



Tropentag, September 11-13, 2024, hybrid conference

“Exploring opportunities ...
for managing natural resources and a better life for all”

A double jeopardy: Climate change affects both yield and grain quality of cereals in Ethiopia

ABEL CHEMURA¹, SIYABUSA MKUHLANI², DAVID ABIGABA³, ANDREW NELSON¹

¹*University of Twente, Fac. of Geo-Information and Earth Observation (ITC), Dept. of Natural Resources, The Netherlands*

²*International Institute of Tropical Agriculture, Natural Resources Management, Kenya*

³*Potsdam Inst. for Climate Impact Res., Adaptation in Agric. Systems, Germany*

Abstract

There is limited information on the impacts of climate change on grain quality and yet this yield component has significant implication for mal- and under-nutrition in many parts of Africa especially among children. Using the crop model DSSAT, we assess the spatial and temporal variability of yield and yield components associated with grain quality (N uptake, canopy N, LAI, Tops N, grain N) for maize, wheat and barley in Ethiopia. We then assessed impacts of 1.5°C, 2°C and 3°C global warming levels on the yield and yield components. We find that there is considerable variation in both yield and yield components and over time. Areas in the central and western parts have higher yield and grain quality compared to those in the north and northeast of the country. Yield is positively correlated with LAI, N uptake, canopy N and grain N and negatively with soil N at maturity across the three crops. The highest variability in grain N over time was for wheat when compared to that of maize and barley. Under global warming levels, the changes in grain N followed the changes in yield with yield changes being more pronounced than grain N changes. The largest changes in grain N occurred in the central highland areas of the country, which have high yields for these crops. Under climate change, the impacts increased with the increase in magnitude of warming being highest under the 3°C level of warming for both crops. We therefore conclude that climate change will have an impact on both the yield and grain quality of maize, wheat and barley in Ethiopia and these effects on grain quality should be accounted for in climate impact studies of food systems to safeguard on health and nutrition aspects of food security especially for vulnerable groups.

Keywords: Climate impacts, food security, global warming levels, nutrition