Abstract

Sesamum indicum, an important oilseed crop, is also well known for its therapeutic values since ancient times. It is one of the richest sources of several health beneficiary lignans. However, its potentiality as nutraceutical is restricted due to the presence of secoisolariciresinol diglucoside (SDG), a potent anticarcinogen, in imperceptible amount (~ 0.03 mg/25 gm of seeds). Therefore, a rational approach was undertaken to enhance the SDG content in *S. indicum* by heterologous expression of pinoresinol-lariciresinol reductase (*plr*) gene of *Forsythia intermedia* through biotechnological interventions. A reproducible regeneration and transformation system for sesame was developed, as revealed by histological studies of the presently developed *gfp* transformed sesame lines. Thereafter, four individual transgenic lines were ($PT_0$1, $PT_0$4, $PT_0$7 and $PT_0$8) generated by *Agrobacterium*-mediated transformation of pCAMBIA/*Fiplr* gene cassette into *S. indicum*, as indicated by PCR and Southern blot analyses. The segregation pattern was found to follow the Mendelian law of inheritance as provided by hygromycin selection of the seeds of T_0 lines. Among the T_1 progenies, $PT_1$1.1 was found to show higher expression (~ 3.5 fold) of *plr* transcript when compared to untransformed control as showed by real time PCR. The plant also showed an increased PLR enzyme activity by ~ 2 fold with respect to untransformed plant. The present transgenic line exhibited better accumulation of SDG content (increased by ~ 3 fold) compared to untransformed control as displayed by **t**he HPLC analyses of lignan of defatted sesame flour. Thus, the study suggested that the presently developed FiPLR transgenic sesame line may have the better perspective, due to favourable increase of SDG content in its seeds, to become useful for consumption by the people suffering particularly from estrogen induced cancers and could be considered to have significant medical implication.