



Effect Of Dry Banana Spathe Extract As A Feed Additive In The Growth Performance Of *Cyprinus Carpio* Koi

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ABSTRACT

Koi carp are attractive ornamental fish due to their different attractive colourations. It has a rich historical background. They are often considered swimming jewels in the field of ornamental fish culture sector. Banana inflorescence holds a good quantity of bioactive compounds and carotenoids that may help to improve the health of organisms. In this view, the present work was performed to test the potential of Hot water extract (HWE) of banana spathe coated along with commercial pellet diet at various concentrations, i.e. 5%, 10% & 20% respectively and supplemented to koi carp to test its efficiency. The results show that a maximum production of $0.60 \pm 0.02\text{g}$ was noticed in B₂ diet-fed fish compared to a low weight gain of $0.23 \pm 0.01\text{g}$, $0.21 \pm 0.02\text{g}$ and $0.16 \pm 0.02\text{g}$ noticed in control, B₁ & B₃ diet-fed fish. The results conclude that 10% of banana spathe extract was helpful in boosting the growth of Koi carp reared in the indoor culture system.

Keywords: Koi carp, Banana spathe, Hot water extract

INTRODUCTION

Koi carp (*Cyprinus carpio*) are high-valued ornamental fish that have great demand due to their beauty, colour, and attractive body shape; furthermore, koi lovers in Indonesia believe that they bring good luck to their owners (Kusrini *et al.*, 2015). Ornamental fish production is an important component of the aquaculture industry. The ornamental fish trade is a foreign exchange business, besides being a source of employment. It has a significant role in the economy of developed and developing countries. The entire ornamental fish industry including accessories and feed is estimated to be worth more than 14 billion US \$. Banana peel can be used as a feed additive in aquaculture to improve fish growth and disease resistance (Giri *et al.* 2016). Locally, the peels have been used as organic fertilizer, or simply discarded. Disposal of these peels might cause environmental problems (Pereira & Maraschin, 2015). So, they are judiciously used as feed additives in fish diets. The present study was undertaken to test the efficiency of hot water extract of banana spathe in the koi carp diet since there is only scarce information regarding the incorporation of banana spathe extract in the koi carp diet.

MATERIALS AND METHODS

Koi carp was purchased from Rifis Aquarium, Nagercoil and brought to the culture site with the least disturbance to the fish. Acclimatization was done by segregating the fish in 100-litre capacity plastic tanks containing well-aerated freshwater maintained with proper aeration for a duration of two days, and then segregated into respective culture tanks.

Banana spathe

Banana spathe was procured from a vegetable market, and they were washed thoroughly to remove the debris. Finally, they were shade-dried for a duration of two weeks, ground into powder and then subjected to hot water extraction according to the method of Fujiki *et al.*, 1992.

Diet preparation

Hot water extract of banana spathe was coated along with commercial pellets at a concentration of 5%, 10%, and 20%, respectively. The banana spathe extract-coated diet was dried in a hot air oven at 50°C for 6 hrs and further stored in an airtight plastic container for future use. In parallel, a control diet lacking the extract was also maintained for analysis.

Experimentation

Koi carp weighing about $3.29 \pm 0.03\text{g}$ to $3.63 \pm 0.02\text{g}$ were segregated respectively into control and experimental tanks (B₁– B₃). The fish were fed on control and experimental diets *ad libitum*, and they were reared in 100-litre capacity plastic

tanks for a duration of 40 days. The unfed remains were siphoned out regularly, and fresh water was added to maintain the initial water level.

RESULTS

Water quality parameters

Water quality parameters recorded during the experiment are shown in Table 1. The temperature was 31.00 ± 0.00 °C in the culture tank, and the pH ranged between 7.52 ± 0.05 to 7.82 ± 0.04 . The dissolved oxygen content fluctuated between 5.62 ± 0.05 mg/l to 5.74 ± 0.04 mg/l, respectively, in the culture tanks. The ammonia content of the water recorded was less than 0.1 mg/l in the culture tanks.

