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Metabolite Profile Analysis of *Aurantiochytrium limacinum* SR21 Grown on Acetate-Based Medium for Biotechnological Applications

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Thraustochytrids, a group of marine protists, are continuously gaining attention due to their capability in producing lipids for various biotechnological applications towards foods, medicines, chemicals and biofuels. Although various substrates, predominantly glucose, have been used as carbon source for this microalga, it is desirable to adopt cheaper and more diversified substrate to expand their application range. In this study, we aimed to examine the ability of acetate, which can be easily generated from various resources by acetogenic microorganisms, as a substrate of *Aurantiochytrium limacinum* SR21. As a result of flask-scale analysis, specific growth rates (μ) of the strain SR21 grown in 3% acetate- or glucose-based medium were 0.55 and 0.98 h⁻¹, respectively. The maximum yield of total fatty acid in acetate medium was 4.8 g/L at 48 h while that in glucose medium was 6.8 g/L at 30 h, indicating that acetate has potential as substrate. Metabolome analysis was performed to comprehensively elucidate characteristic metabolic fluctuations caused by acetate assimilation to understand the difference in growth profile between two substrates. It was found that the use of glyoxylate cycle, which bypasses release of energy molecules such as NADH and GTP and the inhibition of utilization of compounds from TCA cycle for anabolic reactions, may cause the slow growth in acetate which has an effect also in lipid productivity. The activity of the pentose phosphate pathway was found to be weak in acetate cultivation, thus NADPH was mainly produced in malate-pyruvate cycle. Lastly, amino acids synthesized from tricarboxylates were significantly lower in acetate assimilation suggesting that acetate assimilation inhibits the transportation or conversion of TCA cycle related-compounds.

Keywords: Acetate, *Aurantiochytrium*, lipid production, metabolomics.

Biography:

Charose Marie T. Perez is currently a Ph.D. student under the Molecular Biotechnology Department, Faculty of Advanced Sciences of Matter in Hiroshima University, Japan. Their laboratory focuses on genomic breeding of oleaginous microorganisms for provision of new health food, pharmaceuticals and sustainable bioenergy. Specifically, her research is on the use of acetate, an intermediate substrate in a two stage fermentation system being developed, as an alternative substrate to glucose in producing lipids for biotechnological applications. Before pursuing her Ph.D. degree, she graduated with a degree in Bachelor of Science in Biology major in Microbiology and Master of Science in Microbiology from the University of the Philippines, Los Banos Laguna. She published her master's thesis entitled "*Bacterial laminarinase for application in ethanol production from brown algae Sargassum sp. using halotolerant yeast*". She is determined to deepen her knowledge in the field of biotechnology.