

CHAPTER 3

BIOPHYSICAL CONDITIONS AND AGRICULTURE PRODUCTION OF THE STUDY AREAS

3.1 Physical Condition of Chiang Mai Province

3.1.1 Location and Topography

The study area is located in the northern region of Thailand. Chiang Mai province is administratively divided into 22 districts: Muang, Chiang Dao, Chom Thong, Doi Saket, Doi Tao, Fang, Hang Dong, Hot, Mae Ai, Mae Chaem, Mae Rim, Mae Taeng, Omkoi, Phrao, Samoeng, San Kamphaeng, San Pa Tong, San Sai, Saraphi, Wiang Haeng, Chai Prakan and Mae Wang (Figure 3.1).

Chiang Mai province is located between 17 – 21 latitude north and 98 – 99 longitude east. It is 310 meters (1,027 feet) above sea level. The widest point of the province is 136 kms. (85 miles), and the longest is 320 kms. (200 miles) with an area of 20,107.1 square kilometers or 12,566,910.63 rai.

To the north, a 277 kms. (141.82 miles) stretch of mountains divides Chiang Mai's northern districts of Fang and Mae Ai from Myanmar's Chiang Tung (Shan) State. In certain areas, the Kok River also acts as a border between Chiang Mai and Myanmar. On the east, Chiang Mai is bordered by the Chiang Rai, Lamphun, and Lamphun provinces. The Mae Tuen River, Ream Mountain, and Luang Mountain separate Chiang Mai's South from the province of Tak. Some portions of Chiang Mai's south also border the Lamphun province. To the west, Chiang Mai is bordered by Mae Hong Son province (Figure 3.1).



