



Assessment of winter wheat loss risk impacted by climate change from 1982 to 2011

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The world's farmers will face increasing pressure to grow more food on less land in succeeding few decades, because it seems that the continuous population growth and agricultural products turning to biofuels would extend several decades into the future. Therefore, the increased demand for food supply worldwide calls for improved accuracy of crop productivity estimation and assessment of grain production loss risk. Extensive studies have been launched to evaluate the impacts of climate change on crop production based on various crop models drove with global or regional climate model (GCM/RCM) output. However, assessment of climate change impacts on agriculture productivity is plagued with uncertainties of the future climate change scenarios and complexity of crop model. Therefore, given uncertain climate conditions and a lack of model parameters, these methods are strictly limited in application.

In this study, an empirical assessment approach for crop loss risk impacted by water stress has been established and used to evaluate the risk of winter wheat loss in China, United States, Germany, France and United Kingdom. The average value of winter wheat loss risk impacted by water stress for the three countries of Europe is about -931kg/ha, which is obviously higher in contrast with that in China (-570kg/ha) and in United States (-367kg/ha). Our study has important implications for further application of operational assessment of crop loss risk at a country or region scale. Future studies should focus on using higher spatial resolution remote sensing data, combining actual evapo-transpiration to estimate water stress, improving the method for downscaling of statistic crop yield data, and establishing much more rational and elaborate zoning method.