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Survival and Growth Parameters of Jayanti Rohu (*Labeo rohita*) Postlarvae

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ABSTRACT

A six months trial was conducted to evaluate the dietary effect of Safed Musli root powder on Jayanti Rohu post larvae. The substantial losses of fish during the post-larval phase have been one of the bottlenecks in the Indian major carp (*Labeo rohita*). The Safed Musli different dietary levels like 0 g/kg in control diet (C), 0.25 g/kg in treatment Cb1 diet, 0.50 g/kg in treatment Cb2 diet, and 0.75 g/kg in treatment Cb3 diet. The Jayanti rohu brood stocks were fed with test diets @ 3% of body weight during experimental period. After six months feeding, Jayanti rohu brooders were performed breeding in different-different spawning pools. Then eight days old post larvae of Jayanti rohu were transferred into the 12 nursery ponds and 12 aquariums at the rate of 10 million spawn per hectare. Jayanti rohu spawn for feeding mixture of finely powdered groundnut oil cake and rice polish, in equal proportion by weight was supplied in both system nursery and aquarium. Starting on the day of stocking, feed can be broadcast all over the pond and, aquariums. The length weight was measured at initial and final time of experiment. The survival rate was measured at the final time of experiment. The maximum weight ($3.63^{b}\pm0.005$) and length ($6.49^{d}\pm0.034$) was found in treatment Cb2 in nursery pond system in compare to aquarium tanks. The maximum survival rate also found in treatment Cb2 ($41.11^{d}\pm0.12$) in nursery ponds. Both systems showed significant relationships between treatment and control groups ($p<0.05$).

Keywords Safed Musli, Therapeutic, Survival, Potential.

INTRODUCTION

Safed Musli (*Chlorophytum borivilianum*) is an Ayurvedic herbal plant with a long history. Natural products are getting increasingly popular. In most developing countries, traditional remedies and medicinal herbs are generally implemented as a normative basis for sustaining good health. In many nations throughout the world, aquaculture continues to grow in volume and value, closing the gap between production and availability for fish. Diversification of species and systems are essential strategies for increasing aquaculture fish yield. Carp breeding and polyculture in static ponds and tanks have essentially reshaped the freshwater aquaculture industry. Through the

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use of additive genetic variance for commercially relevant qualities like growth and disease resistance, genetic modification can improve fish productivity even further according to Rasal *et al.* (2017). Before determining the appropriate stocking density that can yield the maximum profit and revenue for the economic sustainability of cage culture system, a comparative assessment of expenditure and profit in low and high stocking density is required (Ahmad *et al.* 2013, Ochokwu *et al.* 2015). Hatcheries with specialized technology, such as brood stock, fish breeding, hatching and incubation tanks, and water supply systems, are commonly used to produce fish larvae and fry Migaud et al. (2013). During hatchery practices, a number of factors have a negative impact on the generation of fish larvae and fry. In hatchery operations, there is a close and complex relationship between fish health, microbial load, and ambient water quality, which can have negative consequences for the generation of healthy fish larvae and fry (Hossain *et al.* 2022). Therefore, in the present study, an attempt has been made to evaluate the efficiency of different level of Safed Musli on survival of one of the representative species of Jayanti rohu (*L. rohita*) larvae and fry and to correlate with water quality.

MATERIALS AND METHODS

Experimental site and facility

The present research work was carried out in outdoor earthen ponds at instructional fish farm, College of fisheries science, GB Pant University of agriculture and technology, Pantnagar, distt udham singh nagar, Uttarakhand from August to September 2021. Research diet was prepared in "Feed Mill" of College of fisheries science, Pantnagar, UK. The water quality parameter, length, weight gain and survival of fry were analyzed aquaculture research laboratory" of Department of Aquaculture, CFSc, Pantnagar Uttarakhand.

Collection of medicinal plant *C. borivilianum* (Safed Musli)

The dried root of Safed Musli (*Chlorophytum borivilianum*) was acquired from Maheshwari Enterprises in Udaipur, Rajasthan. The rhizomes (roots) of the plants were thoroughly cleansed with clean water to remove the dirt. The roots were then dried in the shade, mashed in a grinder, and stored in airtight bags for later use.

Procurement of experimental fish

Four hundred male and female brooders of Jayanti rohu (*Labeo rohita*) were obtained from the fish seed hatchery, college of fisheries science, GB Pant University of agriculture and technology, Pantnagar. Before stocking, male and female brooders with an average body weight and length of 717.25± 0.18 g and 23.65±0.82 cm were treated with $KMnO_4$ and then conditioned with adequate aeration for 7 days before being placed in their separate experimental ponds.