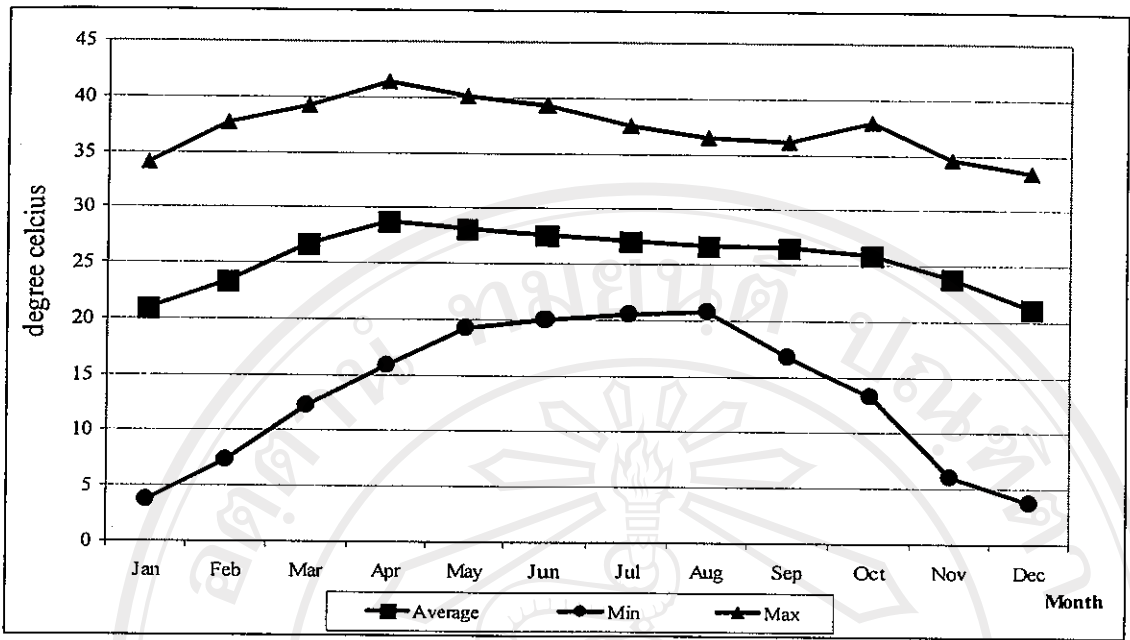
Figure 3.1 Map of Chiang Mai province

In San Sai district, it is located about 300 – 947 meters above sea level with the total area of 198,762 rai. The area mostly is lowland that consists of the area along Ping river and the Kow river. On the north, San Sai district is bordered by Mae Taeng district. At the east is adjacent with Doi Saket district. On the south of San Sai district is bordered by Mae Rim and Muang district. On the west, San Sai district is bordered by San Kum Paeng district.

3.1.2 Climate

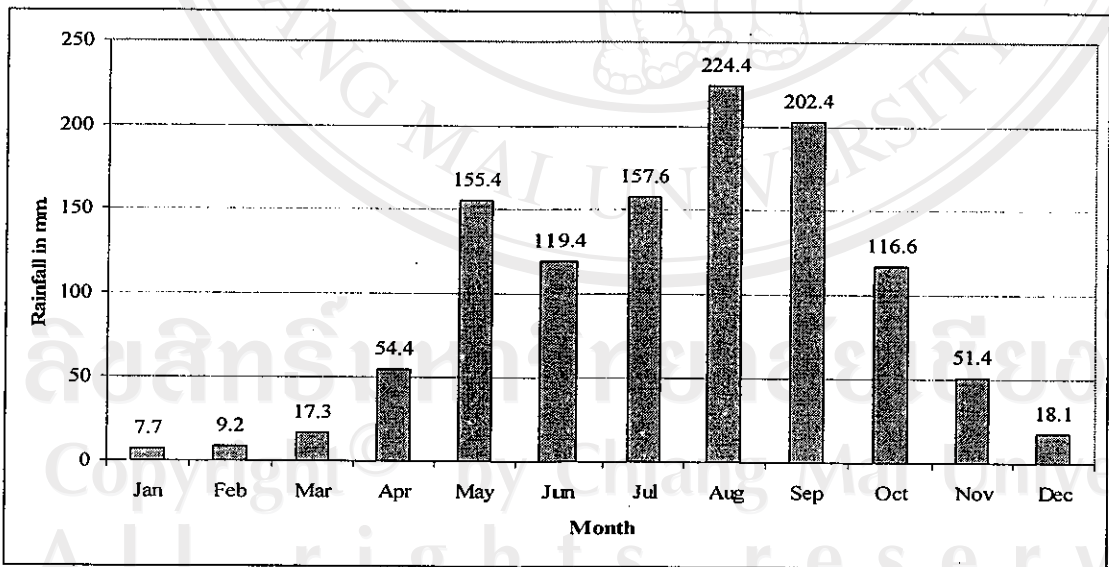
Agro-climatically, Chiang Mai is located in a monsoon region that is characterized by three distinct seasons: cool, hot and rainy seasons. From late October to end of February is cool season with, average temperature of 21°C and much cooler at night. The coldest months are December and January. Early March to end of May is hot season with average temperature of 29.9 °C. The hottest month is April. From early June to end of October is rainy season with average temperature of 25.5 °C. The wettest month is September. Figure 3.2 demonstrate the distribution of temperature in a year which shows average, maximization and minimization of temperature in each month of the year.

According to the seasonal distribution of rainfall, precipitation increases from May to October and is mainly concentrated in the month of June to October (Figure 3.3). The total annual rainfall is 1,134 mm. The highest of precipitation is in the month of August when accumulated rainfall is average at about 224 mm.



