

## Chapter IV

### Study site

#### 4.1 Study area overview

Tra Vinh province has 2,369,000 ha of the natural land with population of about 969,000, the north has borders with Vinh Long province, the east-north and south-east border with part of the Mekong river, the south borders with the Pacific while the south-west and the north-west border with Soc Trang province (Map of Vietnam, 2002).

Tra Vinh province in the Mekong Delta has two typical agroecosystems: favorable zone of irrigated land and unfavorable zone of partially irrigated. The favorable zone of irrigated land in Tra Vinh province and the Mekong Delta has developed intensive agriculture but the unfavorable zone of partially irrigated area has many problems for agricultural development. Bong (1998) recorded that rice grown under irrigation yields of 6 to 7 tons/ha in the dry season and 4 to 5 tons/ha in the wet season. Under partially irrigated lowland conditions yields of 2 to 4 tons/ha were obtained.

The living standard of rice farmers under partially irrigated lowland conditions are not improved yet. Their production were still facing many risks; the impacts of their farming activities on the environment were not clearly known. Specially, in the area where ethnic Khmer communities are settled most of them were living below the poverty line, malnutrition, and poor sanitation (District Statistic Department, 2002).

#### 4.2 Description of the study area

Dai An village was in the partially irrigated lowland area of Tra Vinh province. Total population was 8,709 persons belonging to 1,700 rural households.

Population has three ethnic groups namely: Khmer ethnic group occupied about 80 percent, 10 percent were Chinese and 10 percent were Vietnamese. More than 80 percent of the population in Dai An district depended on agriculture. Dai An village had four mainly farming systems: (1) Traditional rice (rice monoculture); (2) Modern rice – traditional rice; (3) Mung bean – traditional rice; and (4) Taro – traditional rice (De, 2000).

Most agricultural areas were planted to mono traditional rice. But the system had been changed gradually due to changes in production technology, policy, markets, and so on. Agricultural development of Dai An village was evaluated, that was very slow when it was compared with neighboring villages or other provinces in the Mekong Delta of Vietnam.

#### 4.2.1 The rainfall

Yearly rainy season begins on April and finishes on January of next year, but the major rainy season concentrates from May to October, while speaking of rainfall falls down on July at about 400mm (figure 4.1). Total annual rainfall was about 1,500-2,000 mm.

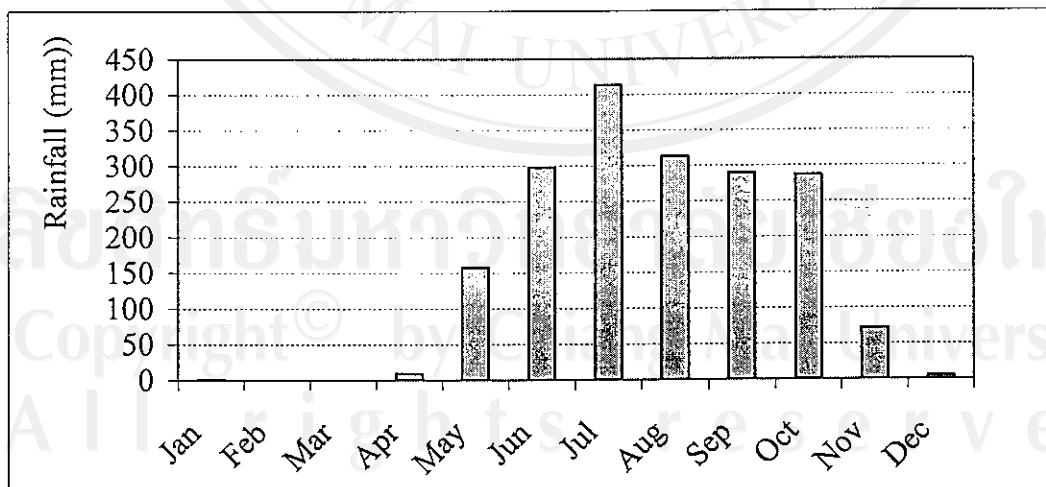


Figure 4.1 Rainfall distribution in the Tra Cu district, Tra Vinh province

Source: IPGRI- In Situ project, 2000

#### 4.2.2 The intrusion of seawater

Time intrusion of seawater annually was very important factor, which affect directly on growth season in Dai An village. Salinity effect from January to June was one of the key problems for agriculture with maximum level of 2 percent on middle February (Figure 4.2).

