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Assessment of Critical Temperature for the Growth and Development of Early Transplanted Temperate Rice

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[Abstract]

Effect of temperature during the period of 10 days from transplanting (10 DFT) on the growth and development of rice plants was investigated by transplanting semi-adult seedlings six times from 5 April to 15 May at 10-day interval in the field conditions of 2020 and 2021, with aims to investigate the critical temperature for early transplanting of temperate rice.

In the two experimental years, mean temperature for 10 DFT appeared 9.1, 10.5, 11.6, 13.8, 13.9, 16.2, 16.4, 16.7, 17.1, 17.8°C depending on the transplanting date. Mean temperature of 9.1°C and 10.5°C for 10 DFT appeared in the April 5 and April 15 transplants in 2020 showed negative or no effect on the increase of rice growth and acceleration of heading date when compared to those of right after transplanting treatments in the same year. Mean temperature of 11.6°C for 10 DFT appeared in the April 5 transplant in 2021 demonstrated greater biomass from early to heading stage but the same heading date compared to April 15 transplant, indicating that 11.6°C for 10 DFT had a positive effect on rice growth but no effect on advanced heading. Both more biomass and advanced heading stage were observed when the mean temperature for 10 DFT was 13.8°C or higher, compared to those of right after transplanting treatments. These findings indicate that effective 10-DFT mean temperature for rice growth exists between 10.5 and 11.6°C, and that for rice development in terms of heading stage lies between 11.6 and 13.8°C in natural condition.

Further field and indoor studies are suggested to narrow down the critical temperature for early transplanting of temperate rice, which will enable to maximize the crop period in high altitude regions with low temperature.

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