

DETERMINATION OF ECONOMICAL FEED FOR GOLDFISH (*Carassius auratus*)
POST-LARVAL AND DEVELOPMENT OF SUITABLE CULTURE SYTEMS FOR
GOLDFISH FRY

By

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ABSTRACT

Ornamental fish sector essentially depends on the production of good quality post-larvae and fry. This could be achieved by feeding them with cheaply available quality feed, which should result in higher growth and survival. Of the different drawbacks identified in Sri Lankan ornamental fish sector, feed cost is considered to be the main factor affecting the industry. Therefore, this study was carried out to develop low cost feeds and culturing methods for goldfish post-larvae and fry.

This investigation consisted of five different series of experiments. Experimental Series 1 was conducted to determine the effect of chicken manure or cow dung on physico-chemical and biological parameters of water. Growth and survival of goldfish post-larvae (Day 0 to Day 21) were compared with different feeds in Experimental Series 2 and 3 in an indoor system and an outdoor system respectively. Four different feeds were tested in an outdoor system for goldfish fry (Day 21 to Day 80) in Experimental Series 4. Experimental Series 5 was carried out to determine whether the stunted growth of goldfish during the post-larvae period (up to Day 20) would be compensated by higher growth during the fry stage (Day 20 to Day 70) under different feeding regimes.

Experimental Series 1 was conducted by fertilizing nine outdoor cement tanks (1 m² each) at 1000 kg/ha (Dry Weight Basis) with either chicken manure or cow dung mixed with dolomite in 19:1 ratio. Phytoplankton and zooplankton densities were significantly higher ($p < 0.05$) in chicken manure than in cow dung treatment and control treatments (without fertilizer). Highest plankton density was between Day 12 and Day 16 after the application of basal fertilizer in the fertilized tanks.

Experimental Series 2, goldfish post-larvae (Day 0 to Day 21) were fed live feeds [*Artemia salina* and microworm (*Anguillula salusae*)] and formulated feed in indoor glass tanks (0.06 m²). Treatments were triplicated. Post-larvae fed *Artemia* had significantly higher ($p < 0.05$) growth and survival. Formulated feed had highest growth at the end of the experiment however with lowest survival.

Post-larvae (Day 0 to Day 21) were tested using outdoor (1m²) cement tanks with chicken manure, cow dung, chicken manure and cow dung in 1:1 ratio, chicken manure and cow dung in 3:1 ratio, formulated feed and *Artemia*. Each treatment was triplicated. Post-larvae cultured in a mixture of chicken manure and cow dung in 1:1 ratio and with *Artemia* grew significantly faster ($p < 0.05$) than those in other treatments.

Experimental Series 3 was conducted to determine suitable stocking density for goldfish post-larvae (Day 0 to Day 21) in an indoor system and an outdoor system. In the indoor system, glass tanks (0.06 m²) were used with *Artemia* as only feed. In the outdoor system, cement tanks (1 m²) were used with chicken manure as the only input. Goldfish post-larvae were stocked at five different densities in both systems and treatment was triplicated. In indoor system, maximum stocking density for optimum growth and survival was 500 post-larvae/m² and outdoor system up to 150 post-larvae/m² could be grown successfully.

Goldfish fry were cultured (21 to Day 80) with chicken manure, cow dung, formulated feed, chicken manure with formulated feed supplementation and *Artemia* in outdoor cement tanks and each treatment was triplicated. Results revealed that growth of goldfish fry was significantly higher ($p < 0.05$) in chicken manure treatment than with

formulated feed supplementation. Percent survival did not show any significant difference ($p>0.05$) among the treatments and survival was more than 85% in all the treatments. In Experimental Series 5, goldfish post-larvae which showed stunted growth up to Day 20 showed compensatory growth during their fry stage (Day 20 to Day 70).

Cost-benefit analysis of different feeding regimes used in this study showed that both manure types can be used to minimize the production cost in goldfish post-larval and fry farming.