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Effects of Rain Frequency on Wheat Grain Quality After Maturity

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[Introduction]

Wheat (*Triticum aestivum* L.) is one of the most important cereal crop in Korea in terms of consumption. Double cropping including wheat following paddy rice is widely adopted in southern region of Korea, and this leads to wheat harvest coinciding with the rainy season in mid-June. High humidity and untimely rainfall trigger germination, by activating the enzyme α -amylase, which cleaves long starch chains in the endosperm into shorter pieces. However, relatively little information exists concerning wheat grain quality affected by rain after maturity. The objectives of this study were to evaluate the effects of rainfall frequency on grain quality in two Korean wheat cultivars.

[Materials and Methods]

In 2021-2022, a single field experiment was conducted in Dep. of Southern Area Crop Science, NICS, Miryang. Two wheat cultivars, Jokyong and Baekgang were planted in October 28 using broadcasting method (row width \times row length of 150 cm \times 120 cm, seeding rate of 16kg/10a). Spikes were harvested on May 31 (control, after 29 days without precipitation), June 7 (a day after 1st rain), 16 (a day after 2nd rain), and air-dried until seed moisture content reached approximately 14%. Samples were threshed using a thresher and ground with a Buhler mill to pass a 2.2 mm sieve.

[Results and Discussion]

A decrease in the vitreous kernel rate was observed depending on rainfall frequency. Color differences between the samples were evaluated in individual parameters ($L^* a^* b^*$), and in total color difference (ΔE^*_{ab}), using Spectrophotometer. Values of the L^* parameter increased from control to 2nd rain, showing that frequent rain after maturity affects the occurrence of chalky grain. The SDS-sedimentation volume was significantly decreased in the 2nd rain samples, compared with the control, whereas protein, gluten content, and falling number had no significant results. MPTi (Midline peak time) was increased, and MPV (Midline peak value), MPW (Midline peak width), MT \times W (Midline time \times 8 min width) were decreased as the rainfall frequency increases, showing that dough stability decreases as grain absorbs water after maturity. A scanning electron microscope (SEM) was used to examine the type A and B starch granules in the endosperm, and accumulation of large amount of starch granules and storage proteins were observed in the control. As rainfall frequency increases, starch granules were expanded and proteins were degraded. This result was coincide with wheat proteomic analysis study during seed germination (Dong et al., 2015). Although there are many studies related to pre-harvest sprouting, it is not suitable for the domestic situation. This study will be useful information for setting wheat quality standard in Korea.

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