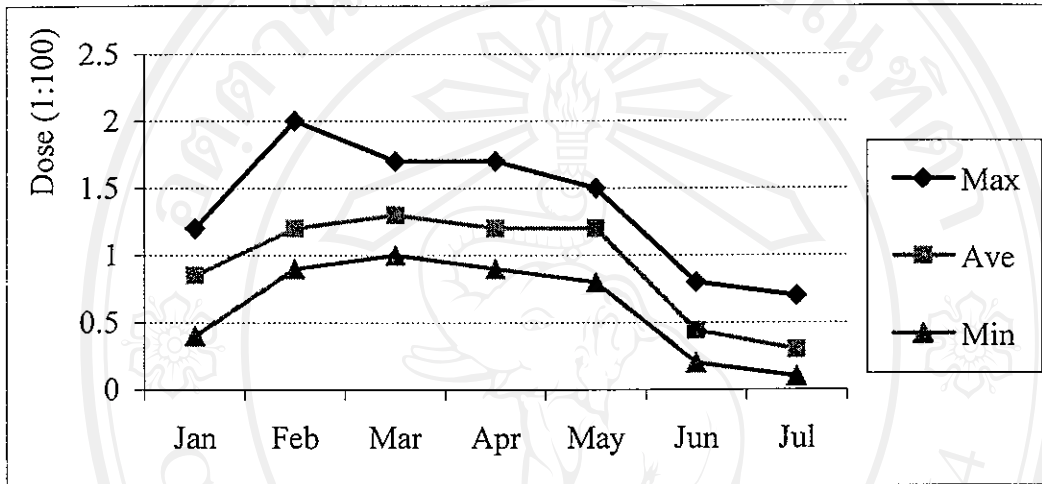


Figure 4.2 Salinity condition measured in the nearby canal Tra Cu District, Tra Vinh  
2000

Source: IPGRI- In Situ project, 2000

#### 4.2.3 Soil types

The soil of Dai An village was classified into three main groups: (1) sandy ridge soils; (2) saline-alluvial soils and (3) saline-acid sulfate soils, and three major topography groups: top of sand ridge, along the sand ridge side and between sand ridges (De, 2000).

#### 4.2.4 Socio-economic characteristics

Dai An village is an agricultural village, over 80 percent of the population were dependent on the agricultural sector, and was evaluated low developed economical and social. High population growth rate was about 2.5 percent per year,

average member in a household about 6.5 persons. Dai An was a poor village, income per capita was low less than \$ 150 per year. Earning less than 90,000 VND/person/month occupy about 22.6 percent, earning less than 60,000 VND/person/month were 7.8 percent (De, 2000). Dai An village has been evaluated poor and low developing village with income per capita less than \$ 150 per year (Provincial Statistic Department, 2000).

Instable employment, demand for labor was limited even in the high season, and on average, a person can expect to work only 10-15 days in a month, for between 10,000VND and 30,000VND per day. In the season of low labor demanded, both the numbers of days working and daily wage were lower (Provincial Statistic Department, 2000).

About cultivation of village, average farm size was 1.06 ha/household in which 66 percent of were affected by saline water in the dry season. More than 20 percent farmers were land-less, they could not get enough food to eat because they were low knowledge and lack education. Table 4.1 showed us to see about 19 percent of the population were illiteracy, elementary was 35 percent, secondary school was 29 percent, High school was 5,6 percent and University /college was 2 percent (De, 2000). They could not get stable job and low swages as above mentioned and access to health and education, sanitary, or even clean water, was limited.

