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## Phenotypic and Genetic Effects of Dwarfing Genes on Plant Height and Some Agronomic Traits in Wheat

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### [Abstract]

Wheat is one of the most widely grown food crops worldwide. Extreme precipitation and wind disturbances increased due to the abnormal climate, which resulted in increased lodging. Introduction of dwarf genes in wheat significantly increased lodging resistance and productivity in wheat breeding. In this study, we performed the genotyping of dwarfing genes between ‘Keumkang’ and ‘Komac 5’ (‘Keumkang’ mutant). In addition, we investigated the relationship between plant height and several phenotypic characters using F<sub>2</sub> segregation populations derived from crosses between the two varieties. There was no significant difference in phenotypic characters between the two varieties except for plant height. In the genotyping analysis using dwarfing genes, mutations of two dwarfing gene were found to be induced between the two varieties. The four genotypes of the F<sub>2</sub> populations from a crossing between ‘Keumkang’ and ‘Komac 5’ were used to compare and evaluate the effects of two dwarfing genes. Plants with two single mutant dwarfing gene and double mutant dwarfing gene revealed reduced plant heights than control plants by 4.5%, 6.9%, and 33.2%, respectively. The phenotype analysis showed that double mutant dwarfing gene affected wheat stem growth as the length decreases from the second node, resulting in decreased plant height. However, there were no significant differences in the agronomic traits between mutant plants and control plant. These results may provide novel information about the effect of double mutant dwarfing gene on plant height, and may help improve lodging tolerance and wheat yield.

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