3. Materials and Methods

3.1 Experimental site

The study employed two main methods. Firstly, informal and formal surveys were conducted to describe cultural practices, soil conservation perception and socio-economic status of the farmers in the study areas. Formal survey was carried out in three villages, namely, Jabo, Yapanae and, Phapeuk, which located at Pangmapha subdistrict, Pangmapha District, Mae Hong Son Province. This province is remote and mountainous area situated in the west of upper northern part of Thailand. It lies between latitudes 17° 34′ N to 19° 49′ North and longitudes 97° 23′ E to 98° 40′ East (Figure 2). It is bounded by Burma to the west and the north, Chiang Mai province is to the east and Tak province is to the south. The data were gathered by interviewing 50 farmers who have ever planted upland rice. A number of 12, 24 and 14 respondents were taken at random from Phapeuk, Yapanae and Jabo, respectively. Secondly, the experiment was conducted under rainfed conditions in the farmer fields for assessing the effects of planting dates and residue management on soil erosion control. Ban Yapanae, was chosen as the site for this study. It is located about 70 km from Maehongson and 250 km from Chiangmai provinces (Figure 2). The topography of experimental area is hilly with the slope ranging from 39 % to 57 % with the elevation of 850 m asl. This area has been used for 3 to 4 years of cultivation. The farmers have adopted the conservation cropping system recommended by the Thai-German Highland Development Project (TG-HDP). The systems consist of grass strips with

