



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

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Introduction

- Smallholder farming is a major rural livelihood in sub-Saharan Africa (SSA) but is highly exposed to climate-induced production risks
- Localised evidence on the timing, farm-level impacts, and adaptation strategies in smallholder production systems in SSA remains limited
- A citizen science approach documented farmers' self-assessed climate extremes, impacts, and adaptation strategies in south-western Uganda

Methodology

- A network of 25 farmer scientists was formed in three hazard-prone districts in south-western Uganda (**Fig. 1**)
- The farmers were trained and equipped with a smartphone-based protocol to record field-level cropping practices and abnormal weather events
- Data were collected during the March–May (MAM) and September–November (SON) cropping seasons in 2024 and 2025

Key results

1. Climate extremes

- Rainfall deficit is the predominant climate extreme across seasons, with land preparation and planting being the most affected phases
- Excessive rainfall is also experienced in all seasons but affects fewer gardens, with a slightly greater effect during harvesting (**Fig. 2**)

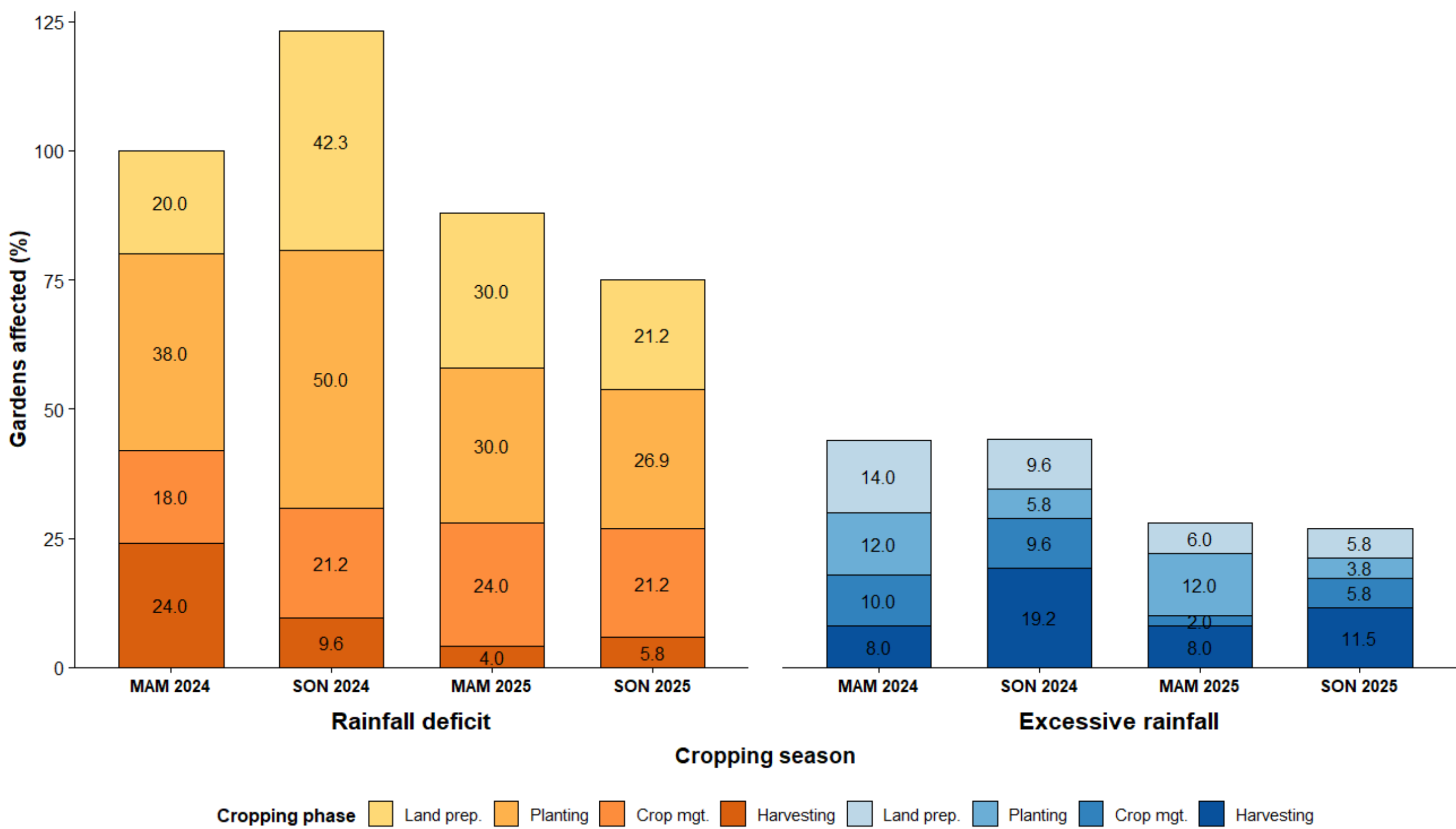


Fig. 2. Distribution of farmer-reported climate extremes across cropping seasons and phases

