting	man/day	1	5.00	5.00
Sub Total				200.00
Total				702.40
2. Indirect Cost				
Administrative Expense	5 %			35.12
Physical Contingency	10 %			70.24
Interest	8 %	4 month		18.73
Total				124.09
Grand Total				826.49



## (4.) Kidney bean In Dry Season (Present)

Item	Unit	Quantity	Unit Cost	Total Cost
1. Direct Cost				
A. Fixed Cost				
Land Rental Cost	ha	1	285.71	285.71
Plowing, Harrowing	ha	1	42.86	42.86
Ridging	ha	1	28.57	28.57
Irrigation Cost	ha	1	21.43	21.43
Sub Total				378.57
B. Variable Cost				
Seeds	kg	49	1.10	53.91
Fertilizer	kg	156	0.52	81.12
Sub Total				135.02
C. Labour Cost				
Sowing	man/day	5	5.00	25.00
Weeding	man/day	10	5.00	50.00
Fertilizer Application	man/day	3	5.00	15.00
Irrigation	man/day	30	5.00	150.00
Harvesting	man/day	20	5.00	100.00
Transporting	man/day	1	5.00	5.00
Sub Total				345.00
Total				858.59
2. Indirect Cost				
Administrative Expense	5 %			42.93
Physical Contingency	10 %			85.86
Interest	8 %	4 month		22.90
Total				151.69
Grand Total				1.010.28

## (5.) Tobacco in Wet Season (Present)

Item	Unit	Quantity	Unit Cost	Total Cost
1. Direct Cost				
A. Fixed Cost				
Land Rental Cost	ha	1	535.71	535.71
Plowing, Harrowing	ha	1	107.13	107.13
Ridging	ha	1	35.71	35.71
Sub Total				678.55
B. Variable Cost				
Seeds	kg	0.043	90.00	3.88
Insecticides	kg	3	97.00	291.00
Insecticides	Q	4	14.00	56.00
Fungicides	kg	1.5	14.60	21.90
Herbicides	Q	6.0	6.50	39.00
Herbicides	Q	3.0	9.50	28.50
Fertilizer	kg	598.0	0.52	310.96
Fertilizer	kg	322.0	0.52	167.44
Sub Total				918.68
C. Labour Cost				
Raising seedling				280.00
Transplanting	man / day	11	5.00	55.00
Weeding				
a. 1st Weeding	man / day	11	5.00	55.00
b. 2nd Weeding	man / day	11	5.00	55.00
Spraying				
a. Insecticides	man / day	23	5.00	115.00
b. Fungicides	man / day	23	5.00	115.00
c. Herbicides	man / day	3	5.00	15.00
Fertilizer Application				
a. Basal Application	man / day	5	5.00	25.00
b. Top Dressing	man / day	5	5.00	25.00
Harvesting	man / day	75	5.00	375.00
Transporting	man / day	22	5.00	110.00
Sub Total				1,225.00
D. Other's				
Classification				1,686.69
Packing	man / day	4	5.00	20.00
Sub Total				1,706.69
Total				4,528.92
2. Indirect Cost				
Administrative Expense	5 %			226.45
Physical Contingency	10 %			452.29
Interest	8 %	4 month		120.77
Total				799.51
Grand Total				5,328.43

## (6.) Tomato in Wet Season (Present)

Item	Unit	Quantity	Unit Cost	Total Cost
1. Direct Cost				
A. Fixed Cost				
Land Rental Cost	ha	1	428.57	428.57
Plowing, Harrowing	ha	1	85.71	85.71
Ridging	ha	1	28.57	28.57
Sub Total				542.85
B. Variable Cost				
Seeds	kg	0.32	139.00	44.48
Insecticides	l	4.5	21.00	94.50
Insecticides	kg	1.4	97.00	135.80
Fungicides	kg	5.7	14.60	83.22
Fertilizer	kg	184	0.52	95.68
Fertilizer	kg	184	0.43	79.12
Sub Total				532.80
C. Labour Cost				
Raising seedling				133.57
Transplanting	man/day	12	5.00	60.00
Weeding				
a. 1st Weeding	man/day	10	5.00	50.00
b. 2nd Weeding	man/day	10	5.00	50.00
Spraying				
a. Insecticides	man/day	8	5.00	40.00
b. Fungicides	man/day	8	5.00	40.00
Fertilizer Application				
a. Basal Application	man/day	4	5.00	20.00
b. Top Dressing	man/day	4	5.00	20.00
Harvesting	man/day	65	5.00	325.00
Sub Total				738.57
Total				1,814.22
2. Indirect Cost				
Administrative Expense	5 %			90.71
Physical Contingency	10 %			181.42
Interest	8 %	4 month		48.38
Total				320.51
Grand Total				2,134.73

## (7.) Tomato in Dry Season (Present)

Item	Unit	Quantity	Unit Cost	Total Cost
1. Direct Cost				
A. Fixed Cost				
Land Rental Cost	ha	1	428.57	428.571
Plowing, Harrowing	ha	1	85.71	85.71
Ridging	ha	1	28.57	28.57
Irrigation Cost	ha	1	38.57	38.57
Sub Total				581.42
B. Variable Cost				
Seeds	kg	0.32	139.00	44.48
Insecticides	Q	4.5	21.00	94.50
Insecticides	kg	1.4	97.00	135.80
Fungicides	kg	5.7	14.60	83.22
Fertilizer	kg	184	0.52	95.68
Fertilizer	kg	184	0.43	79.12
Sub Total				582.80
C. Labour Cost				
Raising seedling				133.57
Transplanting	man/day	12	5.00	60.00
Weeding				
a. 1st Weeding	man/day	8	5.00	40.00
b. 2nd Weeding	man/day	8	5.00	40.00
Spraying				
a. Insecticides	man/day	10	5.00	50.00
b. Fungicides	man/day	10	5.00	50.00
Fertilizer Application				
a. Basal Application	man/day	4	5.00	20.00
b. Top Dressing	man/day	4	5.00	20.00
Irrigation	man/day	34	5.00	170.00
Harvesting	man/day	70	5.00	350.00
Sub Total				933.57
Total				2,047.79
2. Indirect Cost				
Administrative Expense	5 %			102.39
Physical Contingency	10 %			204.78
Interest	8 %	4 month		54.61
Total				361.78
Grand Total				2,409.57

## (8.) Broccoli in Dry Season (Present)

Item	Unit	Quantity	Unit Cost	Total Cost
1. Direct Cost				
A. Fixed Cost				
Land Rental Cost	ha	1	428.57	428.57
Plowing, Harrowing	ha	1	85.71	85.71
Ridging	ha	1	42.85	42.85
Irrigation Cost	ha	1	38.57	38.57
Sub Total				595.70
B. Variable Cost				
Seeds	kg	0.69	220.30	152.00
Insecticides	ℓ	3	36.00	108.00
Insecticides	ℓ	3	21.00	63.00
Insecticides	ℓ	3	30.00	90.00
Fertilizer	kg	552	0.53	292.56
Fertilizer	kg	396	0.43	170.28
Sub Total				875.84
C. Labour Cost				
Raising Seeding				252.86
Transplanting	man/day	11	5.00	55.00
Weeding	man/day	16	5.00	80.00
Spraying				
a. Insecticides	man/day	20	5.00	100.00
Fertilizer Application				
a. Basal Application	man/day	7	5.00	35.00
b. Top Dressing	man/day	7	5.00	35.00
Irrigation	man/day	38	5.00	190.00
Harvesting	man/day	30	5.00	150.00
Sub Total				897.86
Total				2,369.40
2. Indirect Cost				
Administrative Expense	5 %			118.47
Physical Contingency	10 %			236.94
Interest	8 %	3 month		47.39
Total				402.80
Grand Total				2,772.20

