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Physiological Response of Maize under Soil and Water Conservation Practices in Context of Climate Change in Ruzizi Basin

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Abstract

The efficiency of water use in dryland areas is becoming a crucial problem for small-scale farmers in the context of climate change. Agricultural regions of eastern DR Congo like Ruzizi plain are hotspots for such problems. A part of low rainfall distribution, the evaporative demand of atmosphere is higher than rainfall. Dominated by a sandy loam soil, the water retention capacity is low and can create a negative water balance. Adaptation measures through relevant water management technologies may offer some opportunities to ensure sustainable production and reduce environmental impact of agriculture production. A study with the aim of finding the most appropriate and efficient technologies to ensure water and nutrient use efficiency was conducted in Ruzizi plains. Practices such as Zaï, tied ridge and conventional tillage were used to test the efficiency of water and nutrients use and yield. Runoff plot and drainage plot were installed to evaluate the water and nutrient balance for each practices. 3 slopes gradient were chosen according to FAO classification (0–2, 2–8, and 8–15). Some parameters like Yield, water use efficiency, water balance, nutrient were evaluated. Some trials started from 2013 to 2019 but with a break of 2015–2017. For water balance evaluation, the started from 2017–2019. Preliminary results showed that the use of tied ridges without fertiliser and mulch gave the highest yield (1440 kg/ha), while Zaï and conventional tillage had the lowest yield (1006 kg/ha and 815 kg/ha, respectively). The adding of nutrients and tied ridges resulted into high yield (2604 kg/ha) compared to Zaï and conventional tillage (1927 kg/ha) and (1510 kg/ha), respectively. Utilisation of mulch resulted into increased yields ranging from 19–30 % while interaction between mulching and nutrient improved the yield from 101 to 130 %. Moreover, tied ridge and Zaï technologies reduced number of weeding during the growth cycle. There is a need to promote soil and water conservation practices like tied ridges in the Ruzizi plain for mitigating against climate variability. The modelling should be tested in order to evaluate the sustainability of the promoted practices in the future under different climate change scenario.

Keywords: Climate change, Maize yield, soil and water conservation, water use efficiency

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