

Chunjit Kaewkunya 2014: The Potential Use of Forage Legumes in Cropping Systems for Sustainable Management of Lateritic Soils. Doctor of Philosophy (Agronomy), Major Field: Agronomy, Department of Agronomy. Thesis Advisor: Professor Sayan Tudsri, Ph.D. 307 pages.

Lateritic soil has poor soil quality for agriculture as a result of its physical and chemical properties. At present, many people are adversely affected by the lack of agricultural land to meet demand. Therefore, it is necessary to utilize these problem soils and this study investigated the efficiency of a cropping system using forage legumes for sustainable lateritic soil management in the Phon Phisai soil series at the Kasetsart University Chalermprakiat Changwat Sakon Nakhon campus from May, 2005 to March, 2008. The main objectives of this study were to acquire suitable technology in crop management based on the lateritic soils to benefits plant production, animal production, and economic compensation. The sustainability indices were based on the modification of some soil properties for increasing the biomass yield and economic values. There were two cropping systems involved in this research were: (1) forage legumes cropped with maize in no-tillage farming, and (2) the crop forage legumes under rotation farming. The treatments involved six forage legumes: (1) Cavalcade (*Centrosema pascuorum* cv. Cavalcade), (2) Siratro (*Macroptilium atropurpureus*), (3) Centro (*C. pubescens*), (4) Hamata (*Stylosanthes hamata* cv. Verano), (5) Tha phra stylo (*S. guianensis* cv. Tha Phra), and (6) Lablab (*Lablab purpureus*). Maize (Suwan 5) was used as the main crops.

The results showed that the Hamata (*Stylosanthes hamata* cv. Verano) had the highest potential as a forage legume for lateritic soil improvement under Sakon Nakhon province. The chemically, physically, and biologically soil properties were augmented after Hamata cropping especially the total nitrogen content, cation exchange capacity, infiltration rate, soil moisture content, and quality of bacteria in the soil. Moreover, this treatment reported 2,000 kg/rai of dry matter yield within two years. Hamata cropping with economic crop (maize) based on direct seeding without tillage (H+M+M), and ley farming (H-H-M) reported 4,052 kg/rai and 3,927 kg/rai of total biomass, respectively. The economic returns (net income) were 2,807.5 and 2,279 baht/rai/year in H+M+M and H-H-M systems, respectively. Besides contributing to soil improvement, the cropping system produced extra income from the maize and yielded forage legumes for livestock production. Therefore, the cropping system had high potential to be applied for the sustainable management of lateritic soils.

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Thesis Advisor's signature