Source: Thai Meteorological Department, 2003

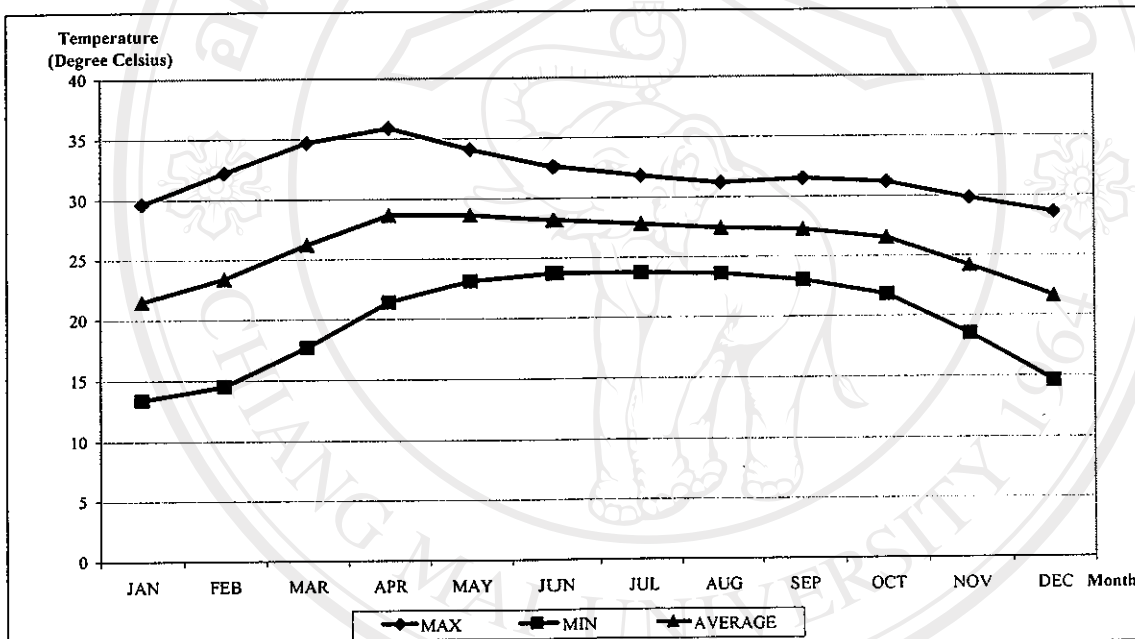
Figure 3.2 Distribution of monthly average temperature in Chiang Mai province



Source: Thai Meteorological Department, 2003

Figure 3.3 Distribution of monthly average rainfall in Chiang Mai province

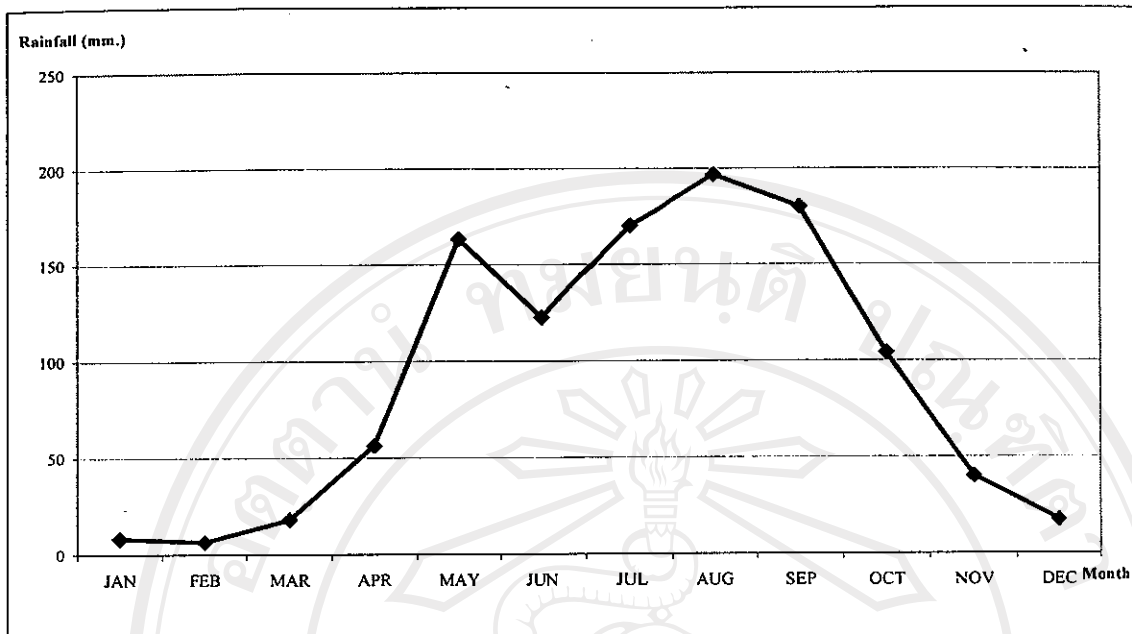
The weather data of San Sai district was discussed by using the distribution of temperature and the precipitation distribution. Figure 3.4 demonstrates the average, maximization and minimization of temperature in each month by using 30 years weather data of Sai Sai district. Maximize of average temperature was 28.65 °C at month of April. The coldest of average temperature was the month of January, 21.5 °C.