Experimental pond preparation

Twelve earthen ponds were used in the experiment, each representing one of four treatments. Each pond was 800 m^2 in size. The ponds were first drained and dried. Liming was done using slaked lime stone (Ca (OH) 2) at a rate of 250 kg/ha for disinfection and pH balancing of soil and water. All of the trial ponds were refilled with bore well water during the culture period, and the water level in the ponds was kept at 1.25 m. All treatment pond was manure with raw cattle dung @10,000 kg/ha prior to stocking and thereafter @ 800 kg/ha at regular intervals to maintain plankton or nutritional status.

Aquarium tanks preparation

Twelve aquarium tanks were used in the research, each tank representing one of four treatments. Each glass aquarium tank (16" × 8" × 10") maintain to capacity of 20 liter water. With the help of scrubber with long handle wash the glass aquarium and, refilled with 20 literate marks.

Stocking of post larvae in nursery and glass aquarium

The stocking of post larvae in nursery pond and glass aquarium tanks was done by at the rate of 10 million/ha.

Water quality parameters

Throughout the trial period, water samples were taken on the weekly basis in the early morning hours and the following parameters (Temp, pH, DO and Alkalinity) of treatments pond water were tested using the standard method (APHA 2012).

Estimation of growth parameters

The estimation of growth parameters was done at initial and, final time of experiment. The growth parameters (Net weight gain and, Net length gain, survival rate) was done by following formula :

Net weight gain = Final weight – Initial weight

Net length gain = Final length – Initial length

Statistical analysis

The results were statistically assessed using SPSS version 16.0 (Statistical package for social sciences) software and a one-way ANOVA.

RESULTS AND DISCUSSION

Our purpose was to determine the survivals of Jayanti rohu post larvae in nursery pond and glass aquarium tanks. The all water quality parameters are maintained during the experimental period. The maximum mean water temperature was found in nursery ponds (Cb1 and Cb2) 27.25°C and minimum mean water temperature was found in glass aquarium tank treatment (Cb1) 22.25°C. The maximum mean water pH was found in nursery ponds (Control) 8.18 and, minimum mean pH was found in glass aquarium tank treatment (Cb1) 7.9. The maximum mean water alkalinity (mg/l) was found in nursery ponds (Cb3) 128.0 mg/l and, minimum mean alkalinity (mg/l) was found in glass aquarium tank treatment (Cb1) 105.0 mg/l. The maximum mean DO (mg/l) was found in glass aquarium tank (Control) 6.8 mg/l and, minimum mean DO (mg/l) was found in glass aquarium tank treatment (Cb2) 6.1 mg/l, all water quality parameters were showed in Tables 1–2. It is one of the most significant external influences on fish output. Fish growth is inhibited at temperatures above or below optimal, and mortality may occur at higher temperatures (Dietrich *et al.* 2014). According to Sharma and Choudhery (2015), water temperatures between 26.06 and 31.97°C are appropriate for warm water fish cultivation. The concentration of hydrogen ions has a substantial impact on fish output. In most cases, a pH range of 6.4 to 8.3 is ideal for fish growth Dietrich *et al.* (2014). According to Espinel-Velasco *et al.* (2018), a value of 6.5 to 9.0 is ideal for fish production. Total alkalinity is a parameter that may be used to assess the productivity and quality of water bodies (Jiwyam and Chareontesprasit 2001). According to (Tamot *et al.* 2008), the alkalinity ranged from 90 to 160 mg/l, and the water may be called nutrient-rich. Dissolved oxygen is a key measure in determining water quality because it represents the physical and biological activities that occur in the water. The DO concentration of 5 mg/l in the culture system throughout the year is fruitful for fish culture according to (Espinel-Velasco *et al.* 2018).

The maximum weight gain was found in

Table 1. Range and average values of selected water quality parameters in different treatments of pond.

Parameters	Control	Cb1	Cb2	Cb3
Temperature (°C)	22.8-30.5 (26.65)	23.5- 31.0 (27.25)	23.7-30.8 (27.25)	23.7-30.6 (27.15)
pH	8.0-8.3 (8.18)	8.0-8.2 (8.13)	7.9-8.3 (8.09)	8.0-8.2 (8.16)
Alkalinity (mg/l)	110-140 (124.6)	120-130 (123.6)	120-130 (124.8)	110-140 (128.0)
Dissolved oxygen (mg/1)	5.6-8.7 (6.48)	4.8-8.4 (6.32)	4.8-8.2 (6.24)	5.6-8.4 (6.44)

Table 2. Range and average values of selected water quality parameters in different treatments of glass aquarium tanks.

