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Neglected and underutilised crops as drivers of climate-resilient food systems: A comparative total factor productivity analysis in Uganda and South Africa

Perez Nuwamanya, Christine Wieck

University of Hohenheim, Dept. of Agricultural and Food Policy (420a), Germany

Abstract

Agricultural systems in Sub-Saharan Africa face increasing pressure to enhance productivity while adapting to climate change and resource constraints. Current food systems remain heavily dependent on a narrow range of input-intensive staple crops, contributing to environmental degradation, reduced biodiversity, and vulnerability to climatic shocks. In this context, neglected and underutilised crops (NUCs) offer significant potential to support climate-resilient and sustainable food systems due to their adaptability, low input requirements, and nutritional value. However, their economic productivity relative to staple crops remains insufficiently quantified.

This study addresses this gap by providing empirical evidence on whether NUCs can contribute to climate-resilient food systems through a comparative analysis of Total Factor Productivity (TFP) in Uganda and South Africa. A sequential mixed-methods approach was employed. First, an integrative literature review synthesizes evidence showing that NUCs enhance climate resilience, improve soil health, support agrobiodiversity, and contribute to nutritional diversity in smallholder systems. Second, a quantitative analysis applies Data Envelopment Analysis and the Malmquist Productivity Index on a harmonised panel dataset (2010–2022).

The findings reveal that NUCs achieve statistically comparable TFP to staple crops, challenging perceptions of their economic inferiority. Distinct productivity pathways emerge in South Africa, productivity growth is driven by technological progress, whereas in Uganda it is sustained through efficiency gains under low-input conditions. Importantly, NUCs maintain competitive productivity with lower external input use, indicating higher resource-use efficiency.

These results demonstrate that NUCs can support climate-resilient food systems through sustainable intensification and diversification. Strengthening policy support, value chains, and investment in NUCs will be essential.

Keywords: Agro-biodiversity, climate-resilient food systems, Malmquist index, neglected and underutilised crops, resource-use efficiency, South Africa, sustainable intensification, total factor productivity, Uganda

Contact Address: Perez Nuwamanya, University of Hohenheim, Dept. of Agricultural and Food Policy (420a), 70599 Stuttgart, Germany, e-mail: perez.nuwamanya@uni-hohenheim.de