Carbon Sequestration Potential of Organic Pasture in Thailand

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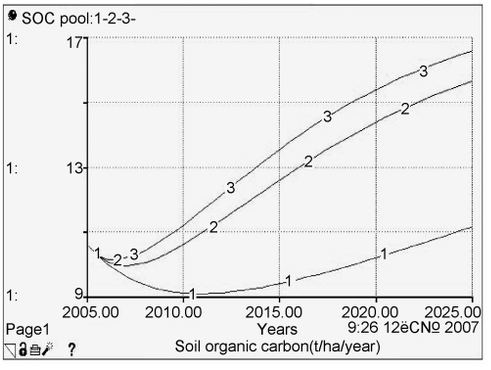
Key words: carbon sequestration, organic pasture, environmental model

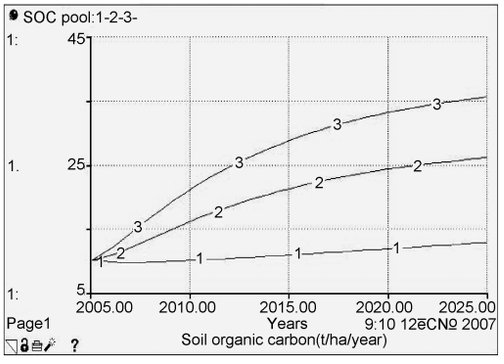
Introduction This paper provides the feature of a generic environmental model to demonstrate environmental impacts of the organic pasture used for beef production as compared with the intensive conventional pasture system. Both pastures had been utilized through the rotational grazing for 3 consecutive years. Carbon sequestration potential which is inversely associated with the Global Warming Potential was simulated.

The model The model was developed following the general stages of modeling strategies described in Forrester (1968). STELLA II version 9 software package (HPS, 1994) has been used in the model construction. The model described the interrelationships between the pasture production, cattle production, and soil organic carbon (SOC) accumulation in the farm boundary. The study focused on Northeastern Thailand. Two types of pasture systems selected for this investigation are the intensive conventional system and the organic system. The pastures were grass-legume mixed of Guinea grass (*Panicum maximum* TD 58) and Taphra stylo (*Stylosanthes guianensis* CIAT 184). The cattle were Thai Indigenous beef cattle. The system in this study involved the pasture production process, the cattle production process, the returning of waste from pasture and cattle into the soil organic carbon (SOC), and soil nutrient and uptake by plants.

Results The organic pasture showed greater carbon sequestration potential (Figure 2) compared to the conventional pasture (Figure 1). Without external fertilization, the soil carbon under organic pasture would gradually increase from 10.0 to 12.75 t ha^{-1} for the 20 year period. With 50 and 100 kg N ha^{-1} yr^{-1} fertilization, the carbon content in the pasture soils would increase to 26.01 and 35.57 t ha^{-1}, respectively. The carbon sequestration potential of the organic pastures with 0, 50 and, 100 kg N ha^{-1} yr^{-1}, were estimated to be 0.14, 0.80 and 1.28 t ha^{-1} yr^{-1}, respectively.



1=0N, 2=50 kg N ha^{-1} yr^{-1}, 3=100 kg N ha^{-1} yr^{-1}
Figure 1 *SOC (t ha^{-1} yr^{-1}) of an intensive pasture.*



1=0N, 2=50 kg N ha^{-1} yr^{-1}, 3=100 kg N ha^{-1} yr^{-1}
Figure 2 *SOC (t ha^{-1} yr^{-1}) of organic pasture.*

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