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Development of the breeding materials with diverse grain size and shape in *japonica* rice

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Abstract

We developed the breeding materials with diverse grain size and shape in *japonica* rice. Grain size and shape are important factors affecting consumer preference and choice. However, most of Korean *japonica* rice cultivars have small, short, and round grain. To diversify the grain size and shape of *japonica* rice, we conducted the breeding program using donor parents, Jizi1560 and Jizi1581. Jizi1560 and Jizi1581 are *japonica* germplasm with extremely large grain. Four crosses between the each donor parents and high yielding *japonica* rice cultivars, Deuraechan and Boramchan, were constructed and then anther culture method was applied. We obtained 290 doubled-haploid (DH) lines with appropriated morphological traits and selected 91 DH lines with diverse grain size and shape. The grain related-traits of the selected DH lines showed a higher diversity when compared with 319 cultivars developed by NICS (264 *japonica*, 13 black, and 32 Tongil type cultivars). We designated the selected DH lines, four parents, and Daeripbyeo 1, large grain *japonica* cultivar, as the breeding materials for further analysis. The breeding materials were classified into five groups, A to E, based on the grain-related traits. Group A (including Jizi1581) and Group B (including Daeripbyeo 1) showed similar grain width, whereas Group A exhibited longer grain length and heavier grain weight. Group C (including Deuraechan and Boramchan) showed shorter and rounder grain shape and smaller grain size than any other groups. Group D including solely Jizi1560 had extremely large grain, such as the longest grain length, width, and thickness and heaviest grain weight. Group E including only two DH lines had long and slender grain shape, so that showed the highest ratio of length to width. The grain size and shape of the breeding materials exhibited beyond the characteristics of previously developed Korean *japonica* cultivars. The breeding materials will be applied in the breeding programs to diversify the grain size and shape of *japonica* rice.

Keywords: rice, grain, size and shape, *japonica*

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