Impact of climate change on sorghum yield, and adaptation strategies in the Teso Farming System of Uganda

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Climate change is a serious environmental and livelihood challenge in Uganda, with the poor agro-based communities in semi-arid areas, such as the Teso Farming System (TFS), being more vulnerable. However, the impact of climate change on key crops in such areas is not fully understood, yet this information is needed for accurate designing of mitigation strategies. Sorghum is a key food security crop in the TFS. The gist of this study is to determine how the yield of sorghum will be affected by the expected climate changes in the TFS.

The study has the following objectives;

- To determine the impact of climate change on the yield of sorghum.
- To establish community perceptions on climate change, and how climate variability and change have affected crop production.
- To assess the efficacy of the existing coping and adaptation strategies to climate variability and change.

Study area; Teso farming system (TFS)

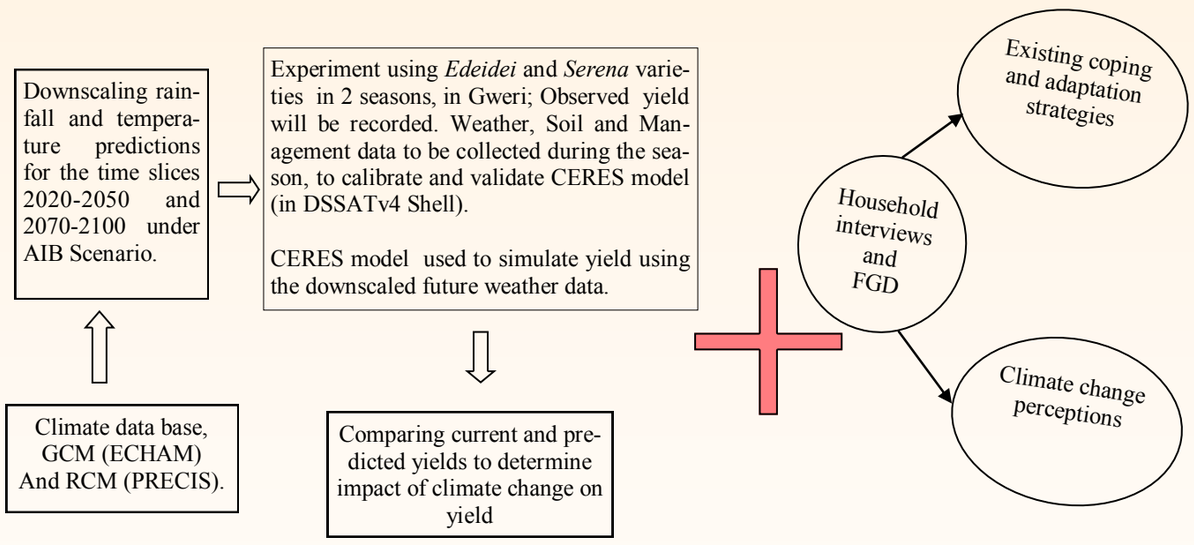
- Is one of the poorest regions in Uganda. Lies in a semi– arid area, vulnerable to droughts due to light textured soils.
- Rural communities depend on livestock and annual cropping for livelihood.
- Thus, the TFS is very vulnerable to the adverse effects of climate change.

Scope of the study

- Climate elements considered; Temperature and rainfall.
- Soroti district selected for the study.
- Gweri and Kamuda sub-counties selected for socio-economic study.

Materials and methods

The methodological frame work of the study is shown in the figure below.



A Regional Climate Model (RCM) PRECIS is being used to downscale climate projections given by the Global Climate Model (GCM) ECHAM in order to provide temperature and rainfall projections specific for Soroti district. The downscaled weather data will be input in the CERES sorghum model (in DSSAT v4 Shell), and the model run to obtain sorghum yields under changed climate. In order to calibrate and validate the CERES Sorghum model, and to determine sorghum yields under current climates, field experiments in 2 seasons using *Edeidei* and *Serena* varieties have been conducted in the study area (Gweri sub-county).

Besides the prediction and field experiments, Household interviews and Focus Group Discussions are being used to obtain data concerning farmers' climate change perceptions and the existing coping and adaptation strategies.

Edeidei

Field sown with sorghum for season 2

Serena

Preliminary findings

Season 1 yield results are showed in table 1. *Serena* gave higher grain yield than *Edeidei*, but *Ededei* had higher stover yield than *Serena*, though ANOVA showed no significant differences.

Yield	Variety		P value
	Edeidei	*Serena*	
Grain yield (t/ha)	2.956	4.368	0.429
Stover yield (t/ha)	6.135	3.771	0.206

Table 1. Season 1 sorghum yields.

The yields of both varieties are high above the average sorghum yields for Uganda, i.e, 1.5 t/ha (FAOSTAT, 2009). This implies that these sorghum yields are promising for food security. *Edeidei* could also be relied on for stover for feeding livestock.

The trial results also showed that *Serena* matured earlier (92.5 days) than *Edeidei* (97.5 days). However, this difference was not statistically significant (P = 0.126). Thus, *Serena* could be a better choice for adaptation to decrease in seasonal rainfall duration**.**

According to key informants in Soroti district, seasons have changed; first season which used to be the major (long duration, more rains, more reliable) is the now minor. Second season now gives more rain. This information will be validated by comparing yield results in seasons 1 and 2. Survey results reveal that majority of the respondents (91%) have heard about climate change. The main perceived indicators of climate change were drought (31%) and late rainfall on set (20%), while the major perceived causes of climate change were cutting of trees (37%) and cultivation in wetlands (17%).

Ongoing work

1. Calibration and validation of CERES Sorghum model.
2. Season 2 field experiment has been established.
3. Downscaling of GCM data for future rainfall and temperature (up to 2100).
4. Preparation for Focus group discussions to validate the information obtained from household interviews.

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