

Division-2-03

Development and Application of Speed Vernalization System for Practical Speed Breeding in Wheat (*Triticum aestivum* L.)

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[Abstract]

A traditional wheat breeding program needs more than 12-13 years to develop a new cultivar. In recent years, 'Speed breeding (SB)' system, which uses extremely extended photoperiod (22 h), enabled up to 4-6 generations of spring wheat per year. However, since almost 70% of wheat cultivars are winter type, and over 95% of total cultivation area is for winter wheat in Korea, optimized vernalization treatment was essential for improving the SB system. Several vernalization temperatures and durations were tested with various genotypes, and the 4 weeks of 8-10 °C vernalization treatment was the most effective to develop 4 generations per year, for both spring and winter type wheat cultivars. This 'Speed vernalization (SV)' system followed by SB, allowed developing a new F₆ recombinant inbred lines (RILs) within 2 years. Among the 184 RILs, which derived from a cross between Jokoyung and Joongmo2008, two outstanding lines were selected for yield trial test, and then named Milyang52 and Milyang53. Compared to the traditional wheat breeding program, over 60% of the time was saved to develop these two lines. Marker-assisted selection and backcross were also combined with the SV system. YW3215-2B-1 (Jokoyung*3/Garnet), which has similar agronomic traits with Jokyoung and the same *Glu-B1* allele with Garnet, was developed within 2.5 years. Thus, the SV system combined with molecular breeding technology would help breeders to make a new cultivar with less time and high efficiency.

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