

ORIGINAL RESEARCH ARTICLE

NUTRITIVE VALUE OF *ASPARAGUS RECEMOSUS* ROOT MEAL IN PELLETED FEED FOR *CYPRINUS CARPIO* FINGERLINGS

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ABSTRACT:

A 120 days feeding trial was conducted to evaluate the potential of *Asparagus racemosus* root meal as dietary protein source in the diet of *Cyprinus carpio* fingerlings. Six experimental diets were formulated to contain 20%,

30%, 40%, 50%, 60% and 70% *A. racemosus* leaf meal to partially replace other protein ingredients in the *C. carpio* diet. The diet containing 0% leaf meal served as the control. Each dietary treatment was tested in triplicate groups of 10 fingerlings. The results of the growth and feed utilization responses show that there were no significant differences among the fish fed diets 1 – 3 but were significantly different from fish fed on diet 4 which had lower growth and feed utilization values. The present findings show that *A. racemosus* root meal has good potential for use as one of the protein sources in *C. carpio* diet up to 30% level without compromising growth.

KEYWORDS: *Asparagus racemosus*; *Cyprinus carpio*; growth; feed utilization.

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INTRODUCTION:

Fish, like any other animal require nutrients to stay alive, healthy, active and grow. Nutrients are the building blocks of all tissues of the animals and they are involved in all the chemical reactions that make up "life". The types of nutrient required by fish are the same as those

required by other animals. Nutrients can be provided by various products of plant, microbial or animal origin or can be chemically synthesized. In nature, fish obtains nutrients from various types of food items, these being determined both by the feeding behaviour or preference of the animal and the availability.

From nutritional point of view, the nature or origin of the ingredients generally does not matter. Fundamentally, the animal is only looking at meeting its requirement for specific nutrients. To do so, it is equipped with a variety of digestive enzyme that allows it to harvest these nutrients from variety of sources, whether it is of plant or animal origin. No ingredients contain all the nutrients required by fish. The use of a combination of ingredients is therefore necessary to combine ingredients to obtain a mixture that fulfils all the requirements of the animal.

There is a developing interest in using medicinal herbs as a kind of dietary supplement in aquaculture and in showing the positive effects on growth and the immune response [1, 2]. Medicinal herbs can improve the quantity of micro-flora in the intestine by increasing some good microbes and inhibiting increased digestion capacity [3].

Many nutritionists tried to incorporate medicinal herbs in fish diet. They showed the positive results regarding growth performance and feed utilization of fish. Inclusion of medicinal plant material in fish diet showed better protein and lipid contents after long term feeding. Various medicinal plants like obosan [4], Chinese herb [5], *Quillaja* [6] and *Glycyrrhiza glabra* [7] were used in fish feed formulations.

In the present work we used *Asparagus racemosus* as a protein source in formulation of fish feed to assess its potential in fish growth.

MATERIALS AND METHODS:

The feeding experiment was conducted in triplicate for 120 days. Fingerlings of *Cyprinus carpio* were used for the experiment. Six types of pelleted feeds were formulated using different ingredients such as rice bran, groundnut oilcake, fishmeal, guar gum binder, Vitamin – Mineral mixture, fine leaf powder of *Asparagus racemosus* in different proportions (diet 1 - 6). A diet with all above ingredients except leaf powder is kept as control (Table 1). The diets were analyzed for their proximate nutrient composition.

Fishes were fed at the rate of 5% body weight in two equal rations daily. At fortnightly intervals a minimum of 50% of fishes were sampled to record the growth. At the end of experiment, the growth parameters like mean body weight, specific growth rate (SGR), feed conversion ratio (FCR) and protein efficiency ratio (PER) were estimated. Difference between means of treatments was tested to find out the level of significance by ANOVA.

Table 1: Formulation and proximate composition of fish diets containing increasing levels of *Asparagus racemosus* root meal

Diet							
	Control	20%	30%	40%	50%	60%	70%
Ingredients (%)							
Groundnut oilcake	43	35	29	24	19	13	08
Rice bran	36	27	23	18	13	09	04
Fishmeal	10	09	09	09	09	09	09
Guar gum Binder	10	08	08	08	08	08	08
Mineral – Vitamin mixture	01	01	01	01	01	01	01
<i>A. racemosus</i> root powder	00	20	30	40	50	60	70
Nutrient content (%)							
Moisture	7.05	8.48	7.21	7.30	7.17	6.36	6.19
Total Ash	12.13	6.82	7.61	7.48	7.13	7.93	8.20
Protein	26.24	23.67	26.62	27.98	26.14	23.85	22.47
Fat	3.81	3.08	3.86	4.72	5.38	6.19	6.49
Fibre	10.54	10.32	12.58	14.58	16.52	17.20	17.15

RESULTS AND DISCUSSION:

The growth performance and feed utilization in terms of body weight gain (WG), specific growth rate (SGR), feed conversion ratio (FCR) and protein efficiency ratio (PER) of *Cyprinus carpio* fed with different levels of asparagus diets are presented in table 2.

