An overview of 3-hydroxy-3-methylglutaryl CoA reductase (HMGR) in plants

ABSTRACT

Isoprenoids biosynthesis in plants involves two separate pathways, mevalonate (MVA) pathway and 2-C-methyl-D-erythritol 4-phosphate (MEP) pathway. A large group of isoprenoids are found to play crucial roles in common plant biochemical functions and have been produced on a large scale for commercial applications. 3-hydroxy-3-methylglutaryl coenzyme A reductase (HMGR) is the key enzyme that catalyses the first committing step in the MVA pathway. In mammals and yeast, HMGR is a well-studied enzyme as many studies have been done on this enzyme due to its important function in the biosynthesis of cholesterol. In plants, many researches on HMGR have been done on different plant species, for example, Arabidopsis thaliana, tobacco, gingko, Zea mays, potato, rose, rubber tree, muskmelon, ginseng and others, in the past decades since it was discovered. Previous researches that worked on plant HMGR focused on the cloning and characterisation of its physiological functions. Little is known about the aspect of regulation and structural characteristics of plantsô HMGR. This review is aimed at providing an overview of the characteristics and structure of HMGR, the transcriptional and post-translational events related to HMGR that have been reported in plants, and proposes areas on the regulation event of HMGR in plants that can be explored to further enhance understanding towards HMGR regulatory interactions.

Keyword: 2-C-methyl-D-erythritol 4-phosphate pathway; 3-hydroxy-3-methylglutaryl-coenzyme Areductase; Isoprenoid biosynthesis; HMGR; Mevalonate pathway