# CHAPTER 7

# CONCLUSION AND RECOMMENDATION

On farm research illustrated that the study area is characterized by double cropping systems. Rainy season rice is a major crop of the study area. KDML 105 and RD.6 rice variety commonly grown by the farmers. Applying chemical fertilizer to rice production is a common practice of farmers in the study area. The 16-20-0 and 46-0-0 common fertilizers commonly use by the farmers. Both the rainy season rice and dry season rice received application rate on average 224 kg $ha^{-1}$ and 293 kg $ha^{-1}$. The use of fertilizer input appeared to be relatively high.

The land is normally left fallow for over three months after second crop harvest. It is thus obvious that *S. rostrata* green manure can be grown in this follow period. *S. rostrata* grown in the study area yielded an average dry biomass at 1.78 t $ha^{-1}$. This yield was quite low when compared with on station grown *S. rostrata*. The low biomass produced was probably cause by adequate seedbed preparation, optimum plan density, drought and water logging stress at critical growth phases of *S. rostrata* would lead to low amount of nitrogen released in to the soil. Rice grain yields of the KDML 105 and RD.6 variety common grown by the farmers under the *S. rostrata*-based production system, base on the year 2000 data were respectively 9% and 19% higher than those under the sole chemical fertilizer applied systems. This apparently demonstrated that *S. rostrata* had positive effect on yields.

The replacement of chemical fertilizers with *S. rostrata* reduced cost of producing coming from fertilizer costs on average by 1,555 Baht $ha^{-1}$. The total net returns of the two varieties, KDML 105 and RD.6, grown in the fields with *S. rostrata* incorporation turned out to be greater than those obtaining from the fields receiving chemical fertilizer. Increased cost of production about 6% when compared with the using chemical fertilizer is not a main constraint that may restrain farmers from adopting *S. rostrata* as a source of nutrient for their fields.

On station experiment showed that rice yield of both three groups of rice including the selected glutinous rice and non-glutinous rice varieties, the selected quality rice varieties, and modern HYV rice which receiving *S. rostrata* gave the higher yield than control. For the selected glutinous rice and non-glutinous rice variety, total good seed yield response of rice under the three plots where management were practiced was almost equal, which was 3.9 t $ha^{-1}$ and approximately 18% greater than that of Control treatment. For the selected quality rice varieties, the highest total good seed yield response was recorded in the *S. rostrata* + (46-0-0) treatment, which was 26.89%, 4.36%, and 15.89% greater than Control, *S. rostrata* and (16-20-0) + (46-0-0), respectively. The HYV rice had better response to nutrient management practices on various yield characteristics. Better response of these varieties under the *S. rostrata* + (46-0-0) treatment resulted in the greatest mean of total good seed yield which is 40.18%, 1.43%, and 18.77% greater than the control, *S. rostrata* and (16-20-0) + (46-0-0), respectively.

The effectiveness of *S. rostrata* to improve both shoots dry weight, N uptake, and rice yield of Chinat rice variety was found in this study. N-mineralization is a major source of N for paddy rice. Nitrogen availability to plants also increases through mineralization, a process of decomposition and transformation of organic matter to available forms of inorganic nitrogen such as $NH^+_4$. The study showed that ammonium N release from *S. rostrata* started immediately after incorporated S. rostrata into the soil. The release of N reached within 2-28 days. In spite of these, the availability of nitrogen in the soil is very often vulnerable to losses via many processes, such as, leaching, erosion, and run off, or by gaseous emissions. The study also found that N lost occurred in each growth stage of rice in each nutrient management system. The major source of N lost is leaching and run off, Algal activities. However N lost from the system did not limit a significant yield benefit to the rice.

From these valuable finding it is worth making relevant recommendations as follows:

- *S. rostrata* can be used as a green manure for lowland rice production system in Chiang Mai lowland area if the pattern cultivation is double cropping system
- Further considerations should be taken to improving various factors such as seeding rate, related soil types, drought and water logging stress at critical growth phases that may have effects on establishment of *S. rostrata* green manure. It is essential that those factors should be seriously addressed if successful cultivation of green manure and spectacular increase in rice yield are expected.
- Another issue that also deserves special consideration is that if a sole *S. rostrata* stand is not capable of producing a desired plant stand and biomass to meet with the rice's nutrient demands, it is important that relationship of chemical fertilizers and *S. rostrata* be investigated to determine at what levels of chemical fertilizer application should be recommended for use in combination with *S. rostrata.*
- If farmers in the lowland area of Chiang Mai are to benefit from the green manuring of S. rostrata they have to apply urea fertilizer if a sole *S. rostrata* stand is not capable of producing a desired plant stand and biomass to meet with the rice's nutrient demands and the HYV rice.
- Because $NH^{+}_{4}$-N accumulation started soon after ploughing down the S. rostrata, immediately transplanting of rice would be critical to maximize N use by rice crop.