Source: Meteorological Department of Mae Jo, San Sai district, 2002

Figure 3.4 Distribution of temperature by using 30 years (year 1972 – 2001) of weather data in San Sai district, Chiang Mai province

Figure 3.5 shows the precipitation distribution of rainfall by using 30 years of weather data of San Sai district, Chiang Mai province. The average precipitation of rain fall in each month demonstrates that they are high during the months of May to September.



Source: Meteorological Department of Mae Jo, Sai Sai district, 2002

Figure 3.5 Distribution of precipitation by using 30 years (1972-2001) of weather data in San Sai district, Chiang Mai province

3.1.3 Soil

Chiang Mai is very mountainous with many valleys and there are also large flat plains along the central region of the province. The valleys along the banks of the rivers and the plains on the foothills of the mountains spread out in oblong shapes stretching from the north to the south. They are plains of the Ping River, the plains of the Fang River and the plains of the Ngad River. These lands are fertile and suitable for cultivation. The major function of the soil is to provide a reservoir for plant water and nutrients in agriculture cultivation. The supply of water and nutrients influences the expansion rate of the growing organs and ultimately their economic yield. Soil series are different in their capacity to hold water and nutrients that significantly determine crop growth. Table 3.1 shows the areas of major soil series in Chiang Mai

province that Hang Dong series are topmost area of soil series in Chiang Mai with approximately 399,004 rai.

Table 3.1 The areas of major soil type in Chiang Mai province

Symbols	Name	Area (rai)
SC	Slope Complex	10,765,558.12
Hd	Hang Dong series	399,004.16
Mr-C	Mae Rim series, rolling phase	250,813.06
Mr-B	Mae Rim series, undulating phase	216,876.58
AC	Alluvial Complex	195,037.86
Ty/Ly	Tha Yang/Lad Ya association	185,308.17
As-pd	Alluvial Soils poorly drained	171,286.82
Ty	Tha Yang series	153,011.97
Hc-B	Hang Chat series, undulating phase	148,739.54
Pc-B	Pak Chong series, undulating phase	119,266.40
Dp-C	Doi Pui series, rolling phase	112,015.83
Sai	San Sai series	102,018.41
River	River, Canal, Lake or pond, intermittent pond & wet spot, swamps	83,997.86
Mt-B	Mae Tang, undulating phase	73,932.63
GrRL	Granite Rock Land	72,626.66
Pc-C	Pak Chong, rolling phase	63,462.71
Kt/Sp	Korat/San Pa Tong association	54,626.34
Cr	Chiang Rai Series	42,434.60
Kt	Korat series	41,002.79
Ng	Nam Phong series	40,423.44
Lp/Sai	Lampang/San Sai association	36,458.54
Nm	Nong Mot series	34,603.74
LsRL	Limestone Rock Land	29,307.80
Tm/Sa	Tha Muang/Sanphaya association	29,232.78
Pm	Phimai series	28,379.32
Rb	Ratchaburi series	28,017.18
Dp-D	Doi Pui series, hilling phase	26,409.33
Tm	Tha Muang series	26,289.94
Sp	San Pa Tong series	25,224.28
Tk	Takhli series	19,316.74
So	Sop Prap series	18,234.08
Sa	Sanphaya series	17,329.22
Li	Li series	16,755.07
Lp	Lampang series	15,356.18
Ms	Mae Sai series	14,873.81
GL	Gullied Land	12,770.45
GrSC	Granite derived Soil Complex	12,011.44
Ly	Lad Ya series	10,561.86
To	Tha Ta Ko series	10,307.36

