

Molecular Profiling of an Oleaginous Trebouxiphycean Alga *Parachlorella kessleri* Subjected to Nutrient Deprivation

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Abstract : *Parachlorella kessleri*, a marine unicellular green alga belonging to class Trebouxiphyceae, accumulates large amounts of oil, i.e., lipids under nutrient-deprived (-N, -P, and -S) conditions. Understanding their metabolic imprints is important for elucidating the physiological mechanisms of lipid accumulations in this microalga subjected to nutrient deprivation. Metabolic and lipidomic profiles were obtained respectively using gas chromatography-mass spectrometry (GC-MS) of *P. kessleri* under nutrient starvation (-N, -P and -S) conditions. Relative quantities of more than 100 metabolites were systematically compared in all these three starvation conditions. Our results demonstrate that in lipid metabolism, the quantities of neutral lipids increased significantly followed by the decrease in other metabolites involved in photosynthesis, nitrogen assimilation, etc. In conclusion, the metabolomics and lipidomic profiles have identified a few common metabolites such as citric acid, valine, and trehalose to play a significant role in the overproduction of oil by this microalga subjected to nutrient deprivation. Understanding the entire system through untargeted metabolome profiling will lead to identifying relevant metabolites involved in the biosynthesis and degradation of precursor molecules that may have the potential for biofuel production, aiming towards the vision of tomorrow's bioenergy needs.

Keywords : algae, biofuels, nutrient stress, omics

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