Characterization of Green Algae *Dunaliella* sp and Cyanobacterial Isolate and Detection of the *DXS* Gene Encoding the Key Enzyme in Carotenoid Biosynthesis

Abstract

Carotenoid is known to be synthesised through the well known mevalonate (MVA) pathway. Recently, a non-mevalonate pathway (non-MVA) was discovered in a green algae. The limiting step for carotenoid biosynthesis in the non-MVA/DOXP/MEP pathway was catalysed by 1-Deoxy-D-xylulose-5-phosphate Synthase enzyme, encoded by the *DXS* gene.

The aims of this study were to characterize two local isolates of a green algal species from Jepara, *Dunaliella* sp. and a Cyanobacterial isolates and to elucidate the possible carotenoid synthesis pathway employed in the two isolates. Morphological, ecophysiological and molecular characterization have been conducted on two local isolates. Elucidation of the pathway was carried out by analysing the presence of the *DXS* gene on the two isolates as it has been widely understood that the *DXS* gene is the key and limiting enzyme in the non-MVA pathway. Detection of the *DXS* gene was conducted by PCR amplification of the gene of interest using *Escherichia coli*, plants and *Synechocystis* gene amplification primers. The mevalonate inhibitor lovastatin and hibridization methods was carried out to reaffirming PCR result.

Morphological, ecophysological, and molecular characterization demonstrated that Cyanobacterial isolate was a prokaryotic algae, while *Dunaliella* sp. was a eukaryotic algae. Cyanobacterial isolate demonstrates striking homology with *Cyanobacterium* MBIC 1210 and *Synechocystis*. *Dunaliella* sp., on the other hand, was a species of *Dunaliella salina* showing 99% homologies. Detection of the *DXS* gene in the two isolates showed about 9 – 50% homology with the known the *DXS* gene. Low homology with the current DNA amplification approach supported with biochemical experiment using lovastatin and hybridization result suggesting that the *DXS* gene was absent in the two isolates.

Key words : characterization, carotenoid, non-MVA, *DXS* , Cyanobacteria, *Dunaliella* sp.