Source: Crop Production Decision Support System project, 2002

Major soil series in San Sai district are Hang Dong, San Sai, Tha Yang and Nam Phong soil series. Hang Dong soil series is the highest area of 49,166,866 square meters or 30,729 rai that this soil series have the characteristic of fine sandy clay loam. It is suitable for rice cultivation. San Sai soil series area is 29,778 rai that the area is nearly Hang Dong soil series in San Sai district. Characteristic of San Sai soil series is loam or sandy loam and medium drains. Table 3.2 demonstrates the areas of soil series in San Sai district.

Table 3.2 The areas of major soil type in San Sai district

Soil Symbol	Soil Name	Area (rai)
SC	Slope Complex	75,639.10
Hd	Hang Dong series	30,729.29
Sai	San Sai series	29,777.60
Ty	Tha Yang series	12,363.93
Ng	Nam Phong series	12,288.82
Ty/Ly	Tha Yang/Lad Ya association	8,528.45
AC	Alluvial Complex	6,587.92
Sa	Sanphaya series	6,034.92
Sp	San Pa Tong series	5,712.08
Rb	Ratchaburi series	5,551.74
Mr-C	Mae Rim series, rolling phase	4,753.20
As-pd	Alluvial Soils poorly drained	4,560.08

Source: Crop Production Decision Support System project, 2002

3.1.4 Sources of Water Supply

A large part of Chiang Mai's land (69 %) is covered by mountains and forests. These generally run in a north-south pattern of the province and give birth to several streams and tributaries (such as the Mae Jam, Mae Ngud, and Mae Klang) which in turn feed important rivers and irrigation canals. Chiang Mai's largest and most important river is the Ping, which originates in the mountains of Chiang Dao and flows southward for 540 kilometers (337.5 miles) to Park Nam Poe District in Nakorn

Sawan province. In Chiang Mai's plain, fertile valley area lies along the banks of this river which are appropriate for filed crop, vegetable and also fruit tree cultivation.

The many irrigation projects were constructed to support the agricultural area. The total irrigated area of the province was 388,191 rai or 26.44 percent of total agricultural area. There are more prevalent in the lowland area. There were 569 irrigation projects in the province. The large irrigation projects with the total capacity of about 528 million cubic meters of water supply that consist of Mae Faeg, Mae Tang, Mae Ngud and Mae Klang irrigation projects. Figure 3.6 demonstrates the irrigated area of large project in Chiang Mai province. The amount of water could supply to the total area of about 423,900 rai. There are 13 medium irrigation projects that preserve total water of about 67.22 million cubic meters to irrigate about 92,990 rai. Lastly, there are 352 small irrigation projects that preserve total water of about 43.80 million cubic meters to irrigate the total area of about 415,329 rai.

In San Sai district, the water supply for agriculture in both rainy season and dry season is from Mae Ngud, Mae Faeg and Mae Klang irrigated projects. There are available irrigation canals to bring water from these mentioned irrigation projects to majority of agricultural areas of the district.

