A Preliminary Study on the Influence of Herbal Extraction; *Cardiospermum Halicacabum* (Welpenela) on the Growth Performance of the Gold Fish (*Carassius auratus*)

L.H.D.H.K. Lakshman, S.C Jayamanne
Uva Wellassa University, Badulla, Sri Lanka

and

A. Mudalige
Ornamental Fish Breeding and Training Center, Panagamuwa, Rambodagalla.

Introduction

Carassius auratus (Gold fish) is an ornamental fish species which is an egg layer, commonly cultured in Sri Lanka. It's annual production is 34,019 (NAQDA report 2011). Calico, Pearlscale, Ranchu, Red cap and Oranda are the common Gold fish varieties cultured in Sri Lanka. Producing gold fish for export market with optimum marketable size after grow-out period using low cost feed having appropriate nutritional properties is crucial. General proportions of various nutrients as proteins, carbohydrates, vitamins, minerals and some pigments are needed to be included in a standard fish diet (Metwally, 2009). Metwally (2009) has indicated that medicinal plants are regarded as potentially safe drugs and have been tested for biological, antimicrobial; antioxidant and hypoglycemic activities and their extracts can be potentially used for enhancing growth of fish by improving quality of their feed. In the present study, *Cardiospermum halicacabum* (*Welpenela*), a climber belongs to the family Sapindaceae which exhibit a wide range of biological and pharmacological properties was selected as the herb and its effect on the growth of gold fish was tested.

Methodology

The experiment was conducted at the Ornamental Fish Breeding and Training Center - Rambodagalla. Extractions of *C. halicacabum* was prepared by grinding the plant and three treatment feeds were prepared by replacing 20 g, 40 g and 60 g respectively from "0" Prima feed with 20 g, 40 g and 60 g of *C. halicacabum* extract. The feed used by the Rambodagalla Center was used as the control. Composition of the four types of feed is given in table 1. Prepared feed were stored in the refrigerator under 2 C.ºProximate Analysis of all the feeds was carried out.

Table 1. Composition of the feed types used.

	Feed types			
Ingredients	T1(20g/kg)	T2 (40g/kg)	T3 (60g/kg)	T4 (Control)
Prima No "0"	980g	960g	940g	1kg
Multi vitamin	10g	10g	10g	10g
Minerals	10g	10g	10g	10g
Water	1l ml	1l ml	1l ml	1l ml
C. halicacabum	20g	40g	60g	-

Properly cleaned twelve (12) rectangular glass tanks of size, 60 cm × 30 cm× 30 cm were used and labeled according to the feed type. As experimental design, Complete Random Design (CRD) was used. Water quality was frequently kept at standard values (pH – 7.2 ± 7.6, DO –2.6 - 3.2 mg/l, Hardness –123.4 mg/l, Ammonia -0 ± 5 ppm, Nitrate –0 ± 5 ppm and Nitrite –0 ± 5 ppm) throughout the period of study.21 days old fry obtained from the same parents were used as seeds. Mean initial body length of the fry was 0.5±0.03 cm, and the mean weight was 0.120±0.001 g measured from randomly collected samples (n=20) using a Vernier caliper and

an electronic analytical balance with 0.001 precision respectively. 10 fish fry were stocked in each tank and three replicates were used for each treatment. Fry were fed three times a day at 7.30 am, 11.30 am and 3.30 pm at 5% of body weight at a time. The amount of feed was adjusted after 15 days according to the newly measured body weight. Temperature, pH, Ammonia, Nitrate and Nitrite were measured every week using a thermometer and a test kit respectively. Three samples of water were taken from each tank at around 7.30 am for this purpose.

The study was conducted for eight weeks. Standard body length and body weight were measured initially and at every 15 th day afterwards, using a Vernier caliper (SN 0.01) and an electronic analytical balance respectively. A sample of 5 fry was randomly selected from each tank each time for this purpose. Color changes of the fry were also observed visually and the number of fry having colour development was recorded compared to control. Specific growth rates (SGR) and Feed conversion ratios (FCR), were calculated after every 15 days during the study period and at the end of the experiment. At the end of the experiment the number of fry survived was counted. Color changing rate was observed visually. Changing the initial brown color of goldfish in to red or white color was observed. The results were analyzed using one way ANOVA incorporated in MINITAB 16 computer software.

Results and Discussion

No significant difference ($p<0.05$) observed among the proximate composition of the feeds. Mean values are; Protein19.05±0.03, Moisture 48.36±0.89, Lipid 16.75±0.55, Ash 11.56±0.29 and Fiber 3.75±0.16. Growth performance of fry under different treatment is shown in Figure 1.

