

GCRF-AFRICAP is a new programme of work funded by the UK government, and being led by the University of Leeds and the Food, Agriculture and Natural Resources Policy Analysis Network (FANRPAN), in collaboration with the Met Office, University of Aberdeen and Chatham House. The programme aims to establish academic partnerships between UK and African research and policy institutions and develop capacity across these partnerships in the field of climate smart agriculture and food systems. It is driven by an aim to build capacity for, co-develop and demonstrate, nationally owned SDG-compliant agri-food development pathways that can be productive, sustainable and climate-smart

Root system architecture and rhizosphere interactions for climate-smart agriculture in Malawi and Tanzania

Drought and soil infertility are amongst the most significant constraints on agricultural yield in sub-Saharan Africa (SSA). In addition to yield losses, poor soil fertility is linked to limited uptake of nutrients by crops (e.g. zinc, selenium, manganese, phosphorus and nitrogen) that are consequently of reduced nutritional value. Conservation Agriculture (CA) promotes soil restoration and crop yield stability fostering a more sustainable climate-smart agriculture.

This programme of work aims to understand the biological and agro-ecological basis of maize-based CA, focusing on crop and intercrop root system architecture and rhizosphere processes. We will also study, in detail, the transition from conventional agriculture to CA in order to understand the reason for transient yield losses (in the first 3-5 years of CA uptake). We will apply our collective expertise in plant-rhizosphere interactions to evaluate how root system biology and interactions with beneficial soil arbuscular mycorrhizal fungi could mitigate yield loss in the CA transition period and potentially improve the range of agro-climatic zones over which CA can be successfully implemented.

Through lab- and greenhouse-based experiments, and field trials (at the Chitedze Research Station in Malawi) using African maize and intercrop cultivars, we will:

- (1) Evaluate the impact of CA on root system architecture and mycorrhizal fungi, and
- (2) Investigate the potential for improvements in existing germplasm for increasing resource capture through mycorrhizal interactions and evaluate their impact on root exudates and other favourable rhizosphere properties.

These activities will provide evidence to inform recommendations on the implementation of CA with the aim of increasing the adoption of CA among farmers for whom CA provides genuine long-term benefits in terms of yield and prosperity in the long term.

For more information about this work, please contact:

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