

THESIS TITLE FEASIBILITY STUDIES ON CULTIVATING SOME SESBANIA
UNDER UPLAND CONDITIONS OF NORTHEAST THAILAND.

AUTHOR MR.NIRUN SUKCHUN

THESIS ADVISORY COMMITTEE

.....*Pongsiri Patcharapreecha*.....CHAIRMAN
(ASSOCIATE PROFESSOR DR. PONGSIRI PATCHARAPREECHA)

.....*Homchan*.....
(ASSOCIATE PROFESSOR DR. JUCKRIT HOMCHAN)

.....*Banyong Toomsan*.....
(DR. BANYONG TOOMSAN)

ABSTRACT

A series of studies has been conducted to evaluate the feasibility of cultivating *Sesbania rostrata* and *Aeschynomene afraspera*, two well-recognized green-manuring sesbania in the poor and infertile upland soil of Northeast Thailand. These two species have both root and stem nodules which allow for relatively greater capability of fixing atmospheric nitrogen.

All pot experiments were carried out in the university but the field trial was established under rainfed condition at Ban Don Daeng approximately 25 km south of Khon Kaen University campus.

The results obtained from a series of pot experiments can be summarized as follow :

1. Supply of phosphorus (P) was very effective in promoting plant growth.

2. For fully-nodulated plants, phosphate rock (PR) was replaceable for triple superphosphate (TSP) although PR was less effective compared with TSP.

3. PR caused harmful effect to the plant in the initial growth period before commencement of nodulation.

4. *A. afraspera* was more sensitive to PR compared with *S. rostrata* especially in the presence of N fertilizer.

5. Root nodules appeared to alleviate the harmful effect of PR.

6. Only little enhancement of growth was recorded from N-fertilizer especially when added together with TSP.

7. Stem nodules greatly contributed to N-nutrition of the plant

These results particularly the beneficial effect of TSP and PR was confirmed by the subsequent field trial. It was also found that *S. rostrata* was more tolerant to drought than *A. afraspera*.

In a study on decomposition, sesbania debris was added to the soil collected from the upland field and incubated under upland condition. It was found that ammonification and nitrification proceeded quite smoothly. The amount of soil-N rapidly increased in the first week followed by a sluggish pattern of increase in the following weeks. The 2 step-decomposition was considered to be a reflection of the chemical constitution of sesbania debris. This consideration was confirmed when microbial observation was made on the decomposing debris which revealed that

1) fungi was the main microorganisms responsible for the decomposition and

2) during the decomposition period, the fungul population changed from sugar fungi to lignin decomposers.

On the basis of the results obtained and other acquired information, feasibility of cultivating sesbania under upland condition of Northeast Thailand were discussed.