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Effect of High Temperature on Grain Characteristics and Quality during the Grain Filling Period

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Global warming has significant effects on the growth and development of wheat and can cause a reduction in grain yield and quality. Grain quality is a major factor determining the end-use quality of flour and a reduction in quality can result economic losses. Therefore, it is necessary to study the physiological characteristic of wheat to understand its response to temperature elevation, which can aid in the development of strategies to mitigate the negative effects of high temperature and sustain wheat production. This study investigated the effects of elevated temperature on grain characteristics and quality during the grain filling period of two Korean bread wheat cultivars Baekkang and Jokyoung. These two bread wheat cultivars were subjected to an increasing temperature conditions regime; T0 (control), T1 (T0+1°C), T2 (T0+2°C) and T3 (T0+3°C). The results showed that high temperature, particularly in T3 condition, caused a significant decrease in the number of grains per spike and grain yield compared to the T0 condition. The physical properties, such as grain weight and hardness, as well as chemical properties, such as starch, protein, gluten content and SDSS, which affect the quality of wheat, were changed by high temperature during the grain filling period. The grain weight and hardness increased, while the grain size not affected by high temperature. On the other hand, amylose content decreased, whereas protein, gluten content and SDSS increased in T3 condition. In this study, high temperature within 3°C of the optimal growth temperature of wheat, quantity properties decreased while quality-related prosperities increased. To better understand the how this affects the grain's morphology and quality, further molecular and physiological studies are necessary.

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