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Yield Gap Analysis for Tanzania - The Impact of Climate and Management on Maize Yields

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Abstract

For Tanzania, food security will be the biggest challenge in the next decades. One dimension of food security is the production of food. Because of limited extendable arable land, the yield (per hectare) must increase to achieve a higher food production. In Tanzania, maize (*Zea mays* L.) is the most important food crop, although the average yield is below 1.5 t ha^{-1}. Nevertheless, field trials show that Tanzania has a large potential to increase the maize yield and enhance food security. Therefore, regional-adapted agronomic practices are needed. The agronomic practices of the Trans-SEC upgrading strategies focus on the issue of both food security and environmental protection. To consider both issues under future climate conditions, crop models allow an impact assessment of agronomic practice and climate on actual (farm) yields (Ya). The Ya are limited by the water and nutrient supply and reduced by pests, diseases, and weeds. Without these limitations, potential (physiologically possible) yields (Yp) are achievable. The process-based model SWIM (Soil and Water Integrated Model) can compute the relevant impacts of agronomic practices on maize yields and thus shows projections to decrease the yield gap between Ya and Yp. However, not the entire yield variability of Ya and Yp can be explained by agronomic (fertiliser applications, crop varieties, sowing and harvest times) and climatic conditions. Additionally, the Ya are influenced by socio-economic and cultural impacts or unmodeled agronomic practices (e.g. plant protection). These impacts can be captured by the statistical crop model IRMA (Interregional Regression Model for Agriculture) by proxy variables or within collinear effects.

Keywords: Crop model, food security, maize, Tanzania, yield gap

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