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EFFECT OF ADDITIVES OF *SILYBUM MARIANUM* IN SOME GROWTH PERFORMANCE OF COMMON CARP *CYPRINUS CARPIO L.*

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ABSTRACT

This experiment was conducted in the laboratory of Animal Production Department, College of Agricultural Engineering Sciences, University of Baghdad for the period for 3 months from 25/8/2019 in order to evaluate dried plant and seed meal of *Silybum marianum* as substitute to corn in feeding of common carp *Cyprinus carpio L.*. 14 aquaria with dimensions of 40 x 30 x 30 cm were used, with a capacity of 36 liters and 84 fish carp were distributed randomly with an individual weight of 2 ± 5 g / fish over seven treatments with a ratio of two replicates. Seven diets was made with iso energy and protein content and with different replacement ratios were from seeds *Silybum marianum* plant and powder, (5,10,15,20)% plants and 5%, 10% for seeds for the treatments T2, T3, T4, T5, T6 and T7 respectively, While as a control treatment which did not contain *Silybum marianum* powder, Fish were fed experimental diets at 6% of their weights. Growth parameters were calculated, . The results showed that the control and T4 treatments were the best. As they gave the highest levels for most of the studied traits. The results of the current study indicated that there was a significant different (P <0.01) between the control and T4 treatments with the other treatments in the rate of body weight, total weight gain, relative and specific growth rate. As for the best food conversion ratio treatment was T4. We have conclude from this study that there is an important role for *Silybum marianum* meal and seeds by add it to diets to improve growth parameters, which is reflected in the productive characteristics and improving their health status.

***Keywords*:** growth, common carp, *Silybum marianum*, seeds *Silybum marianum*.

Introduction

Fish wealth is an essential pillar of achieving food safety, as it is an important food source for people in the whole world and an economic source for many countries. Fish and its products provide about 18.5% of animal protein revenues, while meat of various other types provides 40%. The aqua feed industry looks to convey the dual benefits of improved performance and innate response to humoral immunity of (Daudpotal *et al*., 2016; Hassan *et al*., 2018; Hassan *et al*., 2019), hence nutritional status can be considered as one of the main aspects that stimulate immune responses in cultured fish species. There is a recent trend in our time towards fish farming due to the increasing demand for consumption of fish meat because of its great advantages compared to the rest of the animals meal, as its meat is considered healthy integrated food and its protein contains essential amino acids and unsaturated fatty acids. Vitamins, Minerals (Hassan and Hashem, 2016). Culture of common carp *Cyprinus carpio L.* has received wide attention due to its high production rates, rapid growth rate, clear resistance to adverse environmental conditions, ease of cultivation, availability of requirements, which are typical characteristics of fish to be cultured on a commercial scale (Gupta *et al*., 2005). The development in fish farming has led to an increase in fish production inputs, in particular the feeding process, which accounts for more than 50% of the cost of fish farming. Therefore, various alternatives must be sought to replace the costly feed ingredients such as fish and soybean meal (Sajid *et al*., 2016), like substitutes are plant *Silybum marianum*. As it contains a number of substances with antioxidant activity and has many medicinal and biological activities, as well as the seeds of *Silybum marianum* are considered to be equal or more effective than vitamin E in preventing oxidation by increasing the production of glutathione in the liver of mice by 35% (Valenzuela *et al*., 1989). The term Silymarin refers to the group of active substances consisting of several isomers (Silybin, Silibinin, Silychristin, Silydiain, 2,3-dehydrosilbin dehydrosilychristin, 2,3-). This plant contains other materials, including proteins, sugars, amines, saponins, and mucus substances. It also contains compounds such as Histamin, Cholestrol and some vitamins (K, C, E, B12, A) (Wizard, 2004), *Silybum marianum* and has actions that protect and regenerative liver cells. It also works to reduce free radicals formed by toxins that in turn damage cell membranes and has the advantage of having a competitive regulatory capacity in hepatocytes by modifying the hepatic cell membrane and has a role in stimulating hepatocytes and activating RNA synthesis from the ribosome to stimulate protein formation (Vargas-Mendoza *et al*., 2014). In order to find a natural antioxidant that is cheap and has no negative effects on animal health and does not leave residues that affect the health of people who consume different animal products, this study was conducted.

The present study aimed , possibility of using *Silybum marianum* plant that is widespread in large quantities in gardens and agricultural roads and as a fodder material common carp diets in different proportions as a substitute for maize in the diets of common carp fish.

