

Did Chilling Injury of Rice Decrease under Climate Warming? A Case Study in Northeast China

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Abstract : Global warming is expected to reduce the risk of low temperature stress in rice grown in temperate regions, but this impact has not been well verified by empirical studies directly on chilling injury in rice. In this study, a case study in Northeast China was presented to investigate whether the frequencies of chilling injury declined as a result of climate change, in comprehensive consideration of the potential effects from autonomous adaptation of rice production in response to climate change, such as shifts in cultivation timing and rice cultivars. It was found that frequency of total chilling injury (either delayed-growth type or sterile-type in a year) decreased but only to a limit extent in the context of climate change, mainly owing to a pronounced decrease in frequency of the delayed-growth chilling injury, while there was no overwhelming decreasing tendency for frequency of the sterile-type chilling injury, rather, it even increased considerably for some regions. If changes in cultivars had not occurred, risks of chilling injury of both types would have been much lower, specifically for the sterile-type chilling injury for avoiding deterioration in chilling sensitivity of rice cultivars. In addition, earlier planting helped lower the risk of chilling injury but still can not overweight the effects of introduction of new cultivars. It was concluded that risks of chilling injury in rice would not necessarily decrease as a result of climate change, considering the accompanying adaptation process may increase the chilling sensitivity of rice production system in a warmer climate conditions, and thus precautions should still be taken.

Keywords : chilling injury, rice, CERES-rice model, climate warming, North east China

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