Zootechnical performances of different carbon sources on biofloc microbial composition and effective water quality of Tilapia (*Oreochromis mossambicus*) culture systems

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Biofloc technology (BFT) promotes the growth of microbes in zero water exchange culture systems by adding adequate carbon to manage the existing nitrogen, which improves the water quality. The present study was carried out to evaluate the effectiveness of locally available different carbon sources on water quality in zero-exchange *Oreochromis mossambicus* culture systems and study the microbial composition of the most effective biofloc. Carbon treatments: Rice Bran (RB), Wheat Flour (WF), and Molasses (MOL) and the controls without a carbon source were allocated at random and duplicated in 1500 L fiberglass indoor tanks. Mixed-sex *O. mossambicus* fingerlings (3.6±0.2 g) were added at a rate of 40 fishm^{-3} and fed 3% of their body weight. Except for the controls, all treatments were run with no water exchange and carbon was added at 15:1 carbon to nitrogen ratio. Dissolved Oxygen (DO), temperature and pH were monitored daily. Total Ammonia Nitrogen (TAN) was recorded once a week. One way ANOVA was used for data analysis ($P<0.05$). Bacterial community analysis was done for the most performed RB biofloc. DNA was extracted using the DNeasy Powersoil kit. The 27F forward primer (5'-AGAGTTTGATYMTGGCTCAG-3') and 1492 R reverse primer (5'-TACCTTGTTAYGACTT- 3') were used in the Polymerase Chain Reaction (PCR) (Y=C/T, M=A/C). The related bacterial community was identified by further sequencing. Treatments showed significantly low DO values (RB:6.46±0.16 mgL^{-1}, WF:5.94±0.22 mgL^{-1}, MOL:6.76±0.22 mgL^{-1}) compared to controls (7.38±0.15 mgL^{-1}), which indicated the presence of ongoing microbial metabolic processes. TAN values were lower in treatments (RB:0.53±0.9 mgL^{-1}, WF:0.62±0.13 mgL^{-1}, MOL:0.40±0.07 mgL^{-1}) compared to controls (1.38±0.27 mgL^{-1}). Proteobacteria (52.8%) was the most common bacteria phylum found in the RB sample, followed by cyanobacteria (40%). Proteobacteria have diverse metabolic pathways which help them to establish well in zero-exchange systems. Proteobacteria being the most prevalent, suggests that RB systems have better water quality control. According to the results BFT can be adapted to maintain water quality in zero-exchange Tilapia production systems.

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