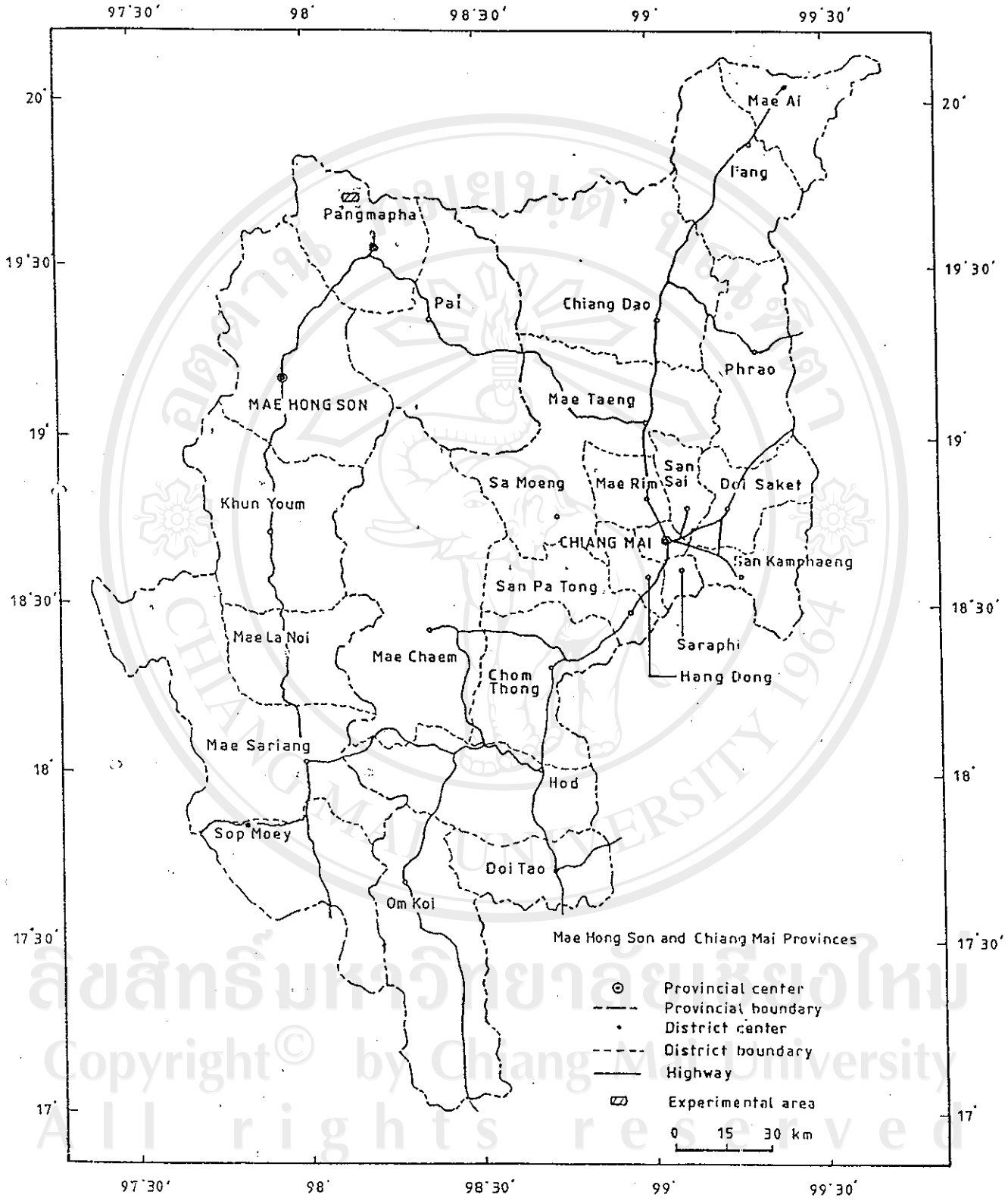

Figure 2 Map of Mae Hong Son and Chiang Mai Provinces.

alternative strips of upland rice and sequential cropping of corn/lablab or corn/red kidney bean.

3.2 Experimental Design

The experimental area was confined to the fields where dominant erosion process, sheet and rill erosion occurred. This was applied to the landscape position on the middle of slope. Fifteen farmers were selected as cooperators. Three farmers, who currently adopted the recommended TG-HDP conservation cropping system, were selected and used for intensive trials. A factorial in strip-plot design was used for this study with planting date as main plots and residue management as sub-plots. Two replications within each farmer's field were employed. Each plot size was 6 x 6 m. Plots layout and the position of intensive farmers are presented in the Appendix-A.

Two levels of planting dates :

P1 = early planting date : sowing rice at the beginning of wet season, early May

P2 = regular planting date : sowing rice at the same period as farmers, late May

Four crop residues managements :

M1 = No mulching, residue of upland rice from the previous year was removed

M2 = Mulching with residue of the upland rice from the previous year

M3 = Mulching with residue of corn and lablab relay cropping from the previous year

M4 = Mulching with residue of corn and red kidney bean relay cropping from the previous year

Upland rice was planted on the eighth day of May for early planting and on the twenty-eighth day of May for regular planting. The land was prepared by traditional tools such as hoes and spades. The sharpened spades were used for planting. Five to ten seeds were drilled 2-3 cm deep with 30 x 30 cm spacing. Weeding was done two times one and two months after planting. No chemical fertilizer was applied.

Twelve farmers' fields scattered around Ban Yapanae were selected to monitor crop cover, soil loss and cultural practices that represented existing upland rice systems.

3.3 Data Collection and Analysis

Top soil movement was measured by staking technique. In each plot, six stakes were installed to the soil with 10 cm clear above soil surface. Height of each stake was recorded every two weeks to monitor top soil loss or top soil gain. Top soil loss was also calculated by USLE model. TG-HDP meteorogical station at Jabo village, located about 5 km from experiment plots, was assumed to be a representative station for climatic data. R-subfactor was obtained from a recording raingauge installed at mentioned station. Daily rainfall was also collected by a standard raingauge at the site. Throughout the study period, ground cover percentage of mulch was recorded using the cord method (Wischmeier and Smith, 1978). The details of such method are explained in appendix C and figure C-1. Crop canopy cover was measured using one square meter quadrangle with 100 grids

made of the cords and framed by one inched PVC pipe. Ground surface cover by canopy of more than half of grid was recorded as one percent cover. The mulch and canopy cover were then used for estimating the C-factor in the USLE. The steepness and length of slope was obtained from the field. Soil samples were collected and analyzed to monitor soil erodibility. Data from soil analysis were manipulated in erodibility nomograph which was developed by Wischmeier and Smith (1978). Data from Inthapun and Boonchee (1990), were used to estimate P-value in the experimental plots where contour grass strip and strip cropping were practiced. From that study, soil loss from traditional upland rice field was 32 t/ha while upland rice with grass strips cropping resulted the soil loss of 8 t/ha. Grass strips, therefore, could reduce soil loss by 24 t/ha. Top soil loss from bare plot with up and down cultivation was recorded at 157 t/ha. Therefore, the plot of bare soil with grass strips should be assumed to have soil loss equal to 133 t/ha. The P-value of 0.85, therefore, was obtained. However, in the farmers' condition, " P " subfactor was assigned to be 1.0 because the farmers applied no conservation practices to their fields. Land and crop management, yield, weed and, pests were recorded.

Data were analyzed by using the Statistical Package for Social Scientists (SPSS), Lotus and Statistix.