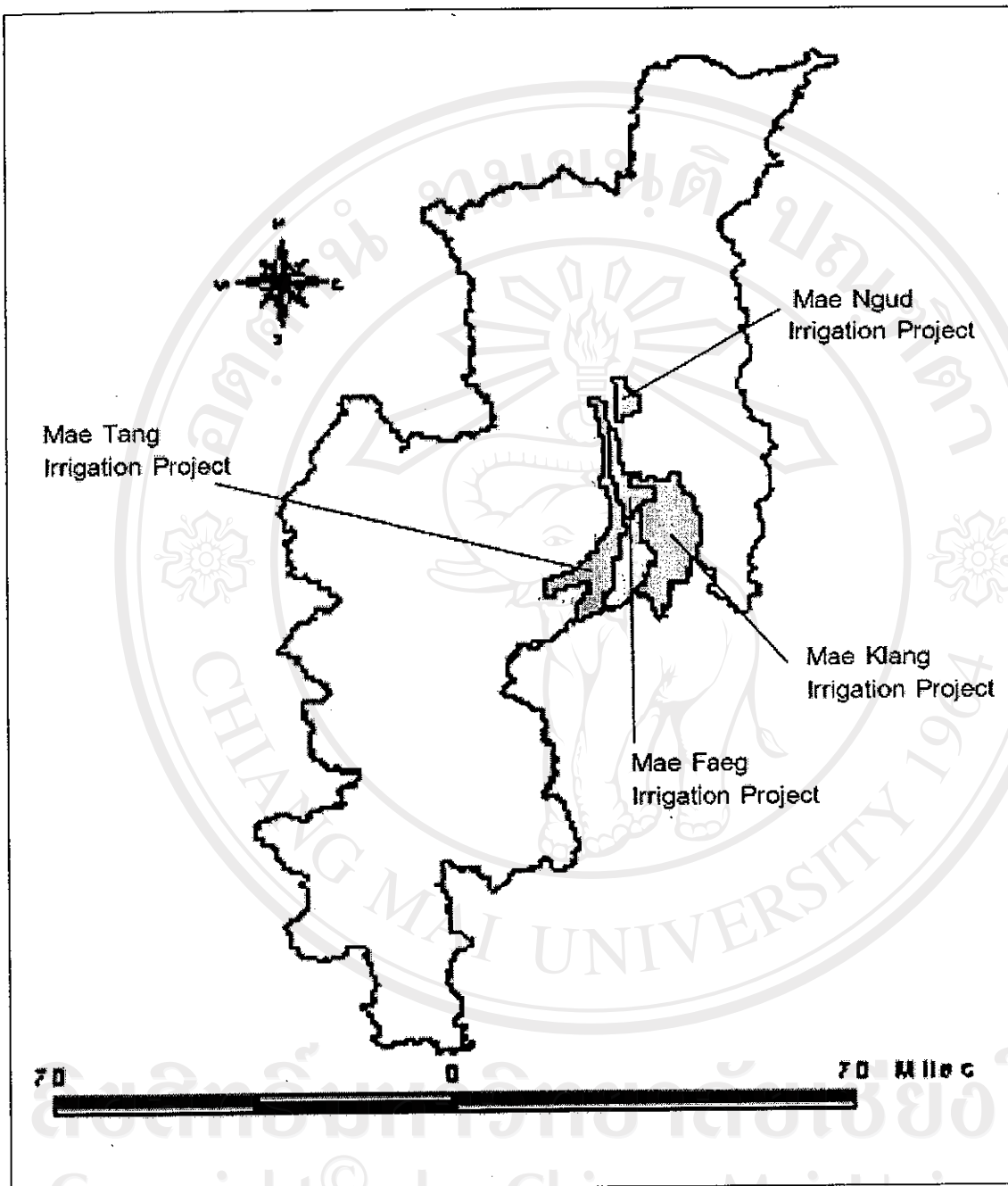


Figure 3.6 Irrigated area of large projects in Chiang Mai province

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3.2 Agriculture Production

3.2.1 Agriculture Production of Chiang Mai Province

In Chiang Mai province, the total agricultural area was 1,468,399 rai. These areas are used to produce staple crops, cash crops, fruit trees and vegetables. The important economic plants according to the planted area were rice, longan, cabbage, mango, soybean, lichee, maize, garlic, citrus, red onion, carrot, potato and onion. Table 3.3 shows planted area, average yield and total production of major crops in Chiang Mai province in crop year 2001/2002.

