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Development of environmental stress-resistant transgenic soybean

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Objectives

This project focuses on development of transgenic soybean cultivar to increase tolerance of the plants to oxidative stresses, drought and low temperature.

Materials and Methods

1. Material

   Plant - Soybean (cv., Eunhwa, Taekwang, Muan)

   Agrobacterium strain - EHA101 (pSB11, pBm43GW)

2. Methods:

Agrobacterium tumefaciens-mediated cotyledonary node transformation was used to produce transgenic soybean. Cotyledonary node explants of three cultivars were co-cultivated with strain *Agrobacterium* (EHA101) containing the binary vectors carrying with CaMV 35S promoter-TPSP or CBF3 gene, and with RD29a promoter-TPSP or CBF3 gene and NOS promoter-bar gene conferring resistance to glufosinate (herbicide basta) as selective agent.

Results and Discussion

Soybean (*Glycine max* L.) is an important leguminous seed crop as it is an economic source of oil, protein and secondary metabolites. Developing an efficient genetic transformation system for soybean should be facilitate physiological and molecular biology studies as well as the improvement of elite cultivars for desirable agronomic traits. Many plants, including soybean, show increased resistance to environmental stress after they have been exposed to low temperature, high salt and drought, and were affected on their growth, development, and productivity. This response, cold resistance is associated with trehalose biosynthetic gene (*otsA* and *otsB*) in rice (Kim et al., 2004) and CBF1 gene in *Arabidopsis* (Kirsten et al., 1998). This project focuses on development of soybean cultivar to increase tolerance of the plants to oxidative stresses, drought and low temperature.

Trehalose-producing, transgenic soybean (*Glycine max*) plants were generated by the introduction of a gene encoding a bifunctional fusion (TPSP) of the trehalose-6-phosphate (T-6-P) synthase (TPS) and T-6-P phosphatase (TPP) of *Escherichia coli* (Kim et al., 2004), under the control of 35S promoter. The trehalose gene was stably integrated into the soybean genome by *Agrobacterium*-cotyledonary node transformation method. A transgenic plants with trehalose genewere regenerated and grown in greenhouse, and transgenic seed (T1) harvested from them. Also, the trehalose levels in leaf from 35S::TPSP plants increased up than control soybean. Further, we will be to develop 20 transgenic lines of soybean per gene, and it will be used to improve a new soybean transgenic cultivar.

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