

Sustainable Intensification to Advance Food Security and Enhance Climate Resilience in Africa

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Chapter Title: ***Climate Change and Crop Yield in Sub-Saharan Africa***

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Abstract

Recent scientific evidence shows that crop yields in many Sub Saharan Africa (SSA) countries are likely to be severely affected by climate change. Reliance on rainfall in this region increases the vulnerability of cereal systems to climate change and variability. In large parts of SSA, maize (*Zea mays* L.) is the principal staple crop, covering a total of nearly 27 M ha, and yet maize yields remain the lowest in the world, stagnated at less than 2 Mg ha⁻¹. Calculated and simulated analyses for SSA show that crop yields will decline by more than 10 % by 2055. The effect of climate change on crop yields is mainly attributed to: increased frequency of extreme events; effects of elevated CO₂(where studies project crop yield increases of 5–20 % at 550 ppm CO₂); interactions of elevated CO₂ with temperature and rainfall as well as with soil nutrients; and increased vulnerability to weed competition, insect pests, and diseases. However, several studies show that rainfall and water availability limit agricultural production more than temperature in SSA. The projected rainfall would increase by 2–4 % in Eastern Africa, but decrease by 5 % in Southern Africa during the main crop growing seasons. Temperatures are likely to increase throughout SSA by 2050, but the combination of increasing temperatures and low seasonal rainfall in Southern Africa suggest this region will be particularly vulnerable. Some of the crop models used for predicting the effect of climate change on yields are limited by their ability to predict effects of climatic events that lie outside the range of present-day variability. In addition, comparisons between models for the same setting have sometimes given differing results. This review paper shows that, for most of the SSA countries, the data required for assessing long-term effect of climate change on crop yield are lacking, that most of the models do not cater to assessment at the household level, and that no single approach can be considered as adequate. Therefore, a clear need exists for collaboration among different scientific disciplines for the development of agriculture in SSA in a changing climate.