Table 3.3 The planted area of major crops in Chiang Mai province, crop year 2001/2002

Crop	Planted area (Rai)	Average Yield (kg./Rai)	Total Production(Tons)
Rice	585,477	639	357,631
Longan	201,589	845	115,135
Cabbage	79,990	3,412	272,069
Mango	72,997	642	33,382
Soybean	68,213	235	16,036
Lichee	54,509	623	27,864
Maize	53,745	541	28,327
Garlic	48,426	3,179	151,006
Citrus	35,752	4,238	114,195
Red onion	35,355	3,562	96,855
Carrot	27,294	2,962	80,846
Potato	22,552	2,585	58,300
Onion	19,219	3,632	36,157

Source: Agriculture office of Chiang Mai province, 2003

Base on data, the rice planted area of Chiang Mai province in crop year 2001/2002 was 585,477 rai. Farmers usually grow rice for household consumption. However, some of them grow rice as cash crop. Figure 3.7 shows distribution of the rice planted areas of Chiang Mai province. Rice growing areas are in lowland area of

Chiang Mai's flat plain especially in San Sai, Doi Saket, Hang Dong, Mae Rim, Mae Taeng, San Kamphaeng and San Pa Tong districts. These rice areas mostly are irrigated area where water supply are from Mae Ngud, Mae Faeg and Mae Klang irrigation projects which provide water supply in rainy season and dry season by irrigated project and including irrigation canals.

