

Author: [ADVANCED](#)Volume Page Keyword: 

[TOP](#) > [Available Issues](#) > [Table of Contents](#) > [Abstract](#)

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[\[PDF \(1112K\)\]](#) [\[References\]](#)

Effects of High Temperature on Growth, Yield and Dry-Matter Production of Rice Grown in the Paddy Field

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Abstract: The effect of high temperatures on growth, yield and dry-matter production of rice growing in the paddy field was examined during the whole growth period in a temperature gradient chamber (TGC) from 2002 to 2006. Experimental plots, TG1 (control), TG2, TG3 and TG4, were arranged along the temperature gradient (from low to high temperature) in TGC. The mean and maximum air-temperatures in TG4 were 2.0-3.6°C and 4.0-7.0°C higher, respectively, than those in TG1. The plant height was taller and the maximum tillering stage was earlier in TG2, TG3 and TG4 than in TG1. Plant dry weight at maturity in TG2 and TG3 was 12.8-16.4% heavier than that in TG1. In TG4, the increase in the panicle dry weight during the ripening period was smallest and plant dry weight at maturity was 11-16% heavier than that in TG1. The increase in plant dry-matter during the ripening period was smallest in TG4. The decrease in the dry weight of stem and leaf during the ripening period, which represents the amount of assimilate translocation to the panicle, was also larger in TG2-4 than in TG1. The increase in the dry weight of stem in TG2-4 at maturity was also larger than that in TG1. The photosynthetic rate in TG2-4 was up to 35.6% lower than that in TG1 because of the acceleration of leaf senescence. Brown rice yield in TG4 was 6.6-39.1% lower than that in TG1. This yield decline was due to the decrease in the percentage of ripened grains and increase in the percentage of sterile spikelets. The relation between brown rice yield and mean air-temperature during 20 days after heading showed that the brown rice yield declined when mean air-temperature exceeded 28°C.

Keywords: [Grain yield](#), [High temperatures](#), [Photosynthetic rate](#), [Rice \(*Oryza sativa* L.\)](#), [Spikelet sterility](#)

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