



Effects of Dietary Garlic on Growth Performance in the Fresh Water Fish *Channa orientalis* (Sch.)

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(Received 20 October, 2013, Accepted 15 December, 2013)

ABSTRACT: The aim of this study was to assess the effect of garlic (*Allium sativum*) on growth performance in the fresh water fish *Channa Orientalis* (Sch.) A total number of 80 fish (average weight 20.08±0.26 g) was used. Fish were divided into four groups fed on diets containing garlic in different levels and the control group diet was without garlic. The experiment extended for two months. The results showed significant weight gain and growth performance increased in all groups fed on garlic. The results of this study show that addition of garlic *Allium sativum* to fish diet can promote growth of fish.

Key words: *Channa orientalis*, dietary garlic, growth

INTRODUCTION

Feed and feeding are among the most important factors influencing growth, feed utilization and tissue composition of the fish in intensive culture (Charjan, 1997; Okumus and Mazlum, 2002). Garlic is an important vegetable extensively cultivated in many countries. It is used as food for humans as well as some animals and as remedy for several diseases, as reported in folk medicine (Shalaby *et al.*, 2006). It is probably one of the earliest known medicinal plants. In recent years, the concern about bacterial resistance to antibiotics in livestock industry has led to legislation minimizing/eliminating the use of such compounds. Garlic contains sulfur containing compounds. Alliin, is converted to the antimicrobial active allicin, when the bulb is cut or bruised. The fresh bulb contains Alliin, Allicin and volatile oils. Allicin gives garlic its characteristic pungent smell. Also, it contains vitamins and minerals and trace elements (selenium and germanium) (Skidmore-Roth, 2003). Allicin (diallylthiosulfinate) is the most abundant compound representing about 70% of all thiosulfates present, or

formed in crushed garlic (Block, 1992; Han *et al.*, 1995). Using of garlic in fish farming has become popular for as a growth promoter (Diab *et al.*, 2002; Metwally, 2009) also it increased body gain, feed intake and feed efficiency ratio (Abd-El Allatif and Ebraheem, 1996; Metwally, 2009).

This work was carried out to study the effect of different values of garlic on growth factors in *Channa orientalis*.

MATERIALS AND METHODS

Experimental fish: The *Channa orientalis*, (20.08±0.26 g) were obtained from a commercial farm and were transferred to the place of experiment and acclimated for 2 weeks. During the acclimation, fish were fed the experimental diet to satiation twice a day at 09:00 and 15:00 hours. After acclimation, fish were fasted for one day; batch weighted and randomly distributed among density of 20 fish per tank. The physicochemical parameter of the aged tap water was determined periodically as per standard methods (APHA 1998).

Table 1: Physicochemical Parameters of water.

1	pH	7.5 ± 0.5
2	Temp.	23 ± 1 °C
3	Dissolve O ₂	6.5 ± 0.3 mg/L
4	Total Hardness	232 ± 3 mg/L
5	Total Alkalinity	243 ± 3 mg/L

Experimental diet and feeding regime: The basal experimental diets were formulated with the commonly available ingredients. The formula and analyzed proximate composition of the basal diet are shown in Table 2. The ingredients were grinded, milled, weighed, mixed and pelleted with meat mincer through a 2 mm die. After pelleting, the feeds were air dried and put in an air-tight container. During the experiment, fish were

fed the experimental diet to satiation third a day at 08:00, 12:00 and 16:00 hours.

Measurements and sample analysis: It was carried out each 20 days. Water temperature was 15°C, O₂ 7-8 mg/l, pH 7-8 and light: dark cycle of 12:12 h was maintained during the feeding trial. Proximate composition of diets and tissues were carried out using the Association of Analytical Chemists (AOAC, 2000) methods.

Calculations and statistical analysis: The following variables were calculated:

- (i). Body weight increase (BWI) = $W_t - W_0$ (Tacon, 1990)
- (ii). Specific growth rate (SGR) = $(\ln W_t - \ln W_0) \times 100 t^{-1}$ (Hevroy *et al.*, 2005)
Where, W_t and W_0 = Final and initial fish weights (g), respectively,
(t) = the experimental period in days
- (iii). Feed conversion ratio (FCR) = $\frac{\text{Total dry feed consumed (g)}}{\text{total weight gained (g)}}$ (Shalaby *et al.*, 2006)
- (iv). The data obtained from the trial is expressed as mean (\pm SD).

Table 2. Formulation and proximate composition of the basal fish diets.

Ingredients	Control	<i>Allium sativum</i> diets Ingredients (g /100g diet)		
		I	II	III
Meat	25	25	25	25
Wheat	50	47	44	41
Soybean	20	20	20	20
Soybean oil	05	05	05	05
Garlic	00	03	06	09

RESULTS AND DISCUSSION

Growth performances of the fishes after 60 days of feeding are summarized in Table 3. Third fish group had higher final weight, weight gain, and SGR than fish

fed on other levels of garlic and control. The highest amounts of dry feed intake (g/fish/day) were seen in the same third fish groups. Results also show that FCR decreased significantly to 1.38 ± 0.01 in the third group.

Table 3: Effects of garlic on growth parameters in fish fed on experimental diets(g/100g).

