

Climate Change and Advancing Rice Production in Asia

Chair: Jun-Ichi Sakagami (Kagoshima University, Japan)

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3:10 PM - 3:30 PM

[S-04]Challenges and Adaptation for Rice Production under Climate Change in Taiwan

(Taiwan)

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Located in East Asia, the climate of Taiwan is governed by the East Asian Monsoon resulting in the strong seasonality of precipitation pattern and the topographic features further amplify the vulnerability to different natural disasters as compared to other countries. It is crucial to develop the resilient agriculture by improving Taiwan's future agricultural production systems with respect to the future trends of climate change. Paddy rice is the major crop produced in Taiwan, and the small fluctuations of rice yield could lead to serious impact on food security. Evaluation of the major crop production under the different effects of climate change would be essential for bettering the future strategies for enhancing food security. Crop production simulation frequently employs the future climate data predicted by global climate models. The effects of climate change on rice production were evaluated based on the future climate data of four different climate scenarios provided by the United Nation's Intergovernmental Panel on Climate Change. Results indicated that total rice production would decrease by approximately 5%–15%, and this could be the consequence of the reduction of the number of growing days and the undergrowth of grains associated with the poor photoassimilation of vegetative organs due to global warming. Analysis of the future Representative Concentration Pathway (RCP) 8.5 scenario showed that rice yields will decrease in near-term, mid-term, and long-term horizons of the century by 5.1%, 12.5%, and 22%, respectively, especially in northern and eastern of Taiwan. These results are consistent with evaluation results concerning other Asian countries. Climate change refers to not only the changes in average temperatures but also the intensity and frequency of extreme weather events, and the unpredictability of natural disasters has increased the uncertainties for understanding the future changes of crop production. The limitation of existing atmospheric models for predicting disaster occurrence, especially heavy rainfall or strong wind events. The current crop model could simulate various specific disasters but not including typhoons and heat waves which are one of the most important disasters in Asia causing yield reduction during the harvesting season or the flowering stages of crops. The present study analyzed the meteorological changes that have caused the reduction of rice production in Taiwan over the past 60 years. These data were used with the predicted frequency of different climatic scenarios in the future to estimate the effects of future disaster factors on rice yield. Moreover, the approach to establishing a resilient system for rice production that would withstand the various effects of climate change has been considered. In particular, the water used for rice cultivation accounts for approximately 50% of the total water resources in Taiwan. As the traditional policy, farmers are offered with subsidies and undergo fallowing during drought periods. This paper introduces an advanced system to change current farming practice into the dry-field direct seeding as an adaptative farming method to water shortages in farming regions. The present findings provide new insights on farming systems for climate change adaptation.

