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EFFECT OF ADDING CUMIN (*CUMINUM CYMINUM)* AND FENUGREEK (*TRIGONELLA FOENUM-GRAECUM)* SEED IN THE RAW KERNEL PALM MEAL DIETS ON COMMON CARP (*CYPRINUS CARPIO*) GROWTH PERFORMANCE

Hazem Dhmoush Mashaan Al-Asadi[1,*] and Taghreed Sadiq Mohsen Al-Obaydi[2]
[1]Ministry of Agriculture, Office of Animal Resourse& Follow-up, Iraq
[2]Department of Animal Production, College of Agriculture Engineering Sciences, University of Baghdad, Iraq
*Corresponding author: hazemalasade1974@gmail.com

ABSTRACT

The study was conducted at the Fish Laboratory, College of Agricultural Engineering Sciences, University of Baghdad for the period from 22/8/2019 until 25/11/2019 with the aim of knowing the effect of adding fenugreek and cumin seeds to the raw and treated kernel palm meal (KPM) on performance common carp fish *Cyprinus carpio* L., 80 fingerlings were used at an initial weight rate (5.5 ± 0.5 g) randomly distributed to 8 treatments with two replicates (5 fish per replicate) and a live mass rate of 26.43±1 g/replicate in 16 aquaria with dimensions of 30 × 40 × 30 cm and filled with 30 liters Water for each aquarium . Eight closely related experimental diets made with protein and energy. The results of the statistical analysis indicated a significant difference (0.01 <P) in the growth criteria for T4, T5, T7 treatments over the rest. I conclude from the current study the role of each of the kernel palm meal (KPM) treated with mushrooms, powdered cumin and fenugreek seeds in the additive treatments is improving growth performance of common carp fish, compared with control treatment.

***Keywords*:** growth, common carp, cumin seeds, fenugreek seeds.

Introduction

Recently, interest in fish nutrition has increased as a result of the rapid expansion of the aquaculture industry, with global fish production continuing to increase by about 5% annually (FAO, 2016). Therefore, aquaculture contributes significantly to global food security, and its contribution to global food production has increased during the past few decades, as this sector now provides nearly half of all fish and shellfish used for human consumption, and there is a consensus between feed manufacturers and farmers that high-quality feeds should It not only guarantees superior growth, but must also give priority to health and thus the benefit is twofold for the good and healthy growth of cultured organisms and in this way ensuring a sustainability strategy in aquaculture and the quality of nutrition for each type of ingredient must be taken into account during the fodder making (FAO, 2010).

Intensive culture of common carp causes a stressful environment for fish, which suppresses the immune response and subsequently leads to outbreaks of infectious diseases, so methods of treatment including approved antibiotics and chemotherapy are used to prevent infection in aquaculture where they are often not Effective / environmentally friendly, with harmful and undesirable effects on bacterial populations within the aquatic ecosystem (Subasinghe, 2009; Lalumera *et al*., 2004; Wei *et al*., 2010), therefore, and for the sustainable development of the aquaculture sector, there is a need to develop alternative treatments for the pathogens Bacterial diseases that can effectively protect animals and prevent the development of microbial resistance (Defoirdt *et al*., 2011).

Since fish's ability to resist pathogens and deal with stress depends to a large extent on their nutritional status, it has become necessary to need food interventions that improve fish health, so efforts have been made over the past two decades, especially in aquaculture, to understand the relationship between nutrition and response Immunology and Disease Control (LimWebster, 2001; Nakagawa *et al*., 2007).

Herbs and aromatic plants are an important part of the medicinal uses of developing countries (Greathead, 2003) and are a safe source of human, animal and environmental health, and among the medicinal plants known as Cumin and are characterized by its seeds or oil by containing active compounds such as Alkaloids, Tannins, Glycosides, ayonoidsFl, Saponines, Cuminalihyde, Careol, Linalool and Geraniol which act as antioxidants and harmful microorganisms which lead to microbial balance events inside the gut and increase the secretion of digestive enzymes such as Amylase, Trypsin, Chemotrypsin, Lipase which in turn gives a better chance of digesting and absorbing nutrients which led to increased Live body weight, weight gain, and food conversion factor (Mansoori *et al*., 2006; Muthamma *et al*., 2008). Also from medicinal plants known as fenugreek and for the beneficial effects of fenugreek seeds, studies have been conducted to assess their effect as feed additives on growth, survival, and hematological responses in fingerlings of common carp fish, Cyprinus carpio, due to their main pharmacological properties against diabetes and cholesterol activity in the blood, anti-microbial effects, anti-oxidant effects, anti-effects Allergies are also anti-inflammatory and antipyretic (Devi *et al*., 2003; iKumar *et al*., 2005; Bhatti *et al*., 1996; Khalil & Mansour, 2000;

Thiel, 1997; Liu *et al*., 2012; Ahmadiani *et al*., 2001). The aim of the current study is to know the effect of adding fenugreek and cumin seeds to the treated and untreated raw kernel palm meal by performing common carp fish Cyprinus carpio due to the lack of studies on them in Iraq.