Parameters	Control	I	II	III
Initial weight(g)	20.08 \pm 0.30	20.07 \pm 0.09	20.09 \pm 0.34	20.06 \pm 0.33
Final weight (g)	37.05 \pm 3.10	45.76 \pm 4.12	51.51 \pm 4.23	55.88 \pm 2.51
BWI (g)	16.81 \pm 3.39	26.81 \pm 4.13	30.03 \pm 4.56	38.02 \pm 3.42
SGR	1.53 \pm 0.06	1.62 \pm 0.05	1.68 \pm 0.04	1.71 \pm 0.03
FCR	1.61 \pm 0.05	1.45 \pm 0.04	1.43 \pm 0.05	1.38 \pm 0.01
Feed intake (g)	69.12 \pm 1.29	73.35 \pm 2.31	77.24 \pm 1.33	83.02 \pm 2.12

It is clear that garlic is a main vegetable extensively cultivated in many countries. It is used as food for humans as well as some animals and as remedy for several diseases, as reported in folk medicine (Shalaby *et al.*, 2006). In this study the highest growth performance was observed in fish fed diets containing garlic, especially on 30 g garlic.

It agrees with studies results of Diab *et al.*, (2002), Abou-Zeid, (2002), Shalaby *et al.*, (2006). Feed intake increased with increasing *Allium sativum* levels. Feed conversion ratio decreased with increasing *Allium sativum* levels. These results are also in agreement with those obtained by Gomes *et al.*, (1993), Degani *et al.*, (1997), Khattab *et al.*, (2004) and Farahi *et al.*, (2010).

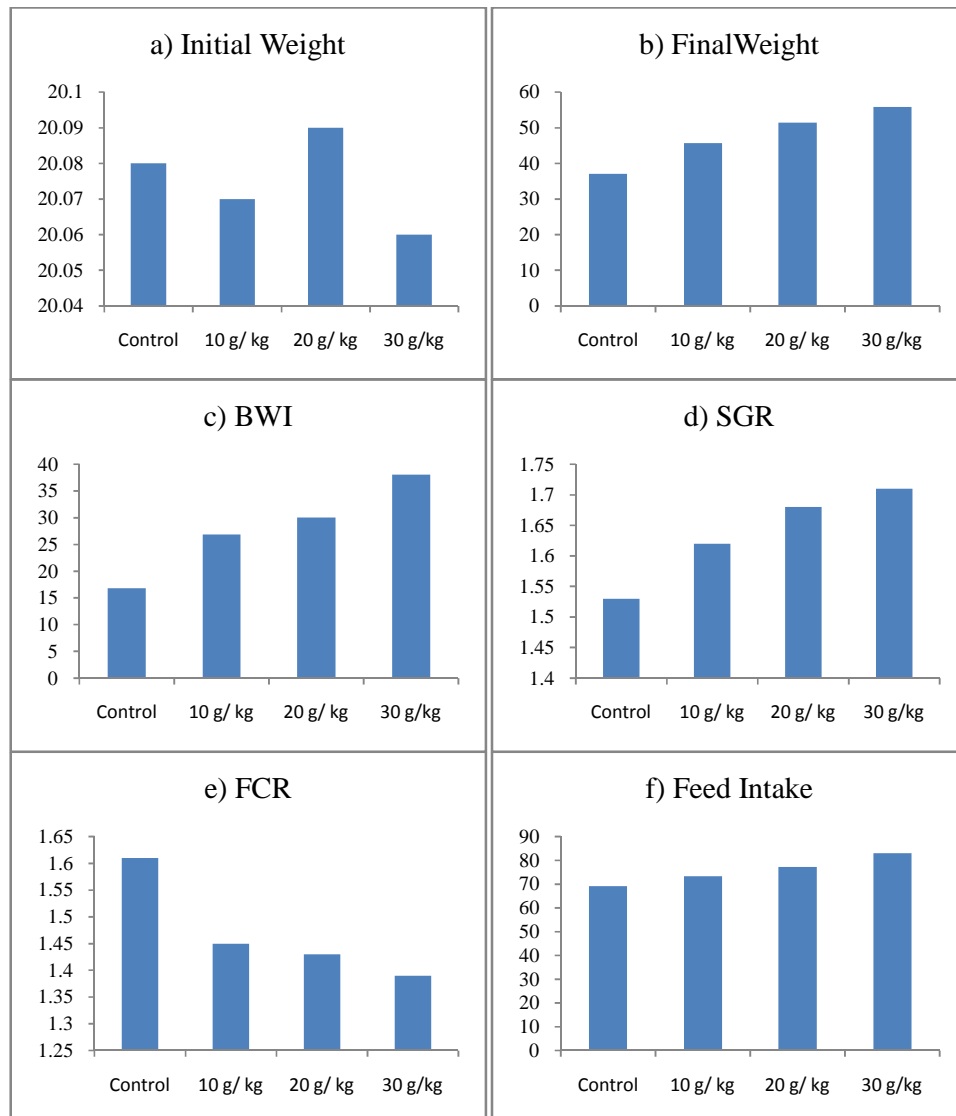


Fig. 1. (a to f): Effects of garlic on growth parameters in fish fed on experimental diets.

CONCLUSIONS

From obtained results, it could be recommended that garlic (*Allium sativum*) can be used as a growth promoter in *Channa orientalis* so garlic should be added to the diets of fish.

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