Impact assessment of climate change on rice crop in India: Uncertainties due to scenarios and crop models

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Estimates of impact of climate change on crop production could be biased depending upon the uncertainties in climate change scenarios, region of study, crop models used for impact assessment and the level of management. This study reports the results of a study where the impact of various climate change scenarios has been assessed on grain yields of irrigated rice with two popular crop simulation models –Ceres-Rice and ORYZA1N at different levels of management. The results showed that the direct effect of climate change on rice crops in different agro-climatic regions in India would be always be positive irrespective of the various uncertainties. Rice yields increased between 1.0 and 16.8% in pessimistic scenarios of climatic change depending upon the level of management and model used. These increases between 3.5 and 33.8% in optimistic scenarios. At current as well as improved level of management, southern and western parts of India which currently have relatively lower temperatures compared to northern and eastern regions, are likely to show greater sensitivity in rice yields under climate change. The response to climate change is small at low N management on the uncertainty in climate change scenarios, level of management and crop model used. These conclusions are highly dependent on the specific thresholds of phenology and photosynthesis to change in temperature used in the models. Caution is needed in using the impact assessment results made with the average simulated grain yields and mean changes in climatic parameters.

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