

Overexpression of oil palm EgDREB1 in tomato decreased fruit size and produced parthenocarpic fruits

ABSTRACT

Drought-responsive element binding (DREB) is involved in the regulation of stress-responsive gene expressions in plants through abscisic acid (ABA)-independent pathway. In this study, constitutive expression of oil palm (*Elaeis guineensis*) EgDREB1 driven by double strength cauliflower mosaic virus 35S promoter in tomato (*Solanum lycopersicum*) reduced seed number, produced parthenocarpic fruits, changed morphology of leaves, and increased root biomass of transgenic plants. Early flowering and fruiting of the transgenic lines were observed in the culture vessels. EgDREB1 was specifically expressed in the fruits and its expression was not detected in vegetative tissues (leaves and roots). Altered expression of several endogenous tomato genes involved in the biosynthesis of phytohormones including jasmonic acid, ethylene, auxin, cytokinin, gibberellin (GA) and ABA were observed compared to wild type plants. The expression of AP2-like-ethylene transcription factor (LeAP2), allene oxide synthase (LeAOS), allene oxide cyclase (LeAOC), aminocyclopropane-1-carboxylic acid synthase (LeACS), 1-aminocyclopropane-1-carboxylate oxidase 1 (LeACO), auxin responsive factor 8 (LeARF8), auxin/indole-3-acetic acid (LeAux/IAA), cytokinin oxidase/dehydrogenase-like (LeSICKX1), adenylate isopentenyltransferase (LeSIPT1), gibberellin 2-oxidase 2 (LeGa2ox2), gibberellin 20-oxidase 4 (LeGa20ox4) and ABA-aldehyde oxidase (LeAAO) were different in fruits with reduced seed number compared to parthenocarpic fruits. These results suggest that their expression has significant effects on fruit development in transgenic tomato. EgDREB1 may mediate the expression of some of these genes as dehydration-responsive element binding (DRE) motif were found in their promoter sequences. These data indicate that the EgDREB1 controls fruit development in transgenic plants by regulating the expression of hormone-associated genes.

Keyword: Abscisic acid; Auxin; Cytokinin; Ethylene; Gibberellin; *Elaeis guineensis*; *Solanum lycopersicum*; Transgenic plants