B-168

Development of novel shattering resistant soybean cultivars by recurrent backcrossing with marker-assisted selection

Ai Hishinuma*, Tohoku Agricultural Research Center, NARO, Akita, Japan
Tetsuya Yamada, Institute of Crop Science, NARO, Tohoku, Japan
Hideyuki Funatsuki, Western Region Agricultural Research Center, NARO, Tohoku, Japan
Koji Takahashi, Institute of Crop Science, NARO, Tohoku, Japan
Kaori Hirata, Institute of Crop Science, NARO, Tohoku, Japan
Makita Hajika, Institute of Crop Science, NARO, Tohoku, Japan

Soybean has been widely used in Japan to produce traditional foods such as tofu. However, the yields of Japanese soybean are much lower compared to other countries. In Japan, it is expected that the size of agricultural fields per farm will increase, which will likely lead to a delayed harvest. In this situation, shattering resistance is one of the most attractive traits to enhance yield by reducing yield losses when using combine harvesters. On the other hand, most Japanese cultivars lack shattering resistance, including the leading cultivars, 'Sachiyutaka', 'Fukuyutaka' and 'Enrei'. In this study, shattering resistance was introduced into these cultivars by backcrossing with marker-assisted selection.

Near-isogenic lines of these cultivars were developed by recurrent backcrossing and marker-assisted selection using DNA markers tightly linked to the shattering resistance gene, *pdh1*. These lines with improved shattering resistance were registered as new cultivars with the names, 'Sachiyutaka A1 gou', 'Fukuyutaka A1 gou' and 'Enreinosora'. The cultivation of 'Sachiyutaka A1 gou' and 'Fukuyutaka A1 gou' from farms in five prefectures showed that the yields of these cultivars were higher compared to the recurrent parents when harvesting with combines. Specifically, the average yield was 40% higher with 'Sachiyutaka A1 gou' and 10% higher with 'Fukuyutaka A1 gou'. These results indicated that the shattering resistance trait effectively decreased the yield loss induced by both natural shattering and machine harvesting. Additionally, the new cultivars were subjected to trials for 3 years, which demonstrated that the agricultural characteristics and tofu possibilities of the new cultivars were similar to the recurrent parents. The use of novel shattering resistant cultivars will eventually increase soybean yields without adverse effects for farmers and processers.