Table 1. Water Quality Parameters recorded in the culture system

Parameters	Control	B ₁	B ₂	B ₃
Temperature (°C)	31.00 ± 0.00	31.00 ± 0.00	31.00 ± 0.00	31.00 ± 0.00
pH	7.52 ± 0.05	7.52 ± 0.05	7.52 ± 0.05	7.52 ± 0.05
Dissolved Oxygen (mg/l)	5.62 ± 0.05	5.68 ± 0.02	5.70 ± 0.04	5.74 ± 0.04
Ammonia(mg/l)	< 0.1	< 0.1	< 0.1	< 0.1

Growth Performances

The growth performances of koi carp fed on control and experimental diets are illustrated in Table 2. The production was high at 0.60 ± 0.02 g in B₂ diet-fed fish, whereas in control, B₁ and B₃ diet-fed fish, the production declined, i.e. 0.23 ± 0.01 g, 0.21 ± 0.02 g and 0.16 ± 0.02 g, respectively. The food conversion efficiency FCE was high, $92.30 \pm 0.15\%$ in B₂ diet-fed fish, compared to low FCE, i.e. $35.4 \pm 0.12\%$, $32.30 \pm 0.14\%$ & $24.7 \pm 0.10\%$ noticed in control, B₁ and B₃ diet-fed fish.

Table 2. Growth performance of Koi carp in the culture system

Parameters	Control	B ₁	B ₂	B ₃
Initial weight(g)	3.5 ± 0.02	3.5 ± 0.03	3.63 ± 0.02	3.3 ± 0.03
Final Weight (g)	3.7 ± 0.01	3.7 ± 0.04	4.23 ± 0.02	3.13 ± 0.04
Production (g)	0.23 ± 0.01	0.21 ± 0.02	0.60 ± 0.02	0.16 ± 0.02
FCR	2.82 ± 0.03	3.1 ± 0.04	1.1 ± 0.02	4.1 ± 0.01
FCE (%)	35.4 ± 0.12	32.30 ± 0.14	92.30 ± 0.15	24.7 ± 0.10
SGR (%)	2.23 ± 0.02	2.21 ± 0.04	2.7 ± 0.03	1.7 ± 0.06
AGR (g/body weight/day)	0.0057 ± 0.0001	0.0052 ± 0.0002	0.015 ± 0.0002	0.004 ± 0.0001
Food consumed (g)	0.65 ± 0.01	0.65 ± 0.02	0.65 ± 0.03	0.65 ± 0.02

DISCUSSION

Ornamental fish farming or culture is the culture of attractive, colourful fishes of various characteristics, which are reared in a confined aquatic system. Farmers and hobbyists mainly grow these fishes due to their vibrant colouration and beauty. There are over 30,000 fish species reported around the world, of this about 800 belong to ornamental fishes. Nutrition plays a crucial role in enhancing the production efficiency of ornamental fish (Jagtap & Kulkarni, 2013). Giri *et al.* (2016) evaluated the effect of banana peel flour on the growth of *Labeo rohita* fingerlings and revealed that 5 % of banana peel flour (BPF) exhibited a high growth rate of (83.61 ± 1.52) . Similarly, in the present study hot water extract of banana spathe at a concentration of 10% i.e. B₂ diet-fed fish displayed a maximum weight gain of 0.60 ± 0.02 g compared to a low weight gain of 0.16 ± 0.02 g to 0.23 ± 0.01 g noticed in C, B₁ and B₃ diet-fed fish. Further evidence from Susanto and Agustina (2023) showed that the addition of 1-2% kg-1 diet of Ambon banana peel flour in feed showed the best growth performance in Nile tilapia (*Oreochromis niloticus*). These results are also similar to our findings that could be correlated to a better specific growth rate of $2.7 \pm 0.03\%$ noticed in B₂ diet-fed fish compared to other treated groups.

CONCLUSION

The present study concluded that the hot water extract of banana spathe at a concentration of 10% enhanced the maximum weight gain in Koi carp reared in an indoor culture system.

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