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### The use of artificial fertilizers for culture of marine microalgae: 2-growth and biochemical constituents of *Chaetoceros calcitrans*

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The high production cost of microalgae remains a constraint to many shrimp hatcheries. Culture media for microalgae should be economical, allow high growth rates, satisfy the needs of the microalgae, and be easy to prepare. Therefore, the present study was conducted to evaluate the effect of some alternative medium formulas, prepared from local commercial agriculture fertilizers (LCAF) instead of F/2 standard Guillard medium (F/2), on growth and general biochemical composition of *Chaetoceros calcitrans*, the most common species used in marine hatcheries as food sources for shrimp larvae. Therefore, the indoor experiment was conducted to evaluate the effect of LCAF (nitrogen from urea, U or ammonium nitrate, A and phosphorus phosphoric acid, P) sources and concentrations (50,100, 200 and 300 % N or P) of F/2 medium contents in 16 treatments on growth (chlorophyll a content (CHL-a), dry weight (DW), cell density (CD), growth rate (GR) and time doubling (TD) and biochemical composition (lipid, protein, carbohydrate, fatty acids, amino acids, and lipid productivity) of microalgae. The results showed the following: 1) the results showed significant differences ( $P \leq 0.05$ ) between all treatment media in CHL-a, CD,  $\mu$  and TD, while no significant differences ( $P \leq 0.05$ ) in DW between all treatment media; 2) the highest significant ( $P < 0.05$ ) CHL-a content (21.72 Pg/10<sup>6</sup> cell) and cell density (9.55x10<sup>5</sup> cell/ml) was achieved by LCAF (A200+P200) treatment, while the LCAF (U50+P300) treatment was the lowest (2.66 Pg/10<sup>6</sup>) and (5.59x10<sup>5</sup> cell/ml); 3) the results showed that there were highly significant differences ( $P \leq 0.05$ ) between all treatments in biochemical composition (total lipid, protein, carbohydrate and energy content) of *C. calcitrans*. Comparing to F2 Guillard medium (CO), which achieved (11.60%) lipids, (64.98%) protein, and (21.90%) carbohydrates with the highest total energy (5687 Cal/g), the highest significant total lipids percentage were achieved by LCAF treatment A300+P300 (13.49%) with total energy (4969 Cal/g), while the lowest (6.45%) were achieved by LCAF treatment U300+P50 with total energy (5184 Cal/g). Further, the highest significant total protein percentage were achieved by LCAF treatment U300+P200 (68.40%) with total energy (5305 Cal/g), while the lowest (45.40 %) were achieved by LCAF treatment A50+P300 with total energy (4359 Cal/g). Furthermore, the highest significant total carbohydrates percentage were achieved by F/2 control treatment (21.90%) with total energy (5687 Cal/g), followed by LCAF treatment A200+P50 (20.64%) with total energy (5000 Cal/g), while the lowest (12.08%) were achieved by LCAF treatment A100+P300 with total energy (4459 Cal/g); 4) the saturated fatty acids (SFA) were tended to decrease when cultured under nutrient limitation by LCAF media as compared with F/2 medium. On the other hand, the results showed that the LCAF tended to increase HUFA at the expense of SFA and 5) the amino acids (AA) profile values showed that the most abundant amino acids in *C. calcitrans* were glutamic acid, aspartic acid, and valine, which were responsible for more than 40% of total AA percentage.

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