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Farmers’ and academia’s views”

Crop diversification under climate change: a comparative assessment in Ghana, Burkina Faso, Ethiopia and Niger

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Abstract

Diversified farming systems as an agroecological measure maintain functional biodiversity at multiple spatial and temporal scales in order to be productive, resilient and efficient. However, the potential for transforming or maintaining diversified agricultural systems depends on the ability of the selected crops to be sustained under the climate of the specific areas they are grown. Climate change can affect the ability of one or more crops to grow within specific niches and thereby reducing their potential to be part of a crop diversification strategy. In this study, we assessed the agro-climatic suitability of four major food crops in Ghana (maize, sorghum, cassava and peanut), Ethiopia (maize, sorghum, teff and wheat), Burkina Faso (maize, sorghum, cowpea and peanut) and Niger (maize, sorghum, cowpea and peanut) under current and projected climatic conditions using the ECOCROP crop suitability model. We find that suitability for four crops will decrease in Burkina, Ghana and Niger, while it will increase only in Ethiopia with the magnitude dependent on the climatic scenario. Positive changes in suitability are also projected for three crops in Ghana (up to 26.3%) and for Ethiopia (up to 7.7%), while in Burkina Faso area suitable for three crops will decrease (up to -36.8%) and remain relatively unchanged in Niger ($\approx 1\%$). Instead, areas that are suitable for only one crop will increase in Burkina Faso, Ghana and Niger, while it will decrease only in Ethiopia. We therefore conclude that the potential for higher crop diversification will be negatively impacted by climate change. The impacts will vary within and across countries and thus, will influence planning for scaling up diversification as an agroecological measure.

Keywords: Climate impacts, crop suitability, farming systems, food crops, multiple cropping