Impacts of Climate Change on Food Grain Yield and Its Variability across Seasons and Altitudes in Odisha

Authors : Dibakar Sahoo, Sridevi Gummadi

Abstract : The focus of the study is to empirically analyse the climatic impacts on foodgrain yield and its variability across seasons and altitudes in Odisha, one of the most vulnerable states in India. The study uses Just-Pope Stochastic Production function by using two-step Feasible Generalized Least Square (FGLS): mean equation estimation and variance equation estimation. The study uses the panel data on foodgrain yield, rainfall and temperature for 13 districts during the period 1984-2013. The study considers four seasons: winter (December-February), summer (March-May), Rainy (June-September) and autumn (October-November). The districts under consideration have been categorized under three altitude regions such as low (< 70 masl), middle (153-305 masl) and high (>305 masl) altitudes. The results show that an increase in the standard deviations of monthly rainfall during rainy and autumn seasons have an adversely significant impact on the mean yield of foodgrains in Odisha. The summer temperature has beneficial effects by significantly increasing mean yield as the summer season is associated with harvesting stage of Rabi crops. The changing pattern of temperature has increasing effect on the yield variability of foodgrains during the summer season, whereas it has a decreasing effect on yield variability of foodgrains during the Rainy season. Moreover, the positive expected signs of trend variable in both mean and variance equation suggests that foodgrain yield and its variability increases with time. On the other hand, a change in mean levels of rainfall and temperature during different seasons has heterogeneous impacts either harmful or beneficial depending on the altitudes. These findings imply that adaptation strategies should be tailor-made to minimize the adverse impacts of climate change and variability for sustainable development across seasons and altitudes in Odisha agriculture.

Keywords : altitude, adaptation strategies, climate change, foodgrain

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