Parameters	Control	Cb1	Cb2	Cb3
Temperature (°C)	20.8-24.7 (22.75)	20.5- 24.0 (22.25)	21.7-24.8 (23.25)	20.7-24.6 (22.65)
pH	7.8-8.0 (7.9)	7.7-8.1 (7.9)	7.9-8.0 (7.95)	8.0-8.1 (8.05)
Alkalinity (mg/l)	110-120 (115.0)	100-110 (105.0)	110-120 (115.0)	110-120 (115.0)
Dissolved oxygen (mg/l)	5.4-8.2 (6.8)	5.0-7.4 (6.2)	5.0-7.2 (6.1)	5.2-7.7 (6.45)

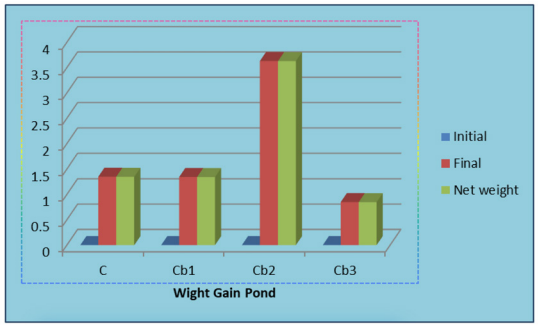

Fig. 1. Weight gain of Jayanti rohu post larvae in pond.

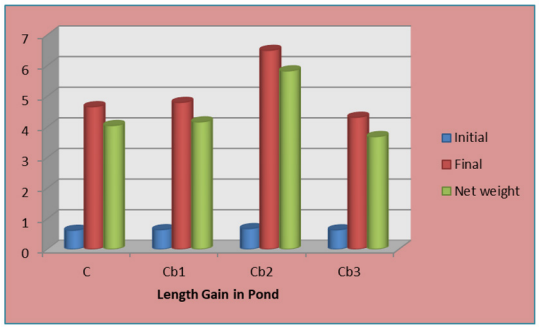

Fig. 2. Length gain of Jayanti rohu post larvae in pond.

Table 3. Range and average values of growth and survival parameters in different treatments of nursery pond.

Sl. No.	Parameters		C (Control)	Cb1	Cb2	Cb3
1.0	Weight (g)	Initial	$0.0014^{a}\pm0.0$	$0.0013^{a}\pm0.0$	$0.0014^{a}\pm0.0$	$0.0013^{a}\pm0.0$
		Final	$1.35^{a}\pm0.28$	$1.34^{a}\pm0.20$	$3.63^{b}\pm0.005$	$0.85^{a}\pm0.05$
2.0	Length (cm)	Initial	$0.61^{a}\pm0.002$	$0.63^{a}\pm0.002$	$0.67^{b}\pm0.11$	$0.63^{a}\pm0.005$
		Final	$4.65^{b}\pm0.02$	$4.79^{c}\pm0.02$	$6.49^{d}\pm0.034$	$4.30^{a}\pm0.06$
3.0	Survival (%)		$33.95^{b}\pm0.19$	$38.30^{c}\pm0.28$	$41.11^{d}\pm0.12$	$28.97^{a}\pm0.56$

treatment Cb2 (3.63b±0.005) in nursery pond, the minimum weight gain was found in treatment Cb3 ($0.0010^{a}\pm0.00$) in glass aquarium tank (Tables 3-4 and Figs. 1-4). The maximum net length gain was found in treatment Cb2 ($6.49^{d}\pm0.034$) in nursery pond, the minimum net length gain was found in control group ($0.61^{a}\pm0.002$) in both glass aquarium tank and, nursery pond (Tables 3-4 and Figs. 1-4). In both experiment Cb2 treatment had a significant relationship between the treatment and control groups ($p<0.05$). The maximum survival was found in treatment Cb2 ($41.11^{d}\pm0.12$) in nursery pond, the minimum sur-

Table 4. Range and average values of growth and survival parameters in different treatments of glass aquarium tanks.

