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GROWTH PERFORMANCE OF ANGELFISH, *PTEROPHYLLUM SCALARE* (SCHULTZE, 1823) FRY REARED AT DIFFERENT STOCKING DENSITIES WITH UNDER-GRAVEL FILTRATION SYSTEM

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ABSTRACT : The study was conducted to evaluate the effect of different stocking densities on the growth and survival of angelfish, *Pterophyllum scalare* fry reared in all-glass tanks with under-gravel filtration system. In the experiment, angelfish fry with length and weight in the range of of 1.3-1.6 cm and 0.060-0.076 g were reared at different densities, *i.e.* 3 fry L^{-1}, 2 fry L^{-1}, 1 fry L^{-1} and 0.5 fry L^{-1} for a period of 45 days in all glass tanks (36 L) with undergravel filtration system. The experiment was conducted according to completely randomized design with four replicates for each density. The freshwater was added to compensate evaporative water loss from the tanks, but no water exchange was carried out in the experimental tanks. Fry were fed flake feed containing 49.02% crude protein. The fry reared at the density of 0.5 fry L^{-1} showed significantly ($P<0.05$) higher length gain (153.6593%), weight gain (967.5915%) and specific growth rate (5.2622%) than that of fry reared at other densities. The densities of 0.5 and 0.1 fry L^{-1} resulted in 100% survival which was found significantly better ($P<0.05$) than that of fry reared at densities of 2 and 3 fry L^{-1}. Decreased growth was observed with increase in stocking density. However, due to use of under gravel filtration system water quality parameters were found to be in optimal range for certain period at different stocking densities. Hence, water quality and consequently fish production of angel fish fry in aquaria can be optimized with the stocking density of 0.5 and 0.1 fry L^{-1} with use of under gravel filtration system.

Key words : Growth performance, fish, *Pterophyllum scalare.*

INTRODUCTION

The angelfish, *Pterophyllum scalare* represents one of the most important ornamental cichlid species because of its body colouration, shape and economical value (Garcia-Ulloa and Gomez-Romero, 2005). Its relative ease in rearing and breeding in captive conditions make the fish particularly suitable to attract the most fish breeders in India. The mass rearing of angelfish is carried out commercially in many places like Chennai, Kolkata, etc. Aquarium business activity at commercial scale is slowly catching up in the Konkan region of Maharashtra.

Stocking density is one of the most important variables in aquaculture as it directly influences survival, growth, behaviour, health, water quality, feeding and production (Rahman *et al*, 2005; de Oliveira, 2012). The negative effect on the growth of several species due to increased stocking density was reported by Papoutsoglou *et al* (1987), Yi *et al* (1996), and Edward *et al* (2010). Increase in stocking density results in increasing stress, which leads to higher energy requirements, causing reduction in growth rate and food utilization. Contrarily, in case of low stocking densities, fish may not form shoals, feel comfortable (Aksungur *et al*, 2007). Identifying optimum stocking density for a species is a critical factor not only for designing an efficient culture system (Leatherland and Cho, 1985), but also for optimum husbandry practices. Patil *et al* (2015) stated that an increase in the stocking density decreased the growth parameters and survival of angelfish fry and suggested stocking density of 0.5 fry L^{-1} is suitable for achieving better growth and survival of angelfish fry during the culture period of 45 days in tanks without aeration and filtration system.

Aquaculture is said to be advantageous in achieving higher growth rates and greater production per unit area, taking full benefit of the three dimensional nature of the water bodies when compared to that of other animal husbandry practices (Pillay and Kutty, 2005). However, the water quality influences health, survival, growth and production of fishes (Sharma and Chakrabarti, 1998, 2003; Sharma *et al*, 2004; Rahman *et al*, 2005 and Bjornssson and Olafsdottir, 2006). In order to utilize the water bodies to their fullest extent water recirculation and filtration was carried out by Suresh and Lin (1992), Degani (1993), Canario *et al* (1998), Maragoudaki *et al* (1999), Anderson *et al* (2002), El-Sayed (2002, Szkudlarek and Zakes (2002), Franco-Nava *et al* (2004), Sharma *et al* (2004),