

Time-Course Lipid Accumulation and Transcript Analyses of Lipid Biosynthesis Gene of *Chlorella* sp.3 under Nitrogen Limited Condition

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Abstract : The freshwater microalgae *Chlorella* sp. is alluring considerable interest as a source for biofuel production due to its fast growth rate and high lipid content. Under nitrogen limited conditions, they can accumulate significant amounts of lipids. Thus, it is important to gain insight into the molecular mechanism of their lipid metabolism. In this study under nitrogen limited conditions, regular pattern of growth characteristics lipid accumulation and gene expression analysis of key regulatory genes of lipid biosynthetic pathway were carried out in microalgae *Chlorella* sp 3. Our results indicated that under nitrogen limited conditions there is a significant increase in the lipid content and lipid productivity, achieving 44.21 ± 2.64 % and 39.34 ± 0.66 mg/l/d at the end of the cultivation, respectively. Time-course transcript patterns of lipid biosynthesis genes i.e. acetyl coA carboxylase (accD) and diacylglycerol acyltransferase (dgat) showed that during late log phase of microalgae *Chlorella* sp.3 both the genes were significantly up regulated as compared to early log phase. Moreover, the transcript level of the dgat gene is two-fold higher than the accD gene. The results suggested that both the genes responded sensitively to the nitrogen limited conditions during the late log stage, which proposed their close relevance to lipid biosynthesis. Further, this transcriptome data will be useful for engineering microalgae species by targeting these genes for genetic modification to improve microalgal biofuel quality and production.

Keywords : biofuel, gene, lipid, microalgae

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