



A novel method for the evaluation of virus-induced gene silencing efficiency

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ABSTRACT. Virus-induced gene silencing (VIGS) is an important tool for studying gene function. However, a number of factors highly restrict the application of VIGS, such as unstable efficiency and tissue-specific silencing. We developed a novel evaluation method for improving the applicability of VIGS vectors. In this method, 4 indexes were defined and utilized to evaluate VIGS efficiency by silencing the endogenous phytoene desaturase (*PDS*) gene with a tobacco rattle virus-based VIGS vector. To illustrate the reliability of this evaluation method, we assessed the silencing efficiency of *SpPDS* and *SpMPK1* in *Solanum pimpinellifolium*. The silencing results of *SpPDS* showed that an optical density at 600 nm of 2.0 was more suitable than 1.0 for VIGS in *S. pimpinellifolium*. This suggests that the proposed evaluation method is a valid technique for optimizing the VIGS system of plants. Moreover, the *SpMPK1* gene was highly silenced in the 4th-9th leaves with a 50-95% reduction in transcription levels, further demonstrating that this method can be used to select highly silenced candidates for further

experiments, particularly when the target gene shows no phenotypic change after being silenced.

Key words: Evaluation method; Virus-induced gene silencing (VIGS); Silencing efficiency; *Solanum pimpinellifolium*