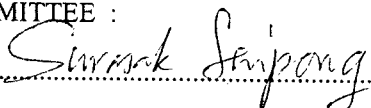



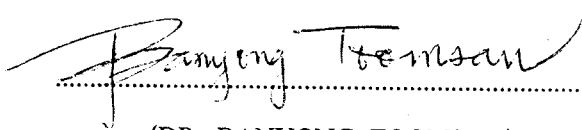
THESIS TITLE : EFFECTS OF CATTLE MANURE AND CHEMICAL FERTILIZERS  
ON GROWTH AND YIELD OF PAPAYA (*CARICA PAPAYA* L.)  
GROWN ON YASOTHON SOIL SERIES.

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### ABSTRACT

A study was conducted to evaluate the influence of farm manure and various grades of mixed chemical fertilizers on some soil properties, quantities of plant nutrient elements. growth and yields of mixed hybrid papaya (i.e. Khag-Dum X Florida) cultivar Ta-Pra-1 grown on yasothon soil (Oxic Paleustult). A field trial was laid out using Split-Plot Design with 4 replications and the treatments for the main plots comprised of 4 grades of mixed chemical fertilizers including 16-8-8, 12-24-12, 13-13-21 and 15-15-15 which were applied at 0 and 1 kg per plant. The treatments used for the subplots comprised of 5 application rates of cattle manure i.e. 0, 2.5, 5.0 and 10.0 kg per plant. The resulting growth and yields were measured twice, the first performed when the first fruit reached 25% of the ripening stage and the second performed 435 days after planting.

The results indicated that both bulk density (BD) and penetrometer resistance (PR) of the soil decreased with the increasing application rates of cattle manure. The lowest

bulk density ( $1.38 \text{ g/cm}^3$ ) was recorded from the treatment which the 12-24-12 chemical fertilizer was used in combination with cattle manure at the rate of 10 kg per plant while the lowest penetrometer resistance ( $\text{PR} = 1.20 \text{ kg/cm}^2$ ) recorded from the treatment which 10 kg per plant of cattle manure was applied.

All grades of the chemical fertilizer reduced soil pH and, in particular, the 16-8-8 (averaged from all rates of cattle manure application) brought the soil pH down to 5.27 which was the lowest pH values recorded. Soil organic matter content increased with the increasing rates of cattle manure application. In addition, a positive, linear relationship was detected between the soil organic matter contents and CEC ( $r = 0.87$ ). Maximum increase in CEC ( $5.38 \text{ meq/100 g}$ ) was noted from the treatment which the 12-24-12 fertilizer was used in combination with cattle manure at the rate of 10 kg per plant.

Plant nutrient elements in the soil including N, P, K, Ca and Mg quantitatively responded to the rates of chemical fertilizer application as in the case of cattle manure. The closest relationship between the amount of available phosphorus and the addition of 12-24-12 chemical fertilizer. However, addition of all the chemical fertilizers brought the soil exchangeable Ca down and a linear, positive relationship ( $r = 0.737$ ) was detected between the exchangeable Ca and the soil pH.

The contents of plant nutrient elements (i.e. N, P, K and Ca) in the petioles responded positively to the additions of both chemical fertilizers and cattle manure. Different degrees of decrease in Mg in the petioles were observed in response to different grades of chemical fertilizer and different rates of cattle manure addition.

The growth of papaya as reflected by various parameters of stem growth and yields showed direct responses to the addition of cattle manure. Furthermore, the average leaf area index (LAI) and the length of petioles also responded positively to all the grades of chemical fertilizer used. Interactions were observed between both kinds of fertilizers and the plant height and yields. The trend was also noted between the application of 16-8-8 chemical fertilizer and the decreases in plant heights and yields. However, positive responses were detected for all the remaining grades of chemical fertilizers. Maximum

yields (i.e. 9.45 kg per plant and 37.1 fruits per plant) were recorded from the treatment which the 12-24-12 chemical fertilizer was used in combination with cattle manure applied at the rate of 5 kg per plant. The above-mentioned response was relatively greater than other grades of chemical fertilizer but was comparable to addition of cattle manure at the rate of 10 kg per plant which the resulting yields were 9.75 kg per plant and 39.1 fruits per plant respectively.