## (9.) Onion in Dry Season (Present)

Item	Unit	Quantity	Unit Cost	Total Cost
1. Direct Cost				
A. Fixed Cost				
Land Rental Cost	ha	1	428.57	428.57
Plowing, Harrowing	ha	1	85.71	85.71
Ridging	ha	1	28.57	28.57
Irrigation Cost	ha	1	38.57	38.57
Sub Total				581.42
B. Variable Cost				
Seeds	kg	3.22	54.30	174.85
Insecticides	l	4	14.00	56.00
Insecticides	kg	0.69	97.00	66.93
Fungicides	kg	5.06	14.60	73.88
Fungicides	kg	1.5	16.00	24.00
Fertilizer	kg	506	0.52	263.12
Fertilizer	kg	322	0.43	138.46
Sub Total				797.24
C. Labour Cost				
Raising Seedling				174.28
Transplanting	man/day	68	5.00	340.00
Weeding				
a. 1st Weeding	man/day	26	5.00	130.00
b. 2nd Weeding	man/day	26	5.00	130.00
Spraying				
a. Insecticides	man/day	13	5.00	65.00
b. Fungicides	man/day	13	5.00	65.00
Fertilizer Application				
a. Basal Application	man/day	3	5.00	15.00
b. Top Dressing	man/day	3	5.00	15.00
Irrigation	man/day	51	5.00	255.00
Harvesting	man/day	50	5.00	250.00
Sub Total				1,439.28
Total				2,817.94
2. Indirect Cost				
Administrative Expense	5 %			140.90
Physical Contingency	10 %			281.79
Interest	8 %	4 month		75.15
Total				497.03
Grand Total				3,314.97

## (10.) Pasture (Present)

Item	Unit	Quantity	Unit Cost	Total Cost
1. Direct Cost				
A. Fixed Cost				
Land Rental Cost	ha	1	143.00	143.00
B. Variable Cost				
Fertilizer	kg	91	0.52	47.32
Ectoparasite	Q	0.015	153.33	2.30
Endoparasite	Q	0.020	440.00	8.80
Preventive Injection	Q	0.005	100.00	0.50
Salt	kg	76.4	0.44	33.62
Herbicides	Q	1	12.00	12.00
Sub Total				104.45
C. Labour Cost				
Fertilization	man / day	2	5.00	10.00
Ectoparasite	man / day	2	5.00	10.00
Endoparasite	man / day	2	5.00	10.00
Spraying				
a. Herbicides	man / day	4	5.00	20.00
Weeding	man / day	2	5.00	10.00
Sub Total				60.00
Total				307.45
2. Indirect Cost				
Administrative Expense	5 %			15.37
Physical Contingency	10 %			30.75
Interest	8 %	12 month		24.60
Total				70.72
Grand Total				378.17

## (11.) Maize in Dry Season (Without Project)

Item	Unit	Quantity	Unit Cost	Total Cost
1. Direct Cost				
A. Fixed Cost				
Land Rental Cost	ha	1	285.71	285.71
Plowing, Harrowing	ha	1	85.71	85.71
Ridging	ha	1	28.57	28.57
Irrigation Cost	ha	1	100.00	100.00
Sub Total				499.99
B. Variable Cost				
Sub Total				197.09
C. Labour Cost				
Sub Total				410.00
Total				1,107.08
2. Indirect Cost				
Administrative Expense	5 %			55.35
Physical Contingency	10 %			110.71
Interest	8 %	4 month		29.52
Total				195.58
Grand Total				1,302.66

## (12.) Kidney bean in Dry Season (Without Project)

Item	Unit	Quantity	Unit Cost	Total Cost
1. Direct Cost				
A. Fixed Cost				
Land Rental Cost	ha	1	285.71	285.71
Plowing, Harrowing	ha	1	42.86	42.86
Ridging	ha	1	28.57	28.57
Irrigation Cost	ha	1	100.00	100.00
Sub Total				457.14
B. Variable Cost				
Sub Total				135.02
C. Labour Cost				
Sub Total				345.00
Total				937.16
2. Indirect Cost				
Administrative Expense	5 %			46.86
Physical Contingency	10 %			93.72
Interest	8 %	4 month		24.99
Total				165.57
Grand Total				1,102.73



## (13.) Tomato in Dry Season (Without Project)

Item	Unit	Quantity	Unit Cost	Total Cost
1. Direct Cost				
A. Fixed Cost				
Land Rental Cost	ha	1	428.57	428.57
Plowing, Harrowing	ha	1	85.71	85.71
Ridging	ha	1	28.57	28.57
Irrigation Cost	ha	1	100.00	100.00
Sub Total				642.85
B. Variable Cost				
Sub Total				532.80
C. Labour Cost				
Sub Total				933.57
Total				2,109.22
2. Indirect Cost				
Administrative Expense	5 %			105.46
Physical Contingency	10 %			210.92
Interest	8 %	4 month		56.25
Total				372.63
Grand Total				2,481.85

## (14.) Broccoli in Dry Season (Without Project)

Item	Unit	Quantity	Unit Cost	Total Cost
1. Direct Cost				
A. Fixed Cost				
Land Rental Cost	ha	1	428.57	428.57
Plowing, Harrowing	ha	1	85.71	85.71
Ridging	ha	1	42.85	42.85
Irrigation Cost	ha	1	100.00	100.00
Sub Total				657.13
B. Variable Cost				
Sub Total				875.84
C. Labour Cost				
Sub Total				897.86
Total				2,430.83
2. Indirect Cost				
Administrative Expense	5 %			121.50
Physical Contingency	10 %			243.08
Interest	8 %	3 month		48.62
Total				413.20
Grand Total				2,844.03

## (15.) Onion in Dry Season (Without Project)

Item	Unit	Quantity	Unit Cost	Total Cost
1. Direct Cost				
A. Fixed Cost				
Land Rental Cost	ha	1	428.57	428.57
Plowing, Harrowing	ha	1	85.71	85.71
Ridging	ha	1	28.57	28.57
Irrigation Cost	ha	1	100.00	100.00
Sub Total				642.85
B. Variable Cost				
Sub Total				797.24
C. Labour Cost				
Sub Total				1,439.28
Total				2,879.37
2. Indirect Cost				
Administrative Expense	5 %			143.97
Physical Contingency	10 %			287.94
Interest	8 %	4 month		76.78
Total				508.69
Grand Total				3,388.06

Table A.3.3.4-12 Present Milk Production

Item	Unit	Production Volume
Volume of Milk per day	ℓ /head W	5.2
	D	2.0
Number of days of Milking	day W	180
	D	90
Volume of Milking per year	ℓ /head W	936
	D	180
Total Volume of Milk per year	ℓ /head	1,116
Number of Heads of Milking	head	3
Total Production Volume of Milk	ℓ	3,348
Production Volume of Milk per Hectare	ℓ /ha	598
Selling Volume of Cattle	kg	342
Selling Volume of Cattle per Hectare	kg	61
Area of Pasture	ha	5.6

Source : Field survey, 1987

Table A.3.3.4-13 Production Cost and Production Value

1. Crop

Crops	Unit Yield (t/ha)	Producer's Price (Q/t)	Gross Production Value (Q/ha)	Production Cost (Q/ha)	Net Production Value (Q/ha)
Maize W	2.7	400	1,080	1,024	56
D	3.2	400	1,280	1,210	70
Kidney bean W	1.1	1,090	1,199	826	373
D	1.4	1,090	1,526	1,010	516
Tobacco W	1.4	4,460	6,244	5,328	916
Tomato W	17.0	260	4,420	2,134	2,286
D	18.5	260	4,810	2,410	2,400
Broccoli D	8.3	500	4,150	2,772	1,378
Onion D	8.5	590	5,015	3,315	1,700

2. Pasture

Item	Unit Yield	Producer's Price	Gross Production Value (Q/ha)	Production Cost (Q/ha)	Net Production Value (Q/ha)
Milk	598 Q/ha	0.5 Q/Q	299		
Beef	61 kg/ha	2.86 Q/kg	175		
Total			474	378	96

Table A.3.3.4-14 Net Production Value

Crops	Gross Production Value (1,000 Q)	Production Cost (1,000 Q)	Net Production Value (1,000 Q)
Maize	3,359	3,185	174
W			
D	81	29	2
Sub Total	3,390	3,214	176
Kidney bean	719	496	223
W			
D	87	58	29
Sub Total	806	554	252
Tobacco	2,997	2,557	440
W	2,696	1,302	1,394
D	1,246	624	622
Sub Total	3,942	1,926	2,016
Broccoli	1,411	943	468
D	652	430	222
Onion			
D	474	378	96
Pasture			
Total	13,672	10,002	3,670

Table A.3.3.5-1 Marketing Channel System of Agricultural Products

Crop	Market body	Market Channel	Market
Maize and Kidney beans	Middlemen and INDECA	through market	Guatemala, Jutiapa, Jalapa
Tomato and Onion	Middlemen and (transporter)	"	Guatemala, Jutiapa, Jalapa, Processing company, El Salvador
Tobacco	Tobacco company	out side the market system (under contract)	Guatemala, Belize, USA, El Salvador
Broccoli	Exporter	"	U.S.A.

