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# Establishment of an efficient transgene expression system for rootcrops

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Although rootcrops are valuable as foods and medicinal plants, almost no molecular studies have been carried out with rootcrops. To establish a highly efficient transgene expression system for rootcrops, we have cloned and analyzed protein targeting sequences and promoters for transgenesis of rootcrops. Two chloroplast targeting sequences (TP1 and TP2) were cloned from sweetpotato (*Ipomoea batatas* L. Lam cv. White Star). To determine their effects in accumulation of proteins encoded by transgene, transgenic Arabidopsis plants were initially generated with *SPagp1::TP1::GUS* and *SPagp2::TP2::GUS*. Quantitative analyses of GUS proteins in transgenic $T_0$ seedling Arabidopsis plants showed that GUS accumulation in *SPagp1::TP1::GUS* was 20-fold higher than that in *SPagp1::GUS* and GUS levels in *SPagp2::TP2::GUS* were 13-fold higher than those in *SPagp2::GUS*. These results suggest that TP sequences significantly increase the levels of transgene protein accumulation in transgenic Arabidopsis. The TP sequences will be further analyzed in transgenic carrot and ginseng plants. To develope a strong promoter for suspension cultures of rootcrops, two abundantly expressed ESTs (KH01009A01 and KH01015D09) were selected from suspension cells of sweetpotato. They showed strong expression during log phase of suspension culture, but not expressed in roots or leaves. Full length of the cDNAs and their promoter regions were isolated and sequenced. The promoters are being analyzed. To determine the activity of a storage root-specific promoter (*SPmads*), in *Panax ginseng*, transgenic ginseng plants were produced using the adventitious root induction system via *Agrobacterium tumefaciens* harboring *SPmads::GUS*. X-gluc reaction revealed that GUS gene expression occurred preferentially on root apical meristems and vascular strands in transgenic ginseng roots. The intensity of GUS driven by *SPmads* was stronger than *CaMV35S* promoter. These results suggest that *SPmads* would be a powerful promoter for ginseng in which most of taproot tissues are comprised of vascular strands.

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