Agronomic Trait Evaluation of Transgenic Rice Line With *Db1* Transgene

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Abstract

Genetic improvement of rice crop resistance to brown planthopper is one of the main goals in rice breeding programs in Indonesia. To achieve this goal, Db1 transgene (Mannose-Binding Lectin Family Gene) driven by sucrose synthase-I promoter, which was isolated from Dioscorea batatas and proven to be effective against sup-sucking insect, had been succesfully transformed into rice genome cv.Taichung-65 by using Agrobacterium-mediated transformation and one homozygous line has been selected. However, plants derived from genetic transformation frequently show phenotypic abnormality, hence agronomic trait evaluation is required to clarify the occurrence of this phenomenon. The objective of this experiment was to obtain transgenic rice plants with normal phenotypes (cv. Taichung 65). Forty rice plants were used in this experiment, consist of 20 T_3 generation of transgenic rice plants cv. Taichung-65 and 20 non-transgenic rice lines of cv. Taichung-65 as check. Data were analyzed by student's t-test. Significant differences were found in heading date, days to panicle exertion, plant height, wet weight of panicle, dry weight of panicle, grain number per panicle, grain weight per panicle, and grain filled per hill. These results suggest that agronomic trait differences in transgenic plants caused by somaclonal variation during in-vitro culture and transformation events.

Keywords: agronomic trait, Db1 transgene, somaclonal variation, transgenic rice.

Introduction

Brown planthopper (*Nilaparvata lugens;* BPH) is one of the most dangerous and harmful pest for rice cultivation, especially in Southeast Asia and East Asia. This pest has become an important issue for farmers and decision makers. The pest attacks rice cultivation on large areas within a short time and may cause huge losses of rice yield even no yield (Baehaki, 2009). Due to this condition the effective way to control BPH is highly needed. Developing new rice lines resistant to BPH through transfer gene technology is one of promising effort to overcome the problem. The application of gene transfer technology has been recognized as the economical and environmentally sustainable approach because of reducing insecticide application (Maqbool *et al*., 2001).

Currently some genes have been utilized to developing resistant plants against insects (horizontal resistance) is the *Cry* gene, which isolated from *Bacillus thuringiensis* (*Bt*) expressing the *Bt* toxin (protein crystals that toxic to insects). Various crops such as rice, maize, sugarcane, tobacco, etc., have been transformed with a various types of the *Bt* genes (*cry1Aa, cry1Ab, cry1Ac, cry2A*, etc.); Rao *et al*., 1998; Maqbool *et al*., 2001; Rahman *et al*. , 2007).