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“Resilience of agricultural systems against crises”

Central American Bean Systems and the Changing Climate

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Abstract

In order to be able to adapt to climate change, bean producing smallholders in Central America have to know which type of changes and to which extent and ranges these changes will occur. Adaptation is only possible if global climate predictions are downscaled and distinct/regionally specific, to give farmers a direction on what to adapt to, but also to provide detailed information about the extent of climate change impact and the exact location of the affected population to local, national, and regional governments and authorities, and the international cooperation/donors in order to coordinate and focus their interventions in the future. Our analysis show that there will be people who will be more affected by climate change than others; some might have to leave the agricultural sector while others will have to change their whole operation. But there will be also new opportunities for those who will adapt quickly making them winners of changes in climate. This presentation seeks to assess the expected impact of climate change on bean production in 4 countries in Central America. We downscaled GCM (Global Climate Models) to a local scale and predicted future bean production using the dynamic crop model Decision Support for Agro-technology Transfer (DSSAT). Based on the DSSAT-results 3 types of focus-spots where impact is predicted were found to be significant. Simulations were repeated with the full range of available GCMs to address uncertainty of model predictions. Alongside this analysis we started a field trial using 10 bean varieties in 5 countries to calibrate DSSAT and run it in order to make assumptions on determining factors and possible breeding strategies. Outputs of downscaled climate data show that temperature is predicted to increase in the future, while precipitation will slightly reduce. Crop modelling shows that bean yields will decrease high along the dry corridor in Central America and Hot-Spots with more than 50% yield reduce could be identified in the study area. Based on the results we finally made recommendations for adaptation- and mitigation strategies such as irrigation and water-catchment, controlled agricultural land use shift, genetic improvement for heat-stress besides others.

Keywords: Adaptation strategies, bean production, Central America, climate change, crop modelling, impact focus spots