

Isolation and characterization of methionine-rich storage protein and dehydroascorbate reductase cDNAs and potato transformation

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Potato tuber is one of major important food crops in Korea and thus its quality improvement is a genetic target for enhancement of human or animal nutritional value. In potato tubers, the contents of sulfur-containing amino acids such as cysteine and methionine, and vitamin C are relatively low. Accordingly, to apply some molecular breeding technology for improving their nutritional components in potato tubers, two cDNAs has been isolated and characterized. One (*PrLeg*) of the cDNAs, which codes for a methionine-rich seed storage protein, showed higher homology to the 11S legumin-like seed storage proteins in their amino acid composition than those of other seed storage proteins. Another important result is that the deduced amino acid sequences of the PrLeg polypeptide are phylogenetically close to the sequence groups derived from evolutionally ancient states of the 11S legumin-like storage proteins, or from gymnospermous seed storage proteins, such as *Magnolia*, *Asarum*, *Dioscorea*, *Cryptomeria*, *Metasequoia* and *Ginkgo*. In contrast, with the exception of sesame, relatively low phylogenetic relations are determined between the Prleg sequence group and those derived from crop plants, such as soybean, pea, brad bean, rape, pumpkin, rice, coffee and citrus. The most important finding in this work is that the Prleg protein has the highest content of methionine residues among the 11S legumin-like seed storage proteins. Southern blot analysis suggests that there may be several copy numbers of the *PrLeg* genes and their seed-specific expression patterns at the transcriptional level were confirmed by northern hybridization analysis. Another cDNA coding for dehydroascorbate reductase was also isolated and partially characterized from sesame hairy roots. Its deduced amino acid sequences are highly homologous to those from other plant species, indicating that this cDNA assumes to code for dehydroascorbate reductase. Two expression vectors with these cDNAs were constructed, transferred into potato with *Agrobacterium* strain and the potato transformants are under cultivation.

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