Fishes fed with 30% asparagus diet showed better growth. The 30% diet group showed highest final body weight (27.54 ± 0.74 gm), weight gain (25.24 ± 0.72 gm), SGR (1.13 ± 0.03) and PER (1.16 ± 0.03). The lowest growth and feed utilization was recorded from 70% diet group. The lowest final body weight (13.95 ± 0.40), weight gain (11.75 ± 0.33), SGR (0.85 ± 0.02) and PER (0.52 ± 0.01) was recorded in 70% asparagus diet. Most of the growth parameters showed their peak for 30% diet group except FCR (Fig. 5). The highest FCR value was observed for 20% diet group (2.42 ± 0.06), which is non significant with control. The lowest FCR value was associated with 30% diet group (1.66 ± 0.04).

Table 2: Growth performance and feed utilization in *Cyprinus carpio* fed diets containing *Asparagus racemosus* root meal

	Control	20%	30%	40%	50%	60%	70%
Initial body weight (gm)	2.15 ± 0.02	2.4 ± 0.05	2.3 ± 0.05	2.3 ± 0.06	2.1 ± 0.05	2.2 ± 0.05	2.2 ± 0.04
Final body weight (gm)	17.23 ± 0.49	19.25 ± 0.55 ^{NS}	27.54 ± 0.74 ^{***}	24.26 ± 0.70 ^{***}	21.42 ± 0.61 ^{**}	16.58 ± 0.47 ^{NS}	13.95 ± 0.40 [*]
Weight gain	15.08 ± 0.43	16.85 ± 0.48 ^{NS}	25.24 ± 0.72 ^{***}	21.96 ± 0.63 ^{***}	19.32 ± 0.55 ^{***}	14.38 ± 0.41 ^{NS}	11.75 ± 0.33 ^{**}
Specific growth rate (SGR) % day ⁻¹	0.95 ± 0.02	0.96 ± 0.02 ^{NS}	1.13 ± 0.03 ^{**}	1.08 ± 0.03 ^{NS}	1.06 ± 0.03 ^{NS}	0.93 ± 0.02 ^{NS}	0.85 ± 0.02 ^{NS}
Food conversion ratio (FCR)	2.38 ± 0.06	2.42 ± 0.06 ^{NS}	1.66 ± 0.04 ^{***}	2.02 ± 0.05 [*]	1.80 ± 0.05 ^{***}	2.25 ± 0.06 ^{NS}	2.14 ± 0.06 ^{NS}
Protein efficiency ratio (PER)	0.57 ± 0.01	0.85 ± 0.02 ^{***}	1.16 ± 0.03 ^{***}	0.95 ± 0.02 ^{***}	0.83 ± 0.02 ^{***}	0.60 ± 0.01 ^{NS}	0.52 ± 0.01 ^{NS}

(Value expressed is mean of n (n=3); ±: SE)

*P<0.05, **P< 0.01, ***P< 0.001, NS – Non Significant

There was a reverse connection between the development of fish and dietary incorporation level of plant protein in their diets. This pattern was seen in exhibit contemplate. The expanding fuse of asparagus in diets demonstrated expanding development in *Cyprinus carpio* up to 30% incorporation level and past that the fish development indicated dynamic abatement. The level of fishmeal supplanting with plant or creature proteins in the eating routine of fish hampers the development. For every species of fish, consideration of plant protein exists in the particular range.

Most of the fish species tolerate the replacement or inclusion level of plant protein below 50%. Above this limit the growth retardation started due to low acceptance of feed, digestion related problems and effect of anti-nutritional factors on growth.

In the present study, the plant sources used in feed formulation proved to be a supplementary ingredient up to a remarkable level solely or in combination for selected fish species, i.e. *Cyprinus carpio*. It is evident from this study that, asparagus meal could be incorporated up to 30% level in formulated diets for *Cyprinus carpio* without affecting fish growth and biochemical composition. Above the said limit the reduction in fish growth was observed.

The data of the present study agree with the finding of Pereira & Oliva – Teles [8], who reported that significant decreases were found for both, growth and feed utilization with the

highest replacement levels of dietary fish meal with plant proteins for gilthead sea bream. There are many evidences, which support the results of present study. Ramchandran & Ray [9] successfully incorporated grass pea as a fish feed ingredient up to 40% inclusion level. The increased incorporation of grass pea above 40% resulted in reduced growth of *Labeo rohita*. Some other researchers also support the negative growth of fish with higher inclusion of plant sources in fish diets [10, 11].

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