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EFFECT OF WATER HYACINTH LEAVES (*EICHHORNIA CRASSIPES*) SUBSTITUTION WITH MAIZE ON SOME GROWTH PARAMETERS OF COMMON CARP (*CYPRINUS CARPIO*)

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Abstract

This study was conducted to Knowing the effect of using dried Water hyacinth leaves instead of maize in the feeding of common carp *Cyprinus carpio* L. 60 fish with an average weight of 27 ± 1 g/fish were randomly distributed on six replicates. Five similar proteins were produced with protein content and different levels of use of Water hyacinth leaf powder (5%, 10%, 15%, 20%, 25%). treatments (T2, T3, T4, T5 and T6) respectively, as well as T1 control, which is free of Water hyacinth leaf powder, Fish were fed on experimental treatments by 3% of their weight. The experiment lasted for 90 days. Growth parameters were used to evaluated ration effect on fish performance as weight gain, Relative growth rate, Specific growth rate, Food conversion ratio and Food conversion efficiency. The results showed that the best experimental diets was T4 which gave the higher levels for most studied parameters . There were significant differences ($p \geq 0.01$) between it and T1 control treatment on most studied parameters. The fish were fed diet of T4 gave higher rate of weight gain (32.72 ± 0.07) gm/fish, and the lowest weight gain for fish of T6 (18.30 ± 0.10) g / fish , T4 was the highest relative growth rate (104.72 ± 0.07)% and did not differ significantly from what was recorded by the rest treatments. While T4 recorded the highest value of Specific growth rate amount to (0.80 ± 0.00)%. The best food conversion rate was to T4 (3.51 ± 0.00) gm. The study showed that common carp fish can feed on not more than 20% of Water hyacinth leaves powder

***Keywords*:** Water hyacinth, common carp, maize, growth

Introduction

The culture of common carp (*Cyprinus carpio*) has received widespread interest in fish farming because it has high production rates, fast growth and clear resistance to extreme changes in environmental conditions, ease of culture and availability of fish, which are typical characteristics of fish to be cultured commercially (Gupta *et al*., 2005). Carps have contributed largely to the poor diet as a source of animal protein because of its low prices in Asia (Dey *et al*., 2005). Given the current level of per capita consumption of aquatic foods, it is projected that the world will require an additional 23 million tons by 2020 (FAO 2012). Artificial feeding plays an important role in intensive and semi-intensive fish culture systems. It offers the best means of fish production within the shortest possible time in earthen ponds. The use of supplementary feed in carp culture has become inevitable for the success of fish culture (Shahzadi *et al*., 2006). The development of fish stocks has led to an increase in the increase in fish production inputs. The nutrition process accounts for more than 50% of the cost of fish farming, so alternative alternatives should be sought to replace expensive feed ingredients such as fishmeal, soybeans and oilseeds (Sajid *et al*., 2016; Craig and Helfrich, 2017). Water hyacinth *Eichhornia crassipes* is a monocotyledonous freshwater aquatic plant belonging to the family Pontederiaceae, and is native to the Brazil and Ecuador region. In the developing countries, this plant is used in traditional medicine and also used to remove toxic elements from polluted water bodies (Center *et al*., 1999). They reproduce both asexually and sexually through seeds, which remain viable for up to 20 years and, therefore, are difficult to control (Center *et al*., 1999). It can double its biomass within 8–10 days and one plant can produce 3000 offspring in 50 days because of its capacity for exponential increase in the biomass (Singh, 1999). The current study aims to benefit from the Nile flower plant, which is distributed in large quantities in local rivers and marshes using instead of with maize in feeding the common carp.

Materials and Methods

This study was conducted at the Fish Laboratory of the Faculty of Agricultural Engineering Sciences / University of Baghdad. Glass basins with dimensions (40 x 30 x 30 cm) were used with 30 liters of water per basin. 60 common carp were randomly and randomly distributed over 12 glass basins at an average weight of 27 + 1 gm with an average mass of 135 g per basin. The period of the marking within the glass basins lasted 15 days. The Water hyacinth plant was brought from south-east Baghdad by the Cree River team. The plant was then cut into small pieces (1- 2) cm and then the plant was spread out for drying and its continuous rotation to reduce the growth of fungus or molds under the sun for 25 days and then was Grind and use in the installation of rations. Five similar proteins were produced with protein content and different levels of use of Water hyacinth leaf powder (5%, 10%, 15%, 20%, 25%). treatments (T2, T3, T4, T5 and T6) respectively, as well as T1 control, which is free of Water hyacinth leaf powder, Fish were fed on experimental treatments by 3% of their weight. The experiment lasted for 90 days.

Fish Growth Studies

Fish growth was monitored at the time of stocking and then for 15 day through the measurement of weight, and feed was adjusted as per weight gain. The gain in weight, percent weight gain, specific growth rate percentage (SGR%) and feed conversion ratio (FCR) were determined with following formulas:

- Net Weight Gain(N.W.G) = Average final weight (g) – Average initial weight (g)

- Relative Growth Rate(R.G.R) = Final weight (g) – Initial weight (g) × 100/Initial weight (g)
- Specific Growth Rate(S.G.R) = ln (Final wet body weight) – ln (Initial wet body weight) × 100/No. of days
- Feed Conversion Ratio (FCR) = Feed intake (g)/Wet weight gain (g)

Statistical Analysis

The obtained data were subjected to statistical analysis including analysis of variance (one way ANOVA) and significance of differences between means was tested according to Duncan (1995), using SAS Program.

