

ABSTRACT

Biofloc technology has become very popular in aquaculture sector. The present study is an attempt to culture rohu (*Labeo rohita*) using biofloc technology. The objectives of the study were to determine the optimum C:N ratio for biofloc formation and evaluate the potential of biofloc as a component of fish feed for rohu culture system; to study and compare the effects of *in-situ* produced biofloc and externally added biofloc on the growth and production of rohu under different stocking densities and to evaluate the growth and production of rohu in prototype biofloc based tank and analyse its economics. To determine the optimum C:N ratio for biofloc formation, experiments were carried out in nine numbers of circular cemented tanks with effective water volume as 0.7 m³. Periodically wheat flour containing approximately 50% organic carbon was added at the rate of 10, 20 and 40 times the concentration of total ammonia nitrogen (TAN) concentration in the tank water to maintain a C:N ratio of 5:1, 10:1 and 20:1 for production of microbial floc and removal of nitrogenous compounds. It was observed that at C:N=10, significantly higher values of VSS and BOD₅ and lesser values of inorganic nitrogen (TAN, NO₂ and NO₃) concentrations were obtained as compared to the other treatments. It was further found that for production of 1 kg of biofloc, 1.1 kg of wheat flour is required. The produced biofloc at the best C:N ratio of 10 was used as test ingredient in fish feed over a 90-day feeding trial. Fifteen experimental diets were prepared by mixing commercial fish feed and biofloc in dry and wet form at different proportions (0 to 100% at an interval of 25%) with each treatment replicated thrice in 50 L glass aquariums. Mixture design was used to obtain a solution of best combination of feed to obtain the optimum growth parameters of rohu. Optimum values of SGR, PER, FCR and NFY were obtained at commercial fish feed to wet floc ratio of 1:1 on weight basis. The nutritional quality of biofloc was found to be quite suitable for rohu. The image of 3 week old biofloc captured in scanning electron microscope (SEM) indicated the presence of different type of bacteria, algae, protozoa, rotifers etc in different size and shape ranges from 10 to 100 µm. To study and compare the effects of *in-situ* biofloc and externally added biofloc on the growth parameters of rohu at different stocking densities, culture experiments were carried out in twenty seven cemented tanks (700 L each) for a period of 90 days. Highest net yield was obtained in the biofloc treatment with STD 3.9 in externally added biofloc tank as compared to *in-situ* and control treatment. In the final part of the study, rohu was cultured in a prototype based culture tank of water volume 25 m³ for a period of 6 months by stocking rohu at optimum stocking density of around 4 no m⁻² and fed with optimum biofloc based feed (ratio of commercial fish feed to wet floc on weight basis = 1:1). Finally economic analysis was carried out for a pond area of 1.0 ha. The fish growth parameters used in the analysis was obtained from the study. The analysis showed that a monthly profit of ₹ 13,355 ha⁻¹ could be obtained. The profitability index (PI) and internal rate of return (IRR) are estimated at 2.12 and 30.76% respectively which are higher than 1.0 and the present interest rate of 7.25% respectively. These results clearly indicate the commercial feasibility of culturing rohu using biofloc technology.

Keywords: Biofloc, C:N ratio, Rohu, mixture design, *in-situ* biofloc, externally added biofloc