Materials and Methods

This study was conducted in the Fish Laboratory, College of Agricultural Engineering , University of Baghdad. In the experiment, 7 glass tanks with dimensions of 40 x 30 x 30 cm with a capacity of 36 liters were used. The aquaria were filled with tab- water (30) liters per aquarium. 84 fish were selected randomly and evenly on 14 aquaria with an average initial weight of 2 ± 5 g and a biomass average of 2 ± 25 g. The leaves of the *Silybum marianum* plant were collected from the gardens of the University of Baghdad - Al-Jadriya in March and April 2019, and the roots were separated from the vegetative part and excluded from the experiment, and then the vegetative part (leaves and stems) were cut into small pieces (1-2 cm) to dry and turn continuously (to reduce the growth of fungi or molds) under sunlight for a period of 10-15 days, then it was ground and used in the composition of diets(table1). Seven experimental diets were made with iso protein content(table 2). *Silybum marianum* leaf meal was added to four of them as a substitute for maize at rates of 5%, 10%, 15% and 20% for the treatments T2, T3, T4 and T5 respectively, and the meal of *Silybum marianum* seeds was added to the other. At rates of 5% and 10%, for the treatments T6 and T7 respectively, while the control treatment T1 was free of the leaves and seeds (table 1). Fish were fed 6% of their weight, and the experiment continued for 90 days. The growth parameters were estimated which is: TWG ,SGR,RGR and FCR.

Table 1 : Components of experimental relationships (% on dry matter basis)

Treat	Ingredients	T1	T2	T3	T4	T5	T6	T7
1	Fish meal	17	17	19	19	17	17	19
2	Soya meal	40	40	40	40	42	40	40
3	Maize	25	20	13	8	5	20	13
4	*Silybum marianum* meal	—	5	10	15	20	5	10
5	Wheat flour	5	5	5	5	5	5	5
6	Millet	5	5	5	5	3	5	5
7	Rice diets	5	5	5	5	5	5	5
8	V/M Premix	1	1	1	1	1	1	1
9	Fish oil	1	1	1	1	1	1	1
10	salt	1	1	1	1	1	1	1
Total	100%	100%	100%	100%	100%	100%	100%	100%

Table 2 : Chemical analysis of experiment diets

Treat.	Crude %protein	Fiber %	Lipid %	Carbohydrate %	Ash %	Moisture %	Growth Energy (Kcal/kg)
T1	32.66	7	5.3	41.65	9	4.39	4279.18
T2	31.57	7.4	4.4	40.43	11.5	4.70	4335.81
T3	32.67	7.2	4.9	38.62	12.00	4.61	4381.03
T4	32.60	7	5.4	36.75	13.50	4.75	4437.68
T5	32.15	7.9	4.6	36.25	14.50	4.60	4538.89
T6	31.62	6.9	5.7	41.58	10	4.20	4325.60
T7	32.77	7.6	8	37.28	10.50	3.83	4360.60

T1 **:**A diet containing 0%, T5**:** A diet containing(S.M) 20%
T2 **:**A diet containing (S.M) 0.5%, T6**:** A diet containing(S.M.S) 5%
T3 **:** A diet containing(S.M) 10%, T7:A diet containing(S.M.S) 10%
T4 **:** A diet containing(S.M) 15%

Results and Discussion

The results of the statistical analysis in table 3 showed that there were no significant differences between the treatments in the initial weight characteristic, and the results for the final weight of the experiment showed a significant superiority ($P \leq 0.01$) in favor of the two treatments T1 and T4 compared to the rest of the trial treatments, while the treatment was T3 and T5, lowest overall final weight. A significant superiority ($P \leq 0.01$) was observed in favor of the control treatment and T4 in the overall weight gain rate, and the sixth treatment came in second place, which contains the seeds of the *Silybum marianum* plant by 5%, followed by the two treatments T2 and T7, which amounted to 20.77 and 20.52 grams, respectively, and finally the two treatments T3 and T5. It was 13.57 and 13.32 gm, respectively. In the results of the current study, it was noticed that the fourth diets made by using *Silybum marianum* leaf meal as an alternative to maize with a 15% replacement rate was the best in the relative growth rate, reaching 63.60%, while the treatment T3 and T5 (17.80%) (14.60%), respectively, gave the lowest rate. Relative growth, the results of the statistical analysis of the specific growth rate indicate a significant ($P \leq 0.01$) advantage in favor of the control treatment T1 and the treatment T4, as well as a significant decrease in the specific growth rate for the two treatments T3 and T5. It was also noticed that the results of the final rate of the percentage of dietary conversion during the period of the experiment indicate a significant superiority ($P \leq 0.01$) in favor of treatment T4 and then the control treatment compared to the rest of the experiment treatments. It is noticed from the

