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Climate change implications for food security in tropical Africa

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The relationships between climate and agricultural production in Benin, tropical West Africa, are elucidated using predictions from a high-resolution regional climate model. The aim is to detect the sensitivity of various mainly alimentary crops cultivated in tropical Africa to changing climate conditions due to increasing greenhouse-gas concentrations and ongoing land degradation. This knowledge is of practical relevance since the predominant cultivation of less vulnerable crops may be an appropriate adaptation strategy in order to maintain or improve food security in Africa. Model output statistics are used to transfer simulated climate variability to changing crop yield. It turns out that the statistical relationships between climate and agricultural production are very strong, amounting to partly more than 50 % of explained variance at the interannual time scale. Especially, summer monsoon precipitation and relative humidity represent reliable predictors of crop yield. Until 2025, the dryer and warmer climate in tropical Africa may come along with a decrease in agricultural production with respect to most crops. The reduction is in the amount of 5 to 20 %, implying severe problems of food security given the increasing population density. However, jams and manioc, as major alimentary crops in Benin, appear to be less sensitive to climate change.