

Optimizing fertilizers doses and their effects on photosynthesis and biomass yield of *Hibiscus cannabinus* cultivated on BRIS soil

ABSTRACT

In tropical climate, huge amount of fertilizer need to be used for the cultivation of kenaf (*Hibiscus cannabinus* L.) in Beach Ridges Interspersed with Swales (BRIS) soil, however this approach is not cost effective and environmental friendly. Therefore, the optimizing of fertilizer rate for BRIS soils and selection of suitable soil amendments are crucial to get a higher yield. In this study, the effects of different combinations of urea, chicken manure and biochar on soil properties, growth performance and physiological characteristics of kenaf cultivated on the BRIS soil were investigated. Eight treatments were conducted namely: control (T1), biochar (T2), chicken manure (T3), urea (T4), chicken manure + urea (T5), biochar + chicken manure (T6), urea + biochar (T7) and biochar + chicken manure + urea (T8). The biomass and physiological characteristics of kenaf were recorded every month, while the soil was analyzed following a standard laboratory procedure. The application of organic and inorganic fertilizer (urea) significantly increased the nutrient content of the soil compared to the T1, whereas T3 showed the highest pH, cation exchange capacity, and exchangeable bases (Na, Mg, Ca). However, the mixing of biochar with organic and inorganic fertilizers showed the highest plant height, diameter of stem and number of leaves as well as dry biomass compared to other treatments. Furthermore, the application of nitrogen fertilizer significantly increased the photosynthesis rate and stomatal conductivity. The results suggest that the mixing of biochar with organic and inorganic fertilizers represents an effective approach for the cultivation of kenaf in tropical climate.

Keyword: Biochar; Chicken manure; Urea; Photosynthesis; BRIS soil