Materials and Methods

The process of preparing the diets was carried out starting with the purchase of fodder materials, (Table 1) from the local market, and it was ground by a laboratory mill of Chinese origin, and according to the required proportions, (Table 2) mixed the feed materials with each other in a homogeneous manner and eight experimental diets was made with iso protein and energy, T6 contains 16.5% raw kernel palm meal (KPM) and the two treatments T7 and T8 contain the KPM with oyster mushrooms by 16.5%. Cumin seed powder was added 1 and 1.5% to the T2 and T3 treatments, respectively, and fenugreek seed powder was added 0.5 and 1% to the two treatments T5 and T4, respectively, fenugreek and cumin seed powder of 1% were added to treatments T6 and T8. The components were mixed by hand until the mixture was homogeneous for each diet. Water was added at a rate of 400 ml per kilogram of the ingredients mixture, then the components of each treatment were placed in a meat grinder (tray of origin with 4.5 mm holes) and re-chopped twice to form Pellet, then spread the diet in vessels and exposed to the air to dry at room temperature for 48 hours with continuous stirring of the bean grains to ensure the disposal of excess moisture as well as avoid the growth of fungi. Keeping the diets in bags made of nylon, as each diet was placed in a tag marked with the treatment number to put in the refrigerator under the temperature (-18 ° C) until it is presented to the experiment fish.

Table 1 : The chemical composition of the primary materials involved in the formation of diets of experimental common carp fish

Feed article	CP Protein %	Fat %	Ash %	Fiber %	Carbohydrate%
fish meal *	62	14	9	1.20	13.80
Soya meal **	45	6.44	7.21	6.90	35.81
Local yellow corn**	9	4.87	2.61	2.25	80.15
Wheat flour **	12.8	1.79	2.14	2.48	79.56
Millet **	10.80	3.00	13.80	9.40	63.00
Wheat bran **	15.72	12.50	3.21	4.11	62.99
Nuclei of raw dates	8.2	3.7	5.5	10.7	71.9
Dates treated with oyster mushrooms	8.7	1.5	11	7.9	70.9
Fenugreek seeds	24	4.8	3.5	13.8	53.9
Cumin seeds	18	15.1	9	22.8	35.1

Table 2: Ingredients and proximate composition of experimental diets (on %dry matter basis)

Ingredients	T1	T2	T3	T4	T5	T6	T7	T8
fish meal	17	17	17	17	17	17	17	17
Soya meal	40	40	40	40	40	40	40	40
Local yellow corn	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
Nuclei of raw dates	16.5	16.5	16.5	16.5	16.5	16.5	----	----
Dates treated with oyster mushrooms	----	----	----	----	----	----	16.5	16.5
Cumin seeds	----	1	1.5	----	----	1	----	1
Fenugreek seeds	----	----	----	0.5	1	1	----	1
Millet	5	5	5	5	5	5	5	5
Wheat bran	5	4	3.5	4.5	4	3	5	3
Wheat flour	5	5	5	5	5	5	5	5
Fish oil	1	1	1	1	1	1	1	1
V/M Premix	1	1	1	1	1	1	1	1
Salt	1	1	1	1	1	1	1	1

Statistical analysis

The Statistical Analysis System -SAS (2012) was used to analyze the data to study the effect of different coefficients on the studied traits according to a complete random design (CRD),

Mathematical Model. $Yij = \mu + Ti + eij$

Results and Discussion

From the results of the experiment and the statistical analysis of the data, it is clear that there were no significant differences ($P < 0.01$) between the parameters for the primary weight rate (Table 3), and the T7, 4T and T5 treatments, respectively, scored significantly ($P < 0.01$) over the rest of the treatments in the final weight rate and the increase Weight and relative growth rate, there were no significant differences between T5 and T6 treatments (and T6 treatment did not differ significantly from T2 and T1 treatments) while T6 treatment was superior to T8 and T3 treatments, and there were no significant differences between T2, T1, T3 and T8 treatments, respectively, and the last treatment recorded lower Rate it in the above attributes.

The results of the specific growth rate characteristic showed significant differences ($P <0.01$) between the treatments in Table (2), as the T7, T5 and T4 treatments outperformed the rest of the experimental treatments, as they recorded 1.470, 1.470 and 1.420%, respectively, and there

were no significant differences between T4, T6, T2 and T1 amounted to 1.420,1.370, 1.365 and 1.355%, respectively, and there were no significant differences between the T1 and T3 treatments, whereas the T1 treatment differed with T8, there were no significant differences between the T3 and T8 treatments, and T8 recorded the lowest specific growth rate of 1.210%.

It is evident from the results in Table (2) that the T7 treatment (which is a treatment that contains 16.5% of powdered KPM treated with mushrooms) recorded the highest rates of growth criteria as it ranked first for the characteristics (final weight, weight increase, relative growth rate and specific growth rate It was followed by treatments T4 and T5, respectively (a treatment containing 16.5% raw date kernel powder + 0.5% fenugreek seed powder, a treatment containing 16.5% raw KPM + 1% fenugreek seed powder) compared to other treatments.