3. Adaptation strategies

- Farmers adopt reactive strategies to rainfall deficit, mainly by adjusting planting periods and replanting
- Responses to excessive rainfall are generally less frequent and mainly involve replanting and early crop harvesting (**Fig. 4**)

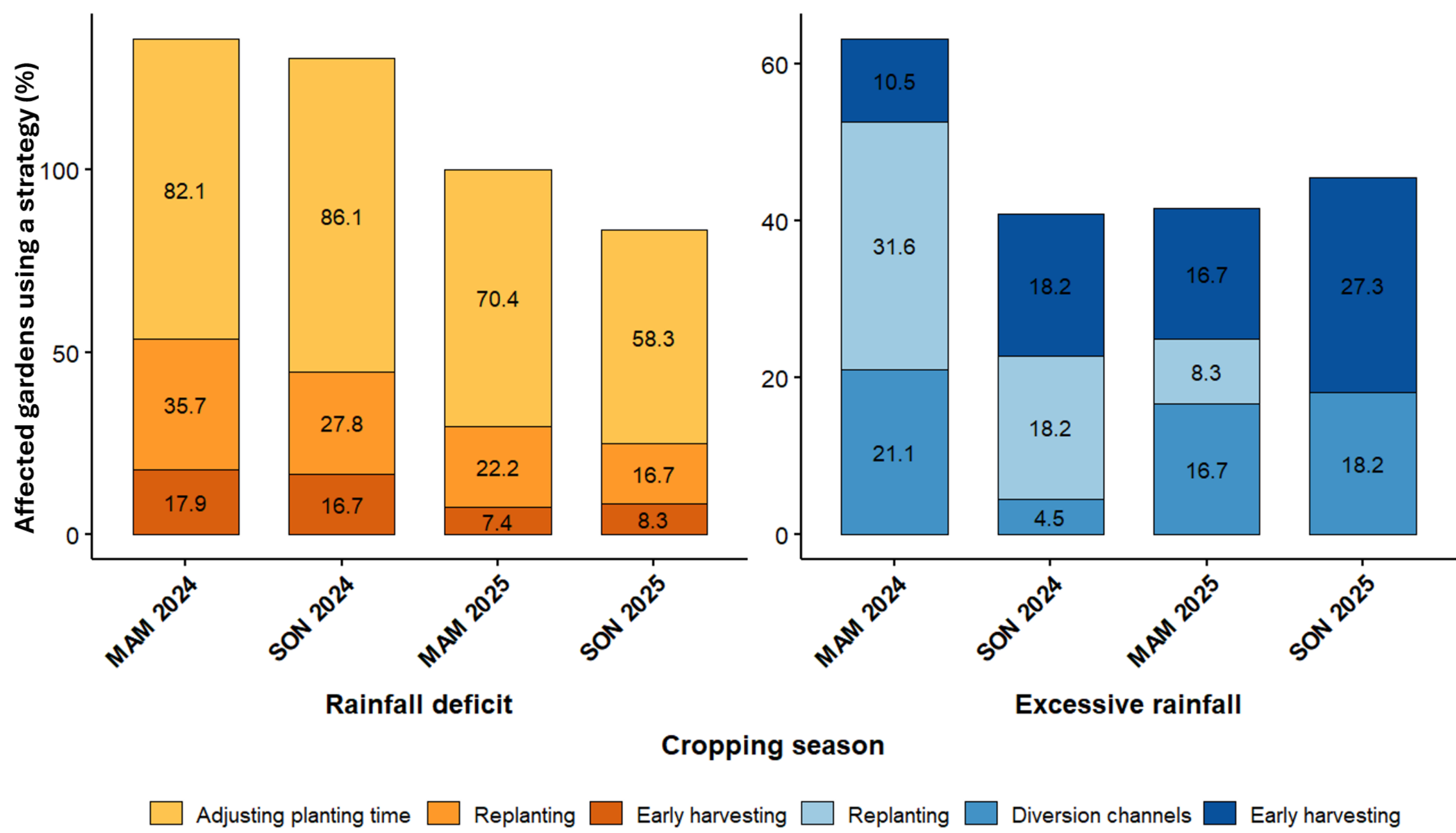


Fig. 4. Reactive adaptation strategies adopted to respond to rainfall deficit and excessive rainfall across cropping phases and seasons

