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Trends and determinants of change in rice-based production systems in the zambezi floodplain in Zambia

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Abstract

With the second national rice development strategy from 2016, the Republic of Zambia aimed at increasing rice yields, expanding the cultivated area, and promoting agricultural innovations. Simultaneously, climate change increases risk for rice-based cropping systems in form of floods and droughts. Farmers may be affected differently depending on the positions of their fields along hydrological gradients in a floodplain. Opportunities and risks from policy and climate change may drive farmers to intensify or diversify their production systems. Thus, the resulting emergence of new cropping patterns and associated practices may require changes in input use and crop management practices. The study therefore aims at answering the following questions: What are current and likely future change trends in agronomic practices and yield? What are likely causes and drivers of change in the rice-based production systems in the Zambezi floodplain in Zambia? Through a diachronic household survey (comparing the year 2023 with 2013) we examined change trends from 40 farms on rice-based cropping systems in the Zambezi floodplain in the Western Province, Zambia. Survey data, including information on cropping practices, yields, and risk perception, was complemented by field observation and soil samples. The survey was stratified based on the hydrological gradient in the floodplain considering the flood-prone riparian zone, the favorable middle zone, and the drought-prone fringe, as well as irrigated rice fields. Soils in all zones were acidic with an average of pH 4.3. Total N was about 0.15 % with CN-ratio ranging from 10-14. Farmer´s attributes, farmer´s resource endowment, rice grain yield, and production constraints differed along the hydrological gradient. In 2023, almost all farmers had access to extension service (75 % in 2013), yet farmer´s access to inputs and machinery remain low. Rice yields ranged in 2013 from 0.9 t ha^{-1} (drought prone zone) to 2.39 t ha^{-1} (irrigated fields) and from 0.71 t ha^{-1} (submerge prone zone) to 1.74 t ha^{-1} (irrigated fields) in 2023. To sustainably intensify rice production, site-specific conditions must be considered. We foresee the need for mechanizing the rice production, linking farmers to markets, supporting farmers with farming inputs and extension of irrigation infrastructure.

Keywords: Agriculture policy, diachronic analysis, diversification, *Oryza sativa*

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