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From monoculture to regeneration:evaluating regenerative oil palm systems in Côte d'Ivoire

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Abstract

Oil palm production is a key livelihood for smallholders in Côte d'Ivoire, but conventional monoculture systems are increasingly associated with declining soil fertility, reduced biodiversity and vulnerability to climatic variability. Regenerative practices, based on increased plant diversity, soil cover and organic matter recycling, are proposed as more sustainable alternatives, yet field-based evidence from West African smallholder systems remains limited. This study evaluates regenerative and monoculture oil palm systems in an experimental plot in Aboisso, Côte d'Ivoire.

A total of 56 young palms were monitored using a balanced experimental design across three observation waves under contrasting climatic conditions, from drought to high rainfall. Agronomic, environmental and sanitary indicators were assessed, including palm growth, biodiversity, soil conditions and plant health.

The regenerative system showed consistently stronger agronomic performance, with higher palm growth and more active leaf development. Biodiversity indicators were clearly higher, with greater plant species richness, vegetation cover and soil macrofauna presence. Soil conditions also differed, as the regenerative system maintained higher litter cover and lower soil temperatures, suggesting improved soil protection and microclimatic buffering, as well as enhanced biological activity, including greater earthworm presence.

Sanitary observations indicated that both systems remained exposed to pest, disease and nutrient-related constraints, highlighting that regenerative practices do not eliminate stress factors but modify system dynamics.

Overall, the regenerative system demonstrated improved agronomic performance, enhanced biodiversity and more favourable soil conditions, along with greater stability under variable climatic conditions. These findings provide field-based evidence supporting the potential of regenerative practices to improve the sustainability and resilience of smallholder oil palm systems in Côte d'Ivoire.

Keywords: Monoculture, regenerative practices, sustainable alternatives

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