39. Assessing the vulnerability of sorghum to changing climate conditions in West Africa semi-arid tropics

Akinseye Folorunso M.[1,2], Diancoumba Madina[1], Adam Myriam[3], Traore Pierre C. Sibiry[1], Agele Samuel O.[4], Whitbread Anthony M.[5]

[1]*International Crops Research Institute for the semi-arid Tropics (ICRISAT), BP320, Bamako, Mali*

[2]*Department of Meteorology, Federal University of Technology, PMB 704, Akure, Ondo State, Nigeria*

[3]*CIRAD- UMR AGAP, Avenue Agropolis, 34398 Montpellier Cedex 5, France*

[4]*Department of Crop, Soil and Pest management, Federal University of Technology, PMB 704, Akure, Ondo State*

[5]*International Crops Research Institute for the Semi-arid Tropics (ICRISAT) Patancheru 502324, Andhra Pradesh, India*

Rainfed agriculture would remain the dominant source of staple food production and the livelihood foundation of the majority of the rural populace in semi-arid West Africa. Prolonged dry spells during the growing season often lead to significant crop yield losses, a situation that is expected to be exacerbated by climate change. In this study, impacts of climate change on the sorghum production system in West Africa semi-arid tropics was analysed using the most accessible process-based crop models (DSSAT, APSIM and Samara) and simulated at six stations under rainfed conditions. The mid-century future climate predictions by 2069 indicate the productivity of grain sorghum would be diversely affected due to the differences in the GCMs projections in terms of temperature and rainfall. On the average, climate change is projected to reduce low photoperiod sensitivity genotype (CSM63E) grain yield to the tune of 13%, and by 7% for both medium photoperiod sensitivity genotype (CSM335) and high photoperiod genotype (IS15401) across the selected sites. Results also indicate that adaptation strategies like longer grain filling period and sowing date reduced the vulnerability on both the medium and high photoperiod sensitivity genotypes (CSM335 and IS15401) compared to low photoperiod sensitivity genotype (CSM63E). As obtained from the study, proper genotypic calibrations and evaluations of crop models could be used to explain the expected outcomes of future climate conditions on the diverse photoperiod sensitivity sorghum genotypes available across semi-arid area. Also, these results would serve as reliable tools towards the understanding of future climate change and adaptation options to be implemented, which could be shared among farmers and development partners interested in food security issues in West Africa semi-arid zone.