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Name of the Scholar : Mohammed Ismail Rehmanji

Name of the Supervisor : Dr. Nida Jamil Khan

Name of the co-Supervisor : Dr. Tasneem Fatma

Name of the co-Supervisor : Dr. Pannaga Pavan Jutur

Name of the Department/Centre : Department of Biosciences, Faculty of Natural Sciences

Topic of Research : Enrichment of Long Chain Polyunsaturated Fatty Acids (LC–PUFAs) in Marine Microalgae – An Alternative for Nutraceutical Applications.

Findings

Microalgae are the most abundant primary producers, converting light energy and fixing carbon dioxide (CO_2) into sustainable bio-renewables. In the present study, we highlighted the specific genes responsible for LC-PUFAs production in microalgae using insilico analysis, screened suitable strain for enhancing the LC-PUFA content based on biomass, biochemical and additional high value products. Further, we employed media engineering strategy for enhancing EPA content in *P. tricornutum*, it was found that the highest EPA content could be achieved when conditions we utilized glycerol and urea in a mixotrophic setup, with EPA proportions of up to 27% of total fatty acids. Further, to understand the metabolism of LC-PUFAs biosynthesis in *P.tricornutum*, we investigated the metabolomic architecture of these cells in mixotrophic condition and concluded that glycerol channelizes carbon flux towards pyruvate while urea facilitates nitrogen transport using pyruvate skeleton this further increases the pyruvate hub and hence LC-PUFAs biosynthesis by enhancing lipid biosynthesis. Our last objective highlighted the potential of microalgae derived compounds including LC-PUFAs in clinical and nutraceutical applications. Anticancer potential of MeOH extracts, EPA and fucoxanthin was demonstrated on HEK and A549 cell lines. In conclusion, this study demonstrates that improved EPA production can be achieved for microalgae.