Table 1 : Ingredients and proximate composition of experimental diets (on %dry matter basis)

	T1	T2	T3	T4	T5	T6
Fish meal	20	20	20	20	20	20
Soya meal	35	35	33	32	30	28
Maize	25	20	15	10	5	0
Water hyacinth	0	5	10	15	20	25
Wheat flour	7	5	5	5	7	9
Millet	5	7	9	10	10	10
Rice diets	5	5	5	5	5	5
Fish oil	1	1	1	1	1	1
V/M Premix	1	1	1	1	1	1
salt	1	1	1	1	1	1

Table 2 : Proximate composition (on dry matter basis) %

	T1	T2	T3	T4	T5	T6
Crude protein	30.52	30.97	30.76	30.88	30.72	30.50
Ether extract	5.78	5.65	5.26	5.38	5.24	5.09
Ash	7.15	7.88	8.53	9.11	9.52	10.94
Fiber	7.01	7.38	7.69	7.90	8.14	8.31
NFE	42.59	41.26	41.18	40.09	39.84	38.89
Moisture	6.95	6.86	6.58	6.64	6.54	6.27
Growth Energy (Kcal/100gm)	387.18	383.12	378.16	375.53	372.40	366.07

Results and Discussion

The statistical analysis of Table (3) showed that there were significant differences at (P≥0.01) between control treatment T1 and treatments of dried Water hyacinth leaves instead of maize T2, T3, T4, T5 and T6 (5, 10, 15, 20 and 25%, respectively) During the trial period , Where both the T3, T4 and T5 treatments coefficients were superior (10, 15 and 20%, respectively) On treatment of T1 control in growth parameters which included both final weight, weight gain, relative growth rate and specific growth rate The T4 treatment (15%) recorded the highest values for the studied criteria (63.97 gm / fish, 32.72 gm / fish, 104.72%, 0.80% and 3.51 respectively) , While T1 control treatment surpassed T6 (25%) in growth criteria , There were no significant differences between control treatment and T2 treatment (5%) during the 90-day trial period.

Table 3 : Growth parameters studied (average ± standard error) of common carp fish fed on diets containing dried Water hyacinth powder during the duration of the experiment

Parameters	Growth parameters				
	F.W.	W.G.	R.G.R.	S.G.R.	F.C.R.
T1	57.95±0.35 d	27.10±0.30 d	87.84±0.83 d	0.70± 0.005 d	4.06± 0.03 d
T2	57.62±0.32 d	26.67±0.27 d	86.19±0.75 d	0.69±0.005 d	4.11±0.02 d
T3	62.07±0.17 b	31.07±0.17 b	100.24±0.56 b	0.77±0.00 b	3.68±0.01 b
T4	63.97±0.12 a	32.72±0.07 a	104.72±0.07 a	0.80±0.00 a	3.51±0.00 a
T5	59.87±0.12 c	28.97±0.22 c	93.77±1.03 c	0.73±0.005 c	3.87±0.01 c
T6	48.80±0.20 e	18.30±0.10 e	60.01±0.92 e	0.52±0.005 e	5.45±0.09 e

Note: a, b, c, d, e ab significance at P ≤ 0.01.

The results of the present study showed that T4 was the highest. This is due to the richness of the Water hyacinth leaf powder from the essential amino acids necessary for growth, especially glutamine, asparagine and leucine (Virabalin, 1993). Water hyacinth leaves also provide good levels of essential mineral elements such as sodium, potassium, calcium, phosphorus and zinc (Niekerk *et al*., 2004). These results were consistent with Mohapatra and Patra (2013). The best result obtained from the growth of the common carp was treated with 15% substitution in the diet from the Water hyacinth plant, which gave a higher growth rate than all other treatments in most studied traits It was observed that the increase in the ratio of the leaf powder of the Water hyacinth plant in the composition of the seeds to 80% instead of the corn negatively affected the growth parameters (W.G., R.G.R., S.G.R) Compared with T1 control treatment This has

been attributed to the high content of the leaf Water hyacinth of the fiber affecting the protein digestion and utilization (Albriktsen *et al*., 2003) This was demonstrated by Nwanna and Ajani (2005) when studying the feeding of African running fish on the Water hyacinth with high raw fiber content Mohapatra (2015) agreed with his study that the Water hyacinth leaf powder was used as a partial substitute for fishmeal in the common carp (0%, 10%, 20%, 30%, 40%) The researcher recorded a decrease in the growth criteria by increasing the levels of powder levels of the Water hyacinth plant in the relationship, which explains why we have a better result of the increase in weight with low rates of leaf powder Water hyacinth plant, it was found that the powder can be used as extra food for fish. T3, T4 and T5 were significantly superior in F.C.R. ($P \geq 0.01$). This may be due to the partial withdrawal of maize ratios and their replacement with the sun-dried Water hyacinth leaf powder, resulting in the provision of nutrients necessary for the growth of fish such as protein and energy As a result of the integration of the nutritional content of the cultivars (Sotolu and Sule, 2011) .The results were agreed with Sarker and Aziz (2017) as the Water hyacinth plant was used as a partial substitute for rice bran as part of the larvae of *Cyprinus carpio* var. specularis, which exceeded the standard of F.C.R of fish fed on the diet containing the level of substitution of 15% of the plant Water hyacinth compared to the control and pointed out that the replacement of leaves of the Water hyacinth plant by 15% is the best replacement ratio in the diet as a practical food for carp fish to reduce Cost of feed and increase profits.

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