Regulation of thiamine biosynthesis upon exogenous application of the vitamin in oil palm (Elaies guineensis)

ABSTRACT

Thiamine (vitamin B1) is an essential microelement that is synthesised de novo by plants and microorganisms. The active form of thiamine is thiamine pyrophosphate (TPP), which plays a prominent role in plant's metabolic activity particularly as an enzymatic cofactor. In vivo analysis of thiamine in oil palm was performed where four months old oil palm seedlings were treated with 125 ml of 50 mM thiamine hydrochloride and tissue samples were collected at Day 0, 1, 2 and 3. The expression of ThiC gene fragment was analysed via quantitative real time polymerase chain reaction (qPCR) which showed an approximately five-fold decrease post-thiamine treatment. Analysis of thiamine and its derivatives via high performance liquid chromatography (HPLC) showed that the concentration of thiamine decreased, while TPP increased post-thiamine treatment. It is suggested that thiamine biosynthesis in oil palm can be effectively regulated at the physiological concentrations of the vitamin.

Keyword: Gene expression; Oil palm; Thiamine; ThiC gene; Vitamin B1