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“Reconcile land system changes
with planetary health”

Productivity and land use efficiency of seven finger millet cropping systems in Chad

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Abstract

Food insecurity and malnutrition poses a significant challenge in Chad, driven by factors such as poverty, conflict, and the impacts of climate change. The CROP4HD project promotes agroecology, crop diversification, and the use of nutrient-rich Neglected and Underutilised Species (NUS) for smallholder farmers, aiming to foster diverse and healthy diets to combat hunger and malnutrition.

Finger millet [*Eleusine coracana* (L.) Gaertn.] has been identified as a high-potential crop due to its rich nutritional content such as protein, calcium, phytates and phenolics. However, finger millet production in Chad remains exceedingly low, and little research has been conducted on optimising its cropping systems. Traditionally, finger millet is planted using a broadcasting technique. While this method can save time, it often results in uneven seed distribution, poor germination rates, challenges in weed management and reduced yields.

The objective of this study was to evaluate the productivity and land use efficiency of seven finger millet cropping systems under organic conditions. We tested four pure stands: broadcasting finger millet at 10 kg ha⁻¹, sowing finger millet in rows (25 cm × 25 cm) with and without board bending and a transplanting system from nursery to field (25 cm × 25 cm) with board bending. Additionally, we assessed three strip intercropping systems, which involve four rows of finger millet alternating with two rows of legumes (bambara bean, groundnut, or cowpea). The three legumes in pure stand were evaluated as well.

A field experiment was conducted at the Ba-Illi Agricultural Technical School in the Chari-Baguirmi region, situated in southwestern Chad, characterised by a semi-humid tropical climate during the rainy seasons (Mai-October) of 2023 and 2024, following a randomised complete block design with three replications.

Preliminary results indicate that the pure stand finger millet cropping system with transplanting has the highest yield potential, while the intercropping systems with bambara bean and with groundnut show stronger yield performance than intercropping with cowpea. According to farmers' perceptions, the cropping systems that combine finger millet with bambara beans and groundnuts are the most appreciated.

Keywords: Cropping system, *Eleusine coracana*, intercropping, land use efficiency, participatory research, productivity

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