- Note: 1/ City, and Department collect the market place tax of 180 Quetzales/month per each trade usually.
- 2/ Municipal shipment office located along the national road, collects the tax of 2 Quetzales per one transporting car of agricultural products.

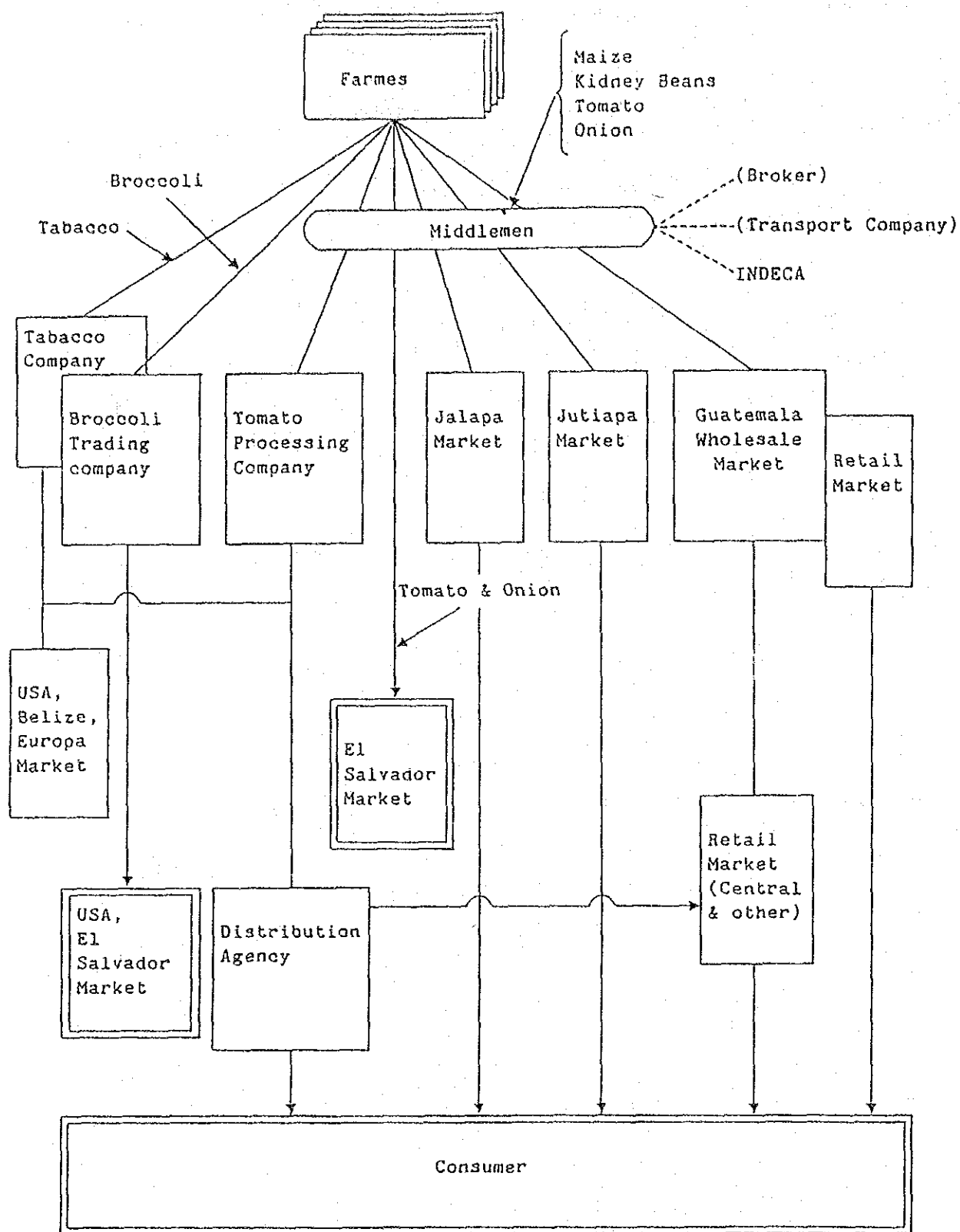


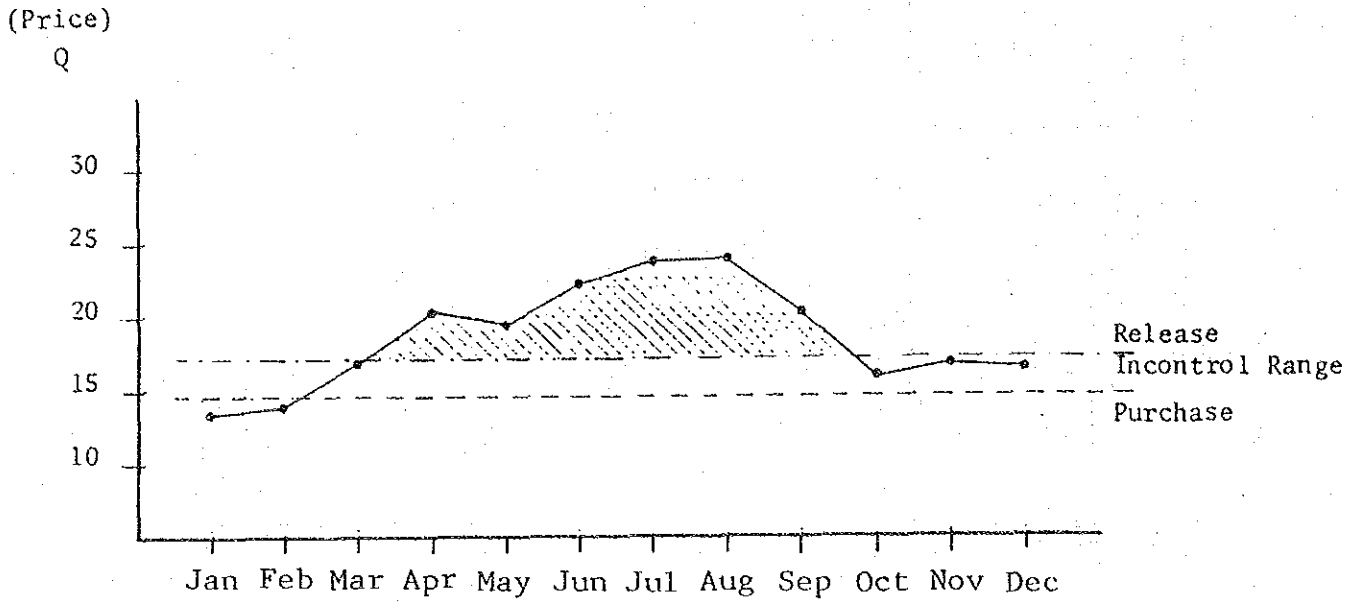
Fig. A.3.3.5-1 Marketing Channel of Agricultural Products

