CHAPTER I

INTRODUCTION

The Chom Tong Land Reform Area is rainfed upland situated in the southwest of Chiang Mai in the northern Thailand, represents one of the fragile agroecosystems. With the area of 16,317 rai, the agroecosystem is typified by the degraded natural resource base with poor soil and lack of water resources (Ratanapesla, 1993). The precariously marginal conditions impair intensive annual cropping to support the livelihood of the farmers (Radanachaless and Gypmantasiri, 1991). In addition, an agroecosystem of rainfed upland is different from other areas. Thus finding the good strategies are an appropriate opportunity, management and using new cultivar plants will diminish the problem of lack of water resource. The fluctuate amount and limited time of raining must be managed to gain an advantage by finding the integrated crops, fruit trees and cattle in this area. Radanachaless (1990) accounted for 20.4% of total area was grown soybean, mungbean, peanut, baby corn and chili in the early rainy season (May-July) and 79.6% of fallow. In addition, 68.4% of total area was grown soybean, mungbean, peanut, tobacco in the late rainy season (Aug.-Nov.) and 31.6% of fallow. The economic cash crops such as peanut, soybean, mungbean, upland rice and maze were grown in this area (TAWLD, 1985). However, as a single crop, soybean is commonly cultivated during the rainy season, integrating with perennial fruit trees and annual field crop is an alternative practice for ecological recovery which intensify land use in this area (Radanachaless and Gypmantasiri, 1992). Mango, the most suitable species, was selected to integrate in existing soybean system (Radanachaless and Krasaechai, 1991a). Ratanapesla (1993) reported that in 1989/1990, the major cropping systems inside rainfed upland area were tobacco monocrop, soybean monocrop, soybean-tobacco, soybean-mango, tobacco-mango and tobacco-tomato-mango cropping systems. In addition, most of the cultivated land was utilized for soybean, tobacco and mango production and the rest was used for peanut,

mungbean, rice, tomato, roselle, longan and other annual crops (Rodpradub, 1997). According to the recommendation of Ratanapesla (1993) the allocated 5 rais land should be managed as 3 rais for soybean-mango and 2 rais for soybean monocropping. However, the crops should have drought tolerance, the income of farmers can be obtained from main crops in such fruit trees, while minor crops are also cash crops couple with cattle. In addition, living beings of the integrated farming system supplement each other. The farmers are center, which can early earn money in the first year, sustainable income and natural resources including environment improved. The role of community should be continuously regarded (Radanachaless *et al.*, 1999).

Mango cv. Kaew is the most promising fruit crop, and traditionally grown by the upland farmers in that area (Radanachaless and Krasaechai, 1991a). But the initial establishment of mango cv. Kaew had serious problems of weed interference due to grass and broadleaved weeds which residue became the source of fire during the dry season. Fire considered as a potential source hazard that causes severe damage on fruit trees almost every year. In addition, the farmers have solved the problems of weed interference previously in dry season by cutting, tillage, applying chemicals etc. These practices not only cost high but also affect on sound environment systems like soil erosion exhaustion.

In order to solve these problems, introduction of soil improving legume cover crops with appropriate management regimes has been deemed a viable technological option in the mango-based integrated farming system. Legume cover crops considered to be an important component in low input land use system, and could enhance soil fertility in the process of rehabilitation of rainfed uplands and highlands (Amaruekachoke *et al.*, 1994). As a smother crops, living mulch as well as soil improving legume, the Verano stylo (*Stylosanthes hamata* cv. Verano) holds very

good promise (Amaruekachoke *et al.*, 1994). During the assessment of legume species in 1992 to 1993, *S. hamata* found to be the most preferred by the farmers because of its erect growth. Moreover, better competed ability, high biomass providing and fire control characteristics gave additional advantages (Amaruekachoke and Kittiwat, 1994). It can be intercropped among the young mango at an early age of 1-5 years and also can be carried to the cattle during dry season. However, legume cover crops used in farming systems have affected on an increased availability of higher quality forage, better continuity of forage supply and accretion of nitrogen in the soil system. Thus understanding of the way management may be applied to promote the persistence of legume yield through the appropriate pathways of plant replacement and to impose a level of utilization, which lead to satisfactory legume growth (Humphreys, 1984).

In addition, the appropriate management regimes of establishing *S. hamata* under the rainfed upland conditions are important part of increasing biomass of the above ground cover as well as getting quality forage. There are three important aspects of legume cover crop management i.e. fertilizer application, cutting interval, and the weed management. The rainfed upland soil is infertile with relatively low phosphorous, which possibly affects on yield and quality of forage. So that phosphorus fertilizer is expected to improve soil fertility as well as increasing yield quantity of forage. While cutting frequency is expected to gain a better quality and more yield. The general recommendation for cutting frequency of monocropped *S. hamata* for gaining a rich nutritive value is about 45 days interval, where up to 3 harvests could be obtained in one year (Department of Livestock Development, 1995). It is generally understood that if the frequency of cutting is higher, farmers can get good quality and quantity of forage. But frequent crop cutting offers a chance of heavy weed infestation in the field. Thus weed interference and how to manage them are always concerned. It is, therefore, essential to know the appropriateness of cutting

frequency, fertilizer applications, and weed management to obtain a good quality of forage yield including being able to maintain its competitiveness to suppress weeds and protect the soil surface at the same time.

As the problems of weed interference and soil degradation in the area are recognized by local farmers, the functions of improving soil fertility and sustaining forage legumes could provide significant contribution to sustainable land use in the marginal uplands. The objectives of study are to assess farmers' perception on intercropping *S. hamata* in mango based integrated farming system, to measure the effect of cutting frequency, weeds control and fertilizer on growth, forage yield, quality and ground coverage of *S. hamata* and weeds infestation and to identify important weed species in the integrated farming system. Thus the management of *S. hamata* establishment, which could be used as feed as well as cover crops under rainfed conditions