

Effect of Short-Term Enriching of Algae with Selenium and Zinc on Growth and Mineral Composition of Marine Rotifer

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Abstract : Rotifers are used in many hatcheries for feeding the earliest stages of fish larvae and crustaceans due to their small size, slow movements, fast reproduction, and easy cultivation. One of the disadvantages of using rotifers as live prey is their lower content of some nutrients compared to copepods, so it is necessary to increase the amounts of these nutrients by means of enrichment. Minerals are a group of micro-elements, essential to fish, that is lacking in the rotifers, for example, selenium (30 fold) and zinc (5 fold) are present in lower quantities than the minimum amounts found in copepods. In this study, the condensed Isochrysis aff. galbana (T-ISO) and Nannochloropsis oculata were suspended at concentration of 18×10^9 cell mL^{-1} of water with 20 ppt of salinity. Four different levels (0, 1000, 2000, and 4000 mg L^{-1}) of each Na_2SeO_3 and $\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$ separately were prepared, and 1 mL of each stock was poured to the algae enrichment vessels for 1 h simultaneously. After that, the material was centrifuged (at 4000 rpm for 5 min), and the precipitated enriched algae was used for rotifer feeding. The contents of Se, Zn, Cu, and Mn were determined in enriched microalgae and rotifer by Atomic absorption. The highest content of both minerals was observed in 0.4 Zn + 0.4 Se treatment and also rotifer enriched with these enriched microalgae. The enrichment of microalgae with Zn and Se does not affect the content of Cu in the microalgae. Also, the content of Cu in rotifer fed with the enriched microalgae showed the highest Cu content in the treatments than the control. But, the enrichment with both minerals had a negative effect on the content Mn in enriched mixed microalgae except 0.4 Zn + 0.4 Se. The Mn content in enriched rotifer decreased in the treatments than the control except for 0.1 Zn + 0.1 Se. There was no significant effect on rotifer growth in combined enrichment with both minerals ($p < 0.05$). Overall, rotifers enrichment with Se and Zn mixed microalgae resulted in increasing Se, Zn, and Cu. This will allow Se and Zn microalgae enriched rotifers to be used as the minerals delivery method for fish larvae nutritional requirements.

Keywords : enrichment, larvae, microalgae, mineral, rotifer

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