Tropentag, September 10-12, 2025, hybrid conference

"Reconcile land system changes
with planetary health"

Futur impact of climate change on rainfed rice yields and adaptation strategies in Côte d'Ivoire

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Abstract

Climate change poses a threat to food security in terms of the need for rice, especially for smallholders famers with limited resources. This study aims to assess the future impact of climate change on rainfed rice yields in order to propose adaptation strategies for smalholders farmers in Côte d'Ivoire. The Decision Support System for Agrotechnology Transfer (DSSAT) version 4.8.2 model was used to simulate rice yields under the two scenarios Representative Concentration Pathway (RCP4.5 and RCP8.5) from 2036 to 2095. The model was calibrated and validated with experimental data from 2015 to 2022 collected at the Africa Rice Center (AfricaRice) research station in M'bé, central Côte d'Ivoire. The results showed that the model performed well, with $R^2 > 0.5$, d-stat > 0.8 and RMSE of 3.287 days for anthesis, 3.254 days for maturity and 223.347 t ha^{-1} for yields. Under RCP4.5, all cropping systems (Rice // Maize under tillage with straw incorporation, Rice // Maize under tillage with straw burning, Maize + Groundnut / Maize + Dolique // Rice in rotation, Rice + *Stylosanthes* // Rice + *Stylosanthes*, Rice + *Stylosanthes* // Maize + *Stylosanthes* in rotation) are expected to experience a decrease in yields ranging from 12.19 % to 20.18 %. On the other hand, under RCP8.5, all systems would see an increase in yields from 26 % to 32.32 % up to the 4th decade (2066–2075) before decreasing from 30.84 % to 35.24 % by the end of the century. In additional, rice-legume cropping systems exhibited higher average yields compared to systems employing tillage and slash-and-burn practices. In response to climate change, agroecological practices such as adopting heat-tolerant rice varieties, improving water management, integrating rice-legume intercropping, and enhancing access to agrometeorological services are recommended for smallholder farmers to bolster their resilience.

Keywords: Adaptation strategies, climate change, Côte d'Ivoire, model DSSAT, smalholders farmers, yield rice

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