

ORIGINAL ARTICLE OPEN ACCESS

Evaluation of Ethanolic Extract of Red Seaweed (*Gracilariopsis lemaneiformis*) on Growth and Haematological Parameters of Nile Tilapia (*Oreochromis niloticus*)

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Received: 9 August 2024 | **Revised:** 12 October 2024 | **Accepted:** 15 October 2024

Funding: This research was funded by the Ministry of Science and Technology (MoST), Government Republic of Bangladesh via Project SRG-221325.

Keywords: blood glucose | haemoglobin | immunostimulant diet | plasma protein | seaweed (*Gracilariopsis lemaneiformis*)

ABSTRACT

Seaweed is multicellular marine macroalgae that enhances the immunity of aquatic organisms. The study was designed to assess the ethanolic extract (EtOH) extracted from red seaweed (*Gracilariopsis lemaneiformis*) on Nile tilapia (*Oreochromis niloticus*) to evaluate growth, immunity and haematological parameters. The EtOH was applied with fish feed in four treatments such as T1-control (0% EtOH), T2 (5% w/v EtOH), T3 (10% w/v EtOH) and T4 (15% w/v EtOH) each with three replicates. The initial average weight of the fish was 17.53 ± 2.1 g. Results showed that the growth increased gradually with the percentage of red seaweed extract, whereas the mean weight gain was found significantly higher in T4 (51.5 ± 4.2) than in the control. The specific growth rate (%) and survival rate (%) were found higher in T4 at the lowest FCR compared to other treatments ($p < 0.05$). The blood haemoglobin level of Nile tilapia was higher in T4 (11.5 g/dL) and lowest recorded in T1 (7.5 g/dL). However, the level of blood glucose interacted inversely with blood haemoglobin. The plasma protein level was also varied among the treatments ($p > 0.05$). The blood parameters, refractive index (RI) and spleen somatic index (SSI) were significantly different among the treatments. The RI of blood plasma and SSI were found to be better in T4 treatment. The research indicated that red seaweed extracts significantly enhanced the growth and boosted the immunity level of Nile tilapia.

1 | Introduction

Seaweeds are typically found in coastal regions with optimum salinity (Phan et al. 2017). They are plant-like organisms and generally live attached to rock or hard substrate. Seaweeds are enriched with essential trace elements and a variety of

minerals. It provides raw materials to the culinary, cosmetics and pharmaceutical industries (Ahmed et al. 2020). Seaweed is a very adaptable substance frequently utilized as food for direct human consumption. Due to their high-quality fat, protein, polysaccharide, vitamin and enzyme, these marine macroalgae are regarded as dietary supplements. Seaweed is also rich in vitamins A, E,

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