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Comparison of *Agrobacterium*-mediated Transformation of 43 Korean Wheat Cultivars using the GUS Assay

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[Introduction]

Agrobacterium-mediated transformation (AMT) can stably insert DNA fragments into the plant genome. Transgenic plants induced by AMT contain a relatively lower copy number of transgene than transgenic plants induced by particle bombardment. Also, AMT is a simple and easy method to generate transgenic plants. Wheat transformation efficiency is relatively lower than that of other monocot plants such as Rice (*Oryza sativa* L.) and Maize (*Zea mays* L.). Cultivars 'Bobwhites' and 'Fielder' are mainly used for wheat transformation. As long as we know, there have been no reports of successful transgenic plant development using Korean wheat varieties through AMT until now. In this study, we compared the transformation efficiency of 43 Korean wheat cultivars using GUS assay to select Korean wheat cultivars suitable for AMT.

[Materials and Methods]

The pCambia1301 vector containing β -glucuronidase (GUS) gene was cloned into *Agrobacterium* (EHA105). The concentration of *Agrobacterium* culture was adjusted to OD₆₀₀ of 0.5 and then incubated for 4 - 5 hours in the media containing acetosyringone (AS, 100 μ M) to activate *Agrobacterium vir* genes. Immature embryos were rescued and centrifuged in wheat inoculation medium (WIM). The embryos were inoculated with *Agrobacterium* culture for at least 20 minutes at room temperature. After 2 days of co-culture, embryos were transferred to resting media for 5 days. Seven days after AMT, embryos were used for GUS assay.

[Results and Discussion]

GUS assay was performed to confirm the suitability of AMT in Korean wheat cultivars. The number of embryos showing at least one GUS spot was counted. 'Saeol', 'Jopum', and 'Jonong' showed 100% (the number of embryos showing GUS spot(s)/the number of embryos used for AMT) among 43 cultivars. In addition, cultivars with more than 70% were 'Saekeumgang', 'Jojung', 'Tapdong', 'Anbaek', 'Dabun', 'Sugang', 'Keumgang', 'Jeokjung', 'Seodun', 'Joeun', 'Dajung', and 'Baekjung'. It seems that the 15 cultivars above showed the possibility of using AMT. On the other hand, 'Yeonbaek', 'Goso', 'Baekgang', and 'Johan' showed less than 20% and GUS spots were not observed in 'Gru', 'Gobun', 'Milseong', and 'Shinmichal-1'. In this study, transient GUS expression seven days after AMT was investigated in Korean wheat cultivars. The initial high transient transformation efficiency might indicate subsequent high stable transformation efficiency. The Korean wheat cultivars with high transient transformation efficiency might be used for creating stable transgenic wheat.

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