

Full Length Research Paper

Adopting a three-strata forage system for an integral food, feed outputs and agro-ecological sustenance

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The exploitation of diverse cropping practices alongside residue incorporation has remained low among small-holder rural farming households in Sub-Saharan Africa. Three-stratum forage system (TSFS) which integrates forages for animal feeds with food crops is a significant sustainable strategy for enhancing residue incorporation. This study was conducted in Busia County in Kenya to; (i) determine the effects of TSFS on yield of diversified food crops grown (ii) to determine the effect of TSFS on growth and physiological responses in food crops grown. In TSFS system, desmodium, brachiaria grass and pigeon peas were grown in the peripheral area of the farm as forages. The treatments were laid on a randomized complete block design at two locations for 3 years (2019, 2020 and 2021), yield in t ha⁻¹, growth and physiological responses in plants measured. The data collected were subjected to Analysis of variance (ANOVA) in SAS software and means separated using LSD at 5% level of significance. Plant growth vigor, physiological responses and yield in t ha⁻¹ were significantly higher in TSFS system where residues were incorporated than in no TSFS system (P<0.001). The results revealed that TSFS cropping system could be a better solution to food security and agro-ecological sustenance.

Key words: Three-Strata forage cropping system (TSFS), crop residue incorporation, food security.

INTRODUCTION

Diversified cropping system improves productivity and resilience in agricultural systems. Research towards achieving food security through diversified farming system has received little attention despite its importance in crop production stabilization (Michler and Josephson, 2017). In Kenya, agriculture is one of the key sectors that drive the economy as visualized in vision 2030 (Ndung'u et al., 2011). However, the growth in the sector is

constrained by inappropriate farming practices like monocropping, burning of crop debris among others which have contributed to decline in soil fertility and low farm productivity. Most soils in the lowlands regions of Kenya are less productive which has contributed to a decline in crop production. Gicheru (2012) found out that over 11 years crop yields had declined by over 70% due to challenges associated with soil infertility. Soil erosion is

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