Rapid, Large-Scale Generation of Ds Transposant Lines and Functional Analysis of Insertional Mutants in Rice

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An Ac/Ds mediated gene trap system was established in rice. To achieve rapid, large-scale generation of a *Ds* transposant population, a regeneration procedure involving tissue culture of seed-derived calli carrying *Ac* and inactive *Ds* elements have been utilized. In the F2 progeny from genetic crosses between *Ds* and *Ac* starter lines, most of the crosses produced an independent germinal transposition frequency of 10-20%. By comparison, in a callus derived regenerated population, over 70% of plants carried independent *Ds* insertions. Most of the new *Ds* insertions were stably transmitted to a subsequent generation. By analyzing 1,297 Ds-flanking DNA sequences, a genetic map of 1,072 *Ds* insertion sites was developed. The map showed that *Ds* elements were transposed onto all of the rice chromosomes with preference not only near donor sites (36%), but also on certain physically unlinked arms. Among them, 55% of *Ds* elements were in predicted ORF regions. Thus, we propose an optimal strategy for the rapid generation of a large population of *Ds* transposants in rice.

The acquisition of genomic DNA and *Ds* flanking sequence of tagging lines and the development of databases of tagging lines will be a very pivotal step to perform functional study of whole rice genes. To identify genes involved in organ development during vegetative stages, young organs of plants from over 2,000 *Ds* lines were examined for GUS expression patterns. Also functional analysis of several rice mutant lines identified by *Ds* will be presented.