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Farmer mental models and fertiliser use decisions: Insights from five districts in Madagascar

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Abstract

Optimising fertiliser use is essential for enhancing crop productivity and building resilient farming systems, particularly among smallholder farmers who are most vulnerable to biotic and abiotic stresses. In the context of agricultural intensification and climate-smart agriculture, understanding how farmers perceive and make decisions about fertiliser use is critical for designing effective and locally relevant interventions. This study contributes to that understanding by exploring farmers' mental models of fertiliser use across five districts in Madagascar, using data from a structured survey administered to 485 farmers. The descriptive results show that among the respondents, 30.31 % were women and 69.69 % were men, with most aged between 26 and 40 years (40.03 %). In terms of marital status, 30.16 % were married and 22.56 % were single. The majority had completed primary education (53.03 %), while 14.39 % were illiterate, and only 1.02 % had attained university-level education. The farmers' mental models results show that fertiliser use is shaped by a combination of agronomic, economic, institutional, and environmental factors, with varying influence across districts. Overall, factors that significantly promote fertiliser use include agricultural education and food security, whereas factors that significantly hinder fertiliser use include limited knowledge of inputs, adverse climatic conditions, and high cost and limited accessibility. The mental model outcomes between female and male farmers reveal that female and male farmers differ in their motivations and constraints related to fertiliser use: women tend to focus on food security and face knowledge-related barriers, while men are more influenced by market opportunities and practical concerns like cost and access. Surprisingly, formal education level did not have a significant influence on farmers' decisions regarding fertiliser use. These findings highlight the need for context-specific, gender-sensitive interventions that align with farmers' perceptions to promote equitable and sustainable fertiliser use.

Keywords: Decision-making factors, fertiliser use, smallholder farmers, sustainable agriculture