The reason for the improvement in the growth parameters of the treatment T7 (a treatment containing 16.5% of the KPM treated with mushrooms) compared to the other treatments may be due to the effect of the oyster mushroom farm wastes, which are characterized by containing some enzymes such as cellulose and lactase secreted from mycelium mushrooms, which increase The digestibility of forage material (Chrapkowska and Podyma, 2000; Elisashvili *et al*., 2003; Sepi *et al*., 2003; Ramamurthy *et al*., 1987). The reason may also be attributed to the nutrients and digestive enzymes contained in the waste of mushrooms that increase the average weight and then the weight gain rate of the fish, which led to an improvement in the relative growth rate and the specific growth rate (Kurtzman, 2005). The mushroom has its nutritional value due to the high-quality protein, as the protein content in it ranges from 15-53.3% of the dry weight and the protein ratios vary according to the species, strains, method of cultivation, the type of medium and the environmental conditions in which the fungus is grown (Dundar *et al*., 2009). And because mushrooms contain most of the essential and non-essential amino acids, especially lysine and tryptophan, as they contain 17 amino acids (Chirinang and Intarapichet, 2009), as well as their good content of vitamins B1, B2, Niacin and C, and mineral salts (Chadha and Sharma, 1995 and Rai, 1995) The reason may be attributed to the low fat content of the mushrooms, as unsaturated fatty acids constitute the largest proportion of fats compared to saturated fatty acids, including linoleic acid and its ratio to the rest of the acids 63-74% (Breene, 1990), in addition to its content of Of carbohydrates (Ahmed *et al*. 2009), they are mainly found in the form of polysaccharides or glycoproteins, and the vast majority are found in the form of polysaccharides such as Chitin, α-Glucans, β-Glucans, Mannans, Xylans and galactans (Wasser, 2002). Glycogen is an important part of carbohydrates as it is believed to act as a substitute for lost starch in mushrooms (Bano, 1967). Mannitol makes up most of the sugars in the fungus body as well as glucose, calcium, lactose, and fructose, among others (Wannet *et al*., 2000). The fruiting bodies of mushrooms are characterized by low calories (Dundar *et al*., 2009). All this is reflected in the improvement in the rates of growth standards.

The reason for the improvement in the growth parameters of the two treatments T4 and T5 (a treatment containing 16.5% raw KPM + 0.5% fenugreek seed powder, treatment containing 16.5% raw KPM + 1% fenugreek seed powder) may be due to the addition of seed powder. Fenugreek, which increases the activity of digestive enzymes and low metabolic requirements, has a beneficial effect on the growth of common carp fingerlings. Similar results were observed by Zheng (2009).

Table 3 : Some studied growth criteria for common carp fed on diets containing KPM (mean ± standard error)

TRT	Intial Weight	Final Weight	Weight Gain	S G R	R G R
T1	26.43 ± 0.00 a	57.300 ± 0.010 cd	30.870 ± 0.010 cd	53.875 ± 0.005 cd	1.355 ± 0.015 bc
T2	26.43 ± 0.00 a	57.795 ± 1.065 cd	31.365 ± 1.065 cd	54.255 ± 0.845 cd	1.365 ± 0.025 b
T3	26.43 ± 0.00 a	56.085 ± 0.215 d	29.655 ± 0.215 d	52.875 ± 0.185 d	1.280 ± 0.010 cd
T4	26.43 ± 0.00 a	62.690 ± 0.580 a	36.260 ± 0.580 a	57.840 ± 0.390 a	1.420 ± 0.040 ab
T5	26.43 ± 0.00 a	61.365 ± 1.565 ab	34.935 ± 1.565 ab	56.900 ± 1.100 ab	1.470 ± 0.030 a
T6	26.43 ± 0.00 a	59.425 ± 0.825 bc	32.995 ± 0.825 bc	55.515 ± 0.615 bc	1.370 ± 0.010 b
T7	26.43 ± 0.00 a	63.475 ± 1.265 a	37.045 ± 1.265 a	58.345 ± 0.835 a	1.470 ± 0.030 a
T8	26.43 ± 0.00 a	55.255 ± 0.115 d	28.825 ± 0.115 d	52.175 ± 0.100 d	1.210 ± 0.020 d

Note: a, b, c, d, e, f significance at $P \leq 0.01$.

Conclusions

The study showed better results in the growth criteria as a result of using medicinal plants (cumin seeds and fenugreek seeds) which are natural materials, so it can be widely used as feed additives and nutritional supplements to enhance the efficiency of feed use and production performance and improve their health and reduce the level of stress of carp fingerlings It is common for *Cyprinus carpio* to be a safe immune plant, because it stimulates the mechanism of indeterminate cellular and humoral defenses in fish. The study also showed the possibility of using treated and untreated with mushroom as ideal alternatives and as a source of feed additives to prevent infectious diseases in aquaculture, which increases the ability of fish to resist pathogens and deal with stress.

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