

## Selection of tropical microalgae species for mass production based on lipid and fatty acid profiles

### ABSTRACT

Numerous recent studies have identified microalgae biofuel as one of the major renewable energy sources for sustainable development due to their high biomass productivity, high lipid content, and availability of locally adapted strains in various geographical locations. There have been minimal studies on the fatty acid composition of lipid production on local microalgae species in Sabah, Malaysia. Thus, screening for local microalgae species capable of producing biodiesel can aid in the selection of suitable species. This study aimed to isolate and identify promising local microalgae as biodiesel feedstock for mass cultivation. Eight microalgae species, *Acutodesmus obliquus*, *Chaetoceros muelleri*, *Isochrysis galbana*, *Ankistrodesmus falcatus*, *Chlamydomonas monadina*, *Chlorella emersonii*, *Nannochloropsis oculata*, and *Tetraselmis chuii*, were successfully isolated and identified from Kota Kinabalu, Sabah. The isolated microalgae were characterized based on the lipid/biomass productivity, lipid content and fatty acid profiles. These isolates had biomass productivity of 0.11–0.78 g/L/day, lipid content of 11.69–39.00% dry weight, and lipid productivity of 21.11–252.64 mg/L/day. According to GC-MS analyses, four isolates produced more than 80% of C<sub>14</sub>–C<sub>18</sub> fatty acids, which were *A. falcatus* (95%), *C. emersonii* (93%), *A. obliquus* (91%), and *C. muelleri* (81%). Despite its low biomass productivity, *C. muelleri* was chosen as the best biodiesel species candidate because of its moderately high lipid productivity (42.90 mg/L/day), highest lipid content (39% dry weight), high level of MUFAs and C<sub>14</sub>–C<sub>18</sub> FAs (81.47%), with the highest oleic acid proportion (28.38%), all of which are desirable characteristics for producing high-quality biodiesel.