Optimising Lipid yields in microalgae screened from Australian marine environment for producing next generation biofuels

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Introduction. Marine microbes have the potential in accumulating large amounts of lipids and are thus considered as feedstock for next generation biofuels[1,2]. Biodiesel tipped as next-generation fuel can be produced from alkyl esters which may be produced by the transesterification of fatty acids contained in a feedstock[3,4]. Here, we report the fermentation, rapid screening of enzyme activities and ability of our in-house marine isolates for the production of unsaturated fatty acids.

Methods. Lipid content in dried biomass and DHA production was determined using GC methods[5,6]. Various enzyme activities based on enzyme assay kits were screened in the in-house isolates[7]. Molecular spectroscopy studies further facilitated accumulation of PUFAs in screened samples[8].

Results. Few isolates from Australian marine environment were obtained after rigorous screening based on fatty acid (FA) composition, omega-3 and omega-6 polyunsaturated fatty acids. The other prominent fatty acids recorded in all isolates were palmitic acid (24.1-49.7 %), stearic acid (4.5-25.1 %), eicosapentaenoic acid (EPA: 5.6-12.9 %) and docosapentaenoic acid (DPA: 6.8-17.9 %). Overall, these isolates exhibited a comprehensive fatty acid profile accommodating saturated and polyunsaturated fatty acids. The molecular identification based on 18S rDNA sequencing and FT-IR spectroscopy confirmed their uniqueness. In addition, the isolate produced fair amount of carotenoids (such as β-carotene) which needs further medium optimisation studies.

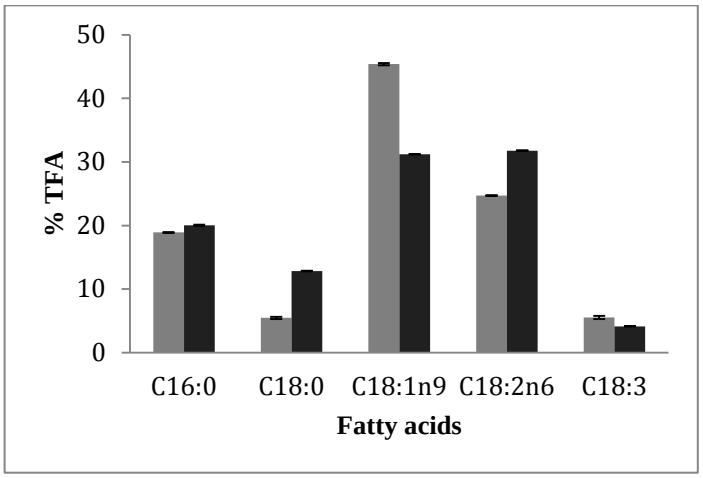

Fig.1 The fatty acid profile of selected in-house isolates (% TFA is Total fatty acids) suitable for biofuel production.

Further comparative analyses will be presented which will help to elucidate suitability of the isolate as a potential biomass for producing biodiesel.

Conclusions. Screening of microbes from marine environment followed by 18S rDNA sequencing resulted in novel isolates. Few important enzyme activities were observed in the in-house isolates. FTIR micro-spectroscopy was found to be suitable to study the presence of lipids (unsaturated fatty acids) in isolates. Some of the isolates were found to be useful for extracting high amount of lipids suitable of enzymatic biodiesel[9] production.

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