Table 4.1 Education present of population

Illiteracy	Elementary	Secondary school	High school	University or college	Others
19%	35%	29%	5,6%	2%	0%

Source: De, 2000

### 4.3 Rice production in the Dai An village

Dai An village remained with single rice crop with traditional rice due to salinity problem. Main rainy season crop with traditional rice was still the important crop. Dry season crop often faces serious risks in this village. Rice production was mostly cultivated in soil group 3-2 and completely depended on the rain. Mung bean and taro were grown in soil group 1 and 2, a greater part depend on artificial well systems and a little part on the rain (Provincial Statistic Department, 2000).

Single rice crop: Traditional rice was dominant with about more than 20 different varieties. Trang Tep, Keo Xiem, Tai Nguyen were the popular ones among them. Besides, some traditional rice varieties were grown in commune as Trang Lun, Troi Bien, and etc (Table 4.2).

Table 4.2 Popular traditional rice varieties in Dai An village

No.	Name of traditional rice variety (in Vietnamese)	Characteristic				
		Yield (ton/ha)	Quality grain	Flowering time	Salinity tolerance	Drought tolerance
1	Trang Tep	3 - 5	High	Dec	Normal	Low
2	Trang Lun	3 - 5	Normal	Dec	Normal	Normal
3	Troi Bien	3.5 - 5.2	Low	Nov	High	Normal
4	Mot Bui	2.5 - 4.5	Normal	Dec	High	Normal
5	Den Bui	3 - 4.5	Normal	Nov - Dec	Normal	Normal
6	Keo Xiem	2.8 - 4.5	Normal	Nov - Dec	Normal	Normal
7	Tai Nguyen	3 - 5	High	Dec	Low	Low
8	Tay Lieu	3 - 5	Normal	Nov - Dec	Normal	Normal
9	Nep Than	1.5 - 3	High	Oct - Nov	Low	Normal
10	Nep Do	2 - 3.5	Normal	Nov	Low	Normal
11	Mot Tep	3.5 - 4.5	Normal	Nov	Low	Normal
12	Lua Phi	3 - 4	High	Nov - Dec	Normal	Normal
13	Lua Den	2.5 - 4	Normal	Nov - Dec	High	Low
14	Trang Chum	3 - 4	Normal	Nov - Dec	Normal	High

Source: IPGRI- In Situ project, 2000

Double rice crops: There was only 10 percent of rice land cultivating with 2 rice crops per year. High yielding rice was grown in some areas where water level was not over 40 cm. First crop was short duration modern rice varieties followed by local traditional rice or even high yielding rice varieties (De, 2000). Popular modern rice varieties were grown in Dai An village as MTL 232, OM 1490, and etc (Table 4.3).

Table 4.3 Popular traditional rice varieties in Dai An village

No.	Name of rice variety (in Vietnamese)	Characteristic				
		Yield (ton/ha)	Quality grain	Growth stage (day)	Salinity tolerance	Drought tolerance
1	MTL 232	3 - 6	High	90 - 95	Low	Normal
2	OM 1490	3 - 5	Normal	85 - 90	Low	Low
3	Cuu Long 8	2.5 - 4.5	Low	90 - 95	Normal	Normal
4	IR 4504	3 - 4.5	Low	85 - 90	Normal	Normal
5	MTL 250	4 - 5	High	90 - 95	Low	Normal
6	Ham Trau	3 - 6	Low	95 - 105	Normal	Normal

Source: IPGRI- In Situ project, 2000

#### 4.4 Four major rice based cropping systems in partially irrigated area

##### 4.4.1 Mono traditional rice production system

In period 1975 – 1985, the most of farmers used to two times transplanted method for their farm. That was evaluated less efficiency because it had to spend so much human labor on the field and high input costs for the transplanting. The method was practiced followed some steps as:

**Seedbed stage:** After seeds were planted and taken care about 30-40days, seedlings were transplanted into nursery field.

**Nursery field stage:** the nursery field occupies about one-fifth of the production area. The seedlings were transplanted and maintained in the nursery field about 40 – 50 days before transplanted into production field.