Table A.3.3.5-2 Export of Agricultural Products

Products	Country	Unit	1985	1986	1987													
					Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total	
Tomato	El. Salvador	ton	5,083.9	8,932.1	961.4	669.5	690.6	636.0	847.9	48.8	1,683.8	11.3	1,698.4	23.7	1,019.6	-	-	8,291.0
	USA	"	18.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Another country	"	-	31.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total	"	5,102.4	8,963.9	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Broccoli	USA	ton	2,207	4,878.9	325.8	829.3	352.0	613.4	39.7	641.4	417.9	1,999.4	2,786.8	1,247.9	817.6	-	-	10,071.2
	El. Salvador	"	348	853.4	74.3	30.8	16.4	-	-	-	-	-	-	-	3.4	-	-	124.7
	EEC	"	-	224.8	-	-	-	-	-	-	-	-	-	-	53.9	-	-	53.9
	Another country	"	1.4	16.9	0.4	0.5	0.3	0.1	0.2	1.1	4.8	1.0	0.6	0.3	1.5	-	-	10.8
	Total	"	2,556.4	5,974	400.5	860.6	368.7	613.5	39.9	642.5	422.7	2,000.4	2,787.4	1,248.2	876.2	-	-	10,260.6
Onion	El. Salvador	ton	3,969.5	1,823.5	230.3	14.2	240.5	122.1	267.0	100.4	394.1	12.3	749.3	26.7	290.7	-	-	2,447.6
	USA	"	12.4	286.7	8.4	48.1	-	171.4	-	176.5	60.5	61.3	99.6	135.0	121.3	-	-	882.1
	Mexico	"	229.1	202.7	10.2	12.7	-	-	12.8	12.9	22.6	3.9	3.4	9.3	-	-	-	87.8
	Another country	"	2,072.4	33.4	1.4	2.5	5.7	80.0	9.8	10.4	29.2	27.8	16.0	3.6	1.5	-	-	187.9
	Total	"	6,283.4	2,346.3	250.3	77.5	246.2	373.5	289.6	300.2	506.4	105.3	868.3	174.6	413.5	-	-	3,605.4
	USA	ton	2,180.4	634.7	-	92.8	270.8	-	229.5	448.1	231.1	427.2	-	18.2	-	-	-	1,717.7
Tobacco	El. Salvador	"	504.4	478.1	26.1	59.4	61.6	30.7	114.1	62.8	90.7	89.5	75.3	64.1	62.7	-	-	737
	Belize	"	63.9	9,053.4	-	9.2	-	-	9.9	9.0	9.9	-	-	-	8.4	-	-	46.4
	Japan	"	551.7	482	-	-	-	-	233.1	470.8	-	-	-	-	-	-	-	703.9
	EEC	"	-	625.3	-	-	-	-	-	141.1	-	221.0	-	-	-	-	-	399.4
	Another country	"	359.4	341.7	-	-	-	-	765.0	-	-	-	-	12.0	98.7	-	-	875.7
	Total	"	4,260	11,615.2	26.1	161.4	369.7	30.7	1,361.6	1,131.8	331.7	737.7	-	87.3	181.0	71.1	-	4,480.1

Source : Departamento de computos, DIGESA

MAIZE (Q/qq)



KIDNEY BEANS (Q/qq)

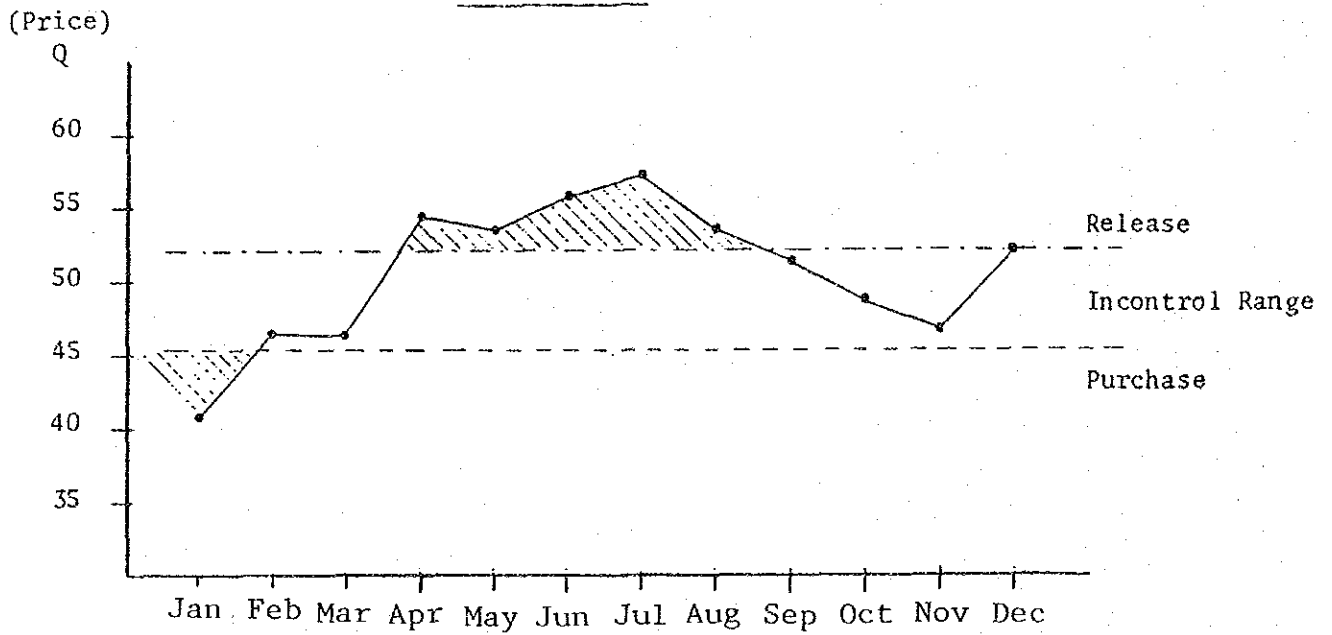


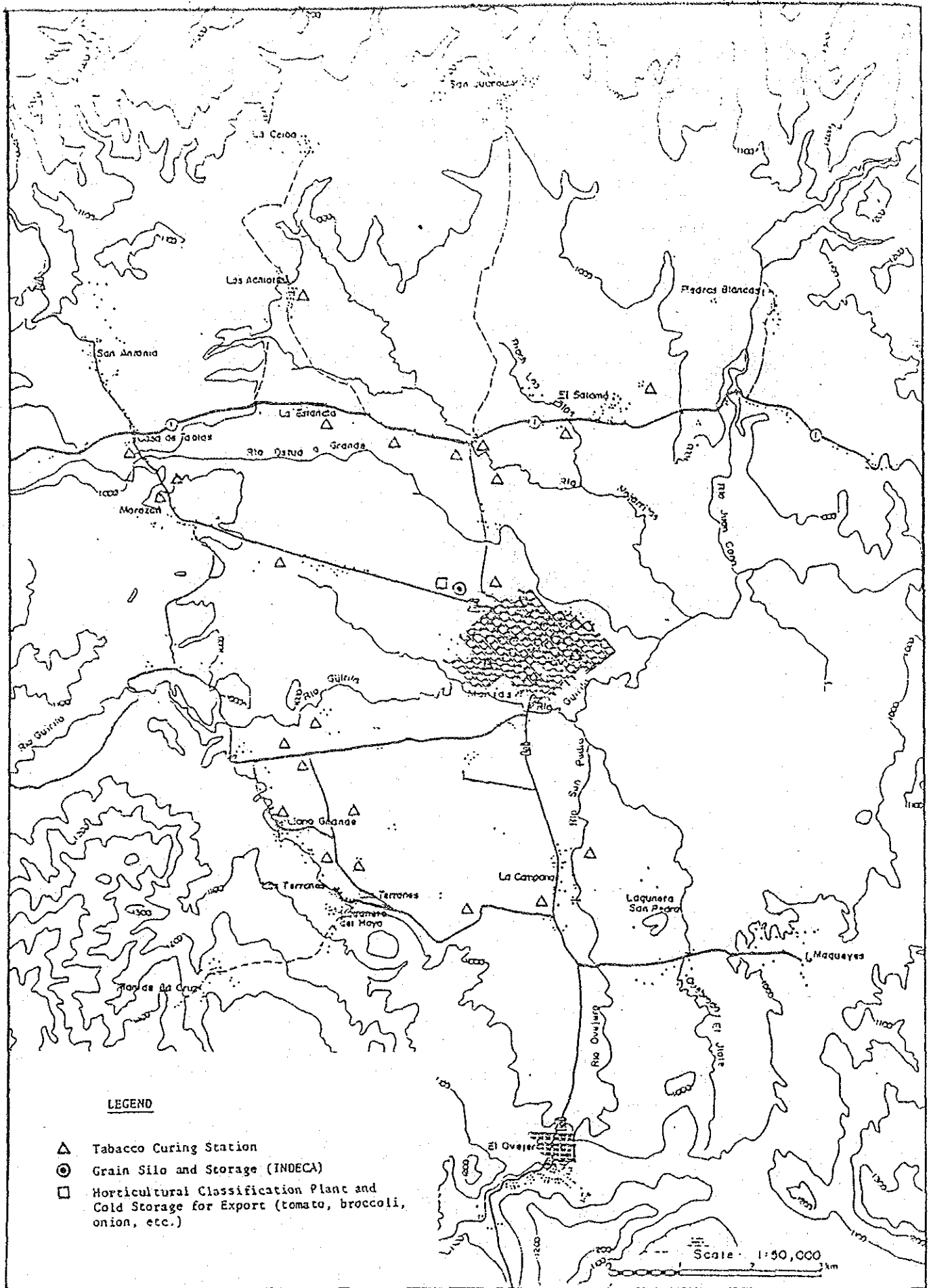
Fig. A.3.3.5-2 Price Control by INDECA (1986)



