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System for Improvement of Soybean Using Gene Editing Technology

Ji Hyun Bae[1], Gyu Tae Park[1], Soo-kwon Park[1], Yu-na Kim[1], Dool-Yi Kim[1], Hyeon Jung Kang[1], Jung Kyung Moon[1], Mi-Suk Seo[1]*

[1]Crop Foundation Research Division, National Institute of Crop Science, 181, Hyeoksin-ro, Iseo-myeon, Wanju-gun, Jeonbuk, 55365, Republic of Korea

[Abstract]
Gene-editing is currently one of the most popular technologies in recent years. Development of the new crop using the gene editing have advantage of improved accuracy and efficiency compared with conventional breeding. Soybean (*Glycine max* L.) is one of the most important crops worldwide used as food and forage. We tried to establish a system for breeding improvement of soybean through gene-editing technology. For the gene-editing system of soybean, i) selection of efficiency gRNA of targeted gene, ii) efficient genetic transformation of the selected gRNA, iii) selection of trans-clean mutant is essential. First of all, we investigated the selection conditions of gRNA with high editing efficiency of targeted gene using isolated protoplast of soybean. Furthermore, we performed the *Agrobacterium*-mediated genetic transformation of various soybean cultivars. We identified the tissue culture ability in 23 soybean cultivars for genetic transformation of soybean. The six cultivars with high tissue culture ability were selected and confirmed the transgenic plants in four cultivars. Finally, we established a speed-breeding system as a powerful tool for the fast selection of trans-clean mutants from transgenic plants. Our laboratory will provide the valuable system for improvement of soybean by the gene-editing technology.

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*Corresponding author: E-mail. sms1030@korea.kr Tel. +82-063-238-5326