

## Assessment and Modelling Climate Smart Agricultural Approaches for Improving Maize Productivity in Isingiro District, South Western, Uganda

### 3.2.1. Impact of climate change scenarios on maize yields

**Objective:** To simulate the impact of climate change on maize yields in Isingiro District under future climate scenarios. 0.8435° S, and 30.8039° E

#### Required data

Climate baseline data from 1981 to 2011. SOC, maize yield for model calibration. DSSAT software for maize yield simulation.

#### Methodology

Maize yields will be simulated using Decision Support Systems for Agrotechnology Transfer (DSSAT) model based on soil organic carbon, soil type and best intercropping system (Liu et al., 2014). Data from the best maize-legume intercropping system was used to calibrate the DSSAT model parameters and this was the baseline data for projecting future maize yield under different climate scenarios. Future maize yields was projected in DSSAT model version 4.7.5 (Hoogenboom et al., 2019) to simulate maize yields for Western Uganda in the near- term 2010-2039; mid-century 2040-2069; and end-of-century 2070-2099. Climate change projections was done from the baseline data and future maize yields were projected based on RCP 2.6, RCP 4.5 and RCP 8.5 climate scenarios and two maize varieties Longe5 (improved and high yielding) and Flint corn (local and low yielding) (Nimusiima et al., 2018). Table 5 provides genetic coefficients for the two varieties of maize.

**Table 5. The CERES Model calibration coefficients (source: Nimusiima *et al.*, 2018)**

ID	Cultivar	P1	P2	P5	G2	G3	PHINT
IC0005	Longe 5	200.8	0.500	508.5	450.0	10.50	45.60
IC0006	Longe 9	2008.6	0.500	554.0	460.0	10.50	45.00

The two varieties provided an insight about the appropriate maize variety for improving maize productivity in SWU. This will help farmers in improving adaptation strategies for future climate changes and increase their incomes and food security. Possible adaptation and mitigation strategies for smallholder farmers were suggested from this study for crop

yield enhancement in the region.

### **Data Analysis**

Climate scenarios data, soil and maize yield data were fed into DSSAT CERES-Maize Module to simulate potential maize yield in south western Uganda for the near- term 2010-2039; mid- century 2040-2069; and end-of-century 2070-2099 based on RPC 2.6, RCP 4.5 and 8.5 climate scenarios. Maize yields for two different maize varieties were compared to determine the variety that performs better amidst the present and future climate change scenarios in the region. Model calibration and validation was carried out using weather data from 6 GPS points selected from the region and entered into climate change knowledge portal (CRU-World Bank, 2021) and Maize yields baseline data 1980-2010 from FAO website. Data for scenario generation will be obtained from AgMIP5 and NASA websites based on standard procedures and R Tool described by agriculture and global weather experts (AgMIP, 2013; Hudson & Ruane, 2013).

### **Required data sets:**

1. Baseline climate data (rainfall, temperature max and min, solar radiation) 1981-2010
2. Weather data for calibrating DSSAT model
3. Genetic coefficients for two maize varieties Longe5 (improved and high yielding) and Flint corn (local and low yielding)
4. Protocols for simulating maize yields early, mid and end of century

MANY THANKS