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Effect of High Temperature on Boro Rice Varieties at Flowering Stage under Different Soil Moisture Levels

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Abstract

Changing climate rises air temperature due to increasing concentration of CO_2 and other atmospheric greenhouse gases. The rise in atmospheric temperature causes detrimental effects on growth, yield, and quality of the crop varieties by affecting their phenology, physiology, and yield components. Boro rice is transplanted in January-February and usually faces high temperature (36–39 °C) at its reproductive stage in April-May. Flowering stage of rice is very critical for high temperature. High temperature may cause drying of pollen and stigma and ceasing pollen tube development for fertilisation. As a result, unfilled grains are produced. The experiment was carried out at BINA, Mymensingh, Bangladesh during December 2019 to May 2020 with three boro rice varieties. The objective of the study was to estimate proper soil moisture level at flowering stage to reduce high temperature effect. So, Binadhan-5, Binadhan-10 and Binadhan-14 were grown in pots each of 8 kg soil in ambient temperature and those were kept at 38 °C at flowering stage for 24 hours under different soil moisture levels (80 % FC, 100 % FC and 2 inches standing water) in plant growth chamber. Then all the plants were again continued to maturity under sufficient soil moisture in ambient condition. The experiment was conducted in CRD with three replications. Data on photosynthetic parameters, yield and yield attributes were recorded. The results revealed that high temperature significantly decreased photosynthetic rate and yield and increased transpiration rate and unfilled grains. Higher transpiration rate maintained T leaf of 33–34 °C during T air of 38 °C. Better yield with less sterility was found in 100 % FC and standing water of 2 inches compared to 80 % FC. So, maintain 100 % FC or standing water of 2 inches at flowering stage of rice can reduce high temperature effect.

Keywords: Boro rice, flowering stage, high temperature, photosynthesis, transpiration, yield

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