Entry No. IRRC-0254

Category	: International Rice Research Conference
Select Theme	: Climate change and environmental sustainability
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Keyword 1	: Adaptation to climate change
Keyword 2	: Climate smart agriculture
Keyword 3	:
Title of Entry	: Nonlinear Temperature Effects on Rice Yields and Milling Quality under Climate Change
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Select only one type of presentation	: 15 minute oral presentation

Abstract : Rice is the staple food for approximately half of the world's population. US rice only accounts for approximately 1.3% of global production, but accounts for 7.4% of internationally traded rice, making it the fifth largest exporter. Unlike other crops, rice markets are driven by quantity (paddy yields) and quality (head rice yields), and milling quality can subsequently impact prices limit export markets, and thus food accessibility for billions of people. Previous research has shown that many crops such as maize, soybeans, cotton, and wheat are impacted nonlinearly by extreme temperatures. Therefore, in this study, we combine rice varietal data on paddy yield and milling quality for 1,012 observations from 1992–2016 throughout the largest rice growing region in the United States with daily weather data during growing seasons to investigate the impacts of extreme temperature on rice yields and milling quality. Milling quality impacts are measured in terms of head rice yield, which is only the proportion of whole rice kernels that remain after milling. Nonlinear temperature effects are estimated for 18 varieties of long grain rice from 1992–2016 while controlling for precipitation, soil type, and locational effects. Initial results suggest that paddy yields decline approximately 5% with each growing degree day above 34 degrees C during the growing season. Moreover, we expect to find an even more substantial decrease in head rice yield, which has been shown to be even more sensitive to extreme temperature events. This work will also include estimations of temperature effects by phenological stage (vegetative, flowering, and harvest) on paddy yields and head rice yields. Lastly, the potential impacts of future climate change scenarios will also be estimated using the models above. Overall, this study will provide critical information on climate change impacts on

rice in the United States, one of the world's largest rice exporters, which could be helpful in identifying high temperature resilient varieties to combat global food insecurity.

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