1-aminocyclopropane-1-carboxylate oxidase 2 reduction effects on physical and physiological responses of Eksotika papaya

ABSTRACT

The Malaysian Eksotika papaya (Carica papaya L.) has poor keeping quality due to its fast ripening attribute, which leads to post-harvest losses. This study is aimed at extending the shelf life of this perishable Eksotika fruit using antisense technology. A total of 6,000 Eksotika somatic embryogenic calli was transformed with the antisense 1-aminocyclopropane-1-carboxylic acid oxidase 2 gene (ACO2) construct, and 46 PCR-positive putative transformants were obtained. Gene expression analysis using real-time PCR on the 46 regenerated putative transgenic lines revealed that 42 showed down-regulation of the ACO2 gene with two- to five-fold differences among the lines. Out of 22 independently selected transformed lines grown under net house conditions, 16 harbored a single copy of the transgene. Physical stature of the transgenic plants was not significantly different from that of the non-transformed seed-derived papaya plants. Physiological evaluations of the transgenic fruits showed a 15-day delay in ripening compared with 4 days of the non-transformed seed-derived papaya fruits. The total soluble solid (TSS) of the transgenic fruits was comparable to that of the non-transformed seed-derived fruits with similar 11-15°Brix, implying the transgenes did not affect the TSS content.

Keyword: Agrobacterium tumefaciens; Antisense; Delayed ripening; Genetic engineering; Shelf-life