**Production field stage:** Production field were transplanted from July to august yearly and harvested from November to January of next year. That processing depends on transplanted time and used the kinds of traditional rice varieties by farmers.

In period 1986-2000: farmers begun to substitute two times transplant method to one time transplanted method. The method, seedlings have been directly transplanted from seedbed to the production field and without nursery field stage. The time transplanted method was evaluated higher efficiencies than the two time transplanted method about saved human labors, decreased input costs and less cropping dangerous on the field because if the rice standing longer time on the field that would meet higher dangerous than shorter time. Traditional rice were planted on early June and harvested on November to January of next year (Figure 4.3).

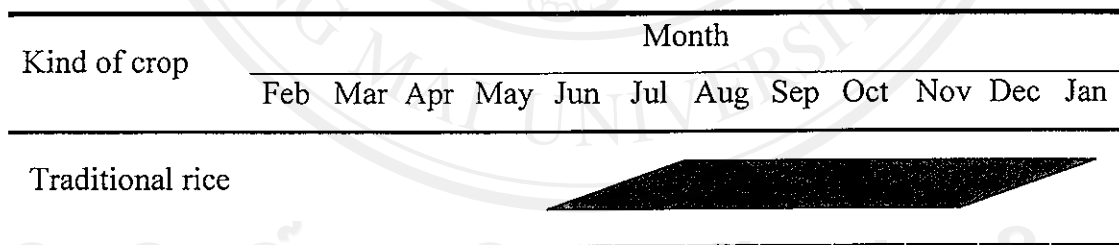


Figure 4.3 Cropping calendar of mono traditional rice system

**4.4.2 Modern rice - traditional rice production system**

The traditional rice in the modern rice – traditional system also happens the same way with traditional rice in the traditional rice system after harvesting modern rice. Modern rice production of community was begun about 1986 to today (District Statistic Department, 2000).

Modern rice were planted when rainy season come of yearly, but some farms can assess the water from irrigation system that can grow the modern rice on early April and expand to may for water less assessing farms from irrigation systems and harvested on July to August. After harvested modern rice, the farmers begun to transplant traditional rice on July to August and finally harvested on January of next year (figure 4.4).

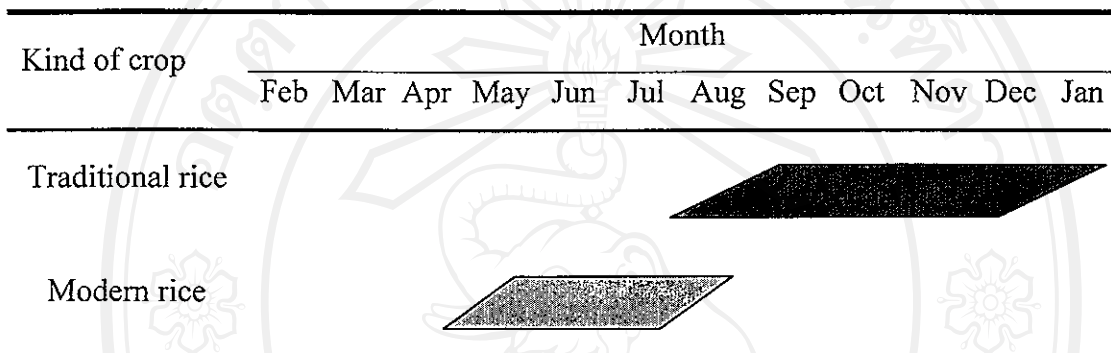


Figure 4.4 Cropping calendar of modern rice - traditional rice system

Modern rice has been planted the following of cropping structural shifting policy of government based on an improving irrigation system of region. In the favorable regions (irrigated system area), strongly have developed greater than 50 percent in intensification crops for the rice in modern rice. But in the unfavorable regions (fresh water shortage for agricultural production) especially in the study area substitutes multiple crops for mono cultivation that have happened very lowly because farmers living in the unfavorable region, they were very poorly, lack of monetary for the investing, lack of the knowledge for applying new technologies, misusing fertilizers, pesticides, and so on (survey, 2003)

In the initiative time, farmers used direct wet seeding method after seeds were treated and germinated. This method was evaluated very dangerous the rice field in the unfavorable region with so many instable natural conditions as drought, lack of freshwater and so on (IRRI, 1997; Xuan, 1997). After, farmers using direct dry seeding method or planting with using new technologies for rice production, results of apply new technologies were rice yield increasing from 1.5 ton/ha in 1986 to 3.3



ton/ha in 2000 (survey, 2003). Because this method, farmers have used fresh water more efficiency than direct wet seeding method (IRRI, 1997).

