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The use of artificial fertilizers for culture of marine microalgae: 1-growth and biochemical constituents of *Nannochloropsis oculata*

Nour A M[1], Ashour[2], Abd El-Wahab K[2], Taha S M[2], M A Zaki[2] and Omar Eglal[1]
[1]Alexandria University, Egypt
[2]National Institute of Oceanography and Fisheries, Egypt

Microalgae are one of the most important feed sources in aquaculture. However, its high production cost of the culture media, low biomass productivity and low lipid productivity are major obstacles in the industrial scale production. 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 *Nannochloropsis oculata* algae cultured in marine hatcheries as food sources for rotifer. 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 highest significant ($P<0.05$) content of CHL-a was achieved by LCAF (A300+P100) treatment (14.57 Pg/10^6cell) followed by (U300+P200, 14.31 Pg/10^6 cell), and F/2 (14.21 Pg/10^6 cell), while the LCAF (A100+P200) treatment was the lowest (1.65 31 Pg/10^6); 2) the highest DW and CD values (1.114 g/l and 15.85x10^6 cell/ml) were achieved by LCAF (U100+P300) treatment, followed by F/2 (1.082 g/l and 14.84x10^6 cell/ml), while the lowest was LCAF (A100+P200) treatment with DW (0.618 g/l) and CD (5.32x10^6 cell/ml) respectively; 3) the results showed that there were highly significant differences ($P\leq0.05$) between all treatments in biochemical composition (total lipid, protein, carbohydrate and energy content) of *N. oculata*. The LCAF (P50+A50) treatment showed highest significant ($P\leq0.05$) lipid percentage (51.22%) and energy content (6550 Cal/g) and F/2 treatment achieved (34.78% and 6556 Cal/g), while LCAF (U100+P300) treatment showed the lowest lipid (25.75%) and energy (4892 Cal/g). Furthermore, A50+P100 achieved the lowest protein (19.61%) and the highest carbohydrates (22.89%), with energy (6164 Cal/g), while the highest protein (39.39%) was obtained from U100+P50 with energy (6102 Cal/g). The lowest carbohydrate (9.66%) was observed in P300+A100 with energy (5884 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. Under the nutrient limitations, EPA percentage were highly increased (14.62% to 31.57% of total FA) by using LCAF as compared with F/2 control (10.07% of total FA). As well as DHA content increased (5.03% to 7.38% of total FA) by using LCAF, comparing to F/2 (3.26% of total FA). The LCAF (A100+P300) media achieved DHA (2.64%) lower than F/2 control and 5) the amino acids (AA) profile values showed that the most abundant amino acids in *N. oculata* were glutamic acid, aspartic acid, and valine, which were responsible for more than 40% of total AA percentage.

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