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Wide Hybridization to Develop Perennial Wheat Line with *L. mollis* in Korean Wheat Breeding Program

Seong-Wook Kang¹, Han-Ji Yoon¹, Donghyeong Go¹, Jae-Young Ock¹, Jin-Guk Kim¹, Jeong-Won Kim¹, Chul-Soo Park², Seong-Woo Cho^{1*}

¹Department of Agronomy and Medicinal Plant Resources, Gyeongnam National University of Science and Technology, Jinju, 52725, South Korea

²Department of Crop Science, Jeonbuk National University, Jeonju, 54896, South Korea

[Introduction]

Wild rye is very important as a future-oriented research material to overcome the genetic limitations of cultivars. This is because wild rye not only has adaptability to harsher environments than cultivar, but also has resistance to biological and abiotic stress.

[Materials and Methods]

Leymus mollis (Trin.) Piler ($2n = 4x = 28$, NsNsXmXm, allotetraploid) and Chinese Spring (*Triticum aestivum* L. $2n = 6x = 42$, AABBDD, hexaploid) were used to perform wide hybridization for Korean wheat breeding program. Metaphase chromosomes were observed by squash method with 2% acetocarmine. Genomic *in situ* hybridization was performed to identify chromosome number and behavior.

[Results and Discussion]

The objective of this study is to develop perennial wheat lines by wide-hybridization. We produced wheat-*L. mollis* F₁ hybrids. Five of F₁ seeds (10 seeds) germinated with two shoots and one thicker root than major three roots. That F₁ hybrids showed perennial characteristics, after growth stage new shoot appeared. New shoot was from rhizome like *L. mollis* with perennial nature. We observed chromosome of F₁ hybrids, Chinese Spring and *L. mollis*. It was expected to have 35 chromosomes (21 from CS and 14 from *L. mollis*), but F₁ hybrids has 35~44 chromosomes. By genomic *in situ* hybridization, we observed CS and *L. mollis* chromosomes were distinguished. Seeds of F₁ hybrids showed unique traits. The seeds were thicker than seed of *L. mollis* and color was brighter but darker than seed of CS. One of F₁ hybrids seeds were shorter than CS and *L. mollis*. Two of spikes of F₁ hybrids has longer length and rachis than spikes of CS, but size of grain was similar. The density of seed in F₁ hybrids spikes were lower than CS. One of F₁ hybrids spikes has similar spike length and grain size of CS. Seeds were formed despite of wide-hybridization, and it seems to be produced by B chromosome (abnormal chromosome) of *L. mollis*, which is different from A chromosome (normal chromosome) of *L. mollis*. It is necessary to study about F₁ hybrids lines in chromosome level.

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*Corresponding author: Tel. +82-55-751-3225, E-mail. chsw@gntech.com