Study area

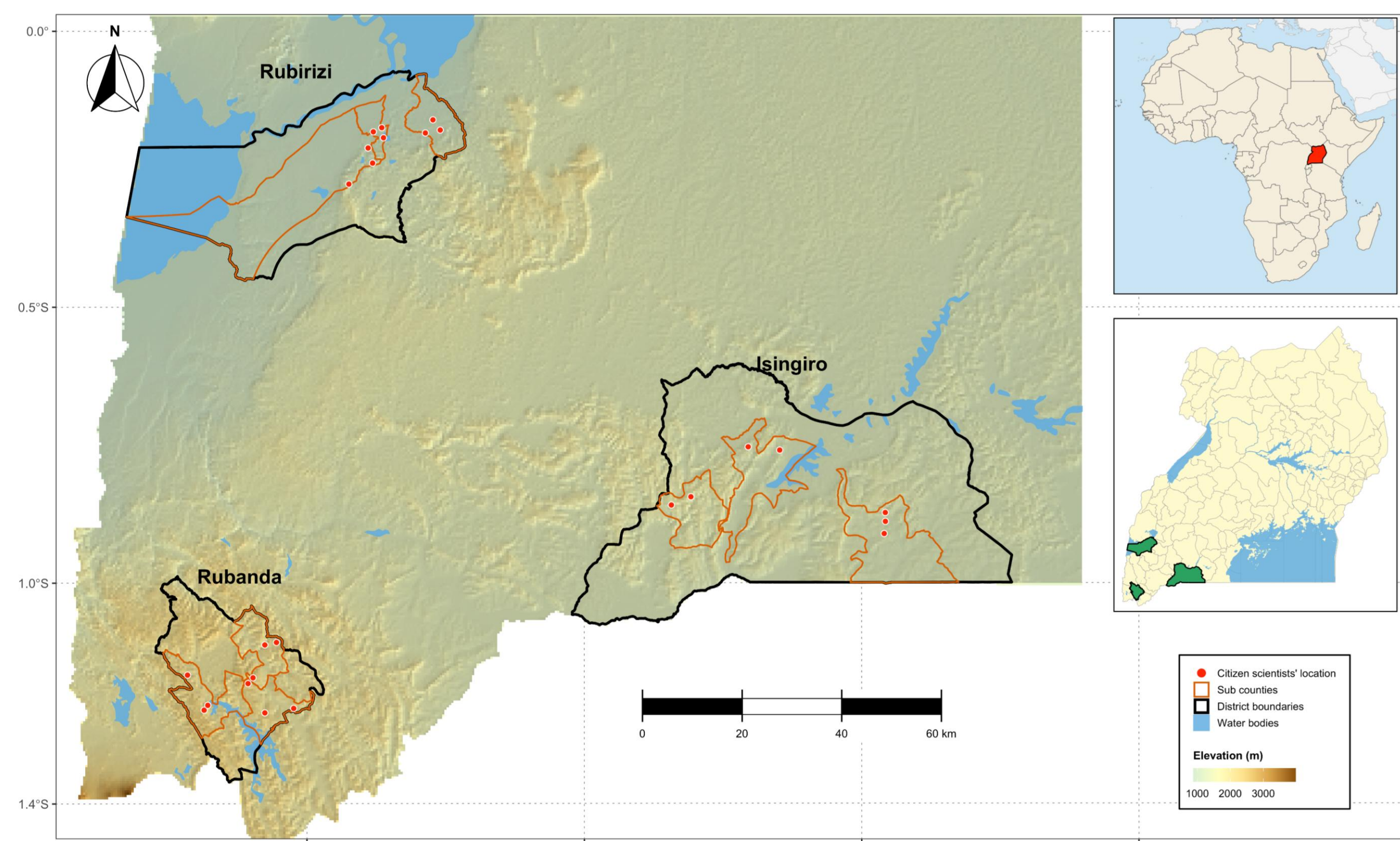


Fig. 1. Map showing three study districts and the location of the citizen scientists

