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Growth and Quality Characteristics in Response to Elevated Temperature during the Growing Season of Korean Bread Wheat

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[Abstract]
Wheat (*Triticum aestivum* L.) is the major staple foods and is in increasing demand in the world. The elevated temperature due to changes in climate and environmental conditions is a major factor affecting wheat development and grain quality. The optimal temperature range for winter wheat is between 15~25°C, it is necessary to study the physiological characteristic of wheat according to the elevated temperature. This study presents the effect of elevated temperature on the yield and quality of two Korean bread wheat (Baekkang and Jokyoung) in a temperature gradient tunnel (TGT). Two bread wheat cultivars were grown in TGT at four different temperature conditions, i.e. T0 control (near ambient temperature), T1 control+1°C, T2 control+2°C, T3 control+3°C. The period from sowing to heading stage has accelerated, while the growth properties including culm length, spike length and number of spike, have not changed by elevated temperature. On the contrary, the number of grains per spike and grain yield was reduced under T3 condition compared with that of control condition. In addition, the. The grain filling rate and grain maturity also accelerated by elevated temperature (T3). The elevating temperature has led to increasing protein and gluten contents, whereas causing reduction of total starch contents. These results are consistent with reduced expression of starch synthesis genes and increased gliadin synthesis or gluten metabolism genes during late grain filling period. Taken together, our results suggest that the elevated temperature (T3) leads to reduction in grain yield regulating number of grains/spike, whereas increasing the gluten content by regulating the expression of starch and gliadin-related genes or gluten metabolism process genes expression. Our results should be provide a useful physiological information for the heat stress response of wheat.

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