CHAPTER I

INTRODUCTION

The tea plant (*Camellia sinensis* L.) has been cultivated for a long time, covering extensive areas in main land Asia's upland (Keen, 1978). It has been dispersed from a center near the source of the Irrawady basin and has been spread out fanwise into south-east China, Indo-China and Assam (Eden, 1976). Consequently, it is found in the hill areas from the highlands of south-east of Tibetan plateau, Assam of India to the southern hills of eastern China, mountainous area of north-eastern Myanma, northern Thailand, and down to south of Vietnam (Weatherstone, 1992 *cited by* Preechapanya, 1996).

All cultivated seedling teas are classified into certain species, i.e., *C. sinensis*, the small leaves China types, and *C. assamica*, the large leaves Assam types (Funchs, 1989). However, Sealy (1958) *cited by* Eden (1976) used *C. sinensis* var. *sinensis* and *C. sinensis* var. *assamica* for China type and Assam type respectively. The additional type of tea is *C. sinensis* var. *cambodinensis* for Cambodian type or Indo-China type with long, narrow turned-up leaves (Khatikan and Swynnerton, 1986; Weikhoven, 1974).

1.1 *Miang* Production in Northern Thailand

There are at least three ways which tea is consumed in Thailand, i.e., black tea, green tea and *miang*. *Miang*, a common local name for tea plant or processed tea product, is grown freely and apparently wild in northern Thailand, mainly in provinces of Chiang Mai, Chiang Rai, Mae Hongson, Lampang, Lamphun, Nan and Phrae (Ritsom, 1981). One of the main growing *miang* area

in Chiang Mai is Pa Pae sub-district where the tea is planted under tree canopy of evergreen forest for centuries (Makarabhirom, and Beukeboom, 1992). The practice of *miang* processing is by steaming it and then storing anaerobically, such as in pits or seal baskets. The product is marketed over northern provinces. In the past, the northern Thai people processed *miang* for consumption only within their own families. Over the last two decades, *miang* has been one of the main source of income for farmers. However, during the last decade the farmers have faced with various constrains in *miang* production.

1.2 Constraints of *Miang* Production

Several studies have indicated the constraints of *miang* production system include:

(1) Shortage of labour: Since production process of *miang* has many phases started from picking, processing, and transporting, these require intensive labour especially picking and processing. Normally, labour for picking comes from the family and augmented by workers who live in the village (Keen, 1978).

(2) Fuelwood: One of disadvantages of *miang* production is that *miang* steaming process consumes quite a large volume of fuelwood (Khemnark *et al.*, 1971 *cited by* Del Castillo, 1990) and it is costly (Sangchai, 1993). With increase in *miang* production, there is an increase demand for fuelwood.

Together with the household fuelwood consumption, the total high demand for fuelwood causes the more clearing of hill evergreen forest (Khemnark *et al.*, 1971).

(3) Price: Some of the product may be unsaleable, a serious matter where the majority of the producers are already living at the base of subsistence levels. The 58% of *miang* growers at Pa Pae sub-district had suffered from the price set by the middle man and 42% from price fluctuation (Sangchai, 1993).

(4) *Miang* consumption declining in modern society: The market of *miang* appears to be declining in *miang* consumption due to lack of popularity among the young generation (Keen, 1978). Del Castillo (1990) surveyed market demand of *miang* at Ban Kui Tuai, Chiang Mai province, has shown that 50% households stated decreased, 46% stated stable and only 4% stated increasing.

1.3 *Miang* in Transition

The shortage of labour in picking and processing, insufficient fuelwood for *miang* processing, unattractive price, and declining in *miang* consumption among the young generations have forced the growers to adopt alternative land use, or change to green tea production wherever possible.

Farmers of Pa Pae sub-district, Chiang Mai, usually grow fruit trees such as mango, santol and Chinese apricot together with forest trees (Makarabhirom, and Beukeboom, 1992). Fast growing local economic tree species are grown with rice and maize at the lower slope. Fish is also raised in the pond at the foot of the slope.

1.4 Rationale

The main objective of *miang*-based agroforestry system is to optimise production and economic return over the time while respecting the principles of

soil conservation. In designing the land use pattern, choosing tree-crop species, and their spatial arrangement are important elements.

In choosing tree and crop species, only such species which cause no or least damage to agricultural crops are preferred. Tree should not compete with crop for light, water and nutrients. Therefore, architecture of tree canopy and root system must be carefully considered (Packham *et al.*, 1992). For an agroforestry system, hence, characteristics of trees taken into consideration include root, crown, bole, phenology, nutrition and water absorption, and growth (Dwivedi, 1992).

Considering the tree arrangement, the dense crown tree with lesser density may have the similar effect on crop to looser crown with higher density as pointed out by Schroth (1995) that the root competitiveness is not a fixed characteristic of tree species, but may be influenced by tree management. Thus, the severe competitiveness between trees and crops could be reduced by tree spacing, tree-crop arrangement, timing of tree pruning, and choice of trees and crop species.

As demand for *miang* is declining, the traditional *miang* dominated land use pattern will be expecting to transform into various combination where fruit trees are important component. The interaction of trees and *miang* as well as monetary return of new land use patterns necessitate to be assessed, so that appropriate measures could be recommended.

It is observed that farmers in selected *miang* producing areas such as Chiang Mai, have integrated fruit trees and other perennial species into the

existing *miang* orchard. To achieve sustainable production and economic return, the design of *miang* based land use pattern should be considered.

1.5 Purposes of the Study

(1) To describe past and present land use patterns on hilly areas where *miang* is traditionally cultivated.

(2) To determine the canopy structure and root architecture among *miang* and selected tree components in *miang*-based agroforestry systems.

(3) To assess production performance of the selected *miang*-based agroforestry systems.

1.6 Usefulness of the Study

The study will provide information on root structure and canopy architecture of trees and *miang*, which will be useful for preliminary screening or selecting tree species for any agroforestry system. The canopy structure, root architecture and spatial arrangement of the components can be used with monetary return to assess the suitability and sustainability of existing *miang*-based agroforestry systems in order to provide the proper management such as adding more trees or removing as well as re-selection of the trees and crops.