#### 4.4.3 Mung bean- traditional rice production system

In the art of sustainable agricultural development policy, local government stimulated farmers to substitute mono cultivation by multiple crops with legume crops for improving their field, decreasing synthetic fertilizer in the cropping production. Mung bean was early planted in Dai An village but it does not expand yet with larger area, because farmers lack of technologies and natural condition problems.

Mung bean was grown after harvested traditional rice when humid was remained on soil at high value. Mung bean was begun on January and finished on June. Mung bean farms assessed the differently water resources as: irrigation systems, wells. Especially, well water was the major water resource to supporting of the mung bean development of region more than the water of irrigation systems. Traditional rice season was begun following mung bean season on June and finished on January of next year (Figure 4.5).

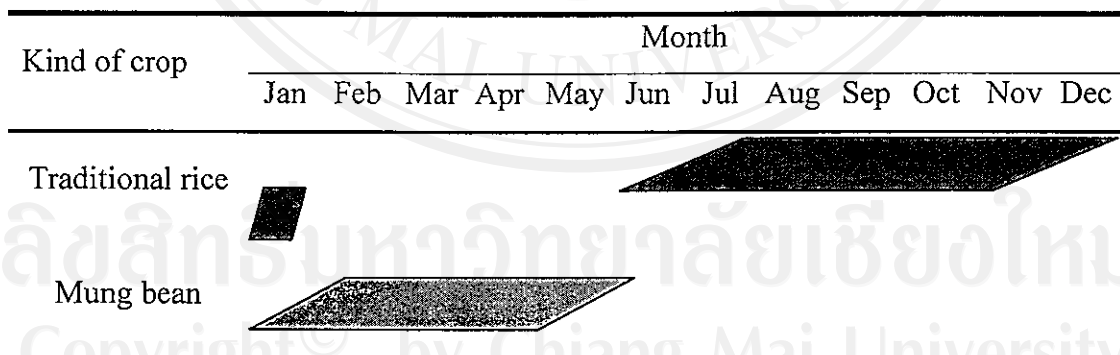


Figure 4.5 Cropping calendar of mung bean- traditional rice system

#### 4.4.4 Taro - traditional rice production system

The taro has high economic potential and good growth in the local condition (light soil texture). The taro was evaluated as crop for alleviate hunger and reduce poverty of village. But this crop has to need so high inputs as: labors, fertilizers, high

technique, and seed cost that were main problems to limit the expanding larger area in Dai An village (survey result 2003).

As the mung bean, taro was planted on area that can access the fresh water from wells. Farmers begin to grow the taro on January to March and harvest on May to August. After harvest taro, traditional rice were planted on July and finished on January of next year (figure 4.6).