Table A.3.3.5-3 Amount of Export of Principal Agricultural Products

Product	Destination	1985	1986	to Nov. 1987
Tomato	El Salvador	546,274	2,137,769	2,971,276
	USA	9,700	-	-
	Other	-	6,315	-
	Total	555,974	2,144,084	2,971,276
Broccoli	USA	1,172,957	2,181,366	5,452,101
	El Salvador	67,780	305,760	169,530
	EEC	-	100,375	29,147
	Other	355	10,595	4,480
	Total	1,241,092	2,598,046	5,655,258
Onion	El Salvador	450,731	849,054	1,042,656
	USA	3,366	35,670	174,528
	Mexico	25,432	30,398	10,477
	Other	30,668	15,487	59,980
	Total	510,197	930,609	1,287,641
Tobacco	USA	6,981,516	1,431,061	9,395,345
	El Salvador	539,654	456,967	1,721,485
	Belice	264,989	202,666	183,100
	Japan	1,704,183	1,574,971	2,593,413
	EEC	-	1,238,399	572,292
	Other	525,512	2,285,607	1,148,927
	Total	10,015,854	7,189,671	15,614,562

Source : Departamento de Computos ; DIGESA



**LEGEND**

- ▲ Tabacco Curing Station
- Grain Silo and Storage (INDECA)
- Horticultural Classification Plant and Cold Storage for Export (tomato, broccoli, onion, etc.)

