

Informing CSA in Lilongwe district: A proposal to study resilience, pests and disease in the Chitedze long-term CA trial

Project Team

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Background

To facilitate the adoption of Conservation Agriculture (CA) by resource-poor smallholder farmers in Southern Africa CIMMYT established a long-term-trial at [Chitedze Research Station](#), Malawi. The trial consists of four replicates of the treatments listed in **Table 1**. Treatments were established in 2008 and consists of 18 x 24 m long maize rows (spaced at 0.75m). The initial objectives of this project were to monitor and evaluate the longer term effects of CA practices on soil quality, weeds, pests, diseases and crop yield.

T1:	Control (tilled), MM, residues removed.
T2:	No-till basins, MM, CRM.
T3:	No-till dibble stick (NTDS), MM, CRM.
T4:	NTDS, maize cowpea, CRM.
T5:	NTDS, cowpea maize, CRM.
T6:	NTDS, maize-pigeon pea, CRM.
T7:	NTDS, maize-cowpea, CRM.
T8:	NTDS, maize-velvet bean, CRM.

Table 1 Management treatments at the Chitedze long-term CA trial. CRM = crop residue mulching, MM = maize monoculture, “|” = rotation, “-” = intercrop.

2015-2017 SRI buy-in

CIMMYT funding for the trial has finished and we (the [Sustainability Research Institute](#) (SRI) through PS/AD) are taking over funding in exchange for access to the site for new manipulations. We will be continuing the project for at least the next two growing seasons (sowing in Nov/Dec and harvesting in May). The site is well maintained and CIMMYT have given positive feedback regarding site management by DARS (Dept. for Agricultural Research Services) research staff. Due to low labour costs and the rarity of agricultural research sites under competent and consistent management over such a period of time the site is extremely good value for money.

CA as CSA – Drought resilience?

We will improve the [evidence base for CA](#) as climate smart agriculture (CSA) by studying the resilience of crops in the Chitedze treatments to simulated rainfall stress. We are constructing rain-shelters (Figure 1A) to cover five rows of treatments T1, T3, T4/T5, T6 and T7. Rainfall will be reduced in the critical tasselling and

silking phases of maize growth in Jan/Feb. This will be complemented by a synthesis of existing sub-tropical CA datasets to examine its resilience to drought and temperature stress across multiple contexts.

CA as CSA – Pest and disease resilience?

We will enhance the pest and disease work of the trial by introducing standardised monitoring of agricultural macro fauna such as leafhoppers ([stickytraps](#)), soil-nesting terrestrial arthropods (emergence traps, Figure 1B) and wireworms/white-grubs ([bait traps](#)). To investigate potential trade-offs or synergies between drought and pest resilience under different management scenarios we will introduce a crossed pesticide treatment to the trial.



Figure 1 A) Inside a pilot rain-shelter built earlier this year to investigate design and logistics. B) Locally constructed emergence trap covering about 3 m².

Opportunities

This project offers substantial opportunities for applying contemporary methods in ecology and soil science to a widely promoted (though often contested) agricultural practice thought to both sustainable and resilient. The project has clear pathways to impact through food security and climate adaptation for poor and vulnerable smallholders in sub-Saharan Africa.

We are looking for collaborators who can investigate how soil biodiversity in the trial interacts with crops to enhance plant health, yields and resilience to multiple stressors and shocks. We are particularly interested in application of soilomics approaches and study/manipulation of vascular arbuscular mycorrhizal fungi (VAMF).

There is excellent security on-site and we are also looking for opportunities to employ sensors to monitor environmental parameters such as soil moisture.

If you want to know more please contact Pete.

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