

Development of Visible Markers for Transgenic Plants and their Availability for Environmental Risk Assessment

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Monitoring of transgenic plants in the field is important, but risk assessment has entailed laborious use of invisible marker genes. Here, we assessed three easily visible marker transgenes – *green fluorescent protein (GFP)*, *R*, and *Nicotiana tabacum* homeobox (*NTH*) 15 genes – for their potential use as marker genes for monitoring genetically modified plants. Transgenic *Arabidopsis thaliana* plants for each of these genes were visibly distinguished from wild-type plants. We determined the germination rate, 3-week fresh weight, time to first flowering, and seed weight of the transgenic plants to evaluate whether the expression of these marker genes affected the growth of the host. Introduction of *GFP* gene had no effect on the evaluated parameters, and we then used the *GFP* gene as a marker to assess the out-crossing frequency between transgenic and two *Arabidopsis* species. Our results showed that the hybridization frequency between transgenic plants and *Arabidopsis thaliana* was 0.24%, and between transformants and *Arabidopsis lyrata* it was 2.6% under experimental condition. Out-crossing frequency was decreased by extending the distance between two kinds of plants. Thus, the *GFP* gene is a useful marker for assessing the whereabouts of transgenes/transformants in the field. We also demonstrated that the *GFP* gene is possibly applicable as a selection marker in the process of generation of transgenic plants.

Key words: Green Fluorescent Protein, Risk Assessment, Transgenic Plant