



Sulfur fertilization enhanced productivity and profitability of popular kenaf varieties

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ABSTRACT

Kenaf, also known as Deccan hemp (*Hibiscus cannabinus* L.) is the one of the most important, hardy and economic bast fiber industrial crops. Sulfur plays a significant role in determining yield and quality of fiber crops. However, the effect of sulfur application on yield, nutrient uptake in kenaf varieties, agronomic efficiency, apparent S recovery, and nutrient availability and sulfur fractions is still unclear. Thus, the present investigation was carried out to study the effect of sulfur (S) fertilization (S_0 = Control, S_{15} =15kg S ha⁻¹, S_{30} =30kg S ha⁻¹, S_{45} =45kg S ha⁻¹) on fiber yield, nutrient uptake, nutrient availability and S fractions of experimental soil and to screen the kenaf varieties ('JBM-2004-D', 'MT-150', 'AMC-108' and 'HC-583') for higher S use efficiency and increased productivity. Compared to control (S_0), S_{45} treatment significantly increased fiber yield of kenaf by 37%. MT-150 produced the highest fiber yield (2.61 t ha⁻¹). Among the S levels, S_{45} exhibited lowest value of agronomic efficiency (16.5 kg kg⁻¹ S), apparent S recovery (18.7%) and highest value of nutrient uptake in kenaf. Results also revealed that nutrient availability (nitrogen, phosphorus and potassium) increased with increase in S levels at all soil depths and the nutrient status decreased with depth. Sulfur fractions (total S, organic S, adsorbed S, plant available S) increased with increasing S levels and followed the order as organic S > non-sulfate S > adsorbed S > plant available S. In addition, organic sulfur contributed 63–74% of total sulfur. Thus, the results suggest that by selecting appropriate variety and level of sulfur (@ 30kg ha⁻¹) for kenaf cultivation farmers can obtain higher fiber yield for sustainable crop production.

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Introduction

Kenaf, Deccan hemp (*Hibiscus cannabinus* L.) is one of the foremost natural bast fiber crop in the world (Akinrotimi and Okocha 2018) which produces a high quality pulp suitable for industrial and textile uses (for carpets, canvas, sac, ropes etc) (Hamidon et al. 2019). Kenaf fiber is commercially used as sorbent for wastewater purification, engineered wood, building materials, animal feed, geotextiles, electrostatic discharge protection and composites (Alexopoulou et al. 2015; Mohammed et al. 2017; Tharazi et al. 2017). Kenaf has high potential for remediation of heavy metal contaminated soil (Guo et al. 2023) and currently used as renewable source of raw materials for paper pulp production (Al-Mamun et al. 2022) and as cellulosic biofuel (Singh 2013). Saba et al. (2015) suggested that kenaf biomass might also be a promising lignocellulosic