Scale 1:50,000

Fig. A.3.3.5-3 Location Map of Agro-industry and Storage Facilities

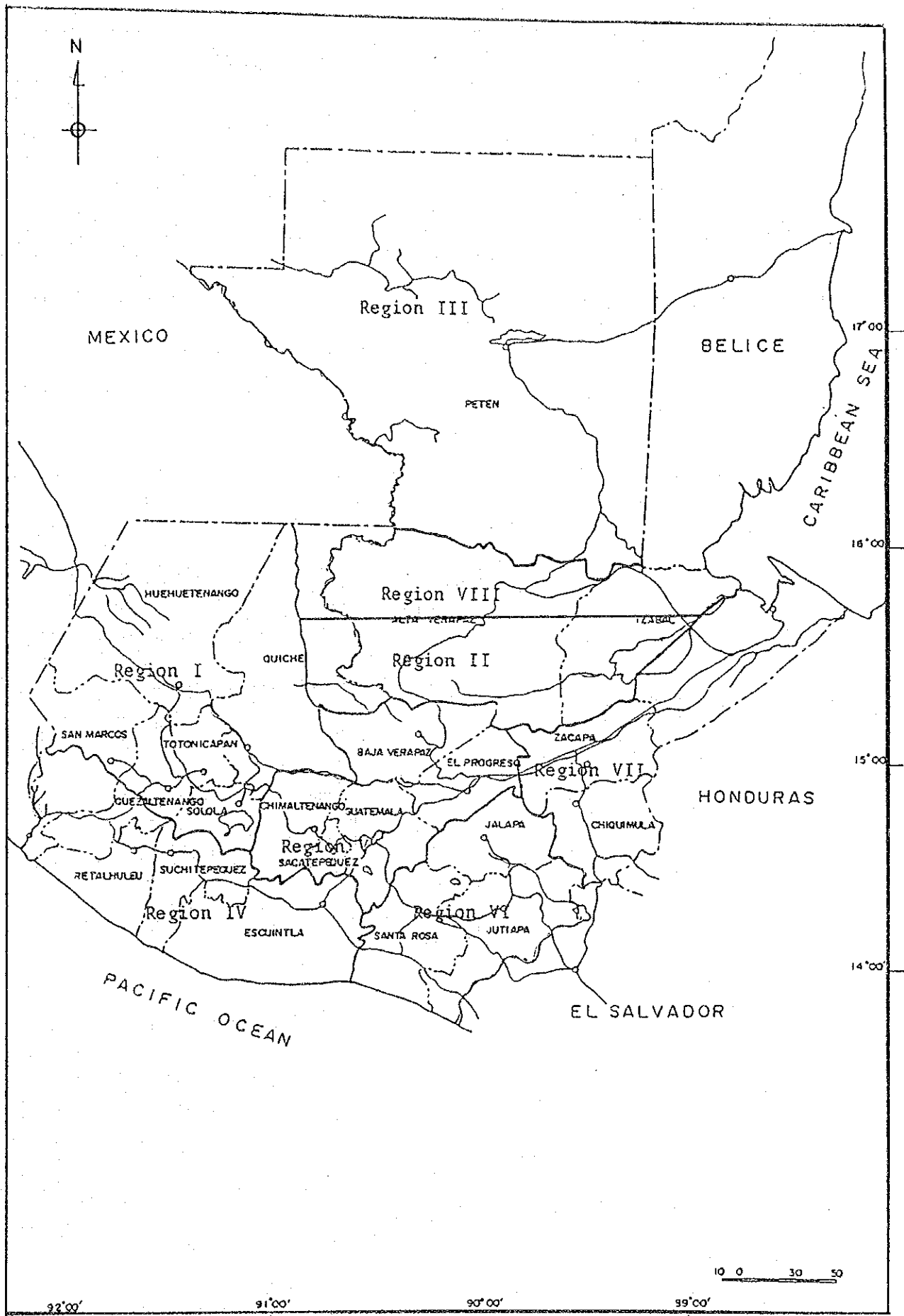


Fig. A.3.3.6-1 Division of Region

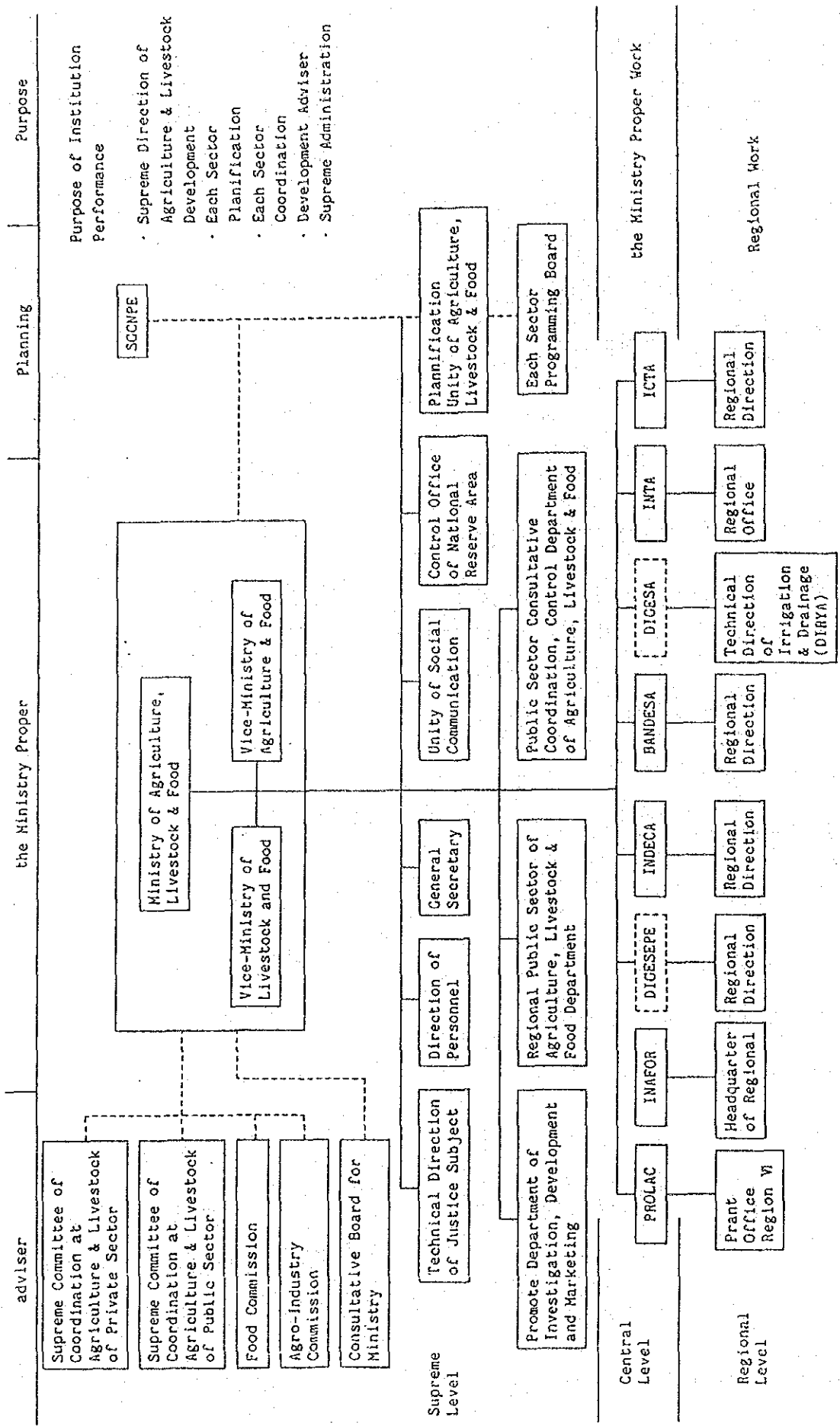


Fig. A.3.3.6-2 Organization of the Ministry of Agriculture, Cattle and Food Resources

