

Development of marker-free potato with multiple stress tolerance

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The potato (*Solanum tuberosum* L.) is a major food crop in many regions of the world and ranks the fourth in the production of the world. Although the potato is widely cultivated in Korea, the internal brown spot and hollow heart in tubers are major physiological disorders caused by environmental stress, especially high temperature during the cultivation. The overexpression of both CuZn superoxide dismutase (CuZnSOD) and ascorbate peroxidase (APX) in chloroplast under the control of an oxidative stress-inducible peroxidase (*SWPA2*) promoter rendered the transgenic potato (SSA plants) tolerances against oxidative stresses including high temperature. In SSA potato, a kanamycin gene was used as selection marker. Because of public concerns about possible risks related to the marker genes such as antibiotics resistance gene, there is a demand for development of transgenic crops free of selection-marker genes. In this study, to develop marker-free transgenic potato (cv Superior) with environmental stress tolerance, we developed the expression vector, pSSA-F, carrying both CuZn SOD and APX gene under the control of *SWPA2* promoter, in which there is no antibiotics genes. In addition, the selection marker removal system with negative selection marker that have both the kanamycin or hygromycin resistance gene for initial selection and loxP site/Cre recombinase driven by inducible promoter was introduced into pSSA-F, which results in pSSA-FR construct. The expression vectors were subsequently introduced into *Agrobacterium tumefaciens* EHA105 or AGL1. Transformation of potato using two marker-free expression vectors is in process. We anticipate that the marker-free expression system developed in this study will be useful for the generation and commercialization of transgenic crops which has reduced possibility of risks related to introduction of marker genes into environment.

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