

Effect of Aquaponic System in Increased Stocking Densities of Guppy Fish (*Poecilia reticulata*) at Grow-out Phase One

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Guppy (*Poecilia reticulata*) is one of the widely marketed ornamental fish. Fry rearing density recommended by NAQDA, Sri Lanka for grow-out phase one was 20 fish ft⁻². However, grow-out farmers are using different stocking densities. Production efficiency of existing facilities can be enhanced by increasing the recommended stocking densities. Therefore, identifying possibility of enhancing stocking density is vital for increasing production. Current study was focused to improve the efficiency of grow-out rearing of Guppy by incorporating aquaponic system using water spinach (*Ipomea aquatica*). Guppy juveniles with mean body size of 2.63±0.06 cm were stocked in similar glass tanks at three different stocking densities as 20 fish ft⁻² (T1), 25 fish ft⁻² (T2), and 30 fish ft⁻² (T3), with three replicates. NAQDA recommended stocking density was used in T1 and increased densities were used in T2 and T3. Fish were fed three times a day with commercial larval rearing feed at 10% of their mean body weight. A mixture of sterilized brick-lets and coconut coir were used as media for the grow bed with 10.6 cm thickness. Six plants of same size and age were introduced to each aquaponic system. Temperature, pH, dissolved oxygen level, nitrate, nitrite, and phosphate concentrations were tested. Growth performance was determined using Mean Length Gain (MLG), Specific Growth Rate (SGR), Feed Conversion Ratio (FCR), and condition factor (K). Collected data were subjected to one-way ANOVA and Tukey's pairwise comparison at a significance level of $p < 0.05$, using Minitab 17 software. T3 showed significantly lowest MLG and SGR, whilst T1 showed the highest. However, T1 and T2 did not show significant difference. Significantly highest FCR was observed in T3. Condition factor did not show significant difference and no mortality was observed. Nitrate, nitrite concentrations were significantly high in T3 whilst other parameters did not vary significantly among treatments. According to the results obtained, the medium stocking density of 25 fish ft⁻² can be suggested as the optimum stocking density for guppy grow-out phase one for aquaponic coupled rearing facilities as it allows medium level stocking density while obtaining satisfactory growth and maintaining favorable water quality.

Keywords: Aquaculture; Aquaponics; Fish growth performance; Ornamental fish