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Importance of Climate Change on Farmers' Production Decisions in Nepal

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Abstract

Climate change is considered as one of the major causes of uncertain farm income in rainfed agriculture. The research assesses the effects of climate variables on farm income and its impacts on farmers' production decisions. Both primary and secondary data were considered. The farm level data (specified per crop) in three growing seasons of the year July 2010 to June 2011 were collected through face-to-face interviews with 225 farm households in three tropical districts (Banke, Chitwan and Morang) of Nepal. The observed district level average data of crop yields and seasonal climate variables (rainfall, maximum temperature and minimum temperature) during 1976 to 2011 were considered for the regression (time series) analysis to create the change in crop yield equation. The independent variables in the regression were the changes of seasonal climate variables and standard deviations of climate variables within growing seasons. Based on regression equations and observed historical data, yield of major seven crops across growing seasons and districts for 35 years were predicted. The predicated crops yields were considered as the yield risk due to changes in climate variables. A mathematical programming model with the objective function of maximizing utility (expected total gross margin minus measure of its variability due to yield risk) was developed. The model was run for three districts, with incorporating average district level farming data, for two scenarios as (i) without accounting for risk and (ii) with accounting for risk. To run the model with incorporating risk, multiple runs with different risk aversion coefficient ranges from 0 to 1.65 was done. The model chose the risk aversion values 1.65, 1.45 and 1.15 for Banke, Chitwan and Morang districts, respectively, that gave the minimum deviation between the simulated and the base year land use patterns. The model results for two different scenarios yielded different land use patterns in all districts. The model results showed the high fluctuations of gross margin across the years in all districts. The research concludes that the accounting for the effects of climate variables on farm income is important and the climate change adaptation strategies need to be considered in production decisions.

Keywords: Climate change, climate variables, farmers' production decision, mathematical programming, regression analysis, risk aversion, yield risk

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