2. Impact of climate extremes

- At planting, rainfall deficit reduces seed germination, while excessive rainfall mainly causes garden erosion (**Fig. 3a**)

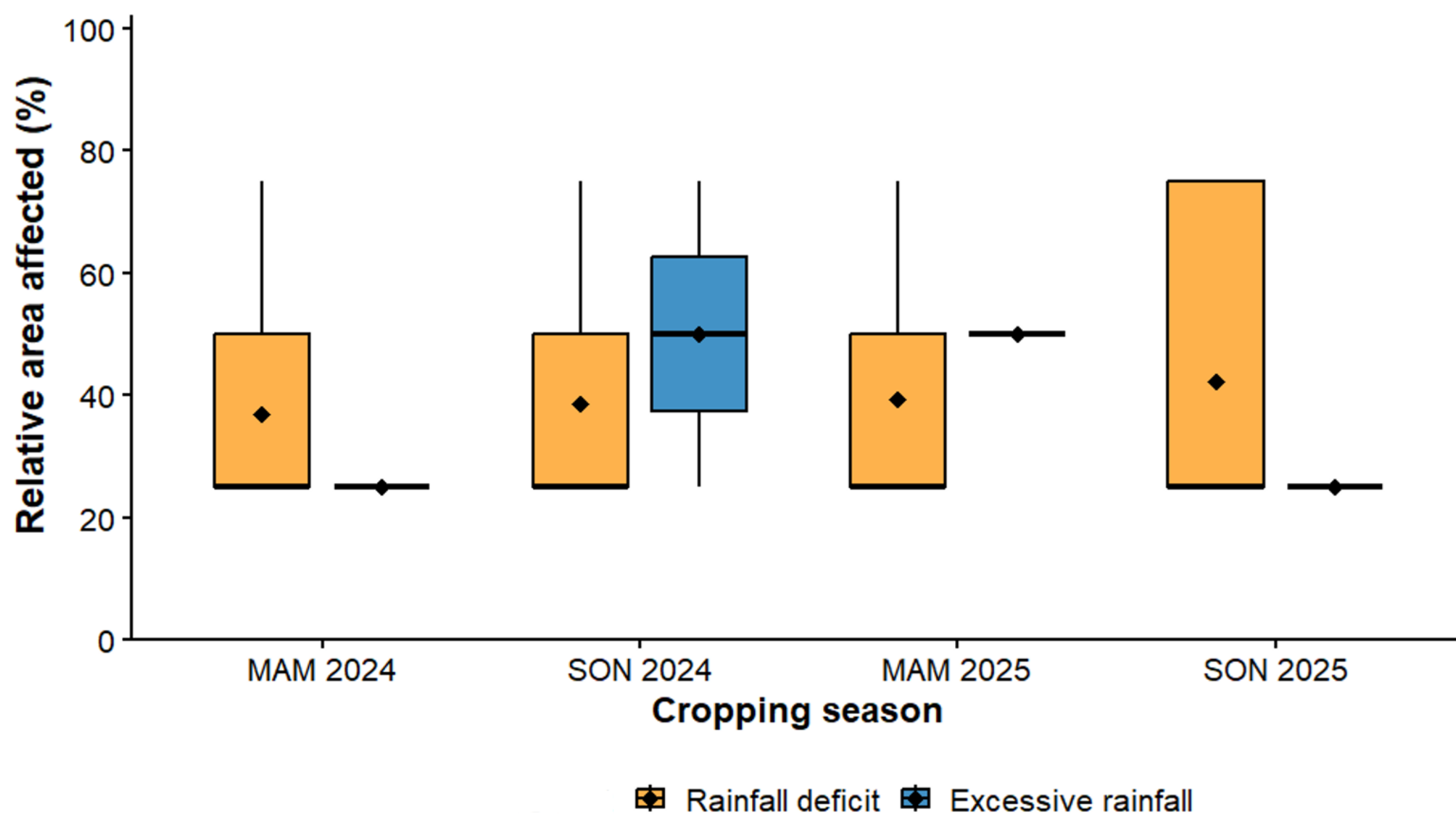


Fig. 3a. Relative area affected by rainfall deficit and excessive rainfall during the planting phase across cropping seasons. Diamonds indicate the mean relative area damage

- At harvest, rainfall deficit manifests as early rainfall cessation, causing premature crop drying, while excessive rainfall causes crop rotting (**Fig. 3b**)

