



Tropentag, September 16-18, 2026, hybrid conference

“Towards multi-functional agro-ecosystems  
promoting climate resilient futures”

## Vegetation structure and diversity under farmer managed natural regeneration: A comparison of silvo-arable and silvo-pastoral systems in Kenya

IRENE AWINO OJUOK<sup>1</sup>, MADELON LOHBECK<sup>2</sup>, TILL STELLMACHER<sup>3</sup>, FIRAS A-ZYLOUD<sup>4</sup>, TONY RINAUDO<sup>5</sup>, CHRISTIAN BORGEMEISTER<sup>6</sup>

<sup>1</sup> *University of Bonn, Center for Development Research (ZEF), Ecology and Natural Resources Management, Germany*

<sup>2</sup> *Wageningen University & Research, Forest Ecology and Forest Management Group, The Netherlands*

<sup>3</sup> *Center for Development Research (ZEF), University of Bonn, Bonn, Cultural and Political Change,*

<sup>4</sup> *Mu'tah University, Dept. of Plant Protection and IPM, Jordan*

<sup>5</sup> *World Vision, Australia*

<sup>6</sup> *University of Bonn, Center for Development Research (ZEF), Ecology and Natural Resources Management, Germany*

### Abstract

Farmer Managed Natural Regeneration (FMNR) is a low-cost, adaptable agroforestry practice that enhances land restoration by promoting systematic integration of naturally regenerating trees within farming systems through tree selection and management. Despite its increasing adoption in sub-Saharan Africa, comparative evidence across land uses remains limited. This study empirically compares tree and woody regeneration density, species richness, and composition between silvo-arable (maize cultivation) and silvo-pastoral (grazing) FMNR systems in semi-arid Kenya. Sixty-three plots were established across these two land uses, within which a total of 1409 trees and 505 woody regeneration individuals were recorded. Tree density was higher in silvo-pastoral FMNR systems (558/ha) than in silvo-arable systems (150/ha), though the difference was not statistically significant. In contrast, woody regeneration density was significantly greater in silvo-arable systems (2450/ha vs. 727/ha). Rarefied species richness of trees was the same in silvo-arable FMNR and silvo-pastoral FMNR systems, while richness of regeneration was either significantly higher than the tree community, like in silvo-arable systems, or significantly lower than the tree community, like in silvo-pastoral systems. Non-metric multidimensional scaling showed that silvo-pastoral FMNR systems exhibited similar species composition between trees and regeneration, whereas silvo-arable FMNR systems displayed greater variability in tree composition across fields, reflecting less variable preferences by farmers. Given that regeneration represents future tree communities, reduced regeneration diversity in silvo-pastoral systems may constrain long-term species richness. These findings suggest that silvo-arable and silvo-pastoral FMNR systems follow distinct restoration pathways, with implications for biodiversity conservation, livelihoods, and the scaling of FMNR as a restoration practice.

**Keywords:** Dryland restoration, Farmer Managed Natural Regeneration, silvo-arable, silvo-pastoral, smallholders, sub-Saharan Africa

---

**Contact Address:** Irene Awino Ojuok, University of Bonn, Center for Development Research (ZEF), Ecology and Natural Resources Management, Genscherallee 3, Bonn, Germany, e-mail: barrackawino@yahoo.com