

Abstract:

The biochemical composition of three groups of seaweeds; green (*Ulva lactuca* and *Enteromorpha intestinalis*), brown (*Sargassum illicifolium* and *Colpomenia sinuosa*) and red (*Hypnea valentia* and *Gracilaria corticata*) from the Persian Gulf and the effects of seaweed extracts (SWE) either as a supplement or as an alternative media to the f/2 medium on the growth and composition of two microalgae *Isochrysis galbana* and *Chaetoceros muelleri* cultured as live food for *Penaeus indicus* larvae were investigated. Results showed that seaweeds were relatively high in carbohydrate and ash, but low in lipid. Lipid content in green seaweed was significantly higher than both the red and brown seaweed ($P < 0.05$). Protein content of both red and green seaweed was notably higher than brown seaweed ($P < 0.05$). The red and green seaweed had the highest proportion of saturated fatty acids, while the brown and red seaweed had the highest proportion of monounsaturated and polyunsaturated fatty acids, respectively. The mineral compositions in seaweeds were found in the sequence of $K > Mg > Fe > Zn > Mn > Cu > Co$.

The study clearly showed that the two microalgae *I. galbana* and *C. muelleri* could be successfully cultured using the various SWE either as a supplement or as an alternative to the f/2 medium. Since no major changes were found in most of the measured growth parameters, proximate composition, important polyunsaturated fatty acids and mineral content following culture of the microalgae with SWE as an alternative media, it was concluded that the SWE evaluated in the present study are able to provide the necessary nutrients for microalgae growth and could be used as a low cost nutritive media in establishing microalgal populations for use in aquaculture operations.

The present study found that when shrimp larvae were fed on microalgae (exclusively or mixed) that had been cultured with SWE as a supplement media, they molted faster to mysis 2 (M_{II}) stage compared to larvae fed on microalgae cultured with conventional f/2 media (Control). Maximum final total length, survival rate and specific growth rate were recorded for shrimp larvae fed on microalgae diets that included SWE as a supplement in the culture media compared to shrimp larvae fed the control diet. The overall growth performance clearly showed that *P. indicus* larvae were successfully reared using microalgae diets tested, and the shrimp larvae fed on mixed microalgae (*I. galbana* + *C. muelleri*) showed better larval growth, survival and development than those that were fed on single microalgal diet. Furthermore, similar larval growth, survival and development were obtained when shrimp larvae were fed with microalgae cultured with SWE as a substitute media to f/2 medium. In conclusion, microalgae cultured with SWE could potentially be used as a low-cost alternative method in producing live food for the hatchery production of shrimp larvae.

Key words:

Seaweeds , Persian Gulf , microalgae , biochemical composition , *Penaeus indicus* , enrichment