Abstract

Cassava (Manihot esculenta) is an important drought-tolerant root crop suitable for arid and semi-arid lands (ASALs), yet its adoption in Eastern Kenya remains limited, contributing less than 10% to national cassava production. This study evaluated eight cassava varieties across three ASAL sites namely, Southeastern Kenya University (Kitui County), Lukenya University (Makueni County), and Scott Christian University (Machakos County), to identify high-yielding and well-adapted cultivars. Field experiments covering five acres per site were established using a randomized complete block design with four replicates. The evaluated materials included four farmer-selected landraces (Kasukari, Mzungu, Kitwa, and a local check) and four improved cultivars, including Migyera and two KALRO-developed lines. Growth parameters, yield components, and hydrogen cyanide (HCN) concentrations in tubers were assessed and analysed using analysis of variance (ANOVA) and least significant difference (LSD) tests at $\alpha = 0.05$. Significant varietal differences ($p < 0.01$) were observed in plant height, leaf morphology, tuber number, and yield. Kasukari, Mzungu, and Migyera consistently exhibited superior performance, achieving plant heights exceeding 2.5 m and yields ranging from 15 to 18 tons per hectare. These varieties also recorded lower HCN levels (45–55 mg/ kg) compared to others that exceeded 70 mg/kg. Although all varieties surpassed the recommended safe food threshold (10 mg/kg), appropriate processing can mitigate cyanide toxicity. No major pest or disease outbreaks were observed. The results identify Kasukari, Mzungu, and Migyera as promising cultivars for ASAL conditions, with potential to enhance food security and promote cassava-based value addition in Kenya's drylands