Sl. No.	Parameters		C (Control)	Cb1	Cb2	Cb3
1.0	Weight (g)	Initial	$0.0013^{a}\pm0.00$	$0.0010^{a}\pm0.00$	$0.0013^{a}\pm0.00$	$0.0010^{a}\pm0.00$
		Final	$0.074^{a}\pm0.00$	$0.080^{a}\pm0.00$	$0.094^{b}\pm0.00$	$0.091^{b}\pm0.002$
2.0	Length (cm)	Initial	$0.61^{a}\pm0.005$	$0.64^{a}\pm0.005$	$0.66^{b}\pm0.005$	$0.62^{a}\pm0.005$
		Final	$3.6^{a}\pm0.05$	$4.1^{b}\pm0.02$	$5.30^{c}\pm0.17$	$3.50^{a}\pm0.05$
3.0	Survival (%)		$28^{a}\pm0.28$	$29.33^{a}\pm0.12$	$30.66^{a}\pm0.56$	$25.50^{a}\pm0.76$

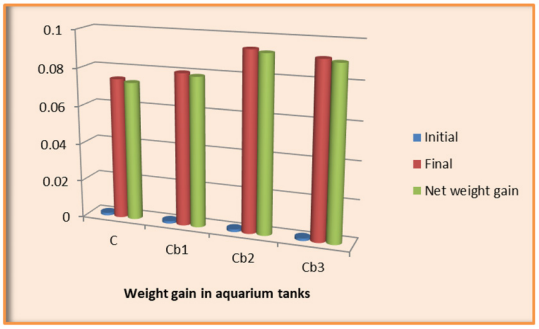

Fig. 3. Weight gain of Jayanti rohu post larvae in aquarium.

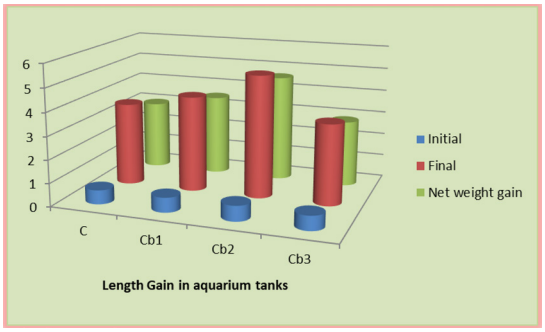

Fig. 4. Length gain of Jayanti rohu post larvae in aquarium.

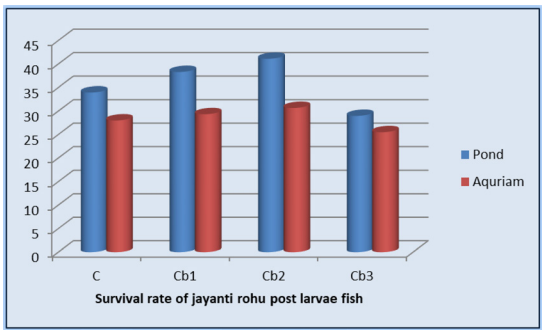

Fig. 5. Survival rate of Jayanti rohu post larvae in aquarium and pond.

vival was found in control group ($28^{a}\pm0.28$) in glass aquarium tank. The survival rate data were presented in Tables 3-4 and Fig. 5. The treatment Cb2 and Cb1 had a significant relationship between the control group and, other treatment ($p<0.05$). The control and, Cb3 treatment had a non-significant relationship ($p<0.05$). The most commonly used substances in the formulation of normal supplementary feeds for carp larvae and fry are rice bran and oil cakes of diverse kinds. Oil cake, rice bran, and black gramme were tested as carp larvae feed by Shyam *et al.* (2013). Shipton (2021) found that feeding carp larvae a diet of feedstuffs, groundnut oil cake, and rice bran (1: 1: 1) resulted in improved survival above 80%. Ayyappan and Jena (2003) also found some related results for stocking and survival of *L. rohita*. There have also been attempts to replace ground nurseries for the purpose of producing fry. Initial investigations by Natarajan (1979) and Menon, (1983) yielded promising results, with survival rates ranging from 25% to 85% throughout the rearing of Indian major carp fry. These results strongly support to our study.

CONCLUSION

An attempted has been made to determine the survival rates of Jayanti rohu post larvae in nursery ponds and glass aquarium tanks. The results are clearly showed that the Safed musli are affecting the survival rate of post larvae of Jayanti rohu. The dose of 0.5 g/kg safed musli (*Chlorophytum borivilianum*) is directly correlated with servility as well as weight and, length of post larvae in the nursery ponds.

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