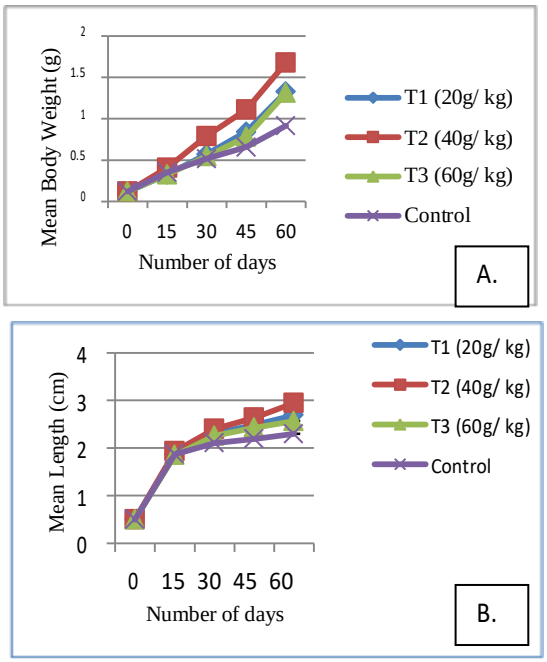

Figure 1. Changes in mean body weight (g) (A,) and mean body length (cm) (B,) of goldfish during the period of study.

All feeds incorporating *C. halicacabum* have shown better performance in growth compared to control. The mean body weight and mean body length of gold fish fry in T2 showed a significant increase after 30 th day ($p<0.05$). Best growth performance was achieved in T2 (40

g/kg) followed by T1 (20 g/kg) and T3 (60 g/kg). A summary of mean body weight gain, mean body length gain, SGR, FCR, survival rate and percentage of colour changing is given in Table 2.

Table 2. The mean body weight gain, mean body length gain, SGR, FCR, survival rate and percentage of colour changing in goldfish fed with different feeds at the end of the experiment. The similar letters indicate that there is no significant difference between treatments.

Treatments	Growth Performances				Visual Observations	
	Mean Weight Gain (g)	Mean Length Gain (cm)	SGR (g/day)	FCR	Survival Rate (%)	Color Changing Rate (%)
T1 (20g/kg)	$1.206^{b} \pm 0.009$	$2.183^{b} \pm 0.009$	$0.187^{b} \pm 0.006$	$1.027^{b} \pm 0.01$	$86.67^{a} \pm 5.8$	$63.33^{ab} \pm 5.8$
T2 (40g/kg)	$1.559^{a} \pm 0.004$	$2.444^{a} \pm 0.021$	$0.443^{a} \pm 0.006$	$0.812^{d} \pm 0.01$	$90.0^{a} \pm 5.8$	$73.33^{a} \pm 0.58$
T3 (60g/kg)	$1.191^{b} \pm 0.006$	$2.065^{c} \pm 0.010$	$0.177^{b} \pm 0.006$	$0.942^{c} \pm 0.01$	$83.33^{a} \pm 5.8$	$56.67^{b} \pm 5.8$
T4 (Control)	$0.795^{c} \pm 0.002$	$1.798^{d} \pm 0.003$	$0.023^{c} \pm 0.003$	$1.92^{a} \pm 0.01$	$66.67^{b} \pm 5.8$	$33.33^{c} \pm 5.8$

A significant difference ($p<0.05$) in mean body weight gain, mean body length gain, SGR, FCR, survival rate and percentage of colour changing was observed in T2 (40 g/ kg . T2 showed best results among the treatments. T1 (20g/kg) has shown second best results considering all parameters tested except in FCR which was higher than that of T3 (60 g/kg). All treatments showed results better than the control. T2 (40 g/ kg can be the optimum level of absorption of herbal extractions to the fish body or it was the optimum level fish prefers to eat. The visual observation also indicated that *C. halicacabum* induces the colour development in goldfish compared to control.It is clearly evident that incorporation of *C. halicacabum* in feed has a significant effect on growth and colour development in gold fish. In this experiment the treatment with 40g of *C. halicacabum* incorporated feed showed the best results. Frigg *et al.* (1990) has indicated that herbal extractions are capable in increasing the antioxidant level and stabilize the fish flesh. Further, they help in accelerating regeneration of liver cells and liver functions. This may be the cause for the *C. halicacabum* incorporated diets to show better performance. Further research is required to find the optimum concentration of *C. halicacabum*.

References

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