Chapter 1

INTRODUCTION

Upland rice, Oryza sativa L., the major food crop for the hill tribe households, occupies more than 90% of the wet season cultivated land in the highlands of Northern Thailand (Somrith and Prommani, 1986). However, yields are low and unstable. This is brought about by an increasing intensive cultivation on upland and highland areas using improper cultural practices leading to serious erosion problems. Moreover, long-term fallow periods which are necessary to restore the natural level of soil fertility and destroy cycle of weeds, plant diseases and pests which have spread during the cropping period (Andreae, 1980), are shortened to only two years or less, but more frequently, there are no more fallow periods.

Similar problems are also developing in the Philippines where upland rice areas have declined and so has yield (Gonzaga et al., 1986).

One possible solution to help minimize these problems is the introduction of legumes through intercropping systems. Cereal-legume intercropping is one way to increase productivity of the land, at the same time, the legume may improve soil fertility through its nitrogen-fixing activity,

provides additional organic matter for soil cover against erosion, and improves soil structure. And with the trend towards sustainable agriculture, the retention of crop residues is favoured where ever possible. Adding crop residues and other organic materials to the soil improves soil structure, increases the soil moisture-holding capacity, and improves fertility (Halsall and Gibson, 1991). The residues also help to prevent soil erosion by wind and water.

Rice bean, Vigna umbellata (Thunb.) Ohwi and Ohashi, is a traditional legume which has the potential for inter-cropping. Seedlings grow vigorously, establish themselves early and smother the weeds. Rice bean also makes a useful green manure and cover crop. It is usually grown in association with major cereals like rice in Burma (Purseglove, 1974), and with corn in Thailand (Rerkasem et al., 1988). In some countries of Southeast Asia, farmers planted rice bean in rice fields after harvest. Accordingly, the bean benefits the rice by improving the nitrogen and humus contents of the soil (NAS, 1979). On its own merits it is a potentially valuable crop, one that deserves more testing throughout the tropics.

Upland rice is intercropped on small scale with vegetables and legumes, and is commonly grown without

nitrogen fertilizer. It has so far shown to be competing poorly when grown in association with other species (Mandal et al., 1990). Rice bean, on the other hand was found to be an effective intercrop with corn (Rerkasem et al., 1988).

This study was undertaken to evaluate the effects of intercropping on the yield and yield components, dry matter and nitrogen accumulation of the component crops; to assess effects of time of rice bean introduction into a stand of upland rice; to quantify the amount of nitrogen fixed by rice bean and the amount of nitrogen removed by the crops in order to calculate a simple nitrogen balance in the system; and, to determine residual effects of the treatments on a subsequent corn crop.