4. MATERIALS AND METHODS

The basic study constituted the experiment at the field level, however, attention was also paid to farm and village levels as outlined in Table 2.

Table 2 Levels and issues of study

Level	Issues of study
Field	soil loss, soil moisture, soil fertility and production of peanut-soybean
Farm	labor management and household activity
Village	farmers' opinion and adoption of conservation farming

4.1 Field experiments

Farmer field trials were carried out during wet season (May to December, 1990). There were two experiments, one (Experiment I) had established leucaena hedgerows for four years on steep land with average slope of 28 percent. The other experiment (Experiment II) without leucaena hedgerows, was conducted on the field with average slope of 42 percent. Sequential cropping of peanut followed

by soybean as practiced by farmer were investigated on both fields.

Experiment I. Hedgerow intercropping leucaena with legumes.

In the early rainy season of 1990, peanut was grown in the alley field during June-August. The peanut seeds was sown on 6-7 June. The treatment combinations consisting of mulching with and without leucaena as main plots, and triple superphosphate at 0 and 56 kg P_2O_5 /ha as sub-plots, were arranged in a split plot design with three replications. The phosphate fertilizer was applied on 23 June. As the spacing between hedgerows varied from 2.50 m to 4.70 m depending on the slope, plot size of each experimental unit also varied. A minimum of 10 m^2 was used for each sub-plot.

Leucaena hedges were lopped after sowing the peanut and used as mulch. The branches were spread in the alleys after planting and the woody components were removed one week after and were placed within rows of leucaena hedges. The equal amount of leaves and small branches used as mulch were determined for fresh and dry weight and chemical composition. The subsequent lopping were done on 18 August or 73 days after planting, when farmer had competed his paddy planting.

The second season for soybean experiment was conducted during September-December. First planting date was on 6-8 September but the plant establishment was poor. The seed was resown again on 1-2 October. The treatment combinations were modified. It was observed that the farmer always applies complete fertilizer 12-24-12 at the rate of 156 kg/ha and it was anticipated that the soil phosphorus level from the first season would not be sufficient to sustain high soybean yield as phosphorus can easily be fixed as insoluble form which is unavailable to plant (Thompson et al., 1975), and the potassium level in this study area was high. So the treatments were consisted of different types of fertilizer commonly used by farmers and also that based on soil test.

Three types of fertilizer were used namely 0-46-0, 16-20-0 and 12-24-12 at the rate of 122, 281 and 234 kg/ha respectively, which had provided the phosphorus level of 56 kg P_2O_5 /ha as recommended. A control plot with no fertilizer application was also included. Based on soil analysis after harvesting peanut, it showed no different between each plot. Therefore, the fertilizer treatments were randomly arranged in experiment plot by using randomized complete block design with five replications, except for control plot was set in the same plot which did

not apply phosphate during peanut experiment. Soybean seeds were inoculated with rhizobium before sowing.

Leucaena was lopped again in October after soybean sowing to avoid shading and it was left to grow freely after soybean harvesting.

Experiment II. Field without leucaena hedgerows. The experiment was conducted on the nearby plot. The treatments and experimental design were as the same as Experiment I.

Data Collection and Analysis

Preliminary and informal appraisal of the farmer's circumstances were carried out before conducting on-farm experiment. During the experimentation, the data of daily rainfall at Ban Huay Som Sook was recorded. Soil samples at 20 cm depth at the site were taken before and after planting for analysis of pH, OM, N, P, K and Ca. Soil moisture and soil lose were monitored at two week intervals. Soil moisture at 0-10, 10-30 and 30-50 cm depth were determined by gravimetric method. Soil loss measurement was determined by staking technique whereby 30 cm iron rod was positioned and extended to 20 cm depth and the reading above ground was measured. Plant sampling of peanut crop was collected at

two stages: 45 days after planting (DAP) and at harvest for N, P and K analysis (Hiranburana, 1990). The same nutrients were analyzed in soybean plants at reproductive stage R2, R5 and final harvest. Yield and yield components of peanut and soybean were determined from 1 m^2 plot. The seed samples were also analyzed for N P and K. Leucaena leaves samples were taken for determination of biomass, N, P and K. The partial budgeting for each crop was also determined.

4.2 Evaluation of short term benefits

Labor use and cash inputs in alley and non-alley plots were recorded. Return to cash input and return to labor were analyzed.

4.3 Farmer assessment of alley cropping

Twenty households in the village including the two alley farmers and one hilltribe farmer were asked to provide the assessment of alley cropping as an approach of conservation farming practice on the steep land. Farmers' opinion and adoption were studied by using informal survey. They were analyzed by using descriptive statistics.