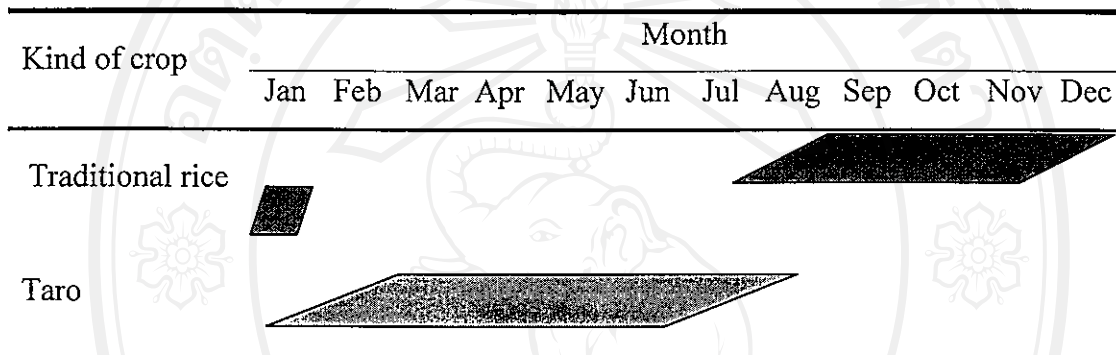


Figure 4.6 Cropping calendar of taro - traditional rice system

#### 4.5 Examples of farmer typology of rice-based farming systems in Dai An village

##### 4.5.1 Mono traditional rice system

Thach Duc, a 48-year-old farmer, has had experiences in traditional rice production for 27 years and his household was a successful farm in region more than 10 years ago. He said the traditional rice system that was higher suitable for his family than other double crops because this system was less investment about production cost and labor. Although income was smaller and unstable than double crops he accepted because of his large farm of 1.2 ha. Besides, his annual income was enough for food security and welfare for his family from rice product.

Tran Van Trieu was born 1962; His rice production experience was more than 22 years; His family had 6 members with 4 of them main labor. His farm was a small farm of 0.6 ha, annual income was not enough to take care family. He said that he

intended to produce double crops, but his farm met some problems such as: intrusion of seawater in the dry season, flood prone in the rain season, without irrigation systems and the dyke to prevent the intrusion of seawater on the dry season.

#### **4.5.2 Modern rice - traditional system**

Tran Ni, 55-year-old farmer, had in traditional rice production for 32 years and in modern rice for 12 years, was a successful farmer in the modern rice production. He said that the modern rice yield was unstable between different farms, depended on natural condition and time access the water in irrigation system of field. Last time, his modern rice yield varied between 2.5 and 3 for 4 consecutive years of the accessing water of the irrigation system because the modern rice would meet more damage such as high salt dose under soil, weed, pest, water management, and so on.

Son Phen was born in 1936, begun the rice production in 1967. His household was normal farm of 1.0 ha and large family with 6 members working in the agriculture. First time, he grew a modern rice in 1995, met the similar problems as Tran Ni farmer but he realized that new technology was very important factor to decide a success of farm. New technology would help him to control weed, pest and water management and especially, the reduction of salt dose in soil by the water of the irrigation system and rainwater and got a success in the modern rice production in commune.

#### **4.5.3 Mung bean - traditional system**

Tram Thi Duyen was born in 1955 with the agricultural production for 25 years and 9 years in the mung bean production, her farm was small farm of 0.4 ha. She said that the mung bean grew faster than other on the water shortage conditions of farm in the dry season, improved soil nutrient for her farm. Especially, mung bean helped her family to get more income than single rice and employment for farm households on the dry season when water resource is limited, while traditional rice was also stable about yield and price of products.

Tran Sang was born 1946, was largest farm of 3.2 ha and 9 members in the family. He begun the agricultural production in 1968 with 3.2 ha that was used for planting traditional rice and 60 percent of them for the growing mung bean in the dry season. His farm was evaluated successful farm in commune about yield and experience. As his experience, he said that traditional rice was very sustainable about yield and price of products if it was compared with other crop such as unstable yield of modern rice, high input of taro crop. Besides, mung bean was good cropping for the improved his family income on dry season.

#### **4.5.4 Taro - traditional system**

Tran Sang, 64-year-old farmer, was smallest farm of 0.2 ha. Income was important factor for food security of family, he said. Because a taro crop is higher economic than different crops, was evaluated stable crop under changing of natural conditions as: drought on the dry season and flood prone on the rainy season. He also identified that taro could not miss for the smallest farms of commune and his family because this crop was very necessary crop to improve income.

Tang Con, 54-year-old farmer, had 25 years experiences in the traditional rice and 15 years in taro production with 0.7 ha of farm size. He said that yield and price of taro products was also decision reason for him to grow taro and traditional rice.