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Farmers' self-reported impact of climate extremes on crop production and adaptation strategies in south-western Uganda

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Abstract

Subsistence and smallholder farming systems constitute the primary rural livelihood in sub-Saharan Africa. These are highly exposed to climate-induced production risks, resulting in persistent food and income insecurity. There are limited localised studies documenting the timing and impact of these risks at farm-level, and adaptation strategies implemented by farmers, hindering identification of appropriate interventions. This study employs a citizen science approach, a digitally-enabled, farmer-participatory approach, to assess the impact of climate extremes on crop production, and farm-level adaptation strategies in south-western Uganda. Data were collected through a network of 25 farmer scientists, located in three agro-ecological zones (AEZs). These farmers were trained and equipped with smartphone-based questionnaires to record field level cropping practices and abnormal weather events across the two growing seasons of March–May (Season A) and September–November (Season B), in 2024 and 2025. Detailed information for 197 fields, with 103 and 94 fields for season A and B respectively were recorded. Preliminary results show that the impact of climate extremes on crops were predominantly associated with rainfall deficits, mainly delayed onset and in-season droughts, and excessive rainfall. Rainfall deficits affected seasonal activities of more fields in Season A (53 %), with contrasts across AEZs, while excessive rainfall affected more fields in Season B (52 %), homogeneously across AEZs. Rainfall deficits primarily reduced crop germination, affecting an average of 39 % of the planted area, while excessive rainfall caused an average crop loss of 30 % of the affected field, mainly due to erosion of the fields. Farmers adopted a range of adaptation strategies. Overall, 63 % fields were planted with improved crop varieties, mostly in Season A (52 %), with contrasts across AEZs. Other practices included use of organic manure (30 %), trenches (12 %), and terraces (10 %). Replanting is a short-term adaptation strategy (17 %), adopted when facing unfavourable climate conditions at the start of the growing season. These findings provide insights into spatio-temporal heterogeneity in climate risks and adaptation strategies, underscoring the value of citizen science as a participatory approach in generating time-specific, localised data to inform climate-resilient interventions. The reported climate extremes will be triangulated with seasonal weather data to guide appropriate recommendations.

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