results of the table 3 for the experimental fish that the control and treatment T4 (15% of the *Silybum marianum* plant) were the best in contrast with the other treatments in the growth parameters. Katz (2002) stated that the presence of the main active flavonoids in plants give antimicrobial and antioxidant activities. Which makes them as powerful basic stimulants that can be adopted as natural antioxidants and then work to improve the average weight of the experiment fish, and can influence various factors such as plant parts, length of experiment, physical characteristics, genetic variation, age, dose used, harvest time, and compatibility with Other ingredients on the performance of fish that feed on medicinal plants. Also, the *Silybum marianum* plant contains a number of important substances and compounds in the plant, as it contains mucus substances, fats, sugars and vitamins, including A, B12, E, C, K as well as apigenin, histamine and tyramine and contains fixed oils 20-30% of the most important of which are Palmiti acid, Linolic acid, Oleic acid. The plant also contains some elements such as zinc, selenium, calcium, iron and magnesium. This may be the reason for the improvement in the relative growth rates. As for the specific growth rate, we point out that the *Silybum marianum* plant has improved and strengthened the growth performance, and that the plant contains a high percentage of flavonolignans, one of the components of Silymarin as an antioxidant that stimulates protein synthesis (Banaee *et al*., 2011). These results are consistent with the researcher's findings. Hassan *et al*. (2019) reached it, in their study, which included evaluating the effect of adding *Silybum marianum* seeds on the growth performance and biochemical characteristics in the blood of fingerlings of *Oreochromis niloticu* (L.), as the experiment included five levels of *Silybum marianum* seeds 0% (control), 2.5%, 5%, 7.5% and 10% respectively in the ration, As the results showed that when the *Silybum marianum* seed meal was introduced into fish diets at a rate of 7.5%, 10% gave the best increase in weight rates, weight gain rates, relative and specific growth rates, and the same researcher added that the higher the levels of *Silybum marianum* added, the better results. He instructed that *Silybum marianum* enhances growth and stimulates the appetite, which increases the digestibility of the forage material and thus reflects on improving growth parameters. As for the percentage of food conversion, perhaps the reason for the superior treatment of each of the *Silybum marianum* leaf meal by 15%, and it may be due to the fact that the palatability of the food was better and then the increased efficiency of the use of the forage material, while the results of the T7 feed indicated that the fish did not accept the diet sufficiently. It reduced the intake of the diet, which is reflected in the characteristic of the feed conversion ratio. As Hassan *et al*. (2019) indicated, the best values of the feed conversion ratio are by increasing the levels of *Silybum marianum* seeds in the diets, and the reason may be attributed to the presence of biologically active components in *Silybum marianum* that are not It not only enhances nutrition efficiency but also affects protein retention. The reason for the decrease in weight rates, weight gain, and the specific and relative growth rates in the treatments T3, T5 may be the increase in the percentage of raw fiber in the meal of the *Silybum marianum* plant, which leads to the acceleration of the passage of the nutrient inside the gastrointestinal tract, which makes it out of the body in a shorter time than the time that It is supposed to be in the gut without taking full advantage of it.

Table 3 : Growth parameters of common carp *Cyprinus Carpio L.* fed diets containing different proportions of *Silybum marianum* (g / fish ± standard error during the duration of the experiment)

Treat.	Initial Wight	Final Weigh	T. W. G	S.G.R	R. G. R	R. G. R
T1	25.00 ± 0.00 a	56.83± 0.23 a	31.83± 0.23 a	51.30 ± 1.02 b	1.46± 0.00 a	0.01± 5.11 c
T2	25.00 ± 0.00 a	45.77 ± 0.60 c	20.77± 0.60 c	32.60± 2.76 c	1.08± 0.02 c	0.18± 7.31 b
T3	25.00 ± 0.00 a	38.57± 0.07 d	13.57± 0.07 d	14.60±0.12 d	0.77 ±0.00 d	0.00±10.47 a
T4	25.00± 0.00 a	56.20 ± 0.25 a	31.20 ± 0.25 a	63.60 ± 0.48 a	1.44±0.00 a	0.00±5.10 c
T5	25.00± 0.00 a	38.32 ± 0.49 d	13.32± 0.49 d	17.80 ± 1.04 d	0.76±0.02 d	0.05 ± 10.62 a
T6	25.00± 0.00 a	47.18± 0.14 b	22.18 ± 0.14 b	30.22± 0.74 c	1.13±0.00 b	0.05 ± 7.01 b
T7	25.00 ± 0.00 a	45.52±0.14 c	20.52 ± 0.14 c	30.02± 2.02 c	1.07±0.01 c	1.26 ± 6.18 bc
Significance	N.S	(P ≤ 0.01)	(P ≤ 0.01)	(P ≤ 0.01)	(P ≤ 0.01)	(P ≤ 0.01)

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

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