MATERIALS AND METHODS

1. Methodology.

1.1 Analysis of the study area.

The Land Reform area at Ban Huai Nam Kao, Tambon Yang Kram, Amphur Chom Thong was selected for on-farm experimentation. The analysis was first based on the existing secondary information from the project documents and research papers. It was then followed by field visits and informal farmer interview.

1.2 Design of on-farm experiment.

The field survey indicated that the land form in the study area was undulating, and soybean yields varied within farm and between farms. It was then assumed that different elevation or terraces would have different moisture regimes and would lead to different soybean productivities. The environment was therefore stratified into two land types: lower terrace and upper terrace. (Appendix Table 1)

Within each stratified environment, six representative sample of farms were selected to cover a range of inherent soil fertility (Table 1). The two factors tested in each sample farms were variety and rate of fertilizer application. The plots were arranged in a randomized complete block design with two replica-

tions per farm (Figure 1). The treatment combinations were the following:

T1 : SJ 5 + no fertilizer.

T2 : SJ 5 + 1.5-4.5-3 kg/rai of $N-P_2O_5-K_2O$ fertilizer.

T3 : SJ 5 + 3-9-6 kg/rai of $N-P_2O_5-K_2O$ fertilizer.

T4 : CM 60 + no fertilizer.

T5 : CM 60 + 1.5-4.5-3 kg/rai of $N-P_2O_5-K_2O$ fertizer.

T6 : CM 60 + 3-9-6 kg/rai of $N-P_2O_5-K_2O$ fertilizer.

Table 1. Average chemical and physical properties of the surface soils on farmers' fields, at the Chom Thong LRA, Chom Thong district, Chiang Mai, 1989

Soil Character	Unit	Mean[a]	
		Lower terrace	Upper terrace
pH	-	5.29 ± 0.04	5.21 ± 0.03
Organic matter	%	0.69 ± 0.03	0.58 ± 0.01
Nitrogen	%	0.03 ± 0.00	0.02 ± 0.00
Phosphorus	ppm	21.30 ± 1.66	22.36 ± 2.18
Potassium	ppm	75.42 ± 2.80	63.33 ± 2.59
Sand	%	72.05 ± 0.73	74.17 ± 0.44
Silt	%	17.45 ± 0.45	16.33 ± 0.44
Clay	%	9.50 ± 0.34	8.83 ± 0.18

[a] average of six fields ± standard error of the mean.

T6 (V2F1)	T4 (V2F0)
T3 (V1F2)	T1 (V1F0)
T5 (V2F2)	T2 (V1F1)

REP. 1

T3 (V1F2)	T1 (V1F0)
T4 (V2F0)	T6 (V2F2)
T2 (V1F1)	T5 (V2F1)

REP. 2

Figure 1. A sample layout of a 2 x 3 factorial experiment involving two varieties (V1 = SJ 5 and V2 = CM 60), three levels of fertilizer application (F0 = no fertilizer application, F1 = 1.5-4.5-3 kg/rai of N-P_2O_5-K_2O fertilizer application and F2 = 3-9-6 kg/rai of N-P_2O_5-K_2O fertilizer application) arranged in a randomized complete block design with two replications. On-farm research, The Chom Thong LRA, Chom Thong district, Chiang Mai, 1989

Additional samples of thirty households were interviewed to determine available farm resources for soybean production in the post rainy season (Appendix Table 2).

1.3 Planting and cultural practices.

All farmers prepared their lands by hiring the tractors with rotary disc plough. The operation began from late July to early August before the onset of the heavy rain. All farmers adopted row planting technique by marking row with string with row distance ranged from 35 to 50 cm. Hill planting within row was done by hoeing with hill distance ranged from 15 to 25 cm. In the experimental plot, the planting operation was done by farmers in a similar manner as their own. Two soybean varieties, SJ 5 and CM 60 were used. Seeds were treated with rhizobial inoculum.

Weeds were controlled by first spraying with pre-emergence Alachlor at sowing followed by hand weeding 15 days after emergence. The practice was common to all farmers. The fertilizer treatment was side-banded after hand weeding. The treated fertilizer was prepared by using ammonium phosphate (16-20-0) and potassium chloride (0-0-60). Insect pests were controlled by spraying monocrotophos (Azodrin 60% WSC) with the rate of 0.06 kg a.i./rai and Supercot (trade name) with the rate of 80 ml/rai.

2. Data collection.

2.1 Physical environment.

The daily air temperature and rainfall during the 1989 growing season were collected from the Plant Propagation Centre located two kilometers from the test site.

2.2 Farmer field environment.

Before planting, the soils from 12 test sites were analysed for pH, organic matter, available N, P and K content, and soil texture. Soil moisture content at 0-20, 20-40, 40-60, and 60-80 cm depth was determined at weekly interval throughout the growing season from two repressentative farms.

2.3 Crop growth data.

Seedling emergence per square meter was counted daily from four days to ten days after planting. Plant height was measured at flowering stage. Crop phenology was recorded according to Fehr et al.,(1971). Above ground plant dry matter was determined at thirty and sixty days after emergence. Finally crop yields were measured.

2.4 Farmer monitor.

The soybean management practices of participating farmers were monitored throughout the season. In addition, thirty soybean farmers were interviewed for information related to soybean cultivation. These included farm size, planting area, labour utilization, land preparation, crop management practices, crop yield, crop price and input cost.

3. Data analysis.

The treatment effects and their range of adaptability over 12 farms were analyzed by combined analysis of variance (Gomez and Gomez, 1984). Economic analysis was analyzed by partial budgeting analysis. The varietal response to test sites was analyzed by modified stability analysis (Hilderbrand, 1984). Based on the above information, recommendation domain for soybean agronomic practice was determined.