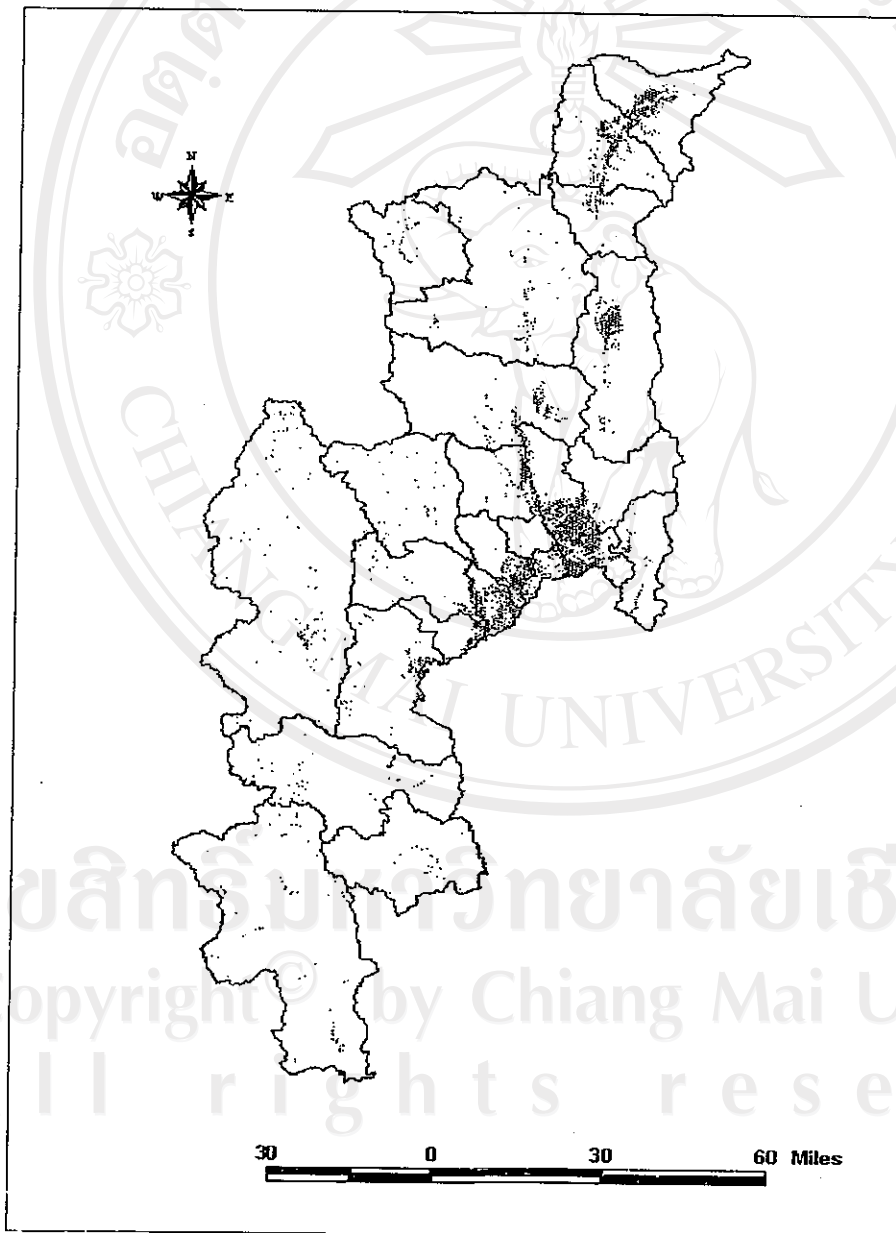
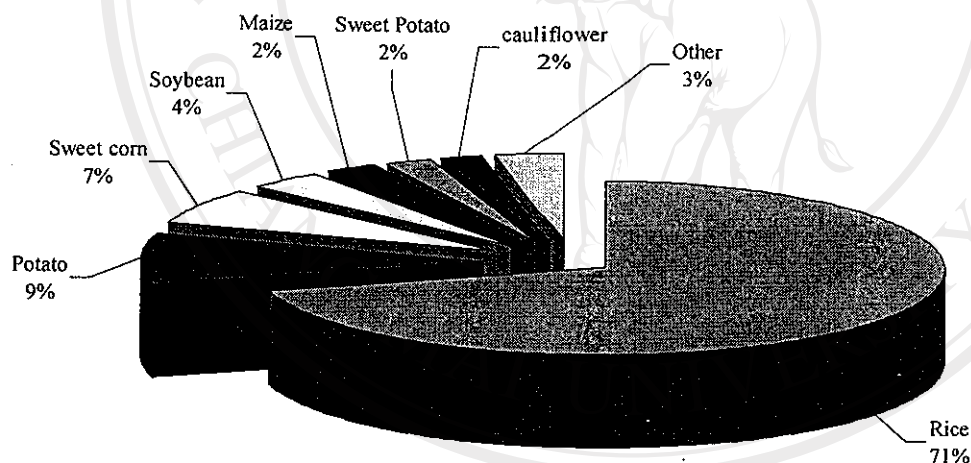


Figure 3.7 Rice planted area in Chiang Mai province

Popular rice varieties in Chiang Mai Province are RD6, RD10, SANPATONG1 and NIEW SANPATONG for glutinous rice and KAOW DAWK MALI 105 for non-glutinous rice. Total glutinous rice planted area of the province was 451,339 rai while that of non-glutinous rice was 134,697 rai (Office of agriculture economic, 2003).

3.2.2 Agriculture Production of San Sai District

In San Sai district, the main staple crop was also rice that planted area in crop year 2001/2002 was 35,518 rai or 71 % of total planted area (Figure 3.8). Potato and sweet corn were mainly cash crop planted in the dry season.



Source: Agriculture Office of San Sai district, 2003

Figure 3.8 The planted area of different crops in San Sai district, crop year 2001/2002