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Parental inheritance of heat stress tolerance during grain filling period in wheat

Chan Seop Ko¹, Meong Kyu Ou², Jong Nae Hyun², Kyung Hun Kim²,
Jin Baek Kim³, Min Jeong Hong³, Yong Weon Seo^{1*}

¹*Department of Biosystems and Biotechnology, Korea university, Anam-ro 145, Seong-Buk, Seoul, Korea*

²*Department of Southern Area Crop Science, NICS, Miryang-si, Gyeongsangnam-do, Korea*

³*KAERI Advance Radiation Technology Institute, Jeongeup-si, Jeollabuk-do, Korea*

Abstract

Wheat (*Triticum aestivum* L.) is one of the major grain crops worldwide. The reduced productivity ascribed by adverse environment is increasing the risk of food security. Wheat cultivars have been actively released by public side since 1960s in Korea. Each variety has been developed for superior regional adaptation, pest resistance and mostly high yield. Heat stress tolerance is one of the major parameters that threaten wheat production in Korea. Heat stress during grain filling period has been conceived as critical level and directly influences on wheat production. We evaluated 11 common wheat cultivars (“Baegjoong”, “Dajung”, “Goso”, “Hanbaek”, “Jokyoung”, “Joeun”, “Jopum”, “Keumgang”, “Olgeuru”, “Sinmichal”, “Uri”) that were exposed to abnormally high temperature during the grain filling period. Each plant was grown well in a pot containing “Sunshine #4” soil in controlled phytotron facility set on 20°C and 16 h photoperiod. At 9 day-after-anthesis (DAA9), plants were subjected to a gradual increase in temperature from 20°C to 33°C and maintained constantly at 33°C for 5 days. After the treatment, plants were subjected to gradual decrease to normal temperature (20°C) and continue to grow till harvest. Seeds were harvested from each tiller/plant. Total chlorophyll contents decrease level as well as grain parameters were measured to evaluate varietal tolerance to heat stress. We also divide each spike into five regions and evaluate grain characteristics among the regions in each spike. The obtained results allow us to classify cultivars for heat stress tolerance. The pedigree information showed that typical wheat lines provide either tolerance or susceptible trait to their off-springs, which enable breeders to develop heat stress tolerance wheat by appropriate parental choice.

Keywords: Wheat, Heat stress, Korean cultivars, Reproductive stage, Pedigree

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Corresponding author*

Yong Weon Seo

Address : Department of Biosystems and Biotechnology, Korea university

Tel : +82 2 3290 3005

E-mail : seoag@korea.ac.kr