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Effect of seaweeds supplemented diets on growth performances of koi carp (*Cyprinus carpio* Linnaeus, 1758) fry in laboratory conditions

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There is a growing trend to use seaweeds as a supplement in fish feed due to its nutritional value, low cost and the availability. The objective of the present study was to determine the effect of two types of seaweed (*Ulva lactuca* and *Sargassum cinereum*) supplemented diets on growth performance of koi carps at their fry stage (birth up to three months). The experimental set up consisted of three treatments with supplemented diets as *U. lactuca* (T_1), *S. cinereum* (T_2) and the Control. Control diet consisted of fishmeal and soya bean (41.57% each), Coconut meal and wheat flour (7.78% each) and vitamin and mineral mixture (1.3%). Crude protein content (CP) of control diet was 36.26±0.57%. Thirty percent of the weight of control diet was replaced by the *Ulva* and *Sargassum* powder to prepare test diets T_1 and T_2 and the estimated CP of the diets were 24.14±0.27% and 21.33±0.01% respectively. Fourteen-week indoor experiment was carried out using koi carp fry belonging to the same cohort having mean weight and mean length 2.20±0.08g and 3.89±0.04cm respectively. They were introduced into 150L fiber tanks (n=20 per tank; four replicates per treatment) prepared under 3 treatments; C, T_1 and T_2. The fish were fed 5% of their body weight twice a day (09.00h and 15.00h) for 98 days. The weight measurements were measured once in two weeks. The water quality parameters, i.e., Temperature, pH, Conductivity, Dissolved oxygen, Nitrate and Phosphate concentrations in treatment tanks were measured twice a week during the experiment. Weight Gain (WG), Daily Growth Rate (DGR%), Relative Growth Rate (RGR%), Feed Conversion Ratio (FCR), Feed Conversion Efficiency (FCE%), Specific Growth Rate (SGR) were calculated to evaluate the fish performance due to the consumption of prepared diets and analysis of growth parameters were statistically tested (one-way ANOVA and Tukey test for pair-wise comparisons). At the end of the 14th week of the experiment, mean weight, mean weight gain, daily growth rate values showed significant difference ($P< 0.05$). Tukey test revealed that FCR of T_2 and T_1 were significantly different ($P<0.05$) from C, while FCE% of T_2 was significantly different ($P<0.05$) from C. Out of the two seaweed supplemented diets *Sargassum* supplemented diet has shown better growth performance in koi carp. Water quality parameters did not show significant difference ($P>0.05$) among treatments. The results showed the potential use of seaweed; *U. lactuca* and *S. cinereum* as a dietary supplement for koi carp at fry stage to obtain better growth performance by developing low-cost diet.

Keywords: koi carp, seaweeds, growth performance, and water quality parameters

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