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"Reconcile land system changes
with planetary health"

Is stress-tolerant maize a pro-poor technology?

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Abstract

Stress-tolerant crop varieties have the potential to enhance the resilience of smallholder farming systems, particularly in the face of increasing climate variability and extreme weather events associated with climate change. Stress-tolerant varieties are developed to perform better under adverse environmental conditions, offering a promising pathway for safeguarding crop yields and food security. However, there is limited evidence on whether stress-tolerant varieties benefit resource poor and women farmers. This study investigated the adoption and effects of drought-tolerant maize varieties during the 2023/24 El Niño season in Zimbabwe, a period marked by severe climatic stress. Using data from 500 farmers, we assessed average treatment effects, as well as effect heterogeneity among farms. To account for observable differences between adopters and non-adopters, such as plot-level input intensity and labour use, we employed a combination of econometric models. We found that the average yield increases associated with the use of drought-tolerant maize ranged from 25–43 per cent. Furthermore, the use of drought-tolerant maize varieties correlated with lower incidences of household food insecurity measured through the household level Food Insecurity Experience Scale (FIES). Our results suggest that yield and nutritional effects were most pronounced on farms with smaller area under crop cultivation, while nutritional effects were most beneficial on farms with women as main decision-makers in maize production. Our findings demonstrate that agricultural innovations can enhance productivity and food security, also among resource poor and women farmers. Maximizing the potential for inclusive development through agricultural innovations requires targeted extension strategies and support systems that lower structural access barriers for women and resource poor.

Keywords: Climate change, crop productivity, drought-tolerant maize, food security, impact heterogeneity

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