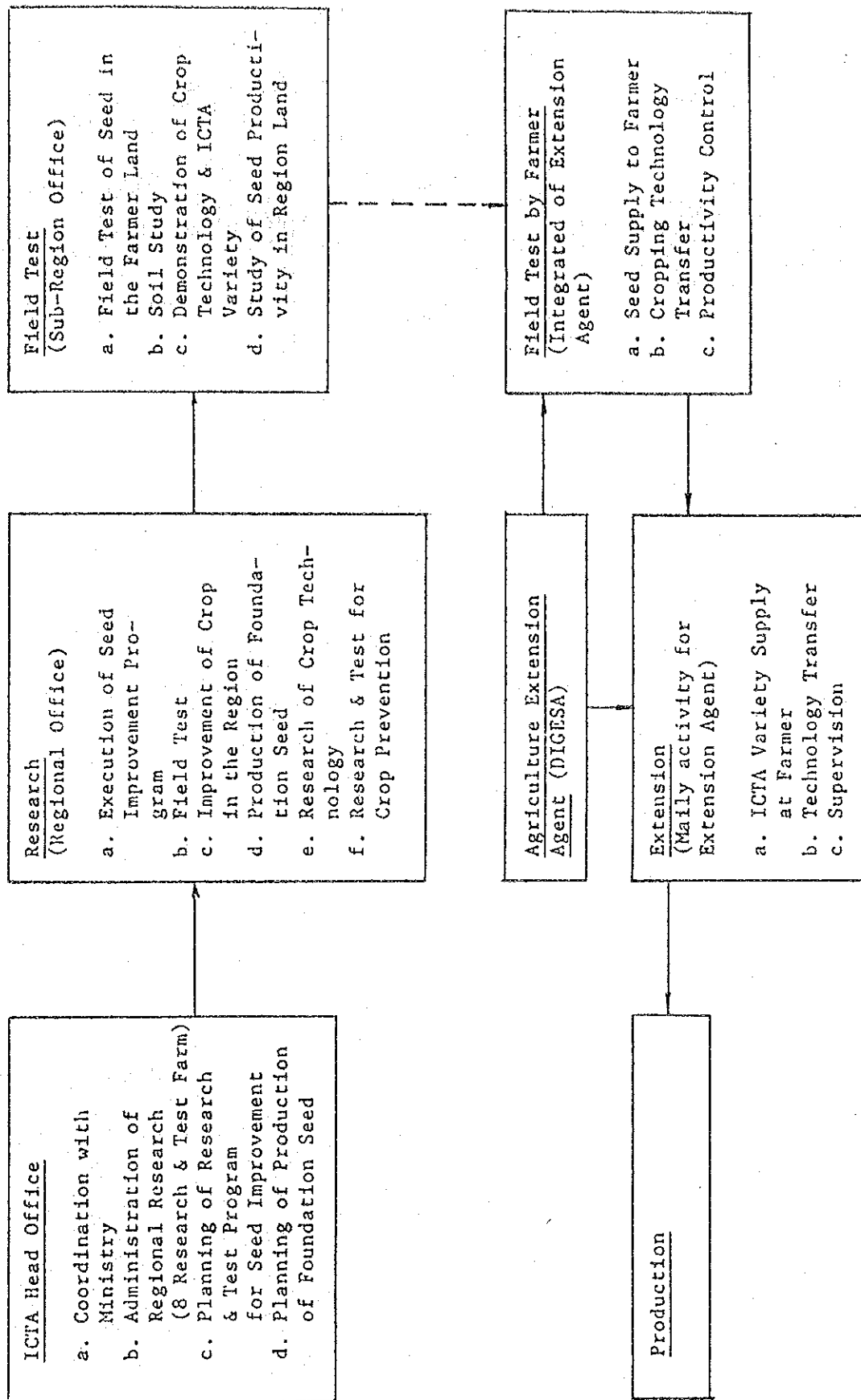


Fig. A.3.3.6-3 ICTA Operation Flow

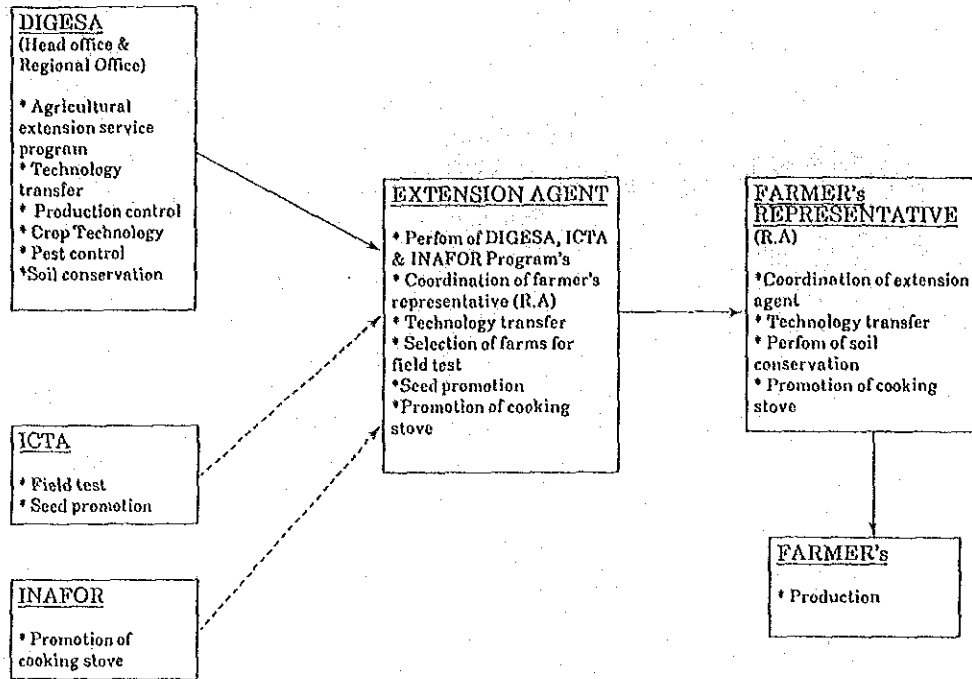


Fig. A.3.3.6-4 Agricultural Extension Flow

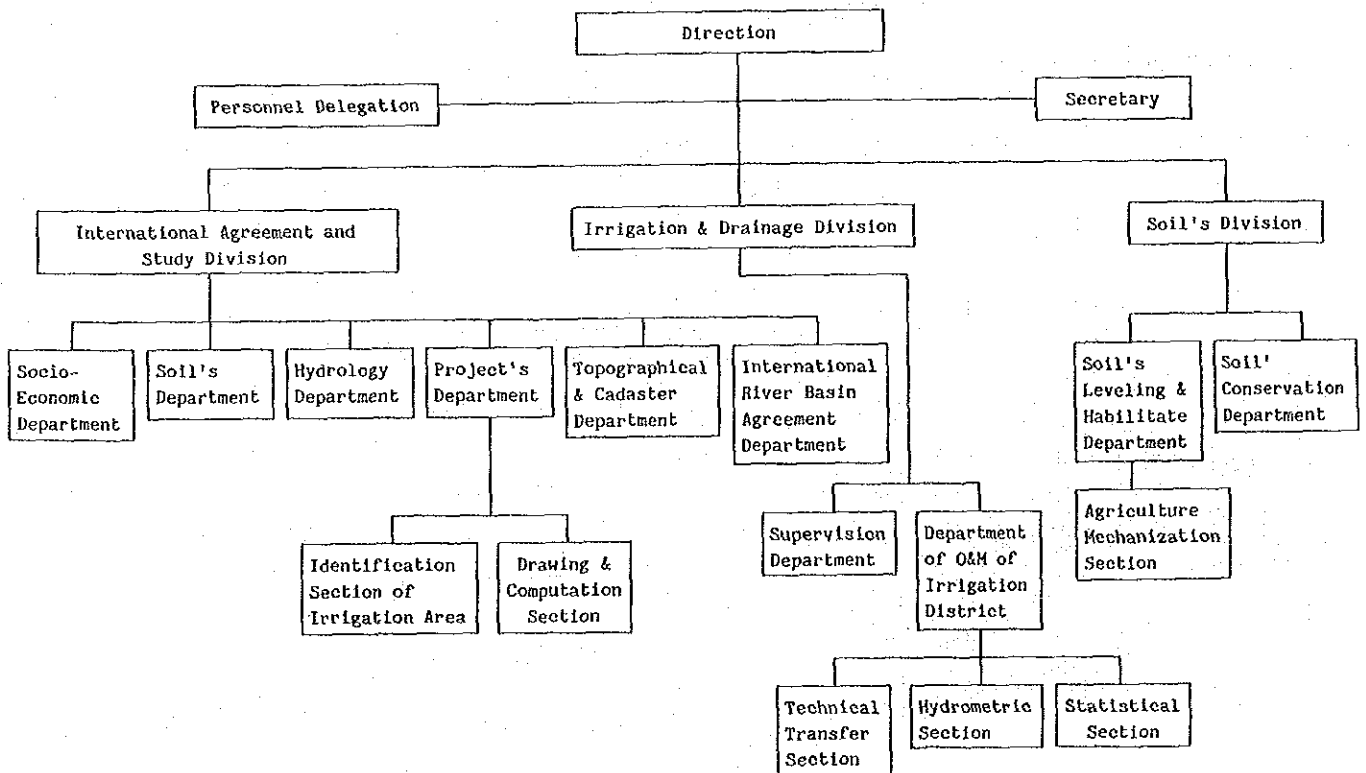


Fig. A.3.3.6-5 Organization of DIRYA

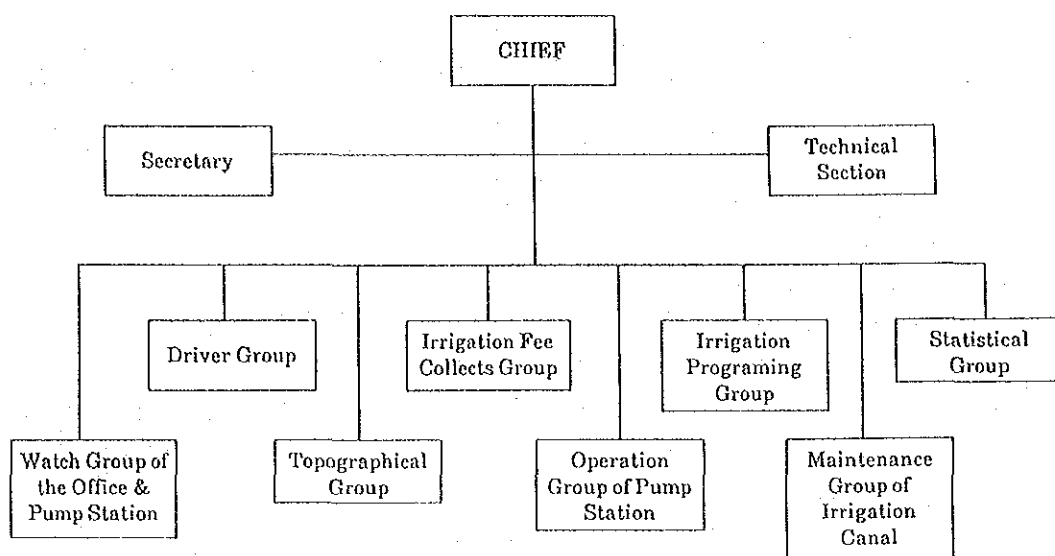


Fig. A.3.3.6-6 Organization of Hoyo Lake Irrigation Project Office

Table A.3.3.6-1 Provided Loans for Crops in Monjas Area (1986)

Loan by Crop	Number of Loans	Amount (Q)	Average (Q)
Maize	46	89,000	1,935
Tomato	18	60,000	3,333
Tobacco	12	46,000	3,833
Kidney beans	28	68,000	2,429
Broccoli	14	39,000	2,786
Chili	1	5,000	5,000
Onion	3	9,500	3,167
Livestock	5	25,000	5,000
Improvement of facilities	3	15,000	5,000
<b>Total</b>	<b>130</b>	<b>356,500</b>	

Source: BANDESA, Jalapa Agency (1986)

Table A.3.3.6-2 Existing Cooperatives in Guatemala (1986)

Organization	Whole Country		Jutiapa	Jalapa
	No.	No. of members	No.	No.
Agricultural Cooperatives	449	49,683	11	11
Saving & Loan Cooperatives	189	126,373	1	4
Housing Cooperatives	71	7,840	0	1
Manufacturing Cooperatives	65	2,946	1	0
Commercial Cooperatives	115	20,959	0	0
Transportation Cooperatives	34	2,423	0	0
Other Cooperatives	4	237	0	0