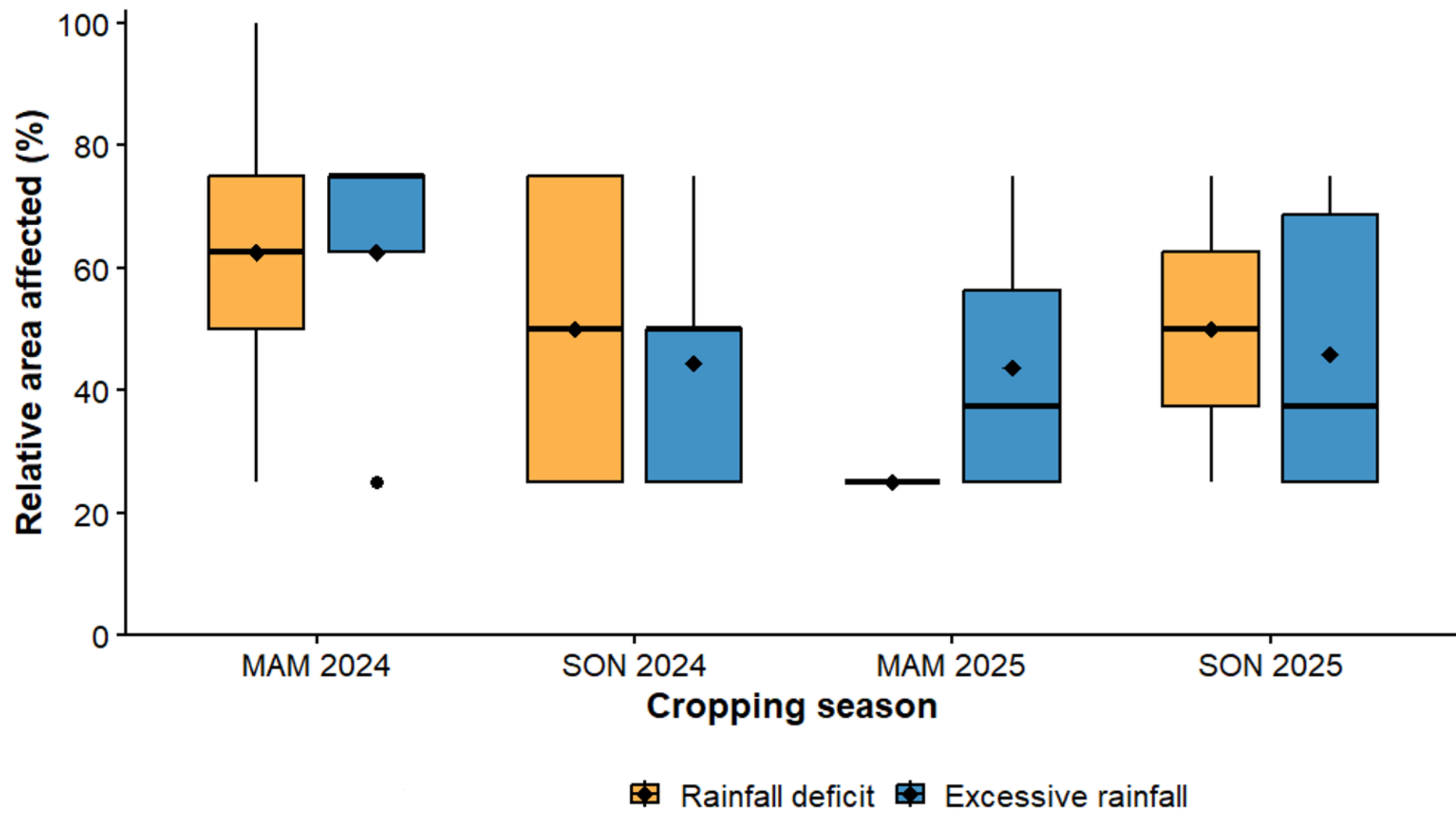


Fig. 3b. Relative area affected by rainfall deficit and excessive rainfall during the harvesting phase across cropping seasons. Diamonds indicate the mean relative area damage

Conclusion

- Farmer-generated evidence identified rainfall deficit as the predominant climate extreme, primarily affecting germination
- Farmers responded to the event mainly by adjusting their planting periods
- The study demonstrates the value of citizen-science evidence for informing localised, context-specific adaptation interventions