RT-PCR amplification and cloning of partial DNA sequence coding for oil palm (Elaeis oleifera) phytoene synthase gene

ABSTRACT

The potential health benefits of carotenoids as anti cancer and antioxidant agents have recently been demonstrated. Oil palm, Elaeis oleifera in particular, is known to be the richest natural source for carotene. However, the species has not been commercially exploited due to its extremely low oil yield. The current work describes the isolation of a cDNA clone coding for phytoene synthase (psy) from E. oleifera by RT-PCR amplification. A pair of psy gene specific primers was successfully used to amplify a 899 bp fragment that codes for a partial length (300 amino acids) of oil palm psy. The DNA and amino acid sequences were shown to share a high level of identity to phytoene synthase from other plants at about 83%. Further analysis also showed the presence of conserved aspartate-rich catalytic domains within the clone. Work was also carried out to obtain the expression pattern of oil palm psy in developing fruits by real-time PCR analysis. Results indicated that the gene is highly regulated during the course of oil palm fruit development. The pattern of psy expression was shown to be well correlated to the accumulation of lutein in the young mesocarp and Ŭ- and ϐ-carotenes in the older tissues. This observation demonstrated that oil palm psy was highly regulated for tissue development and accumulation of carotenes for storage.

Keyword: Carotenoids; cDNA clone; Elaeis oleifera; Expression; Phytoene synthase