Source : Sección de Evaluación y estadística, INACOP

Table A.3.3.6-3 Agricultural Cooperatives in Guatemala

Items	Unit	Whole Country	Jutiapa	Jalapa
No. of Agricultural Cooperatives	No.	449	11	11
No. of Members	person	49,683	2,312	423

Source: INACOP Region Office

Table A.3.3.6-4 Existing Cooperatives in Region VI

Cooperative Name	No of Associated	Location
Brisas de Alutate R. L	68	Villa San Yoyo, Jalapa
Unión Duraznito R. L	58	Villa Duraznito, Jalapa
Flor Blanca Carrizalence R. L	36	Villa San Jasé Carrizal, Jalapa
Esperanza del Futuro R. L	39	Villa Rodeo, Jalapa
Los Brisos R. L	42	Matasquescuintla, Jalapa
La Corona R. L	41	Villa Miramundo, Jalapa
Antuta R. L	21	Jalapa
Evaydeé Sandoval R. L	22	San Pedro Pinula, Jalapa
El Recuerdo R. L	30	San Pedro Pinula, Jalapa
Reina Pocomán R. L	45	San Luis Jilotepeque, Jalapa
Monjas R. L	21	Monjas, Jalapa
Renacimiento "59" R. L	134	Atescatempa, Jutiapa
Ujiapa R. L	28	Asunción Mita, Jutiapa
Atescatel R. L	60	Atescatempa, Jutiapa
Esperanza "2,000" R. L	39	Santa Catarina Mita, Jutiapa
Joventud Rayos del sol R. L	39	El Peñón, Jutiapa
Amistad de Potrero Grande R. L	25	Aldea Potrero Grande, Jutiapa
Unión Sampedrana R. L	65	Conguaco, Jutiapa
San Antonio de Padúa R. L	27	Jalpatagua, Jutiapa
San Juan Bautista R. L	45	Moyuta, Jutiapa
Cuna del sol R. L	1,800	Jutiapa
Jalpatagua R. L	50	Jalpatagua, Jutiapa

Source: INACOP Region Office



Table A.3.3.6-5 Interview Survey for Cooperatives in Monjas Area

Questions	Answers	Persons	%
Do you belong to Agricultural Cooperatives?	Yes	41	63
	Yes, but past	11	17
	No	13	20
	Total	65	100
What kind of organization?	Cooperatives.	20	31
	Association	1	2
	Committee	3	4
	Not particular	41	63
	Total	65	100
Is there any benefit through organization?	Yes	17	26
	Yes, but a little	4	6
	No	3	5
	Not particular	41	63
	Total	65	100
What was the reason to terminate the membership of the organization?	Unstable management	4	6
	Not beneficial	1	2
	Independent is better	6	9
	Not particular	54	83
	Total	65	100

### 3.4 Existing Irrigation Facilities

Table A.3.4-1 Water Use at Hoyo Irrigation Project Area

Fig. A.3.4-1 Water Level of Hoyo Lake

Table A.3.4-1 Water Use at Hoyo Irrigation Project Area

	1986												Total Average (10 <sup>3</sup> m <sup>3</sup> )
	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	
1) Irrigation Water Demand (10 <sup>3</sup> m <sup>3</sup> )	190	553	893	549	177	34	-	-	-	-	-	-	2,3996
• Pump Running Hours (3 unit total hours)	514	1,093	1,091	1,110	984	337	-	-	-	-	-	-	5,129
• Running Day	19	26	24	23	27	11	-	-	-	-	-	-	mean 22
• Average Running Hour	9.0	14.0	15.2	16.1	12.1	10.2	-	-	-	-	-	-	mean 13
• Release from Laguna de Hoyo (Daily Average l/s)	114.9	175.2	189.4	200.1	151.8	127.6	-	-	-	-	-	-	mean l/s 160
2) Release (10 <sup>3</sup> m <sup>3</sup> )	189	393	393	400	354	121	-	-	-	-	-	-	1,850
QP # 100 1/	207	432	432	440	389	133	-	-	-	-	-	-	2,220
QP # 120 2/													

1/; Actual pumping capacity

2/; Designed pumping capacity

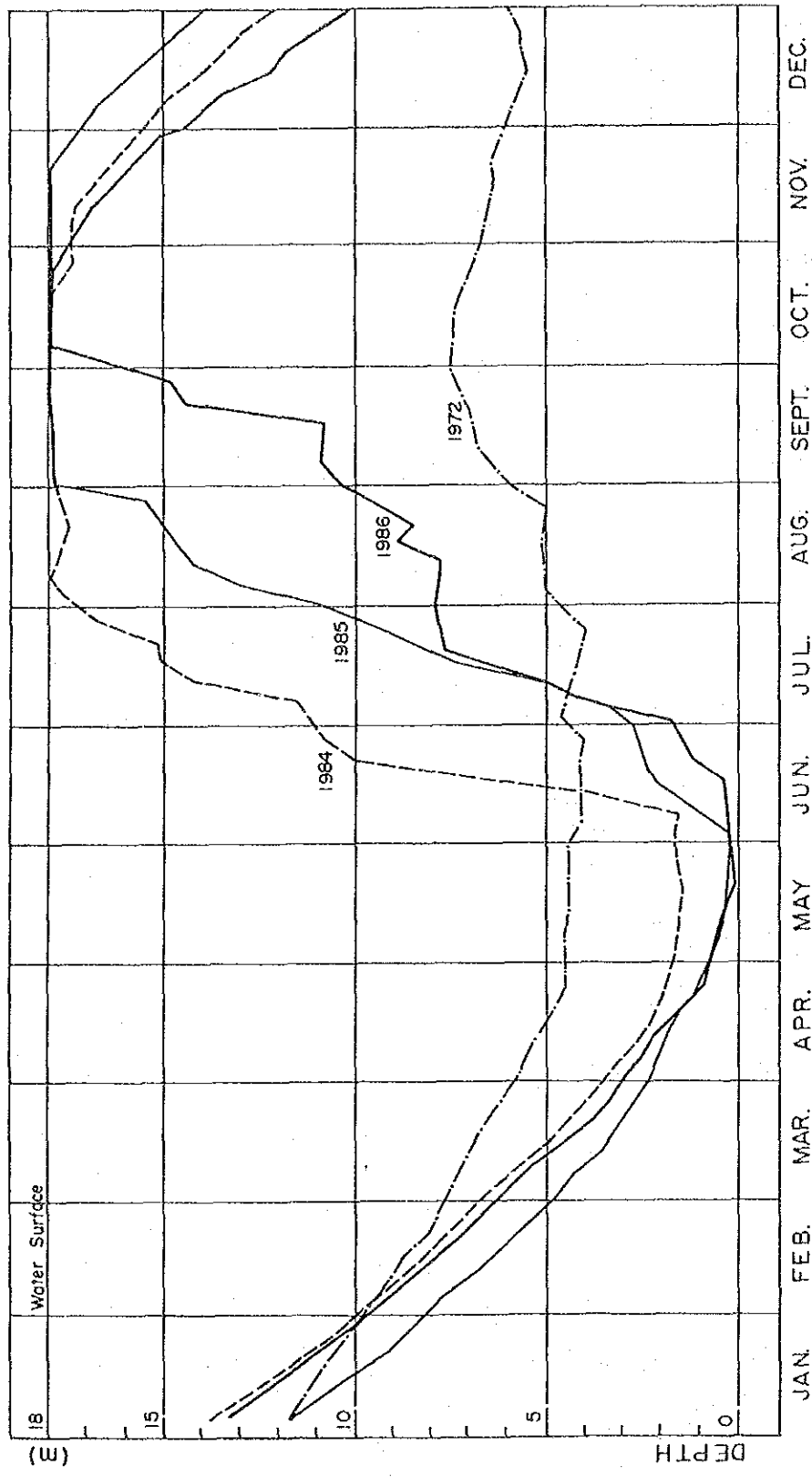


Fig. A.3.4-1 Water Level of Hoyo Lake



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